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February 2015



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Foreword

Olli Rehn
Vice-President
European Parliament

Europe's fragile recovery is gradually gaining more solid ground. The European Commission published its Winter Economic Forecast some weeks ago. However, we are heading towards the spring with some cautious optimism: the economic outlook is improving, but risks still remain. Looking back at recent years, there is a fair chance that 2015 will be the year to kick-start the European economy, as for the first time since 2007 all Member States are showing positive signs for growth.

On the flip side we know that there is no economic forecast that would have ever been waterproof. In order to turn the Commission forecasts into reality, many pieces of a puzzle have to fall in place.

First of all, what Europe and its Member States' economies need is determined and skilful political steer. As politicians we are often faced with difficult decisions. In addition to boosting investments, we also need to keep on pursuing often unpopular reforms and balancing public finances. Reforms are needed in the labour market, pension systems and health care, which requires strong leadership to communicate their importance to those voters easily swayed by populist arguments.

In order to enable strong and sustained economic growth, governments have to find a balance between following the deals made and using their legitimate power for policy choices. According to the OECD, the most compatible measures of consolidation with growth are: cut subsidies, reduce pension spending, increase property taxes. However, such economically preferable fiscal-structural reforms have been an uphill struggle, since across-the-board cuts are usually politically more palatable. In many countries, this has led to the crowding out of capital expenditure (= investment) by current expenditure (= social benefits, running costs), which has contributed to the squeeze of investment, and thus to the squeeze in economic growth and employment.

Moreover, we must ensure the adequacy and sustainability of social protection systems, while at the same time making them more supportive to growth. Since the crisis has already hit public finances, and since population aging is advancing, European societies are currently facing a true stress test in their pension and social systems. To illustrate the policy urgency, there is a wave of reforms going on: in 23 out of 28 member

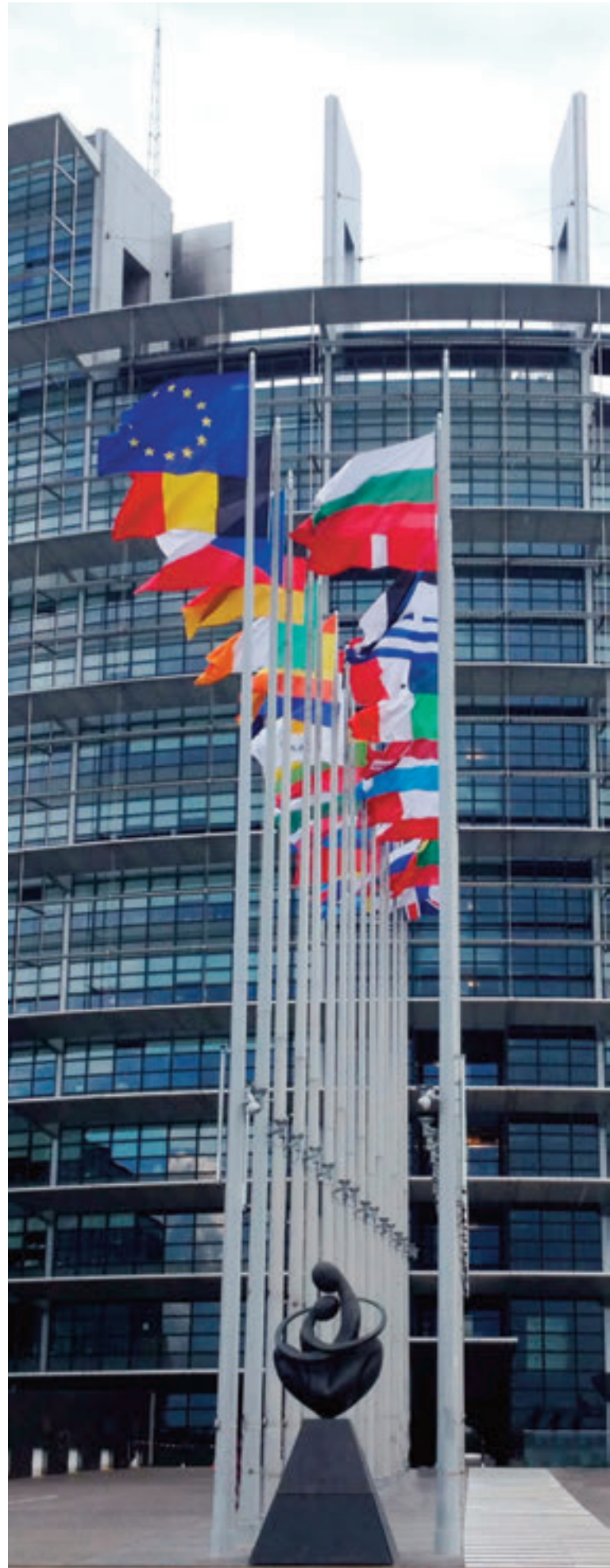
states of the EU, significant pension reforms that link the retirement age to life expectancy have been decided in the recent years.

Europe needs growth-enhancing structural reforms in order to become more attractive especially for private investments. Europe must be more competitive, flexible, future-oriented and innovative than today.

Despite the challenges we face today we should not lose our focus on the future. Even though the declining oil price is having a positive impact on growth in Europe, the energy-dependency of Europe from third countries and fossil fuels is making an increasing slice to the annual import bill. All this happens at the same time that money could be invested better in developing our own green economy. I firmly support Commission President Jean-Claude Juncker's plan to make Europe's Energy Union the world number one in renewable energies. Not only is there an enormous potential to promote growth and jobs in Europe via investments in the bio-economy and renewable energy sources, they are also the number one policy area to tackle the climate change.

Europe needs more growth and jobs and this requires more investment, not least in knowledge and innovation. Even during the economically tough times we should not deviate from investing and maintaining our inputs for education. Education is the key tool to enable innovation. Otherwise we would not only be damaging our future competitiveness, but also our environment, if we were not able to use all our know-how and do our utmost to develop better and greener technologies. ■

Olli Rehn
Vice-President
European Parliament





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Introduction

Happy New Year to our Adjacent Government readers – I know it might be a bit late to say that now, but we kick off the New Year with a brilliant edition of the publication. As Jean-Claude Juncker and his Commission start to settle into their role, and David Cameron and Ed Miliband prepare to go head to head in the general election in May, Europe is in for an eventful few months ahead.

In this edition we give thought and highlight a number of key issues that are at the forefront of policy. The publication starts with an introductory Foreword from Vice-President of the European Parliament Olli Rehn, formerly European Commissioner for Economic and Monetary Affairs.

The built environment section of this edition kicks off with an article from European Commissioner for Regional Policy, Corina Cretu discussing her main priorities for the coming year, including, why she feels investments and the Cohesion Policy reforms are key. In that section we also highlight the Building for Life program and how it represents good urban design.

Horizon 2020 is the European Commission's flagship funding programme, and we give special focus to this, highlighting the opportunities it will bring for Norway. With an article from the Research Council of Norway, and another from Adjacent Government, we explore how the Norwegian Ministry of Research and Development are ensuring their commitment to R&D over the coming year.

Consideration is also given to the importance of air quality management throughout Europe, and the European Environment Agency (EEA) explains this further. In an article by Dr Valentin Foltescu at the EEA, thought is given to the impact of air pollution on human health and ecosystems. Christian Friis Bach at the United Nations Economic Commission also highlights this issue and the prominence of renewing efforts against air pollution.

In the education section we look at how the Department of Education hope to reform the education system in the UK, and how Secretary of State, Nicky Morgan hopes to increase opportunities for young people. We also spoke to Dr Victoria Showunmi from the UCL Institute of Education about what makes an effective leader, particularly in an education setting.

Consideration is also given to areas such as muscularskeletal disorders; skin cancer research; sustainable agriculture; road safety management systems; and, domiciliary care.

As always I hope you find this edition though provoking and useful, and welcome any feedback or article suggestions you may have. ■

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Promoting research in Norway

Adjacent Government highlights how the Norwegian Ministry of Education and Research are ensuring their commitment to research and development over the coming year...

The EU's significant investment in research comes in the form of the Horizon 2020 programme. This programme is the biggest of its kind with nearly €80bn of funding available over 7 years.

In May 2014, Iceland and Norway became the first non-EU countries to associate to the 7 year programme. Norway has been associated to EU research and innovation programmes since 1987, and by associating with the programme, Norway aims to take advantage of the great opportunities it could bring for the country's research and development (R&D).

The Ministry of Education and Research is responsible for research priorities throughout Norway. The Minister Torbjørn Røe Isaksen has set out clear goals in regards to education and research in the country. Over the next 7 years the government has identified 7 measures to help achieve higher quality in research and education across the nation.

The measures detail how "Norway should develop more world leading research. In dialogue with the higher education sector, the government will find and invest in relevant research environments and institutions that can contribute to breakthrough research in the world."

The Horizon 2020 programme offers a number of great opportunities for Norway including:

- Strengthening industrial competitiveness;
- Building up excellence;
- Accessing a wide range of European Infrastructures;
- International Networking;
- Training of staff;
- New level of Benchmarking;

- Expanding to new markets and business;
- Strong focus on support for SMEs.

In an edition of Projects Magazine EU, the Minister explained how there has been "strong growth in both the research and education budgets through the Horizon 2020 programme, compared to the previous FP7 funding period.

"Given that the Norwegian government is spending billions on our participation in Horizon 2020, we believe that this implies an obligation for the research community of Norway," said the Minister.

The government is keen to increase international research cooperation, which it feels is important to help the nation achieve its other research goals.

In 2014, the government presented a strategy for cooperation with the EU on research and innovation which establishes a target to increase Norwegian participation in the EU Framework Programme on Research and Innovation, Horizon 2020 (2014-2020), by about 60%, compared to participation under the previous framework programme.

"An important part of the research will be to solve economic and social challenges Europe is facing, such as climate, environment and population issues," said Isaksen. "This is a massive investment that gives Norwegian minds opportunities to collaborate with some of the best researchers in the world." ■

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New treatment to prevent long-term complications after deep vein thrombosis

Deep vein thrombosis is a condition caused by the formation of blood clots deep inside a leg. It is an immediate, dangerous and sometimes fatal condition. Despite the current recommended treatment that involves halting the growth of the clot with anticoagulants, a large number of patients develop long-term complications, commonly known as post-thrombotic syndrome. We have recently investigated the use of clot-dissolving agents administered through a catheter to rapidly dissolve the clot and restore blood flow, a treatment that significantly reduce the risk of post-thrombotic syndrome.

Acute deep vein thrombosis of the lower limbs occurs in about 1 in 10,000 young people per year, and 1 in 100 advanced age people per year (average 1 in 1,000 per year in the general population). It is associated with high levels of morbidity, being immediately dangerous and sometimes fatal, and causing long-term problems in the legs of a large proportion of the patients. Deep vein thrombosis occurs in the deep veins of the legs that drain blood from the tissues including the musculature back to the heart. Some clots are very large and may stretch from the ankle all the way up to the heart. Smaller or larger fragments of these clots break off and follow the blood stream to the lungs, eventually obstructing the blood flow. Larger clots are immediately life-threatening as they fully block the blood flow through the lungs, a condition known as fatal pulmonary embolism.



Responsible radiologist, professor Nils-Einar Kløw (left), former PhD student of CaVenT, now senior consultant Tone Enden (middle), and project leader, professor Per Morten Sandet. Ylva Haig and Ole Grøtta, both PhD students, not present

Current guidelines recommend use of anticoagulants, such as unfractionated or low molecular weight heparin followed by oral vitamin K antagonists. Recently, novel direct-acting oral anticoagulants have been developed, that have certain advantages, including no need for monitoring. All anticoagulants stop growth of the clot, but do not remove it. Dissolution then relies upon the endogenous fibrinolytic system, but this system is highly variable from one individual to another and cannot provide sufficient dissolution in most patients. Thus, substantial residual clots that obstruct the blood flow, or other damages to the veins, occur in a large proportion of the patients. Around 20-40% of all patients with deep vein thrombosis will develop post-thrombotic syndrome, which is characterised by swelling of the leg, various degrees of pain and sometimes venous ulcers. This often leaves the patients (including the younger ones) immobile, unable to exercise and with reduced quality of life.

Clot-dissolving therapy for the treatment of deep vein thrombosis and pulmonary embolism was introduced in the 1970s. Randomised clinical studies showed that intravenous streptokinase or urokinase, drugs that activate the body's own fibrinolytic system, removed clots and reduced the risk of post-thrombotic syndrome. However, it rapidly became clear that this treatment was associated with a very high risk of bleeding complications. Thus, by the late 1980s, intravenous fibrinolytic treatment with streptokinase or urokinase had been banned by most institutions.

More recently, interventional radiology was introduced for the treatment acute coronary heart disease including acute myocardial infarction, a condition caused in most cases by clot formation. Introduction of a catheter allows topical delivery of a drug at much lower doses than is needed when given as a systemic infusion. This procedure was then developed for the treatment of acute

severe deep vein thrombosis. A catheter is usually introduced into the popliteal vein at the back of the knee joint, using ultrasound to identify the vein, and the catheter is pushed up into the vein between the vessel wall and the clot all the way to the top of the thrombus. The procedure is called catheter directed thrombolysis (CDT). The catheter has multiple side-holes, which may be fitted for the length of the thrombus, and allows local delivery of a thrombolytic agent at much lower doses than necessary with systemic treatment. The time to dissolve the clot may also be reduced and the risk of bleeding complications is reduced. We currently use alteplase (Actilyse), which is identical to the body's own activator of fibrinolysis and is produced by gene technology.

There is good evidence that rapid dissolution of the clot may reduce the occurrence of post-thrombotic syndrome. We and others have shown that opening the vessel is critical to avoid this complication. Known as the "open vein hypothesis", the idea is that if the vessel is opened up and better blood flow is encouraged, blood will pass through the vein and back to the heart without causing problems in the legs.

The CDT technique was rapidly adopted by many centres, particularly in Norway and Denmark and in the US, and a number of case series reports and registry data suggested its efficacy and safety. However, no randomised clinical trials had proven its effectiveness at reducing long-term post-thrombotic syndrome and whether it can actually reduce the risk of bleeding. We therefore decided to perform a randomised clinical trial named the CaVenT study, comparing patients given the conventional treatment of anticoagulants with

those treated with CDT. We followed these patients for two years and the main paper was published in The Lancet in 2012. We now have 5 years of follow-up data that will be presented later this year.

The main result of the study was that only 41.1% of patients treated with CDT developed post-thrombotic syndrome as compared to 55.6 per cent among those who received conventional treatment. It was also shown that if veins were open after six months, most patients had no signs of post-thrombotic syndrome, in contrast to those with occluded veins. This supports the "open vein hypothesis", suggesting that it is important to improve flow through the vein.

The CaVenT study has provided the first evidence of the importance of CDT for patients with severe DVT. However, being rather small, more data on the effectiveness and safety of CDT is needed. There are currently two on-going studies, one in the US (the ATTRACT study), and one in the Netherlands (the Dutch CAVA study). These studies have similar protocols to our CaVenT study, but also utilizes additional procedures such as mechanical clot removal through the catheter. The US study recently completed recruitment of patients, but additional two year follow-up is needed. By combining the results of these studies, we will have a stronger basis for clinical recommendations. This is important since the procedure requires early hospital stay and surveillance. However, in the CaVenT study we were able to show that CDT in fact was a cost-effective treatment.

In Norway and Denmark most patients with severe deep vein thrombosis that affects the upper thigh and/or pelvic veins are now considered for CDT. The

procedure is also taken up in many other countries. At this time, careful follow-up of the patients in registries will provide further evidence for the utility of CDT in the "real-life" setting. A Norwegian registry was recently funded by the Research Council of Norway.

The CaVenT study has helped to raise global interest in CDT, and once the results of US and Dutch studies are published, there will be enough evidence to make a judgement on whether or not it is a useful and effective treatment. If the studies are successful, they could well signal the beginning of a paradigm shift in the treatment of severe deep vein thrombosis, and help to reduce the number of people who go on to suffer from post-thrombotic syndrome.



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Hydropower vs ecology

Society's conflicting demands for more renewable hydropower and improving the ecological status of European lakes and rivers: Is it possible to meet both requirements?

The water management authorities face a contradicting dilemma in EU directives regulating the management of water resources in Norway and Europe. The European Water Framework Directive (EU WFD) and the Nature Diversity Act seek to preserve and improve the ecological status of lakes and rivers, whereas the European Renewable Directive and the el-certificate market promote increased production of renewable energy to reduce greenhouse gas emissions.

Norway has the potential to export renewable and flexible hydropower energy, and to serve as a "green battery" for Europe, but the above-mentioned market drivers and environmental considerations call for knowledge based and applied solutions that optimise the trade-off between renewable energy production and the preservation of local environmental conditions, and multiple user interests in existing and planned hydropower projects.

The RIVERCONN research project

The research project "Hydropower and Connectivity in Inland Rivers" – RIVERCONN, funded by the Norwegian Research Council, aims to provide new knowledge of the ecological requirements of migratory fish species in inland rivers in Norway. The key species are the salmonids European grayling (*Thymallus thymallus*) and brown trout (*Salmo trutta*). The E.

grayling are declining in numbers across Europe and are even redlisted by some countries. Many grayling populations in Norway are still viable, but several new hydropower projects give rise to a growing concern amongst fishermen as well as environmental management authorities. Hydropower dams have already fragmented many river systems in Norway, and they represent barriers or hindrances for migratory fish species. In the Glomma river, which is the largest river in Norway, 12 hydropower dams are established in the main river. These obstacles and river development raises an important question for both the hydropower companies and the water management authorities: What is the ecological significance of preserving migratory life histories? Is the preservation of a variety of naturally evolved life histories relevant to the EU WFD?

Why stress fish migrations and life histories?

Fish migrations are adaptations that allow fish to utilise several habitats to optimise survival, growth and reproduction, i.e. obtain greater net benefits and thus lifetime reproductive output. Hence, human actions that reduce or prevent fish migrations, reduce habitat quality and water flows are expected to cause reduced individual and population fitness. As a consequence, this may lead to declining populations and poor resilience capacity. Mitigation measures have primarily

focused on the stocking of hatchery reared fish to sustain and support sport fishery in regulated inland rivers in Norway, and partly on safeguarding upstream migration past hydropower dams. However, the obvious requirements for wild fish to perform return migrations past hydropower installations have by far been neglected. The EU WFD focuses on improving the ecological status of lakes and rivers, and one of its main goals is to restore the ecological connectivity of fragmented river systems. The Norwegian water management authorities have clearly stated that stocking hatchery-reared fish does not improve the ecological status of degraded water localities. Hence, it is urgent to develop new measures that safeguard natural recruitment and production of wild fish populations.

Traditional mitigation measures in fragmented rivers, such as the stocking and construction of fishways, need to be evaluated in light of new knowledge and legislative recommendations regarding their ecological effects. Fishways in European rivers have rarely been evaluated for functionality, and dysfunctional passage routes may cause high mortality and traceable evolutionary responses in wild fish populations. The scientific literature also reports an increasing body of studies showing that compensatory fish stocking programs may have limited positive or even detrimental effects on wild fish populations.

Suspension of compensatory stocking of brown trout in large river in Norway

In 1991, the environment authorities ordered the hydropower companies in the Glomma to release more than 50,000 two-year old hatchery-produced brown trout annually. The main goal of the stocking program was to maintain the important sport fishery in the river. However, relatively few resources were allocated to evaluate the effects of the program, which is also due to common practice. Fish stocking is a relatively inexpensive and simple measure to mitigate the negative consequences of hydropower development. However, the authorities and fishermen experienced a lack of success. The artificial produced brown trout had higher mortality and grew slower than wild fish. Few cases of large and attractive stocked fish in the catches of anglers were reported. In 2010, NINA implemented boat electrofishing as a new survey method in large rivers like Glomma, and the results showed that few stocked trout survived their first winter in the wild (NINA Report 1056). A big proportion were eaten by the piscivorous northern pike, and 80% of pike diet constituted more than 80% hatchery-reared trout in some reservoirs during the weeks after release. At the same time, boat electrofishing surveys gained new knowledge about the wild populations of grayling and trout, and NINA concluded that their population status should be improved despite the hydropower production. In addition, one could not exclude that the fish stocking could have a negative effect, e.g. because of undetectable outcome from competition for food and shelter, on the wild fish populations. In 2014, the water management authorities decided to revoke the stocking program.

The decision was made without major protests from municipalities or fishermen. For many anglers, both locals and visitors, wild fish are increasingly more sought after compared to stocked trout.

Is it possible to improve the ecological status in regulated rivers?

Society has decided to produce renewable hydropower in Glomma, and undamming the river is not yet considered a relevant question in Norway. The concept of environmental design seeks to optimise the trade-off between continued hydropower production and environmental considerations and preservation, e.g. how to safeguard migrations or habitat requirements of fish without losing too much hydropower. This is a research-demanding challenge, but NINA and partners in the "Centre of Environmental Design of Renewable Energy" (www.cedren.no) have developed this concept in regulated salmon rivers in Norway. Our advice to the water management authorities in Glomma is to start the process to develop this concept also for fish species like the European grayling and brown trout. To succeed with the concept of environmental design, we first have to reveal the ecological bottlenecks necessary to improve the ecological status of grayling and trout, and thereafter work out the most effective mitigation measures. Some emphasis should be placed upon threshold values for spillwater release necessary to maintain ecological connectivity. The results from the RIVERCONN-project imply that it will be mandatory to pay much effort into improving facilities for safeguarding two-way fish migrations past many hydropower dams in the future.

In conclusion: It is beyond doubt that hydropower developments generally have a negative impact on river ecosystems, but there is a great potential to reduce negative effects using environmental design to reveal ecological bottlenecks and work out goal-oriented mitigation measures. This will demand a more proactive approach applying dose-response trials designed by fish ecologists, hydropower companies and water management authorities in Norway. Supplementary stocking of hatchery-produced fish in the Glomma river is a past regime, and we should probably realise that preserving wild fish and ecological functionality after hydropower development in complex river systems like Glomma are far more demanding and expensive than continuing the supplementary stocking program. But on the other hand it will be more effective and the ecological status will be improved according to EU WFD.



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High aspirations for Norway in Horizon 2020

Arvid Hallén, Director General of The Research Council of Norway sheds light on how the country will benefit from the Horizon 2020 programme and the opportunities it will present...

Horizon 2020 is an extensive knowledge bank under construction, and it would be unthinkable for Norway as a nation not to participate in this wide-ranging initiative.

It is widely accepted in Norway that taking part in EU-funded research projects gives research communities the opportunity to join important European networks and cooperate with top-notch researchers abroad. Norwegian research policy is based on this premise, and in general the priorities of Horizon 2020 are in line with Norwegian priorities. The Norwegian government has formulated an ambitious strategy to increase the country's participation in Horizon 2020.

Horizon 2020 offers major benefits to Norwegian research and trade and industry

Norway, too, must find ways to resolve societal challenges ranging from an ageing population to renewable energy, and the country cannot do this on its own. Horizon 2020 will play a valuable role in the

development of Norwegian research, trade and industry. Increased participation in Horizon 2020 will promote greater internationalisation of Norwegian research, thereby raising the level of quality overall. Further societal impacts are expected in the form of greater innovation, new products and markets for industry and a stronger ability to meet future challenges.

Norway: an attractive partner

Norwegian researchers have achieved good success in the previous framework programmes in fields such as climate, energy, marine and polar research. A number of Norwegian research institutions are world leaders in these fields. As such, they are attractive as partners for their European counterparts and can make an important contribution to dealing with societal challenges at the European level.

Norway possesses unique longitudinal data series, with information about health, education and other socio-economic factors for large segments of the

population over long time periods. The potential of these data series for comparative studies in the health and social sciences should be better exploited by national, as well as international research groups.

Great expectations for Norwegian participation in health-related projects under Horizon 2020

The goal for participation under the Horizon 2020 challenge “Health, demographic change and wellbeing” is to double the number of successful projects compared with the FP7 Health programme, and bring Norway’s level up to that of its neighbouring countries, Sweden, Denmark and Finland. The Research Council of Norway is funding 9 national Centres of Excellence (SFF) and 4 national Centres for Research-based Innovation (SFI) within the field of health to build and strengthen research groups of top international standard. Norway also participates in the EU’s Joint Programming Initiatives (JPIs) on health and is involved in health-related infrastructures at the European level.

Norway’s national biobank is a vital infrastructure for the health sciences. The biobank provides a basis for outstanding research and innovation, enhances Norway’s ability to participate in international research projects and makes Norwegian research institutions attractive partners for comparative studies. There is also major potential for the further development of health clusters.

Specially-targeted Norwegian support schemes

The Research Council has initiated several funding schemes to support Norwegian participation in Horizon 2020. This includes funding to cover expenses in connection with the preparation of grant applications and support for institutions taking part in policy discussions at the European level.

Norway has a comparatively large number of independent research institutes outside the university and university college sector. These institutes must be competitive and able to respond to the need for research-based knowledge in both industry and the public sector. The Research Council has introduced a targeted support scheme to encourage these institutes to take part in EU-funded projects.



Arvid Hallén, Director General, Research Council of Norway

The Research Council seeks to align national research programmes and funding schemes with the priorities of various European networks, while facilitating access to the European research front for Norwegian researchers.

We are currently expanding our staff dedicated to mobilising and guiding applicants to more successful participation in Horizon 2020. The Council advises Norwegian researchers to apply for funding under Horizon 2020 before applying for national funding, when possible. Given political willingness and focus, targeted funding instruments and the growing interest in and understanding of researchers of the significance of the EU research arena, we have great expectations and high aspirations for Norwegian participation in the world’s largest research programme. ■

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Are we changing a four-legged miracle?

Brown bears are some of the most iconic wildlife species in the world. Many a child has grown up with a teddy bear as their favorite good night companion; bears are cute and cuddly. However, once adult, the same child is afraid of taking a walk in a forest where real bears occur; bears are now big and scary, and remind us that to them we may be nothing else but another flavor of meat. Little does the former child know that good ol' Winnie the Pooh has taken an evolutionary pathway that may hold the keys to some major medical challenges affecting humans. And little does the now-adult understand (or care?) that we may be changing these evolutionary pathways forever.

Think about an astronaut in space. After some months he returns to Earth, but he is barely able to walk by himself because his muscle mass has decreased due to the lack of exercise in the weightlessness of space. Consider that although we are able to travel to space, our well-fed western world has also developed obesity as a disease, and doctors warn us about the consequences of yo-yo dieting. Or think about yourself being affected by a major illness (or age) and having to spend weeks or months in bed without being able to get up. Besides rapid muscle loss, you will struggle with pressure sores, and you may be affected by brittleness of the bones, blood clots and all sorts of other



The author measuring the body fat content of a large adult male bear in Sweden

Image: Andreas Zedrosser/SBRP

disagreeable physiological conditions. Plus, you will have to pee into a bottle or a diaper.

A miracle on four legs has found solutions for all of these physiological and health issues through evolution. No other mammal species in the world is able to sleep for 6 months without having to pee or poop,

without major muscle loss, blood clots, osteoporosis, and without a single drop of water or bite to eat. No other mammal is able to add and lose up to 40% of body fat in a year without developing coronary heart disease, high blood pressure, diabetes and running into the risk of strokes and cancer. This miracle species is the same brown bear that we loved so

dearly as a child and that we now are afraid of as adults.

Researchers of the Scandinavian Brown Bear Research Project (SBBRP) and Telemark University College have studied the brown bear on the Scandinavian Peninsula since 1984. One can say, without much exaggeration, that this is one of the largest, longest, and scientifically most productive large mammal projects in the world. The brown bear was once almost extinct in Scandinavia, but with careful management, the bear population has increased from its all-time low at the beginning of the 20th century, to quite a large population, and is now a major game species sought after by hunters. At the same time, bears depredate on sheep or other livestock, and they may sometimes even injure humans. Therefore, the basis of this long-term research has always been to provide the management agencies in Norway and Sweden with data on population development and monitoring of population size. We have been able to build an individual-based long-term database unique for large carnivores. This allows us to answer conservation and management questions, but also gives us the opportunity to study life history, genetic, physiological, and evolutionary processes. The unique physiology of bears, especially during hibernation, has intrigued researchers of the SBBRP for a long time. Therefore we have started a cooperation with physiologists and human medical doctors to better understand the physiological processes going on inside this miracle species in the wild. The first results have already given us a glimpse into a fascinating evolutionary product, which may help us to find solutions for some of our own woes.

But how are we “changing” the bear species, and more importantly, why should we care? Evolution is usually considered as a long-term concept, and surely we cannot affect the evolution of a long-lived large species as the brown bear? Well, don't be so sure about that. In fact, evolution is happening fast, changes happen from one generation to the next generation. Simplified, evolution consists of two processes: natural selection, which determines which individuals survive longer and why; the other process is sexual selection, which explains which individuals have a higher reproductive success and why. Our research results show that sexual selection in bears still works as designed by evolution: larger and genetically more “fit” individuals enjoy a higher lifetime reproductive success than smaller less fit individuals. The crux in the evolutionary equation is natural selection: the natural life span of a brown bear is about 30 years, however the average life span of a bear in Sweden today, a heavily hunted population, is not even 5 years. The other problem is that the majority of the mortality, between 80 and 90%, is human-caused. This is also true for strictly protected populations outside of Scandinavia, such as in the Italian Apennine mountains. The problem with that is that the natural factors positively affecting survival (again, body size and genetics are very important) have been basically taken out of the equation. Larger and fitter individuals do not live longer anymore. In Scandinavia, a hunter can shoot any bear, independent of size and age. The same is also true for legally and illegally killed bears in many other European populations.

Wherever you look on our planet, humans have become a major evolu-

tionary force affecting all mammalian species and their life histories. Are we maybe even “creating” species that are genetically adapted to living close to humans? Maybe this is not such a disadvantage after all. Think again – first of all there is the ethical side. We have a moral obligation to understand if, and especially how, we affect the other species living with and around us. Then there is the uncomfortable truth of climatic change. Not just us humans, but all living things on this planet have to adapt or perish. Some of these species may carry key-components inside their genetic code that may help us find solutions for our own problems. We should strive to understand these species and conserve them as they are, for the sake of future generations.



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A fully fledged growth policy

Corina Crețu, European Commissioner for Regional Policy gives an overview of her key priorities for the coming year...

The European Union is currently facing a major growth and jobs challenge, as a result of the most severe economic crisis in decades.

Millions of European citizens have put their hopes in the capacity of our policies to restore economic momentum and foster employment.

But Europe is also at a crossroads where mere crisis management is not sufficient and there is a real need for strategic, forward-looking investments in key areas, such as research and development, information and communication technologies, competitiveness of small and medium-sized enterprises and the shift to a low-carbon economy.

In this context, Cohesion Policy has undergone a far-reaching reform for the 2014-2020 period. It has

been made more effective, through the introduction of ex-ante conditions and a clear focus on results and performance.

It has also been positioned over previous years as a key investment policy to support the delivery of the Union's strategy for jobs and for smart, sustainable and inclusive growth: the Europe 2020 strategy that was adopted in 2010 to help Europe come out of the crisis by boosting competitiveness, productivity, growth potential, social cohesion and economic convergence.

The €450bn that we are going to invest in the European regions in the next 7 years will also help in reaching the objectives of the €315bn EU Investment Plan, announced by President Juncker at the end of last year, in terms of job creation and sustainable growth.

As sound investments go hand in hand with solid economic governance, my second priority for this term is enhancing institutional capacity and encouraging the structural reforms that are necessary to consolidate the foundations of future growth. It is my conviction that these aspects are at the root of any successful development effort. In this sense, my departments are currently working with Member States' administrations and managing authorities, in order to ensure they fully exploit the potential for collaboration and synergies across different ministries, which is essential for policy effectiveness and reduction of wasteful efforts.

“The €450bn that we are going to invest in the European regions in the next 7 years will also help in reaching the objectives of the €315bn EU Investment Plan, announced by President Juncker at the end of last year, in terms of job creation and sustainable growth.”

In addition, we are encouraging all relevant stakeholders involved in the implementation of our funds to build strong partnerships, where they could exchange good practice and learn from each other. The European Commission has earmarked a share of available technical assistance funding to support these and similar activities.

My third priority for this period is policy simplification. Our funds are generally welcomed, but a number of our partners report that existing procedures might be streamlined and simplified. In my opinion, the new policy and regulatory framework for 2014-2020 provides us with a unique opportunity to engage all public and private stakeholders in a dialogue aimed at making their life simpler and letting them focus on what they know best: designing and implementing valuable projects for the benefit of their communities.

My fourth and last priority: ensuring that the funds made available by the European taxpayer are managed according to the most exigent standards. This entails regular auditing in accordance with sound risk assess-



Corina Crețu, Commissioner for Regional Policy

ment, but also setting out mechanisms to prevent any possibility of fraud. I will repeat it as many times as it takes – I have zero tolerance for fraud.

At present, the European Commission is finalising negotiation and adoption of the programmes of the new period 2014-2020. All of them should be fully in place in the next 3 or 4 months. Consequently, the time is now for implementation. It is time for managing authorities to start working on identifying and selecting high-quality projects, in order to let the funds flow to the ground as soon as possible.

We should not forget that this Policy will be judged on its ability to deliver growth and to create jobs, in particular in the many regions where it constitutes the primary, if not the only source of public investment. ■

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Corina Crețu

Commissioner for Regional Policy

European Commission

http://ec.europa.eu/commission/2014-2019/cretu_en

Reborn, Rethink, Return to Minamisoma, Japan

It is early 2011, a quiet year for the Japanese until a 9.0 magnitude earthquake hits the northeast of the country at 70km from the coast, and 30km's deep under water. Suddenly, the country was in shock. Not only because of the effects of the earthquake, but also because the sophisticated risk procedures and manuals 'how to act in case of a disaster' proved to be of limited use. Immediately after the earthquake the process of planning and rebuilding started. This is a lengthy and slow process. Many citizens feel the government is planning *for* and not *with* them. Therefore the project presented here is a design process for the prefecture of Minamisoma, which involves key stakeholders of diverse

categories in the design process, aiming to increase the resilience of the community.

In between radiation and water

Minamisoma is located approximately 25km's from the nuclear power plant of Fukushima. The area, consisting of the town and surrounding agricultural fields was hit in duplo: the earthquake caused a tsunami that flooded the coastal landscape and it also hit the nuclear plant, causing a radioactive plume that reached the Minamisoma area. The lines on the map (figure 1) are a tsunami line (pink), and the 20km circle (yellow) showing the distance from the Fukushima nuclear plant. A radiation plume determines

the activities that can be undertaken in areas with different radioactive levels. The government has decided no building activities are allowed between the tsunami line and the coastline. The two disasters at once had other impacts: 70% of the farmers don't work anymore, and many young families have left the area. The risk of population and general decline lurks, especially when growth is concentrated in the valley where the Shinkansen rides.

Rebuild?

The question after every disaster is whether the lost buildings and infrastructure will be rebuilt. In many cases the population desires their properties to be rebuilt in the same

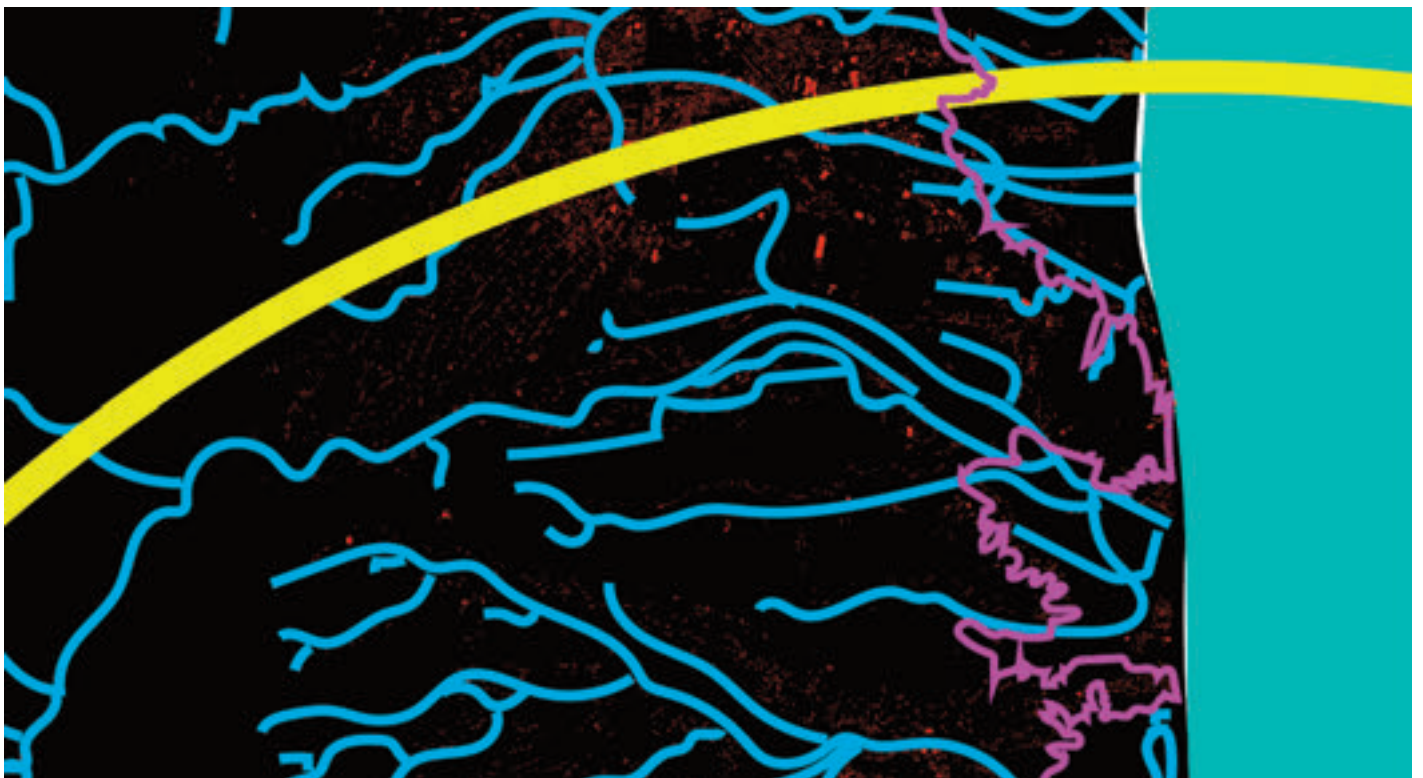


Figure 1. The duplo disaster of nuclear (yellow) and tsunami (pink) impact



Figure 2. Design work during design charrette in Minamisoma

locations and in similar ways. However, this is not the best strategy as the new houses are, from the moment they are realised, as vulnerable as they were before. The new building must be located where a future disaster cannot harm them or be prepared for the impact of possible future disasters. In some cases, when disasters are unpredictable, this is difficult.

A connective planning process

The design process in Minamisoma is concentrated in a design charrette of five days. During this period the participants, design team, local leaders and a group of high school children became connected to the problem, the solutions, and each other. The main reason for this is the approach is driven by core capabilities of the participants to view, feel, notice, listen, see and interact with each other. The

design charrette is a method to collaboratively design one or more solutions for a complex problem in an intense pressure cooker and in a time constraint process (figure 2). This method is amended and tailored to the local circumstances. For Minamisoma, the five days were intensively used to explore and visit the site and receive information and presentations about the background of problems. The design team, consisting of approximately 10 people, worked on design propositions in a central location in town. The stakeholders, local leaders and the high school children were involved in the design process at two moments. The first interactive session was held in the first half of the week and harvested the basic values and beliefs, desires and fears for the future. During the second interactive evening, at the end of the design charrette, the

stakeholders and design team collaboratively built their future image and dream, using plasticine, a material of bright coloured flexible clay. Participants in the charrette were asked to shape the future of their own environment and this is a very tactile method, which allows people to leave behind their concerns and hindrances. In the conversation that takes place during the building process, people collaborate, raise understanding and accept other insight more easily. At the end of the charrette the plans are presented. After this charrette many people took the floor to express their gratitude, happiness and support of being part of such an interactive and special occasion.

Horses, Food, Energy and Coastal protection

In developing a plan during the



Figure 3. Long-term Masterplan for an adaptive Minamisoma prefecture

charrette it became clear that solutions of a technical nature would not suffice. The mechanical approach of building strong seawalls is just causing debate between proponents and opponents, but doesn't deliver what is needed to help the local population most. The people in this area lost their pride. That is the reason why so many left. The main design task is therefore how to give the people their pride back. How can they become proud again on their own land, their heritage, their families and their lives. For sure, this isn't going to happen with a stronger seawall and other technocratic solutions to deal with the impacts of the disasters that happened. This has to come from somewhere else. People must be reborn. Therefore we started this plan from a philosophical basis.

The thinking of Ninomiyasongtoku takes nature as its core. Live with nature and build with (the principles of) nature. Learn from nature and give back to nature. Create self-sustaining places where cycles are closed. The understanding of the landscape and appreciation of its heritage allows us to create embedded landscapes. In Minamisoma two genetic characteristics shape the basis for the future: the horse festival and the ideal landscape. The horse festival is very old and connects heritage symbols in the landscape through a heritage route (red lines figure 3). 400 horses come together in Minamisoma during this three-day festival. In the early days 200 horses were born, raised and kept in Minamisoma prefecture, but nowadays this number is only 20. In the plan, the festival route is used

to create a year round calendar of events to give rebirth to the impact and meaning of the horse festival.

The ideal landscape used to appear everywhere, but due to the radioactive plume, most of this landscape is no longer productive. The spatial principle is the sequence of landscape elements from the basis of the valley. First the stream itself, then the rice paddy, followed by vegetable gardens and houses at the edge of the mountain/hill, and finally the forest on top of the hill. After the disaster this ideal landscape must also be reborn.

The spatial plan takes these values as a starting point and uses them to design a future. When every design decision is linked to these principles, a coherent landscape will emerge.

Rethink

The plan for the region rethinks every part of the landscape. The time frame for realisation is set at 40 years.

The horse-keeping of 200 horses is proposed to be located in the area again. These horses are kept, groomed, they eat, train and can be seen in the vicinity of Minamisoma, where they historically used to be, along a new waterway with drinking places. This area is connected to the festival route.

Food

The beauty of the old ideal landscape is jeopardised, the productivity is nearly zero and there is no-one working and living in this landscape. The production of food is in four phases restored, linked to the cleaning of the waterways. The first three phases can grow rice and vegetables again in subsequent steps of 2-3 years, while the last phase will be used from the beginning despite the longer contamination. This land, adjacent to Ota-river (yellow in figure 3) can be used as a canola plantation, taking up the radiated water and transforming it into rapeseed oil. Moreover, the bright yellow flowers provide a beautiful landscape in the valley, surrounded by the dark green hills.

Algae fields

The tsunami line shows the flood impact where no building is allowed. The government proposes a protective wall at the coastline, but a similar tsunami would still wipe it out. Therefore, we propose an alternative protective system, minimising wave energy. Instead of a closed wall, a reef could decrease the power of the water. The planned sea wall can act as a reef by making little gaps and let the water in, where it comes to rest.

This water fills algae fields, where algae transform and clean the water into biofuel, meanwhile capturing carbon (twice their own weight). Moreover, algae operate as a bioproduction plant, as they transform water (and air) into the biofuel, which can be used in CHP's to generate a combination of heat and power. The heat can be used in greenhouses to grow extra food and surpluses can be used in nearby residential areas. The power can directly be used in residential housing. The waste from the algae can be used to feed the horses. The basins themselves add an extra layer in defending the land from a flood. The location of the basins leaves space for the existing monument for tsunami victims. The shrine forms an island in front of the basins and can be reached by a bridge, which makes the monument even more dramatic and scenic.

“The beauty of the old ideal landscape is jeopardised, the productivity is nearly zero and there is no-one working and living in this landscape.”

Energy

The energy generated in the algae fields is not sufficient to provide energy for all people. There is additional electricity needed, which can be harvested through extra solar power plants. Solar sharing projects, in which solar panels are put over agricultural crops are a good option. These solar sharing projects are connected to the ceremonial horse festival route, at crucial crossroads and junctions, such as near the festival stadium/racecourse. The algae and solar sharing projects together

generate enough energy for all people in the area. Surpluses are sold to neighbouring areas.

Return

The exciting design process generated a great deal of support as it was tactile, engaging, creative and visionary. This binds people, while co-creation engages them. Engaged people will return sooner than the disengaged.

The embedding of the comprehensive plan in the philosophical basis of Ninomiyasongtoku, allows people to be reborn, upon which rethinking about the land-use and functionalities of the landscape could take place. This helps to give pride back to the people and makes it attractive again for farmers, who could use their skills in algae fields, vertical farms, and keeping horses.



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New Station

New

Reinventing the City Building on Creativity

Creativity, innovation and a strong focus on sustainable and attractive growth are at the very heart of the vision for the City of Varberg to become the Swedish West Coast's Creative Hot Spot by 2025. The municipality is growing quickly and has a population of more than 60,000 residents, mainly due to its location between two expanding regions – Göteborg (the West Sweden region) and Malmö (the Öresund region). Varberg is a stronghold for culture and tourism, and is especially renowned for its 13th Century fortress, long stretches of beautiful beaches and inland deciduous woodland with plenty of small lakes. It is also well known among surfers from all across northern Europe as one of the best places in Scandinavia for all kinds of surfing.

The City of Varberg is focusing strongly on sustainable development and has been acknowledged for its success in bridging the gap between public service and the diverse interests of various partners in society (e.g. commerce, business, industry, development, conservation, culture, etc.). The municipality has a sharp focus on the way ahead, and a portfolio full of solid strategies. In our vision for the future, the City of

Varberg has unique opportunities and we are acting on them. We are building a city converging around means of public transportation in a rapidly expanding region. The railroad, which has long created a barrier between the seaside and the city centre, will now be relocated into a tunnel underneath the city. To expand on this opportunity we are moving the harbour in order to further free up land for letting the city reclaim its position as a seaside town. In total, the project will result in more than 500,000 m² of land for development of our future city front. For people living, working or visiting the city of Varberg, the change will dramatically increase the freedom to experience the coastline. More places of residency, places for eating and meeting, places to shop and work, etc. – comes as a bonus.

In our vision for Varberg 2025 we are striving to be at the forefront of supporting social and cultural aspects of sustainability. The municipality is localised in the middle of a strong academic region. The University of Göteborg and Chalmers University of Technology, the University of Lund and Malmö, the University of Borås and the University of Halmstad are all located well within



v Cityfront

comfortable commuting distance from Varberg. This is of great importance for our local business climate and for our young. We are focused on consolidating the relationship with our academic allies even stronger, strengthening the position of our own Campus Varberg. The same is true for cultural institutions. For our growth it is key to attract enterprises and institutions that share our idea of building a more sustainable future, in the heart of a progressive region. This means that we are especially on the lookout for academic and cultural institutions, and enterprises with profiles that fit our idea of a modern sustainable city and trying to attract them into investing in Varberg.

It is often stated that the place, and the people and lifestyle associated with it, is everything. If this is true, then the City of Varberg has everything to offer.

Come to Varberg. Share our vision.



The City of
Varberg

www.varberg.se



Active Roofs and Facades in Sustainable Renovation

The Nordic Built “Active Roofs and Facades” project is supported by Nordic Innovation allowing for strong development of leading Nordic competences in the area of building renovation. This is achieved by creating transnational Public Private Partnership models to support the development towards nearly zero energy building solutions and associated performance documentation – which is required in the EU building directive.

The proposed cooperation with the building industry on developing models and the demonstration of “Active House” based sustainable renovation will create a strong Nordic alliance.

The project runs from 2014 to 2017 and will involve companies which are represented in the Nordic countries, and companies from the international Active House Alliance, www.activehouse.info. The development will

use the best transnational competences and networks, creating greater possibilities to export technology.

The background of building renovation in both Nordic and European projects, where actual energy use is quite often 30-40% higher in practice compared to what was expected from calculations, and where innovative solutions are seldom used, is very much connected to the way the building industry is organised. Here, consultants will normally only want to operate in a conservative way, because they are not only selling their expertise, but also the insurance that goes with it, and also because consultants fees have been considerably reduced, so it is common to work with well-known large suppliers who can contribute to large parts of the design process. This means there is a tendency to not choose the most energy efficient solutions but to allow more mediocre



and old fashioned solutions, that the suppliers prefer. Also, because it is common knowledge that detailed performance of equipment in practice is never controlled, then there is no incentive to perform better, and higher energy use will often be explained by the user behaviour.

A main issue of the proposed Nordic Built project will be to realise the renovation projects in a much better way and secure positive involvement of consultants, so they can be more proactive, e.g. by full scale testing of innovative solutions before large scale implementation, and by monitoring key performance indicators as a basis for negotiating guarantees of performance results as part of the overall procurement process, something which also might be used to avoid normal tendering in connection to development of renovation projects.

An important challenge is to introduce holistic oriented demands in the so-called Nordic Built Charter in practice in involved demonstration projects. See:
<http://www.cenergia.dk/da/images/Nyheder/2014NordicBuilt/150108nordicbuilt.pdf>

Added value in Nordic Built Active Roofs and Facades in Sustainable Renovation

Coordinated by the Danish energy specialist company Cenergia, the project will utilise the results from the recently finalised EU-Concerto project Green Solar Cities (www.greensolarcities.com).

These results will be presented in a book by Routledge/Earthscan in early 2015. See: www.routledge.com/books/details/9780415731195/

The main results from Copenhagen are illustrated in the two small videos below:

<http://vimeo.com/98926904>

and

<http://vimeo.com/98926905>

Building for life

John Slaughter, Director of External Affairs at the Home Builders Federation (HBF) details how 'Building for Life' represents good urban design, and could help with the national housing crisis...

The design of housing developments is rightly of interest to all those involved in or affected by the delivery of new housing – communities, local authorities, and of course house builders themselves. This interest is naturally growing as we seek to increase the supply of new homes significantly to tackle our national housing crisis.

At the same time, however, everyone will have their own view of what constitutes good design in a particular location and this means there is inevitably a degree of subjectivity involved in reaching decisions. How are we therefore to encourage and support good urban design in a way that is responsive to local context while being practical for house builders to implement?

For HBF and its partners – Design for Homes and Design Council Cabi – a large part of the answer lies in the use of Building for Life 12 (BFL12)

Building for Life 12 is a distillation of many years' experience of working to encourage good design. The original Building for Life was established in 2000 with the aim of capturing the generally accepted principles of urban design for residential development in one place and in a way that could apply to a wide range of different housing projects.

It comprised 20 principles broadly covering issues from environment and community to design and construction. The government recognised Building for Life as the national standard for good design and a system of "awards" was initiated for projects that were judged to have achieved the majority of the 20 principles – silver for 14 and gold for 16 or more.

This was effective in raising awareness of good design principles and providing recognition for well-designed

developments. There were, however, concerns over time that some of the 20 BfL criteria were more a product of current policy objectives than the enduring principles of urban design and that BfL was not as accessible as it should be to local communities, councils and the full range of the industry.

This led the BfL partners to rethink their approach, with a particular stimulus to doing so being the current government's promotion of localism in planning, including neighbourhood plans, at the same time as reinforcing the importance of good design in the new National Planning Policy Framework (NPPF).

In this context we worked with local authorities, design experts and community representatives as well as industry practitioners to make sure that Building for Life was fit for purpose for the new planning regime. We concluded we could rationalise the key elements of good design into 12 principles and express these in a way that was far easier to grasp for non-professionals without detracting from the robustness of Building for Life.

The 12 principles are made up of 4 questions in each of 3 chapters:

- Integrating into the neighbourhood;
- Creating a place;
- Street and home.

We launched the resultant BfL 12 in the autumn of 2012 and it has already gained widespread recognition as an effective means of promoting good quality development and facilitating a sensible dialogue between councils, communities and developers on design.



It has succeeded in the latter by providing a common and accessible language exploring the 12 BfL principles and providing a set of questions or prompts that allow the application of the principles to particular developments to be probed by non-experts as well as professionals.

In addition, because the BfL 12 principles are set out in a non-prescriptive way they can be successfully applied to all sizes of development and a wide range of development contexts. It is this practicality that underpins BfL's usefulness and attractiveness to all parties.

Most recently, we have sought to reinforce the incentives for developers to follow BfL12's principles by creating an independent accreditation for new projects – which we are calling “Built for Life”.

Based on a simple ‘traffic light’ system (red, amber and green) BfL12 recommends that proposed new developments aim to:

- Secure as many ‘greens’ as possible,
- Minimise the number of ‘ambers’ and;
- Avoid ‘reds’.

The more ‘greens’ that are achieved, the better a development will be. A proposed development might not be able to achieve 12 ‘greens’ for a variety of reasons

not necessarily resolvable due to the nature of a site and its context. The BfL partnership is therefore making developments that achieve 9 ‘greens’ eligible for ‘Built for Life’ accreditation.

‘Built for Life’ accreditation is an independently assessed quality mark available immediately after planning approval, offering developers the opportunity to promote the quality of their developments during sales and marketing activity. It will also help those seeking a home to find a place to live which has been designed to have the best possible chance of becoming a popular and desirable neighbourhood.

Developments that achieve 12 greens will be eligible for Built for Life “Outstanding”.

We believe BfL12 offers an excellent basis for promoting constructive dialogue on good design and supporting house builders in investing in this and would wish to engage with all parties in ensuring its many benefits can be maximised. ■

.....
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Garden cities – a design for life

Over a decade ago I set up Core Connections Ltd as a consultancy to assist clients plan and design interesting and meaningful places. I hoped then that the new Building for Life assessment system I helped to create at The Civic Trust could last a few years, and I am delighted that, reissued as Building for Life 12, and now 'curated' by the Design Council, it continues to be a useful checklist for developers, designers, planners and communities. It guides them through a wide range of considerations that must be taken into account to create housing schemes that will be interesting and meaningful places.

Aspects of green space, even if only buildings with green walls, will increasingly be valued for their climate contribution as well as aesthetic appeal. Indeed a single well-positioned street tree, with a lifetime of a hundred years, once planted and nurtured, will outlive most of us designers, so it is worth paying careful attention to choose the right species located in the right place!

Seasonal changes, growth and eventually decline are all demonstrated by living landscapes. Green spaces can offer activity, food and a common place for people with a shared interest to meet and to work together on a joint outcome. I have enjoyed working with many communities to revitalise their parks, playgrounds and community orchards. In Lordship Recreation Ground I helped the community define a brief for a new Eco Education Centre.

Working together to create new housing is a more daunting task for communities. In Germany we know there are Housing Building Groups, who advertise for members, and the Group becomes a legal entity that will find space, commission designers and builders, and then live in their built-to order housing. Could this happen here?

Looking afresh at the Garden City movement led by Ebenezer Howard, a group of founder members has set up a New Garden City Alliance, to ask the question "What would a 21st Century garden city look and feel like?" The Wolfson Economics Prize in 2014 sought solutions to "How would you deliver a new Garden City which is visionary, economically viable, and popular?" A conference in September 2014 in Letchworth, the original Garden City, looked at experiences of Community Land Trusts, and asked those shortlisted for the Wolfson Economics Prize to explain their thinking about the economics, rather than the aesthetics, that lie behind the solutions they propose. The New Garden City Alliance is an alliance of organisations – commercial and not-for-profit as well as individuals – dedicated to promoting the formation of new, genuine Garden Cities. We aim to work in partnership with existing bodies to establish standards for a new wave of Garden Cities, Towns and Suburbs of which Britain can be proud. One of the objectives is to explore the "invisible architecture" i.e. the mechanisms for locally owning and governing the land, and sharing the extra land value uplift – the value

that is in addition to a reasonable sum for builders and landowners profits – that will accrue in the long term as the town becomes settled and development risks decrease. More information is available at www.gardencities.org.uk.

As an urban designer, who also trained as an ecologist, I have used this combined perspective to lead a masterplan process that started with considering the design of landscape. The landscape design is too often added on as a sort of decoration to the site and is only considered at the end of a design process. Also landscape is often the first item cut when saving money on a scheme. Sustainability considerations are, however, changing this as water, sun, wind and soil are increasingly seen as potential resources to design with.

A more volatile climate is expected, so the design process needs to accommodate extremes: floods or droughts; high winds or airless heat waves; and also needs to reuse sites with a soil made up of recycled building materials or biologically managed wastes.

I find this emphasis on looking at the potential to integrate a more natural landscape into towns to be inspiring. People who care about nature and are interested in managing natural environments will join together to create such places. Core Connections takes very seriously the design of good links for walking, including the regular walk to public transport, to

work and to school, and recreational walks, with cycling and running routes. They are a strong 'glue' to hold together coherently planned places.

Sometimes the process of collecting data in neighbourhoods will reveal potential new routes where, with an intervention of relatively little expense, whole areas can be made more accessible on foot, and routes can open up that are an easier walking distance to a school or shopping centre or to the train, bus or – in some rare places – tram stop. Capturing the economic spending power of this "pedshed" i.e. all those people within a 10-minute walk, is often vital in a business plan for locating a new enterprise or for planning the environment of a new public transport node. Early in the design process – as I do with the landscape designers – I will bring into my masterplan team experts in transport planning, so any such potential links can be explored for their transport capacity potential.

Communities can use planning experts to help them visualise the environment they want, as well as to work with the developers so the reality of funding and making places work can be fully explored. It is both cheap and interesting to hold workshops to explore options on paper and in models early in the process. No-one feels too committed to a solution and ideas are still fluid, and using models made of paper and cardboard, and lots of sketches and photos is much cheaper than trying to change the wrong solution once built. Core Connections uses extensive consultation, with as many ways to consult as we can think of. However I am also constantly looking at what is done elsewhere. In Peckham, where I

have been informally helping the community groups for four years, the mobilisation of local talent has resulted in them building a very large and splendid cardboard model of Rye Lane. You can use it to visualise new development and to consider links across roads, pavements and open spaces.

Other London communities are looking at the impact of lighting on use of spaces, involving designers, artists and analysts to explore the same place both by day and by night and to see how lighting will have a radical effect on how the spaces are perceived, and therefore how they are used. And, ultimately, it is the uses made of places that bring meaning to them. To take a fun example, recall Anita Ekberg wading at night in the Trevi Fountain in Rome in Federico Fellini's 1960 classic, *La Dolce Vita*.

Communities build meaning around our public monuments, our squares and avenues. These are stored in our memories: both of participating in major festivals or events and simply individual moments. St James's Park for example is used both a tranquil place for a solitary stroll at dusk as the birds settle to sleep and as the backdrop to major celebrations along the Mall.

A "sense of place" may consist of layers of many such shared moments associated with a particular spot. In Greenwich the view to London from the hill next to the Observatory has been admired for centuries. It recently changed immensely, but the planning control on one part of the view from here still offers visitors the chance to seek out St Paul's Cathedral in London's skyline. The view from here to Canary Wharf changes all the time,

and yet the river setting, with Wren's baroque symmetry in front of it is still one of London's only set piece locations to show urban design on a grand scale. The use of landmarks to orient visitors was well understood by the baroque designer, and in England this led to the 18th Century landscape park whose beautiful set piece viewpoints were part of the walking circuit used by the proud owner to entertain his visitors. In many ways the Queen Elizabeth Olympic Park in Stratford London is also emerging as a modern interpretation of a classical landscape park of walks punctuated by landmarks.

Retrofitting a continuous walk along a canal towpath or disused rail line provides the user secluded and tranquil routes that traverse the city, with many glimpses of wildlife, although nothing quite prepares you for seeing the giraffes stare down at you as you walk the canal path next to London Zoo!

A good designer will help capture all these possibilities, and assist in creating a "genius loci" – a unique sense of a place, link up sites to maximise connections and coax out the communities' requirements for desired activities and spaces.



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Forms of living

If we talk today about our cities, or in particular about the urban environment we live in, we can use statistics to show how we behave within our environment. We explain our living behaviour using graphs to measure our intentions, or we use diagrams to show how our urban behaviors relate to each other. While we might have given quantitative data to our behavior, we don't research the formal understanding of our human environment. While cities are made out of buildings, streets, parks, and public spaces we hardly talk about its forms. What we neglected to ask ourselves is about the quality of the form we want to live in.

The intention of the institute of urban design (ioud) is to develop an expertise on the formal understanding of our urban environment within metropolitan areas as well as our countryside. What we investigate is the architectural knowledge of our human environment, which gives form to our quantitative data. We call our research 'a research by design', with the intention to investigate new architectural forms of living environments. After all, there is no content without a form.

History

If we look into the history of urban design and planning, especially in Europe during the 19th and 20th Century, and more recently into the 1st decade of the 21st Century, two essential aspects of urban design and development belonged to each other. One was the understanding of our

spatial behavior through statistics, and the other was to give form to it. When our cities grew during the 19th Century, the grid became its model of urban expansion, and the urban block gave it architectural form. We can see the variation of such urban blocks throughout our cities based on the various cultural differences of land ownership and housing typologies.

Within the beginning of the 20th Century – on a free piece of land mainly owned by the city itself – the single standing slab building emerged. This architectural type became the model of our urban settlement before and after the 2nd World War. Both urban forms were highly influenced by the involvement of city and state governments to increase the quality of our living environment.

Through late capitalism and definitely within the last 20 years, urban developments are executed by project next to project, development next to development. The question of form became replaced by the problem of where investment is needed. Cities have given away the formal control of their cities. What we witness today is what was historically known as the liberal urbanism of the 19th Century, an urban development without formal consciousness. What we need is a research of forms under which our cities evolve. It is the form in which we live in, not its data.

Urban living

Recently published statistic on the behavior of the Austrian population

within their urban environments, by APA/Statistik Austria, shows tendencies became visualised. This can be found nearly anywhere within the European landscape of historically developed modes of inhabitation.

While many cities in Austria grew immensely – from 14.1% as in the city of Eisenstadt, 12.9% in Graz to 9.3% in the metropolitan city like Vienna and 8.4% in Innsbruck the city of the alps – small size villages or cities within the immediate distance also exploded in terms of population by up to 30%.

There is an enormous magnetic tendency, which attracts people towards large urban metropolitan areas, while at the same time historically established villages on the countryside empty out.

This tendency is similar throughout Europe and even globally; while in Central Europe, within the area of the Alps, this tendency took on a particular form. The villages decreased by twofold: not only did these villages decrease in size and population, but at the same time, their population changed from permanent inhabitants (those that both lived and worked in the village), to temporary inhabitants, like tourists, (second home citizens and weekend dwellers which work or study during the week in metropolitan areas and spend their weekends in the village). It can be argued that the village is not sustainable anymore, neither socially nor economically, or even spatially. It's form as we know it will eventually die.



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The Hotel as a model of urbanisation

At the same time a new architectural form has emerged within the tourist areas of the Alps, namely the high-rise building. The high-rise emerged as a particular form within densely populated environments like Chicago and New York. The reason for the emergence of high rise buildings was not only its potential to increase the density, but to gain maximum profit for the increasing land values within metropolitan areas.

The urban hotel

Today it seems that the architectural form of the high-rise has lost its context. Emerging from alpine areas so its real quality can be seen – namely the idea of the high rise building as a hotel containing all the facilities of a city. The high-rise can be seen therefore as a form of a city, a building that contains the life of a city.

One of our recent research projects has been the investigation of the possible merge of a village and the hotel as a model of urbanisation. Our research mainly developed forms of high-dense living environments on

the base of a one family house. While villages are constituted by a large number of single family houses spread along roads, the design challenge was to keep the individual home alive while reducing the related outdoor space and the form of access. Such a design investigation has happened many times throughout the history of urban design, and has its precursors in Le Corbusier Villa Immeubles from 1925 and many research projects within northern European countries during the 1950s to the 1970s, as well as recent projects in Asia, (especially Japan).

The intention of the research is to understand urban transformation as a problem of form. The forms that are investigated are high dense urban fabrics. These fabrics are not only intended to reintroduce aesthetics into the political consideration when planning our cities, but they are the only primary architectural forms that can solve problems of sustainability. In order to live socially, economically, and materially sustainable we need to live in dense urban environments.

The investigation of such forms is what we as an institute of design have developed as our expertise.

Author

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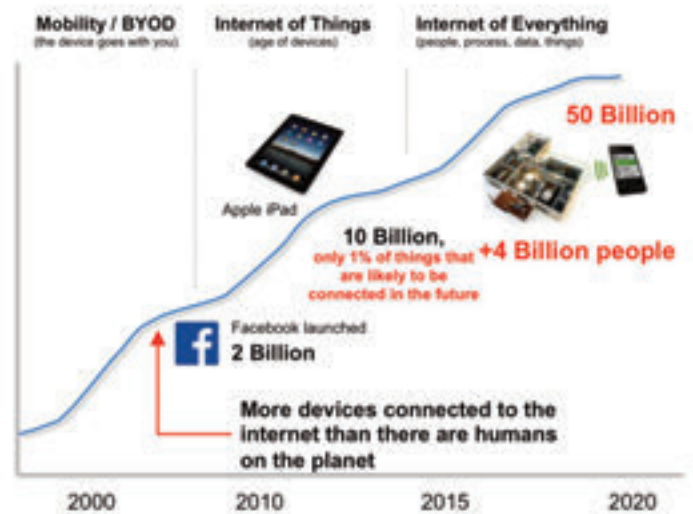
BIM and the data challenge

In developing data solutions for BIM Maturity Level 2, we also need to have in mind the future needs of Level 3 and beyond. Steve Thompson, Chair of BIM4M2 and Market Manager for Construction & Infrastructure at Tata Steel evaluates the product information required and how it can be delivered...

One of the most interesting aspects of digitisation of the construction industry for me is the potential to see a more complete picture of the reasons for a project and how an asset can be delivered, operated and maintained to maximum benefit. With my architect's hat on I see the BIM process as potentially providing a more complete and detailed brief to work with, with access to the information I need to make real-time decisions. With my product manufacturer's hat on I see it as a way of helping project teams ensure they have the right product to meet their specific needs, as defined by the whole project team throughout the asset's lifecycle. This may sound idealistic, but on both counts these scenarios have already been achieved many times over, they're just not yet the norm.

To illustrate the bigger picture and the direction of travel, it's worth looking at the number of things connected to the Internet, and how this is predicted to increase exponentially over the coming years. There are already significantly more things connected to the Internet than there are humans on the planet, and the impact of this is that things and humans can more easily communicate and interact.

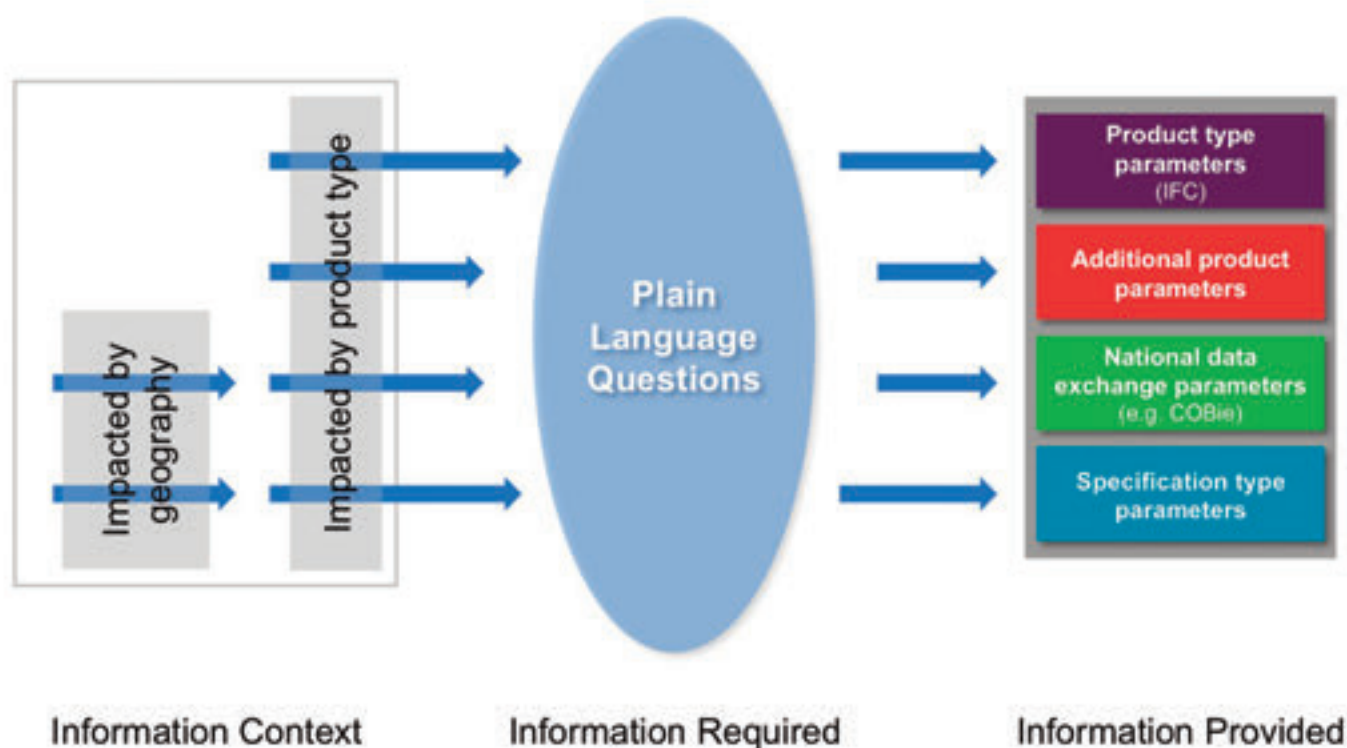
In addition to the predicted significant increase in connectivity, the United Nations are predicting a global urban population growth of over 2.5 billion between 2014 and 2050 (United Nations Population Division, 2014). In short, that means that if we house the increase in population at an average of 100 people per building, we will need to build just under 2,000 residential buildings every single day for the next 35 years.



Devices connected to the Internet over time. Source: CISCO IBSG, 2013

The reason for this slight detour is to highlight the point that when BIM maturity Level 2 becomes the norm, we are still only at basecamp in terms of the potential that can be achieved. It also means that in developing data solutions for Level 2, we need to have in mind the future climb to make sure we don't keep heading back to basecamp and starting again. From a delivery perspective, it means that with the scale of the physical construction challenge ahead, we need those tasked with delivery to be involved in defining the information that they will need to succeed, working with those who have the product data (manufacturers) to identify the data available and its potential benefits.

To get to the Level 2 basecamp we need structured, accurate, reliable and accessible product data that not



only clearly describes what a product is and how it performs, where it comes from and how it needs to be maintained, but also helps in the specification, supply and construction stages of its lifecycle. The challenge for the manufacturer amongst others, is to provide the right information in a suitable format to support a vast range of players, across different sectors and in different territories, using different approaches. If that is going to be achieved, there are a few key issues to address:

- Clearly defining what a product is, so that everyone and everything knows what they are looking at;
- Understanding the information requirements of different players (e.g. architects, engineers, supply chain partners, contractors, clients) and providing answers to those requirements;
- Understanding the most suitable format for exchange and use of information;

- Understanding how information requirements change in different countries or applications;
- Delivering the information required to address all of these issues, and understanding the potential resources and investment required.

It is certainly crucial that product information can be exchanged across software platforms and regions, so there needs to be clear mapping to open standards, including IFC (the Industry Foundation Classes). In addition, there needs to be clear mapping to any nationally mandated or required exchange formats such as COBie in the UK. The terminology used in these systems is still inaccessible to a large proportion of those who need to use them, including the majority of product manufacturers. Describing the thickness of a profiled composite cladding panel highlights the need for clear descriptions and definitions of parameters. Whilst generally described to the same ISO standard, a quoted panel thickness can mean

the core thickness (without the depth of the profile), or overall thickness (including the profile depth). This means that if a parameter is simply described as thickness, there may be two very different values used in comparisons, potentially leading to incorrect specifications.

This is where the concept of Plain Language Questions (PLQs) comes in. If a manufacturer understands the questions they are being asked and in a language that they are familiar with, they are much more likely to be able to provide the right information to answer the question.

This is the concept behind PDTs and PDSs (Product Data Templates, which become Product Data Sheets when completed with a manufacturer’s product information). Originally developed by CIBSE, the PDT Steering Group now consists of representatives from other professional institutes, content providers, BIM4M2, BIM4 Fit Out, BIM4Water and BIM4DC (Data Centres). The focus is on having a cross-project team that has experience of a product or system type to develop templates based on what is required to effectively deliver that product, in commonly used language that is accessible to all. The BIM4M2 Data Working Group is working with others to significantly broaden out the reach of the templates to other product types.

In developing PDTs, the starting point is always COBie or SPie (Specifiers Product Information Exchange) templates where they already exist to ensure the minimum information requirements are met, and direct links to open standards. However, to maintain accessibility the complexity of mapping from the Plain Language Questions to these standards can, and is dealt with away, from the simplicity of the main data sheets.

The sheets are developed in a controlled environment between members of the design, manufacturing, contracting and FM communities, and then opened out to industry for wider consultation, meaning that the templates are created for industry, by industry.

There can be location-specific or sector-specific PLQs, all which are completed in Excel, and can then be used across all software platforms.

One of the key benefits of this approach is that the information only needs to be supplied by the manufacturer once for every product, and it can then be used in many applications, with project teams defining what information they require at each project stage.

The format can also be used as part of the selection process to filter products that meet the specified requirements. This may be achieved in the UK through the likes of the forthcoming Digital Plan of Works (DPoW), which whilst not mandated is likely to be used on public projects and will be a useful tool. However, as manufacturers who supply products into different territories, we need to provide data in a way that can be used in several formats and platforms, thus supporting both the Government’s 2025 Strategy to increase exports of construction products and those private sector clients in the UK that are already using alternative approaches to developing MIDPs (Master Information Delivery Plans), and different formats of information. By providing information in a format that can be easily mapped to suit these differing requirements we are likely to arrive at a more efficient solution all round. ■

For more information on Product Data Templates, visit www.bimtalk.co.uk or the BIM4M2 website.

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Saint-Gobain brings birthday celebrations to Ecobuild.

my comfort
by Saint-Gobain

Saint-Gobain, the world leader in sustainable habitat, will be celebrating its 350th anniversary at Ecobuild 2015, as well as launching its Multi-Comfort concept at this year's show.



Sharing its vision for the future, Saint-Gobain will unveil its Multi-Comfort building concept. Multi-Comfort buildings not only save energy but can improve your health, wellbeing and productivity.

Visitors will be able to experience Multi-Comfort first hand at Saint-Gobain's Ecobuild stand, which will feature experience pods, allowing guests to feel the individual elements that contribute to comfort – indoor air quality, thermal, audio and visual comfort.

A dedicated website and brochures will accompany the launch at the show, while experts for each comfort dimension will be on hand to put theory into practice and explain the fifth comfort element that Multi-Comfort brings – economic comfort for the long term.

Visit us at Ecobuild, held at ExCeL London from 3rd – 5th March on stand N6050/N6060 and in the main Boulevard.

Richard Halderthay, Director of Communication for Saint-Gobain UK, Ireland & South Africa, said: "Saint-Gobain UK & Ireland is pleased to be returning to Ecobuild in our 350th anniversary year.

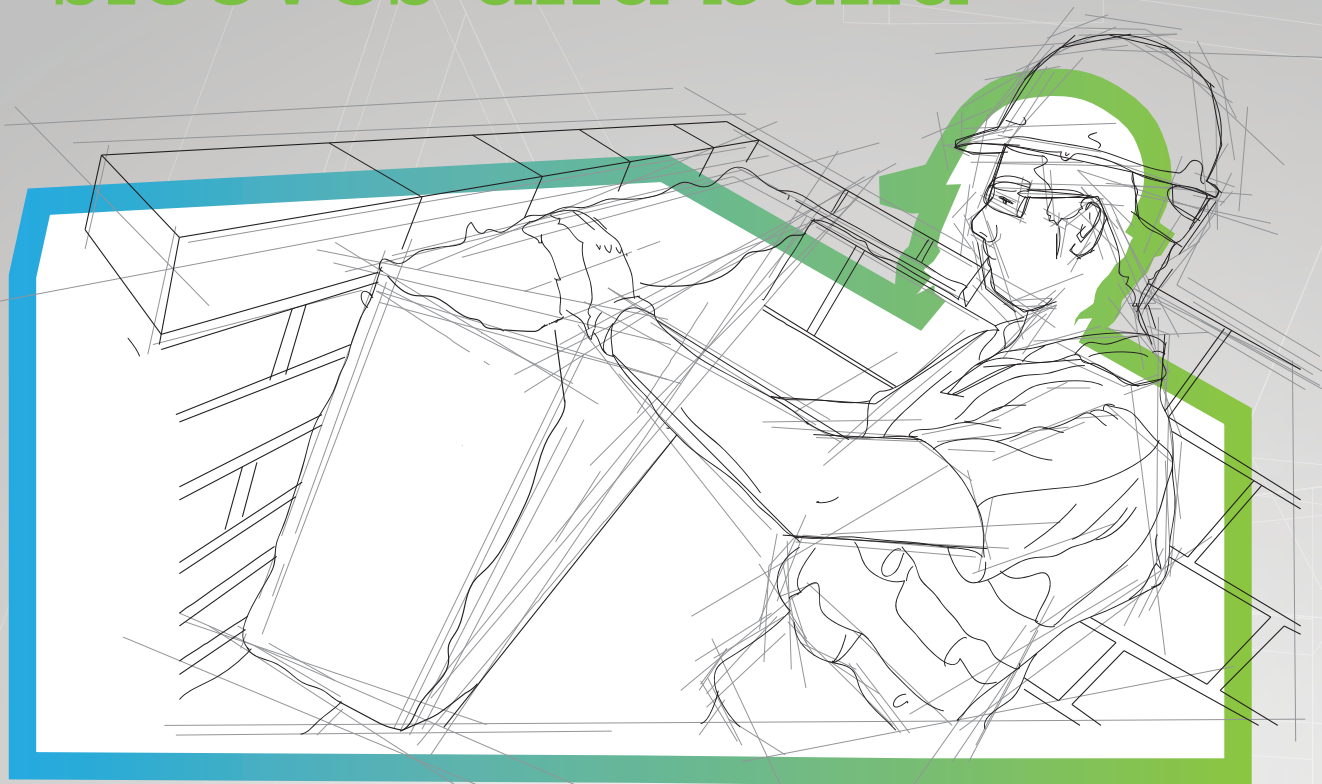
"As we celebrate our milestone birthday, we are also looking at 350 reasons to believe in the future. The launch of Multi-Comfort supports our belief that sustainable habitat is within our reach. By providing sustainable products and solutions, this vision can be made a reality.

"Ecobuild is an important event in our calendar, as it's a place for the industry to come together to discuss key issues and showcase innovation. We have a number of exciting events and surprises planned for Ecobuild, and we look forward to welcoming visitors to our stand and introducing them to Saint-Gobain's vision for the future."

For more information, visit www.saint-gobain.co.uk, like the Facebook page or Tweet @SaintGobainUK using #sgecobuild to get involved.



It's time to roll up your sleeves and build



It's all very well having well-trained, knowledgeable and certified building designers, as long as somebody can build to their designed standard. And, let's be clear, we're not talking about sweeping, aesthetically pleasing curves, we're talking about the details that remain out of sight, details that make the building comfortable, details that keep the running costs in line.

With this in mind, Saint-Gobain has partnered with the Passive House Academy to offer, from the Saint-Gobain Technical Academy in Erith and the CITB in Glasgow, the UK's first Passivhaus Institut certified hands-on tradesperson course.

This type of hands-on training is essential, not just for achieving Passivhaus standards, but for the UK, if it is to realise its zero carbon build standards.

The training is five days long and is a combination of classroom lectures and presentations but with

Become a qualified Passive House builder

a significant amount of hands-on, practical work. There are also a number of demonstrations in different fields of Passivhaus, including airtightness and mechanical ventilation heat recovery.

The foundation of the training is the understanding of what Passivhaus is and what principles should be followed when designing and constructing a Passivhaus building. Whilst most tradespeople would be unlikely to design a Passivhaus, if they understand the thought process and principles followed, they will be in a stronger position to ensure the performance standards are delivered on-site. Also covered is:

an overview on how to calculate U-values for opaque building elements; and appreciating the impact of thermal bridging.

Different construction types are covered, and instruction is given as to the correct positioning of the airtightness and vapour barrier layer in relation to the insulation and structural layers. Time is spent looking at how the insulation should be handled and how the thermal performance is affected when it's badly installed or damaged. Insulation can be damaged during installation or by a following trade. The course encourages all trades to consider those that have gone before, and those that are following – if trades don't work together and understand the implications of their installations then they're unlikely to deliver a building that performs to its highest potential.

The requirement to work together supportively is nowhere more evident than when it comes to air-tightness. The most conscientious installation can be unwittingly undermined by a rogue fixing or over-zealous slip of the knife. The training covers not only the correct airtightness treatment at door and window openings, service penetrations, joints vertically and horizontally, corners and where the wall meets other constructional elements, but also demonstrates how an air-tightness test is carried out.

Using full-size construction models, built specifically for the tradesperson training, attendees will familiarise themselves with the installation techniques required for Passivhaus standard windows and doors, as well as ducting detailing for ventilation outlets. The sizing and commissioning of mechanical ventilation heat recovery systems is also covered.

They will also learn to identify and accurately interpret data from the PHPP files to determine construction details.

On successfully passing the Passivhaus Institut exam, participants will receive international accreditation from the Passivhaus Institut as a Certified Passivhaus Tradesperson. It's a theory examination but, due to the inclusion of the hands-on practical training for course participants, the Passivhaus Institut will also make note on their qualification of the hours of hands-on training undergone during the course.



The Passivhaus Tradesperson Course runs over 5 days (Mon-Fri, 9am to 5pm) and costs £825+VAT. CITB grants are available and Passivhaus Trust members in the UK also get a 10% discount.

For more information and to book onto a course visit www.passivehouseacademy.com/saint-gobain

BIM and GIS: A harmonious future?

Dr Anne Kemp, Chair, BIM4IUK enthuses about the potential of blending the BIM vision with that of geographic principles and how it could be utilised to deliver major infrastructure projects...

I believe that the convergence of BIM and geospatial in delivering major infrastructure projects is a game changer. But it will only be so if we understand and adopt a more holistic approach. And we can only do this if we consider the wider philosophy and approach of BIM and geospatial, rather than simply their tools and technologies.

The UK Government BIM programme is driven by the principle of managing information across the whole life of an infrastructure project, starting with the end in mind, and continuing forward to managing information across the whole infrastructure portfolio – with projects serving the needs of the wider context. That context may be a single organisation, such as Thames Water, Crossrail, Highways Agency, National Grid or Vodafone – but the real prize is if this can work across the whole of the UK's infrastructure.

I am a geographer, just finishing two years as chair of the [Association of Geographic Information](#). Consider the brand straplines of AGI – “championing the value that the intersection of geography and information has for the economy, business and for the individual”, and of the Royal Geographic Society (RGS) – “...the place for all those who want to know more about our planet and its people”. I have been working in the AEC industry for 25 years, and serve as the Chair of the Institution of Civil Engineers' BIM Action Group, and of BIM4Infrastructure UK. Throughout my career I have been striving to make the right and relevant information available to the right people at the right time to stimulate thought and to facilitate better decision making. What fascinates and excites me about the potential in blending the BIM vision with that of geographic principles is the convergence of how we

design and manage our physical infrastructure – both man-made and natural – with the human dimension. We can do this if we achieve collaboration across professions – but we need to cross the boundaries which exist between disciplines and between industries.

I reflect that what gives us so much angst is what we believe or interpret to be “right”, and it is here that perhaps we make the most mistakes. For each of us, our behaviours and our outlook are governed, often unconsciously by our background – our culture, our education, our discipline, our profession. And this can lead us, intentionally or not, to reject valuable and relevant approaches, data and information from sources which we are not familiar with, or we don't trust. Time and again I have seen barriers to sharing valid and insightful data or ideas arise through differences in professional language and approach.

Both geospatial and BIM technologies are there to serve data from disparate sources into a common pool in such a way that it can be trusted and understood by people from a range of backgrounds, disciplines and skills. The art and science of cartography has evolved to portray the real world in 2 dimensions, in a way which enhances and clarifies understanding. There are good and bad examples of where this discipline has been carried into GIS. There are many lessons to be learned about the dangers which can occur if information is inaccurate, incorrect, distorted, manipulated or mis-represented. And where an individual's privacy can be invaded by inappropriate integration and sharing of pertinent datasets. We must carry these lessons forward as we extend our use of digital technologies to convey our understanding and interface with the world around us.

Every physical thing has a place and a given state and context in time. Our moods can be tracked through time and space – and the way we are impacted by, and adapt, to the world around us. As we move forward, and integrate the internet of things and of people with the physical infrastructure which we plan, design, construct and maintain, so will we enhance our understanding, and our ability to monitor, guide and control our behaviours and interaction with the man-made and natural environments which make up our planet. As planners, the socio-economic dimension has always played a part in the consideration of projects. But as we see a convergence of our physical world with the virtual world delivered through our mobile devices, so I anticipate the psychological dimension requiring more and more attention (see Susan Greenfield's "Mind Change", 2014, for more information). Furthermore, the amount of information which our senses receive, whether within the work environment, or within our day to day living, has been increasing rapidly. But information is not understood, and we need to ensure that each of us is empowered and equipped to challenge the information which is served to us.

We need to ensure that BIM and GIS provide us with the information and the tools to enable us to interrogate, question and challenge the scenarios presented to us – and to allow us to make wise decisions which build on and complement the intellectual and analytical power which artificial intelligence will increasingly present to us.

So this is where I believe the convergence of BIM and geospatial can take us over the next decade in improving how we manage and interface with the outcomes of our major infrastructure projects. And while much has changed, we have a long way to go. There are arguments that the vision of the internet of things has not been realised because of the lack of standards. But there are more fundamental things missing before we are ready for that progression. In the UK, our ability to record and maintain a comprehensive dataset of our buried infrastructure is hindered – not by technology – but by lack of policy and process. If as a country we really want to realise the vision of Digital

Built Britain, then we must as an industry pull together and make this happen. Without doubt, there are problems around security. Without doubt there are challenges with standards. And without doubt there are issues around education and training. But what we really need is agreement – an understanding, and galvanisation around a common framework which can allow us to take this next important step, integrating both geospatial and BIM practices toward a coordinated, comprehensive and integrated model of our underground world equivalent to that above the surface. A number of activities are underway to seek to achieve this.

Do get in touch if you would like to find out more. ■

ICE is working in a number of areas to enable this, and would be keen to know of others who have an interest in this area.

If you are, please contact Richard Armstrong on 0207 665 2411

richard.armstrong@ice.org.uk Information Systems Panel, Geospatial Engineering Panel and BIM Action Group secretariat.



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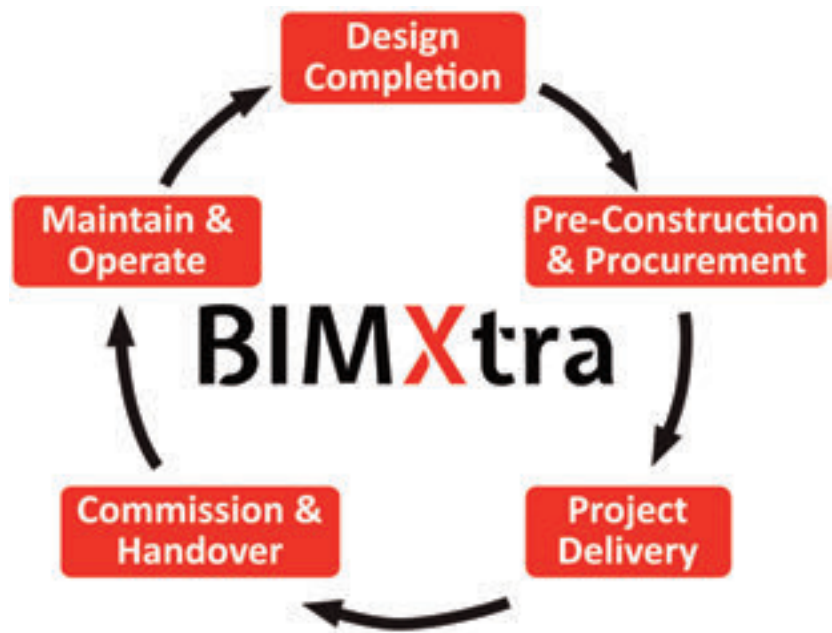
www.twitter.com/ICE_engineers
www.twitter.com/BIM4IUK

Bringing the simplicity and opportunity of BIM to all

BIM means lots of things to many people and risks being one of the most misused words in construction, however BIM represents the enabler to a transformation that is engulfing not only the UK but also the global design, engineering & construction market; and why, because BIM enables us to work together more easily, in a modern digital environment. Using BIM we are encouraged to share information bringing efficiency and visibility, to ultimately, reduce the risk and cost of our projects. In addition we influence and improve the ongoing operation of our assets, delivering a better more intelligent output for our clients and in doing so providing them with more value in their portfolio of assets.

BIM enables people to interact with their projects in a visual environment, but is increasingly focussing on “the I in BIM”, the INFORMATION, which is held within the modelled objects as data. With modern BIM tools, information previously held in separate and disconnected documents, can be created and held within the modelled objects as the central repository for core project information.

Like the automotive industry before us, the efficiency and simplicity of a managed information process contributed to the renewed success of manufacturing. The effect has been that we buy more cars, appreciate the fact that they are more reliable, last longer and cost less to use and maintain – vehicle manufacturing is in new health.



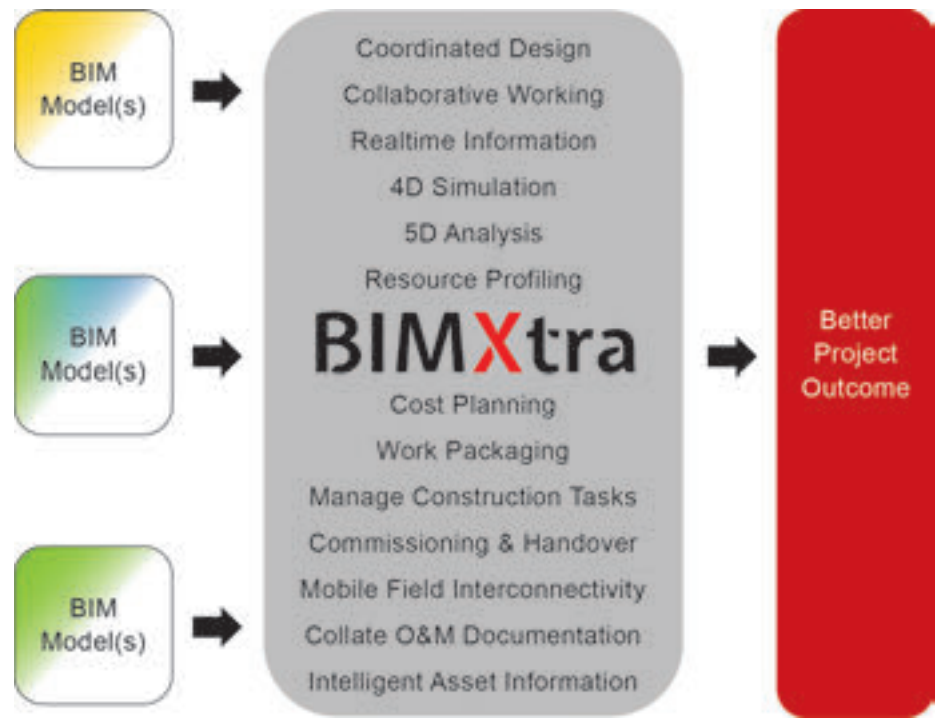
The expectation is the same for the construction industry, allowing us to define and communicate our requirements better, iron out issues before arrival on site, remove unnecessary waste in the process and provide, for the Client, a better service and an intelligent model that can help better manage the clients asset through its operational lifecycle.

Not surprisingly achieving the utopia from this transformation, like all transformations has it's challenges, however, much has been done to address the needs of industry through new technology, and the guidance for the new BIM enabled project delivery process is established in the British Standard and PAS 1192 series, but to maximise the benefits of these new tools we need to consider the working practice changes that are also needed in many environments.

Driven by a focus on low cost procurement that can result in uncertain end out cost and, subject to your position in the supply chain, insufficient consideration of whole life operational cost, together with margins driven ever lower in a highly competitive market we are often faced with risk aversion rather than more proactive risk management.

However, in some parts of our industry suppliers and manufacturers are fully integrated with 3D CAD-CAM tools either direct to manufacture or through the creation of fully co-ordinated pre-assembled or pre-manufactured modules that dramatically reduce the onsite work and risks in installation and in doing so provide a higher quality product, manufactured and tested in a controlled environment.

The vision of BIM is that all parties in the supply chain collaborate across



the same source of information, and make informed decisions based on better information with an improved awareness of the repercussions on others.

BIM delivers the maximum benefit when all parties take part, the leadership of key Clients like Government, who acknowledge the benefits in project delivery and on-going asset management has been instrumental in establishing BIM as a modern working practice.

The prize for all of us is a better, more efficient, higher quality, world leading industry.

Providing a simple solution to the technology and workflow issues of BIM is where Clearbox can support the process.

Clearbox

Clearbox are a technology provider looking to bring the opportunity of BIM to all through their digital information hub BIMXtra which enables simple access to the information based

around a true common data environment. BIMXtra addresses many of the issues of BIM by bridging the gap between the complexity of the BIM authoring tools and the plethora of project tools that characterise the current construction market. BIMXtra not only supports project delivery during the design and construction phase but delivers out the intelligent asset information at handover to provide a new level of opportunity for Facility Management and Asset Management.

BIMXtra takes information from BIM and makes it available to all in the simplest of approaches. Each user has access to the information they need in the right format at the right time, allowing the influence of BIM to be shared out from the design through the entire project delivery phase. BIM in BIMXtra not only enables interrogation and exploitation of the visuals but also extends and enables the full digital information management of the project.

Developed by individuals with years of experience of delivering design and

build projects, and who use BIMXtra tools themselves on their own projects, BIMXtra will help enable consultants, contractors, and SMEs alike to enjoy and benefit from BIM.

So if you are starting your journey or have uncovered some of the complexities of BIM then we can support you to meet the requirements of Level 2 BIM and beyond as a hosted solution. As 2016 approaches and the

gap between the haves and have not's of the BIM world grows there is no better time to jump on board and benefit from the lessons learnt from some of the early adopters.

In this, the first of four articles leading to the 2016 deadline we aim to take you on a journey of the simple functionality that is now readily available, as well as reassure individuals of the benefits of BIM that

can be realised in case studies. In the next papers we will address the solutions and some case studies to allow users to appreciate the scale of the benefits and the simplicity and ease with which this can be achieved starting with the interface to programme.

Graeme Forbes

Graeme Forbes is the Managing Director of Clearbox a technology and consulting business that brings years of experience in the BIM space through new collaborative tools that help to bring simplicity to the delivery of BIM based projects.



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Adoption of BIM by product manufacturers

Chris Witte, BIM4M2 Steering Group examines the recent BIM survey by Chris Ashworth, BIM4M2 Promotions Working Group Chair and Director of Competitive Advantage...

There are a lot of BIM surveys out there. They are all interesting to product manufacturers, but they don't really address our concerns or reflect our progress on our BIM journey. BIM4M2 conducted a survey of just under 200 product manufacturers firstly to understand how we as a newly formed group could add value to those embarking on that journey. An important part of our remit is to educate manufacturers and the insights from this research are helping us shape the advice we are developing. Secondly, we want to share the insights from the survey with as many product manufacturers and other interested stakeholders as possible. The survey should help those who have commenced their journey to assess progress and should act as a stimulus for those thinking about embarking shortly.

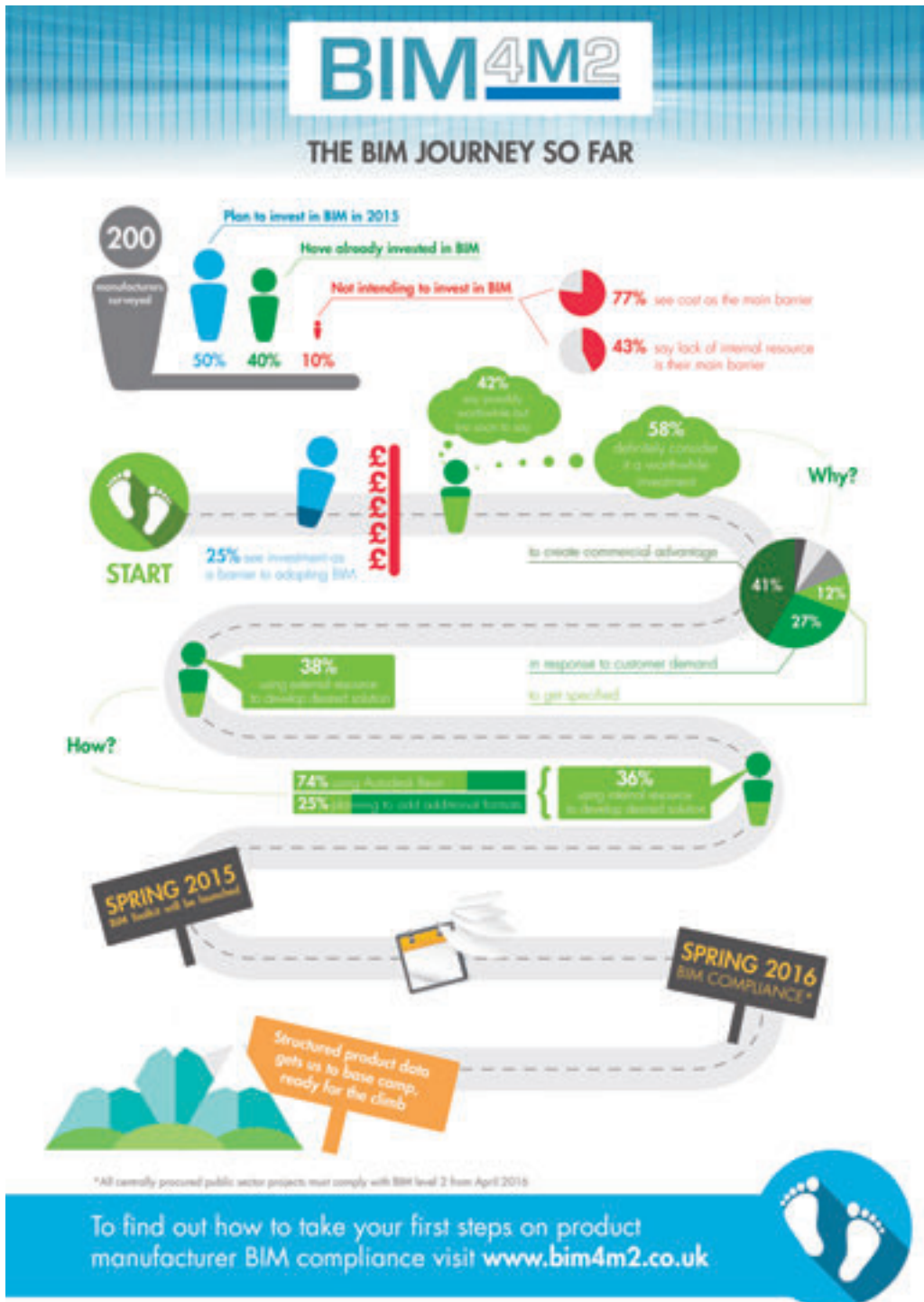
Those surveyed that have invested in BIM (40%) have done so to create commercial advantage (41%); in response to customer demand (27%); or in order to get specified (12%). However, 50% of those surveyed, whilst planning to invest in BIM soon (next 12 months), have yet to make a start. Of those not intending to invest in BIM, the cost was the main barrier (77%), followed by lack of in-house resource (43%). It is highly likely that some of these respondents are unaware of the Product Data Template route to compliance, which requires no more internal skills than are currently required to deliver project information; just in a different format.

Now is the optimum time to start your BIM journey, because the standards and optional tools will be complete by Spring 2015. So there is increasing clarity on what is required from product manufacturers. Having said that, there are still some important choices to be made.



Chris Witte, BIM4M2 Steering Group and Marketing Director Northern Europe at Knauf Insulation

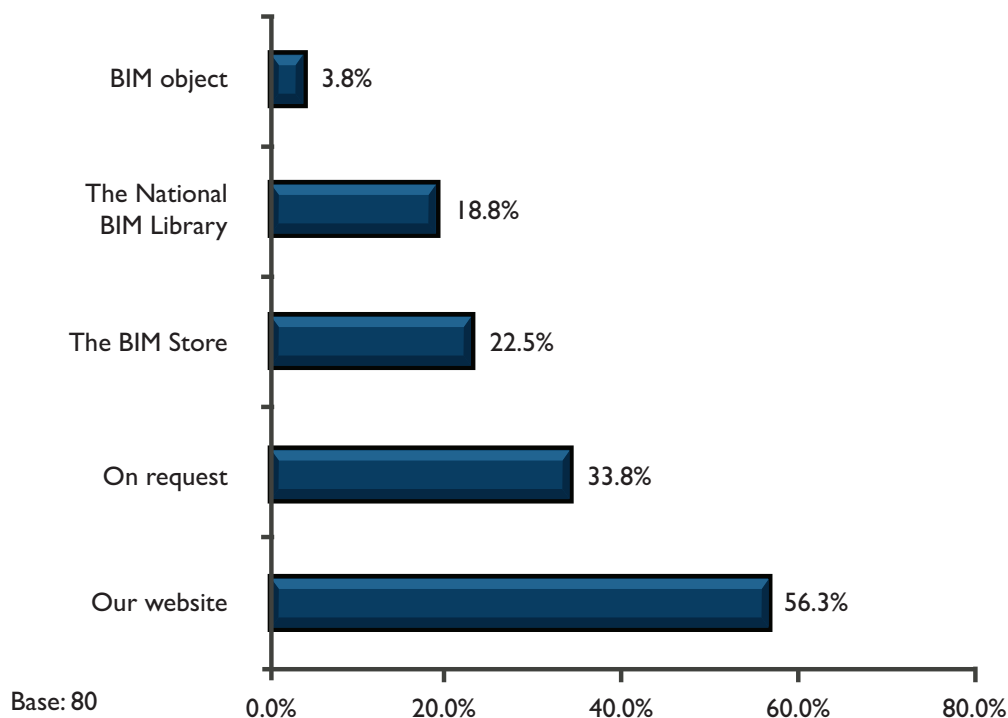
One of those choices is about exactly what you need to develop and whether to do it yourself or get a third party to do the work. The first stage is to determine whether Product Data Templates (PDTs) or BIM objects are the best choice for your company. PDTs are excel based templates that capture all the product information required by a specifier and are compatible to BIM level 2. BIM objects (with PDT information as a minimum, plus graphical representation of your product) may be preferred by some specifiers. But whilst populating PDTs can be done in-house (they become Product Data Sheets when you have populated them with your information), fewer companies will have the internal skillset to develop their own BIM Objects. Our survey found that 38% of us are using external resources to develop our desired solution, but 36% are using internal resources. And the software of choice used is Autodesk Revit (74%) with only a quarter planning to add additional formats.



It would be quite easy to become UK centric in our approach to BIM. However, since 52% of those surveyed export to mainland Europe, it is clearly important that all BIM solutions are sufficiently flexible to work in other geographies, with minimal adaptation. Working with BuildingSMART to achieve standards consistency across geographies will become an increasingly important part of the BIM4M2 role.

1 in 4 respondents saw investment as a barrier to adopting BIM. The main concern is the resource required; but almost as important is convincing internal stakeholders as to the importance of focussing on BIM. Developing the business plan rationale to convince senior managers to invest in a BIM solution is part of the advice that BIM4M2 is developing for product manufacturers. Understanding software options also

Fig 6.2: Where are your BIM objects available? – Have BIM



comes out as a greater concern than obtaining the finance to develop appropriate solutions. Of those that have implemented a solution, 58% consider it to have been a worthwhile investment, with one product supplier commenting that:

“There have been a high number of BIM downloads from our website and, as users are willing to register – a good quality database of users is being established. We conducted a survey of those downloading our files and 80% of downloads were for use on current projects. Our specification team are following up on those leads.”

Developing BIM objects is not the end of the journey, we have only reached base camp at this point.

The obvious place to promote your BIM solutions is your website (56%), but 34% of us are being more coy by only making the content available on request. The logic here is perhaps to protect the commercial advantage and tie in a technical conversation to the request, before sharing content. But 45% of respondents are making their content available through the libraries or clouds available such as BIMstore, NBL and BimObject (many of which are hosted both on a library and on a manufacturer website). The libraries

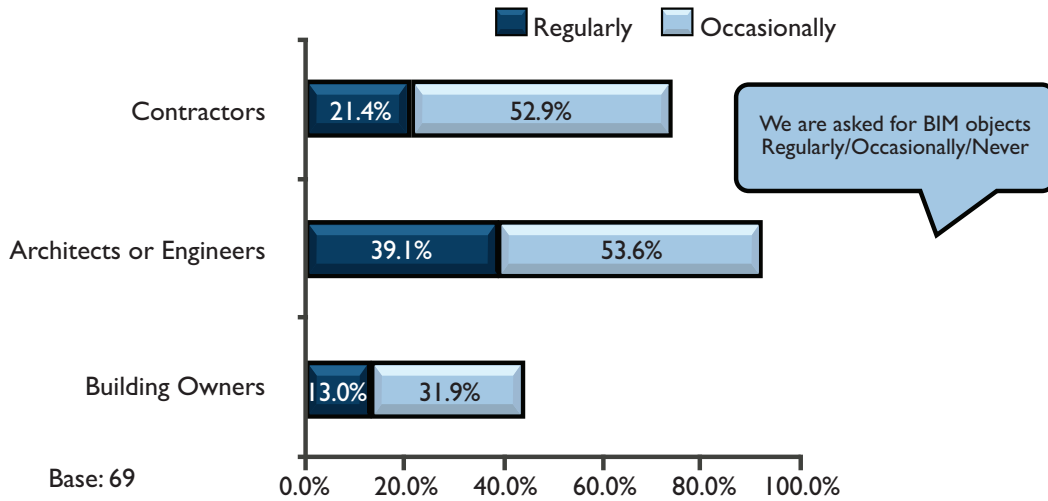
give manufacturers an equal presence regardless of size, as well as a high number of specifiers searching their content; something that individual product manufacturer websites can't always achieve.

Those that have published BIM objects can expect requests from architects on a regular (39%) and an occasional (54%) basis; but fewer contractors make requests, as can be seen opposite. Making architects, engineers and contractors aware of your BIM capabilities is clearly an important focus area that can increase lead generation and specification opportunities.

Having a BIM solution where your competitors do not, is likely to be a short term differentiator. How successfully you build the new leads you generate into your CRM processes, and make the connection between BIM solutions and projects won, will be one of your long term differentiators.

Only 13% of those that have BIM solutions have case study examples of how BIM has helped secure work. This is probably because it can take several months for projects to come to fruition, and many additional weeks to develop good case studies thereafter. Another reason might be that the BIM

Fig 5.1: Requests for BIM Objects – Have BIM



solution has been developed as a piece of content, not as a catalyst for process improvement. If the content has been developed by marketing or technical departments, have sales been fully engaged?

Of those manufacturers that have BIM solutions, 82% have an individual responsible for BIM in their organisation, whereas for those planning BIM it is still a positive 58%. The benefits of BIM to the manufacturer are not just external. The need to provide up-to-date structured data in a digital format can lead manufacturers to improve internal processes. Can the data provision be automated? Can the data be used in the manufacturing process? There are examples starting to emerge, anecdotal at present, where companies have used BIM to improve internal processes in a number of ways. To the question: why did you invest in BIM? “business process efficiency”, and “improved efficiency of manufacturing workflow” support the idea that BIM is as much about internal process improvement as it is about winning or maintaining specifications.

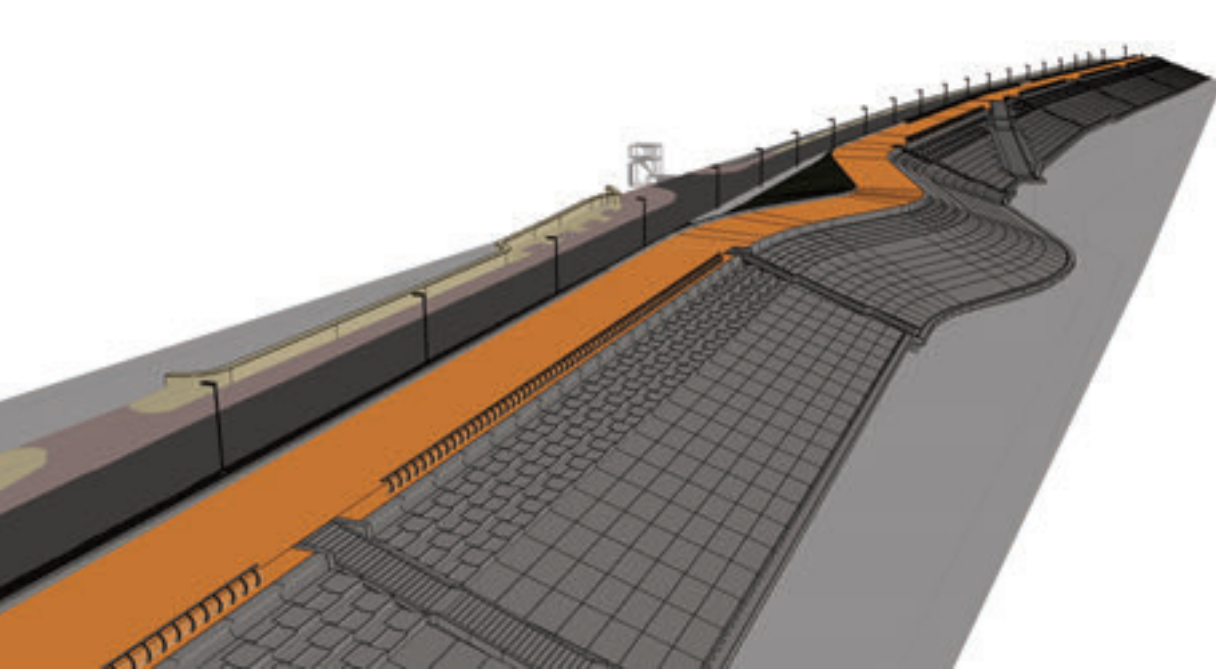
There is still an education job to do, even amongst those that have already published their BIM solutions. 59% of respondents incorrectly think that BIM Objects must be supplied to meet the Government’s

requirements in 2016. In fact it is just structured data to PAS 1192 – 2: 2013 that needs to be supplied. The PDTs are sufficient for this, but only 38% of us are aware of their existence.

In summary, the health-check on product manufacturers from this survey is that many (40%) are ready for April 2016 and most of the rest (50%) intend to be. However, there is still some knowledge building required even amongst those that have launched their own BIM content. ■

For the full report go to www.bim4m2.co.uk

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BIM for coastal defences: A client's perspective

In the first of a series of interviews with Carl Green, Head of Engineering Services for Wyre Council, we follow the progress throughout the construction and operation of the Fylde Peninsula Coastal Programme – the world's first BIM coastal defence scheme...

The Fylde Peninsula Coastal Programme (FPCP) is a partnership between Wyre Council, Blackpool Council, Fylde Council and the Environment Agency. It is responsible for managing the Fylde Peninsula's coastline and reducing risk of flooding to people and the developed, historic and natural environments. The scheme currently covers two areas, Rossall and Anchorsholme.

The Rossall area is situated on the North West coast between Cleveleys and Fleetwood in the Wyre Council area and is subjected to some of the strongest currents and highest waves on the coastline. The flood defences are old and could fail during a major storm, resulting in significant flooding to low lying properties in the area. The most recent major flood events occurred in 1927, which resulted in the deaths of six people, and 1977 when over 1,800 properties flooded following a breach of the sea defences.

Similarly, in the Anchorsholme area, situated at the northern boundary of Blackpool Council, major flooding occurred in 1927 and 1977. Flooding to the promenade, highway and tramway occurs regularly during storms when waves overtop the existing sea defences, resulting in temporary road closures. A

United Utilities pumping station forms part of the sea wall at Anchorsholme, which means Anchorsholme and parts of Rossall are also at risk of sewerage flooding.

The new defences will protect 12,000 properties in total – 7500 in Rossall and 4500 in Anchorsholme plus critical drainage and transport infrastructure. Extensive public consultation has been undertaken and a variety of public feedback has been considered in the development of both schemes. One clear underlying theme was evident throughout the consultation process; people just want to feel that they, and their properties, are safe.

Carl Green, Head of Engineering Services for Wyre Council, is leading the programme. Carl has over 20 years' experience in the design, construction, operation and maintenance of major civil and coastal engineering projects around the UK.

The project began in a pre-BIM world, where Green had seen contracts signed before relevant sections of the Government strategy had been released, particularly PAS1192/3. The competency of contractors to understand 3D modelling and information was key. Despite these competencies, it was clear that applying

a nascent methodology to a 'world first' wouldn't be without issues, and it was this understanding that led to Carl's structured approach to maximising the benefits of BIM.

"When we started the process, we thought long and hard about the challenges that we face when looking after the current sea defences. The main issue is that the information in our archives wasn't complete. Some information had been lost, some had been borrowed over the years and not returned, and some wasn't even captured in the first place.

"This made it more difficult to completely understand exactly how the current defences were constructed, what maintenance had been undertaken and why and even where exactly the sewerage outfalls were. I was determined that the next generation of people who would be renewing the defences in 50 years' time wouldn't face the same challenges as my team".

Carl mentioned that one of the key challenges was ensuring that the right data was captured rather than all data.

"The natural view of many in the team was to attempt to capture all of the data possible. It quickly became clear that on a programme of this size, this approach would be unsuccessful due to the sheer volumes of data that could be generated.

"As a group, we looked at our own requirements during the pre-design, design, construction and operational phases and decided on the data that we would need to capture at each stage to meet these requirements, and optimise asset management and minimise maintenance costs throughout the lifecycle of the project.

"We then formalised this in a document to use as a template to ensure and verify that we have captured the required information. What was most interesting is how different the new EIR was from our initial Employers Information Requirement documentation. (EIR)".

The next key challenge was software. There are a multitude of design packages, and GIS packages, maintenance packages as well as existing council software and different packages from internal and external supply chain organisations. The new EIR

didn't only include 3D models and traditional design data. It also included photographs, spreadsheets, PDFs, MS Office, scanned paper documents, video, audio and even laser scan files. Carl explained how he and the team overcame this challenge:

"We were initially worried about how to make best use of the data with all of the different tools that were being used on the programme. It quickly became apparent that we needed to identify a simple to use tool that enables us to use and capture information throughout the construction and operational processes that ideally can be used in the field.

"We managed to find a tool called Sitedesk www.sitedeskconstruct.com which can handle large complicated models on mobile devices as well as desktops, all of the file formats and versions that we require. Sitedesk also allows all members of the team to use existing documentation and workflows if required. We chose Sitedesk because it makes it simple to take advantage of the whole life cost benefits of BIM without the exposure to high hardware, software or integration costs".

Lessons learned so far...

For Green, the biggest lesson learned so far is to be more prescriptive in terms of the desired whole life outcomes for the asset. This process is the best way to ensure that the EIR correctly informs and defines the quantity and quality of the information that is actually required to manage the construction and operation of the asset.

Next time we will evaluate progress against expectations... ■



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Looking forward – Westminster and fire?

Graham Ellicot, CEO of the Fire Industry Association (FIA) looks at the current government departments that have a concern over fire policy, and what impact the next general election may have...

It's an interesting time in politics at the moment with the rise of UKIP and the likelihood that the SNP could decimate the Labour vote in Scotland at the next General Election. Indeed the bookies are offering 20/1 on a Labour/SNP coalition. And, as Alex Salmond has not ruled out running for a seat at Westminster if Labour and the SNP combine to form the next government, we could have the interesting situation of him sitting across the aisle from the Tory Leader.

But rather than continuing to play the what if game with the next government a better question to ask might be which government department will have the most impact on the future of fire? The answer should be simple as the Department for Communities and Local Government (DCLG) has the remit for the English Fire & Rescue Services with the other devolved administrations looking after their own Fire & Rescue Services.

However, in addition to DCLG, the Home Office via the Home Secretary is also seemingly beginning to offer a view on the future of the Fire & Rescue Service. In particular, Theresa May commented in September that the need for further spending cuts will necessitate the future integration of the police, fire and ambulance emergency services.

And it's not just the Home Office that has a view on fire; the Cabinet Office has also had its input here via its Mutual's Initiative. Indeed the Cabinet Office has 'put its money where its mouth is' by providing Cleveland Fire Brigade with £95,000 backing from the £10m Mutual Support Programme so that it can get "specialist business expertise to move the plan for

Britain's first 'John Lewis style' Fire Brigade a step closer to reality."

Moving right along there's yet another government department that has a say in fire and that's the Department for Business Innovation and Skills who are responsible for Primary Authority Schemes, which now include fire. These schemes were designed to create business investment in growth by developing confidence that regulators in different local authority areas would not place competing demands on a business which in turn could impose extra financial burdens on it.

The question I keep asking myself is do all these different departments need to be involved? Do they talk to each other like a joined-up government?

The next election is looming and once the result is known there could be even more changes. My bet is even more departments will become involved and I'm polishing up my John Lewis Card just in case the commercial sector takes over – free coffee every time I cycle to a Waitrose could become call by your fire station for a doughnut. And my local fire station is next to a betting shop...now where did I put that betting slip? ■

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The value of 3rd party certification for fire protection services

Third Party certification bodies are an important and vital part of the fire industry. They ensure that companies with certification are fully trained and competent in carrying out work such as maintaining and testing fire extinguishers, providing fire alarm systems and carrying out detailed fire risk assessments – and that they are regularly re-assessed. Company Managers or Facilities Management companies, who provide these services to their clients, have a vital responsibility to ensure that these services, or those of their sub-contractors, meet national standards and achieve their legislative duties.

Over 1200 companies are now registered to BAFE schemes and as DCLG (Department for Communities and Local Government) say in their Guidance notes: ***“3rd party certification schemes for fire protection products and related services are an effective means of providing the fullest possible assurances, offering a level of quality, reliability and safety that non-certificated products may lack. This does not mean goods and services that are not third-party approved are less reliable, but there is no obvious way in which this can be demonstrated.”***

Due to fairly recent changes in the law with regard to Fire Risk Assessment, it is necessary to ensure that the person undertaking the fire risk assessment is competent and have provided the much needed assurance for end users with regard to the quality of their Fire Risk Assessments to meet their obligations under the Regulatory



Reform (Fire) Order 2005, the Fire (Scotland) Act 2005 and the Fire and Rescue Services (Northern Ireland) Order 2006. Indeed in Northern Ireland and Scotland it is now mandatory that Care Homes have a third party certificated assessment.

There are no national standards for the competence of a fire risk assessor, although a number of organisations that have their own schemes set out standards of competence, such as the Institute of Fire Engineers and the UKAS accredited Warrington Certification FRACS scheme for individual assessors. A competency Council was established following the serious fires at Lakenal House and Rosepark Care Home, to provide guidance on the competence requirements and they have published their recommendations and a guide for specifiers. These are available from the websites of the Fire Sector Federation and BAFE.

There is also the UKAS accredited scheme from BAFE (SP205) which offers third party certification for organisations that provide fire risk assessments, ensuring both the competence of the assessors and the capability of the organisation to support them. There are three

certification bodies licensed to deliver this scheme and IFC offer a similar scheme in their own right.

In summary, there can be no room for complacency by building managers over the quality of their fire protection. Starting with the fire risk assessment and working through the passive elements of the building structure, the alarms, extinguishers, signage and emergency lighting, there must be compliance with legislation and Building Regulations. The enforcing bodies, generally the Fire and Rescue service, are actively pursuing companies and individuals that have not taken all reasonable precautions and the number of prosecutions is growing. To ensure that you have the best possible fire protection in place, both now and in the future, the use of third party certificated providers is an essential factor.

For more information about BAFE go to the website at: www.bafe.org.uk or contact us at: info@bafefire.org.uk.



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BAFE - Helping business to meet their fire protection obligations



Don't gamble with your fire risk assessment!

It is a legal requirement across the UK that all premises have a full and competent Fire Risk Assessment and then implement the fire protection requirements. The 'responsible person' has the duty to ensure that they have carried out these obligations – but how can they be sure that they have used competent contractors?

BAFE has developed a scheme for Companies who carry out Fire Risk Assessments (SP205) which is a vital part of meeting legal responsibility obligations under fire legislation. Providers are rapidly recognising the value of this scheme and gaining certification. After a number of fatal fires, such as the one at Rosepark Care home

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BAFE is the independent, third party certification, registration body for the fire protection industry, founded nearly 30 years ago with a wide range of industry bodies represented on our Council.

We develop schemes for UKAS accredited certification bodies to assess and approve companies to recognised standards. There are now more than 1150 BAFE registered companies across the UK. Our aim is to support property owners and specifiers to ensure that they get quality fire protection for their premises, staff and service users.

If you are specifying the supply and maintenance of portable extinguishers, look for Companies accredited to BAFE Schemes SP101/ST104. Companies are certificated

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There are a range of other schemes for different fire protection requirements.

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Concrete strengthens resilience to fire and floods

Engineering resilience needn't be rocket science. The challenge for designers is to be aware of the issues, and to think ahead, as Jenny Burridge and Guy Thompson from The Concrete Centre explain...

In fire, concrete performs well – both as an engineered structure, and as a material in its own right. Due to concrete's inherent material properties, it can be used to minimise fire risk for the lowest initial cost while requiring the least in terms of ongoing maintenance. In most cases, concrete does not require any additional fire-protection because of its in-built resistance to fire. It is a non-combustible material (i.e. it does not burn), and has a slow rate of heat transfer.

In flood, concrete performs well – both providing flood protection, keeping water away from a building and flood resistance, keeping water out of a building. For houses effected by flooding – concrete and masonry construction provides good flood resilience as it does not absorb significant amounts of water and, depending upon the design, may not require any finishes, which would need to be stripped off following a flood. Nor will concrete and masonry rot or warp as a result of water damage.

Concrete does not burn

Concrete cannot be set on fire unlike other materials in a building and it does not emit any toxic fumes.

Concrete is proven to have a high degree of fire resistance and, in the majority of applications, can be described as virtually fireproof. This excellent performance is due in the main to concrete's constituent materials (cement and aggregates) which, when chemically combined, form a material that is essentially inert and, importantly for fire safety design, has relatively poor thermal conductivity. It is this slow rate of conductivity (heat transfer) that enables concrete to act as an effective fire shield not

only between adjacent spaces, but also to protect itself from fire damage.

Concrete structures and fire engineering

Concrete structures perform well in fire. This is because of the combination of the inherent properties of the concrete itself, along with the appropriate design of the structural elements to give the required fire performance and the design of the overall structure to ensure robustness.

Fire performance is the ability of a particular structural element (as opposed to any particular building material) to fulfil its designed function for a period of time in the event of a fire. These criteria appear in UK and European fire safety codes. For any building or structure, regardless of its complexity, design for fire safety should address the following four principal objectives:

- Ensure stability of the load-bearing construction elements over a specific period of time;
- Limit the generation and spread of fire and smoke;
- Assist the evacuation of occupants and ensure the safety of rescue teams;
- Facilitate the intervention of fire fighters and other rescue parties.

Good practice in design for fire safety incorporates these aspects and more, in what is termed 'fire engineering' for large, complex structures that warrant additional design effort. From a whole building standpoint, concrete can satisfy the 4 principal objectives of fire safety through its inherent fire

resistance and the utilisation of its structural continuity in a fire engineered design.

Concrete proof

The impact of a major fire at Tytherington County High School, Cheshire, was limited due to the fire resistance of the concrete structure. Rather than taking a year to be demolished and replaced, as was the case with an adjacent lightweight structure, the concrete classrooms were repaired ready for the following term.

The insurance benefits of concrete construction have been underlined by reports that insurers could refuse cover for lightweight construction buildings due to growing concerns about their fire safety and the increasing frequency and cost of claims.

Andrew Minson, executive director of The Concrete Centre said: "Every fire causes financial loss and in most cases insurers have to pay for the damage and repair. For this reason, insurance companies keep comprehensive databases on the performance of construction materials. In mainland Europe, this information often results in reduced insurance premiums for concrete buildings due to their proven fire protection and resistance."

Minson pointed to France where insurance premiums for warehouses built from concrete can be reduced by up to 20%. He said: "The growing emphasis on risk avoidance means that the inherent fire resistance of concrete is being increasingly recognised, and it will be of no surprise if this is more widely recognised in lower insurance premiums in the UK."

Concrete can offer up to 4 hours fire resistance, well beyond the periods often stipulated by the Building Regulations for life safety. It offers this high level of protection for buildings whether under construction or completed, with no need for fire-proof boards or finishes that might be compromised due to poor installation, alterations or refurbishment.

"Concrete offers insurers and policy holders the potential for minimal damage, and therefore, smaller claims and lower premiums."

Concrete provides the best fire resistance of any

building material. It does not burn, it cannot be 'set on fire' like other materials in a building and it does not emit any toxic fumes, smoke or drip molten particles when exposed to fire. Concrete and its mineral constituents enjoy the highest fire resistance classification (class A1) under EN 13501-1.

Concrete and flooding

Flooding and flood risk has become increasingly common in the UK. As an island with a mild climate, the UK has always experienced high rainfall, coastal erosion, and fast flowing rivers, all of which can cause flooding.

The prime reasons to protect against flooding are to prevent human suffering, property and infrastructure damage, the spread of disease and financial distress caused by future large insurance excesses and high premiums. With the impact of climate change, flooding and the risk of flooding is expected to increase significantly. Flooding is not only a major threat to future land development and civil infrastructure, but also for building owners and their design and construction teams.

Concrete products can play an important role in helping to prevent and overcome flooding issues through a number of varied solutions.

Flood protection

Flood protection can either be permanent or temporary and is predominantly used to protect infrastructure. Concrete's robustness and durability are demonstrated by structures in the marine environment and concrete is the material of choice for permanent sea defences. However, concrete products are also available for temporary structures – for example:

- Barriers including products for blocking air bricks, window openings, doorway openings etc;
- Skirt-type flood protection systems that can be attached to the building, rising with the flood water and lifting a continuous membrane to exclude flood water;
- Free-standing flood protection systems are available in a range of systems; some of which do require sufficient time and expertise to be erected. There are

systems for any scale and interlocking precast concrete units can provide protection to key infrastructure such as power stations and other installations.

Flood resistance

Flood resistance is focussed on excluding flood water from buildings including the consideration of water management as well as good practice in the design of buildings.

Water management can be achieved using Sustainable Drainage Systems (SUDS) - SUDS aim to mimic as closely as possible the natural drainage of a site in order to manage the inundation of water and reduce flooding and water pollution. A SUDS system uses concrete in many elements:

- **Source control** – allowing surface water to enter drainage systems (including paved areas). Examples of source control techniques include permeable paving, green roofs, vegetative solutions such as swales etc. Concrete pervious and/or permeable paving also gives a level of basic treatment to reduce concentrations of pollutants.
- **Attenuation of flows** – using devices such as storage tanks, swales and storage capacity underneath permeable paving to reduce the total storm flow and peak flows, and to provide treatment benefits.
- **Passive treatment** – to treat water at the end of the pipe before discharge into a watercourse or aquifer. These methods can range from ponds that allow settlement, to wetlands or underground filtration tanks.

A flood resistance design strategy may allow flooding below ground floor level but would generally seek to stop flooding reaching above ground floor level where major damage generally occurs. Flood resistance for new build is best achieved in most cases by elevating the ground floor, ensuring that the most sensitive parts of a building are above the flood level to a standard of risk which is appropriate to meet at least 1 in 200 year return period. A recommended solution is suitably designed solid concrete floors with an effective damp proof membrane.

A flood resilience strategy to manage flood risk

accepts the likelihood that property and structures might flood occasionally, using a flood return period that is appropriate for the location. This demands a building construction which is easy, straightforward and quick to clean up when damaged in a flood. The main ways that buildings can be made more flood resilient are:

- By designing them to dry out quicker and be easier to repair, thereby reducing the length of time the occupants have to stay out of their homes following a flood event.
- Using materials resistant to water damage.

Concrete and masonry construction does not absorb significant amounts of water and, depending upon the design, may not require any finishes, which would need to be stripped off following a flood. Nor will concrete and masonry rot or warp as a result of water damage.

The proven durability of concrete structures means that they can also have an extremely long life. As a result, concrete can provide a cost-effective, high performance, long-term solution to flooding and fire. ■



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Jenny Burridge
Head of Structural Engineering

Guy Thompson
Head of Architecture, Housing and Sustainability

The Concrete Centre
www.concretecentre.com/

Durability challenges for new and existing reinforced concrete structures

Concrete and reinforced/pre-stressed concrete is and will be the main construction material for civil engineering infrastructure. Much more than in the past this construction technology faces challenges that have been discussed at the International RILEM workshop held at ETH Zurich in Switzerland on 17-18 April 2012¹.

For new structures that will be built in industrialised and emerging countries to expand the civil engineering infrastructure, the challenge is to achieve long service life, practical, cost-effective solutions with materials having a reduced environmental footprint. To achieve this, the cement industry made great efforts in substituting clinker (responsible for a large part of the CO₂ emissions) with supplementary cementitious materials (SCM). This substitution is reflected in the decreasing amount of Portland cement (CEM I) and the increase of blended cements (CEM II) worldwide (figure 1). These modern binder systems containing limestone, fly-ash, oil burnt shale etc. in a complex blend are getting included (thus allowed) by more and more standardisation bodies such as the European Cement Standards EN 197-1 and their national companions. The standards include specifications on the proportions in which they are to be combined, as well as the mechanical, physical and chemical requirements for both the products and their constituents. These blends are suitable for achieving strength similar to Portland cement, thus can be used to build concrete structures.

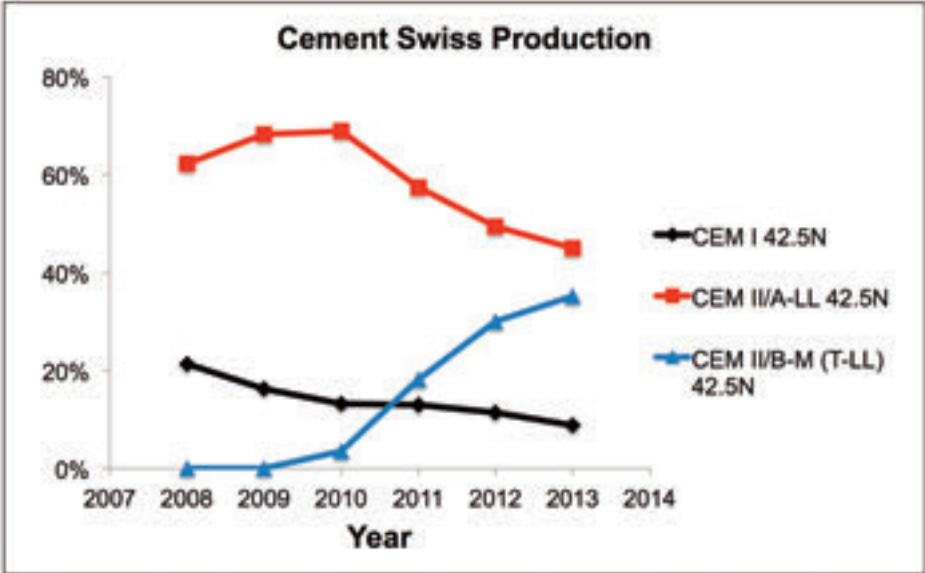


Figure 1: Cement consumption in Switzerland showing the trend going from CEM I (portland cement) to CEM II B (blended with limestone)

From the point of view of the end user (engineer, owner of the structure, society) that the final product uses concrete made of cement is more important. Performance based concrete standards such as the European concrete standard EN 206-1 have thus

emerged that relate concrete durability to different types of exposure. Concrete for a bridge in the Swiss mountains (figure 2) exposed to a severe climate and de-icing salts (exposure condition XD3) must be of much higher quality compared to



Figure 2: Typical highway bridge in the Swiss Mountains with severe exposure to de-icing salts in the winter

concrete inside a building (XC1). The term “quality of concrete” includes the care with which it is executed but also its composition – thus water to cement ratio and the cement type. Whereas long experience is available with concrete structures made with Portland cement (CEM I), new blended cements have a much shorter track-record. In addition, due to the reduced clinker content, the pH of the pore solution will be lower and questions arise regarding the corrosion protection of the steel², thus the durability of these new structures both regarding the resistance against carbonation and against chloride-induced corrosion.

The civil engineering industry is currently, in many industrialised countries, in a transition phase from building new constructions to maintaining the large stock of valuable assets. This is reflected (as an example valid for other industrialised countries) in the increasing costs for maintenance of the Swiss national highway system (figure 3) compared to the costs for building new structures. These reinforced concrete structures are aging and very often show premature deterioration due to corrosion of the reinforcement. For existing infrastructure the challenge is

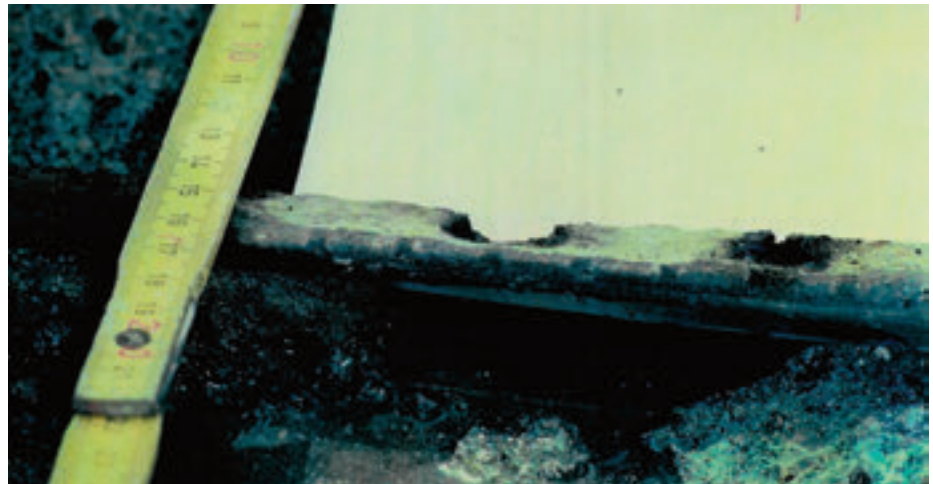


Figure 4: Localized chloride induced corrosion of the reinforcement showing that no rust is formed

thus extending the service life with a minimum of intervention, costs and traffic delay. Bridge management systems based on the results of inspection of the structures are crucial. Today visual inspection is common – once a sign of distress (cracks, rust) is detected maintenance action is decided (reactive strategy). In this way damage, especially chloride-induced corrosion of the reinforcement (figure 4) is detected only in a very late stage and maintenance costs are very high. An improved pro-active maintenance strategy requires a step forward, changing from visual inspection towards more refined techniques for inspection and

condition assessment, e.g. robotic inspection and corrosion surveys. This is particularly important for RC structures exposed to chloride ions (sea-water, de-icing salts) as internally ongoing corrosion of the reinforcement will manifest only in a very late stage at the surface.

The topics addressed here will be further focussed on in future issues of Adjacent Government.

¹ U. Angst, R.D. Hooton, J. Marchand, C.L. Page, R.J. Flatt, B. Elsener, C. Gehlen and J. Gulikers, *Materials and Corrosion* 63 (2012) No. 12

² L. Bertolini, B. Elsener, E. Redaelli, P. Pedeferrri, R. Polder, *Corrosion of Steel in Concrete – Prevention, Diagnosis, Repair*, WILEY VCH second edition (2013)

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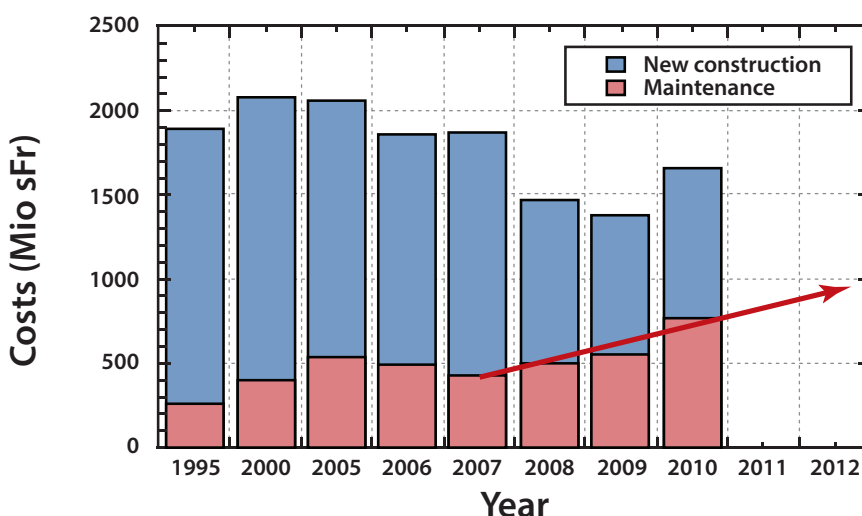


Figure 3: Increasing costs for repair and maintenance of the ageing infrastructure – example Swiss Highway System

The Green Deal – a simple and robust idea?

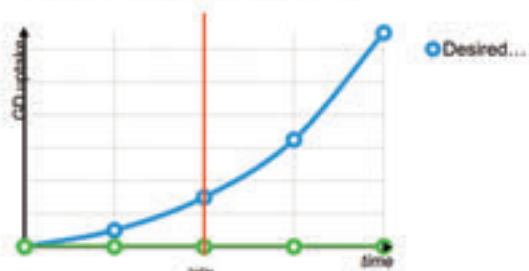
Steve Cole, Policy Leader at the National Housing Federation discusses whether the Green Deal has helped to improve energy efficiency in UK housing stock...

Green Deal, the government's flagship policy to improve the energy efficiency of the UK's housing stock, has been much debated over the last few years. With the second worst energy performance standards in Europe the government recognised that the UK's housing stock is crying out for a transformational programme not only to cut carbon emissions, but to end fuel poverty, and resolve the cost of living crisis that goes hand in hand with the housing crisis. The National Housing Federation and its members fully supported the concept of the Green Deal because it provided the up-front investment at no cost to the property owner or residents and repaid that investment from energy bill savings. A win-win-win situation.

Unfortunately, the Green Deal is currently the Good, the Bad and the Ugly of policy making. A fundamentally good idea, badly implemented leading to an ugly outcome.

Greater minds than mine have given the issues with the Green Deal a lot of thought but it's perhaps best summed up in the graph below from UCL which

UCL
Behaviour over time graph: desired vs. actual take-up
our issue expressed as key variable(s) over time



(1)

charts the desired take up against the actual take up. You'll see the latter is basically the x axis. High hopes, little or no delivery.

But why has this happened? Again there are lots of detailed explanations about the issues with the Green Deal, many of which have been held by government itself. (2)

At its heart the Green Deal is a simple and robust idea; residents (both tenants and owner occupiers) should be able to use the savings on energy bills gained through energy efficiency improvements to pay for the cost of those improvements. The problem comes when layer after layer of bureaucracy is added to the process, leading to high costs, complex systems, and a lack of real incentive to buy into.

The issues around complexity and costs of the scheme, as well as credit checks on residents mean that it was never a viable scheme for housing associations and their tenants. Furthermore, the need for Green Deal assessments when housing associations often know the energy performance of their own stock well and are in a position to take strategic decisions about renovation means the much vaunted Green Deal assessments are actually just another bureaucratic layer.

So what has been done, and what could be done to make this policy work?

With both funding rounds oversubscribed, the first thing to say is that the more recent Green Deal Home Improvement Fund (GDHIF) shows there is a real appetite for energy efficiency. It was a simpler process, easier to access and (importantly for Housing Associa-



tions) prioritised much needed Solid Wall Insulation (SWI) The fund also supported the delivery of multiple measures, moving closer to a whole house approach to energy efficient retrofit, which we know to be more effective in terms of overall cost, improving resident comfort, reducing fuel poverty, and reducing CO₂.

As a result of unprecedented demand this fund has now been closed to new applications. It's possible that it may be re-opened or even that a successor could be announced. Whatever the longer term outcome with, and because of issues around state aid regulations it is not a reliable source of funding but could provide 'bonus' funding for housing association projects being planned and implemented.

While this may sound like carping from a sector about a generous government subsidy, the reality is that housing associations are, in a tough economic climate, investing hundreds of millions in improving the energy efficiency of existing homes above the legally required standard. However, they are doing so at a loss and support from government is just one plank in enabling them to deliver homes fit for the 21st Century.

Last year, the Netherlands Energiespong programme signed a deal to retrofit 111,000 homes to net zero energy standards. Like Green Deal, the programme uses a pay as you save model but crucially the model is not the focus of the programme but a tool to deliver its wider aim.

I recently had the privilege of taking part in a study tour to explore how such a scheme could be delivered in the UK. I was struck by Energiesprong founder Jan-Willem der Group's statement about the key to the whole process: 'once the target becomes net-zero energy, everything else is simple.' By prioritising outcomes rather than process the Dutch, who are operating in a similar economic and political climate to the UK (they even have their own Bedroom Tax) have been able to bring together housing associations, local government, homeowners, and major construction companies to drive fundamental change to energy efficiency in housing.

Lastly, consistency works. The government has taken a lot of flak for Green Deal but the programme remains a step in the right direction and the key plank in the UK of dealing with a very different issue. It is not a million miles from the successful Dutch model and, as such, should not be torn up but must evolve. With the general election looming it is important that we don't go back to the drawing board again but develop the existing scheme to better deliver the change UK housing is crying out for. ■

¹ http://www.bartlett.ucl.ac.uk/iiede/research/project-directory/projects/housing-energy-wellbeing/project-information/Workshop3_Nici_Zimmermann_Green_Deal_example.pdf

² <http://www.publications.parliament.uk/pa/cm201415/cmselect/cmenergy/348/34805.htm#a7>

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The Disintegration of the Housing Debate

In addressing the urgent need for more housing, Professor of Environment and Spatial Planning, Alister Scott believes that key participants in the housing question need to embrace the economic, social and environmental drivers of development in a more joined-up discussion...

As we move inexorably towards the general election in 2015, the issue of housing policy and delivery will become increasingly important in political debates. Current estimates of future housing need reveal an annual need for some 265,000 additional dwellings but, due to significant past undersupply, this figure may well need to rise to 300,000 ([RTPI, 2014](#)). Invariably, building houses on this scale will invoke negative political and public response. But how and where should these homes be built?

In my view, there are no 'magic bullet' solutions as the housing question is complex demanding much more cross-sector thinking; but this type of approach is something conspicuously absent in contemporary

policy and decision-making processes. Unfortunately, this is also a view that does not sit well with the media, politicians or the public.

Arguably, we have reached this impasse because the 'wrong' question is being asked. Leaving aside the intractable issue of how 'need' is measured, the question should not be how many houses do we need to build; rather it should be: what kind of future places do we want to create? But this fundamental societal question is increasingly overlooked as the housing debate becomes increasingly disintegrated. New development is viewed in isolated pieces without reference to its place in the overall built and natural environment jigsaw. The fetish for housing numbers



alone pays little reference to the infrastructure, community, economic and environmental services needed to support them. This is symptomatic of a wider agency and sectoral myopia.

Potential solutions of new [garden cities](#) such as [Ebbsfleet](#) and [Bicester](#) have been heavily promoted by parts of the government. Yet the government is also providing renewed policy support for protecting [green belt](#) from new housing incursions; such political posturing and potential contradictions generates significant scope for land-use conflict and uncertainty.

This is exacerbated by the vacuum in strategic planning and where some 70% of local authorities are yet to make their local plans fully NPPF compliant ([Source: PINS December 2014](#)). Increasingly, questions are being asked about the competency of the [Duty to Cooperate](#) in resolving unmet housing demand, together with other fundamental components of the housing question such as speeding up the [development pipeline](#), overcoming landbanking by developers, identifying viable delivery mechanisms, and delivering [affordability](#) and social and environmental justice through new schemes such as help to buy.

So I want to explore a different way to frame and manage the housing opportunity/problem. In doing this, however, the key participants in the housing question need to go beyond the current Duty to Cooperate models; moving out of established sector-based comfort zones and embracing the economic, social and environmental drivers of development in a more joined-up discussion.

First, there needs to be a more holistic approach to objective assessments of housing need. At present, too many assessments are made by the local authority in isolation resulting in challenges at examination. Unfortunately, the guidance and metrics for housing need assessments are beset by statistical anomalies and dubious econometrics, making any derived figure disputable. A collaborative approach such as that pursued by the [joint housing study](#) of the Birmingham and Black Country LEPS provides a useful model forward under the auspices of the Duty to Cooperate. However, there is a powerful case for making such

models more transparent and understandable and also linking them to transport, employment, waste and climate projections.

Secondly, there needs to be strategic consideration and assessment of different growth models, set within the opportunities and constraints of housing market areas, not just within single local authorities which do not represent functional geographies. Despite claims to the contrary, there is no way that solutions based on garden city ideas alone can address the housing requirement nor, equally, that brownfield sites alone can meet the projected housing need. So we need to bundle several options together within housing market areas that deliver multiple economic, social and environmental benefits. Here a potential option mix might include new towns, urban extensions, urban densification, public transport extensions and dispersed development for example.

Thirdly, we need to move away from any one-size-fits-all approaches that restrict such options. In particular, the green belt has moved past its 'use by' date. I have argued elsewhere that we need to sensitively [rethink the value of the green belt](#) in order to maximise its environmental and social benefits, but only as part of a wider discussion of placemaking. Such green components form a vital link in development considerations: not as bolt-ons, but rather as core infrastructure to help promote liveability and growth.

Fourthly, we urgently need to consider how housing and employment developments are to be financed and delivered. All too often, the debate revolves around the perceived problem of securing planning permission, but this is only one part of the overall development pipeline. Significantly, the development of 10,000 homes at [Northstowe](#) is being delivered by the Homes and Communities Agency as landowner on former RAF land – hence a brownfield, and previously-developed site. In many ways this might provide an instructive way of overcoming some of the stagnation observed in the development pipeline. Significantly, the TCPA has provided some much-needed leadership on this issue within its [New Town Act](#) manifesto with the idea of a revitalised development corporation delivery vehicle.

Finally, we need to think about the quality of life for residents and users of the new places we create. All too often the social and environmental components are seen as luxury bolt-ons to new developments. Yet, in reality, they need to be integral components of the mix from the start. Issues of climate change and health demand that we rethink how our cities, towns and countryside are designed and planned to avoid costs and disruption further down the line; [flooding, drought and extreme weather conditions](#) demand more proactive responses. These are all issues that will greatly add to the sustainability and liveability of our settlements.

At the heart of the housing debate lies the need for a culture change from agency and sectoral insularity to more cooperative and collaborative ventures across the built and natural environment professions and the wider public to understand, view and assess better the housing picture within the wider economic, social and environmental settings in which it sits. This is far from some academic navel gazing exercise, but rather a new set of discussions that have been missing from the current debate, which is becoming increasingly sterile and polarised as the election draws near. ■



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Great British Renewables

Adjacent Government highlights a speech by the Secretary of State for Energy, Ed Davey, which details the government's commitment to renewable energies, and how they will benefit Britain...

Part of a diverse energy mix, renewable energy plays a crucial role in developing the economy, stimulating growth, and creating jobs. Defined as energy that comes from a natural source, such as sunlight, wind or waves, the UK has a number of projects that are dedicated to the expansion of this field, most of which are designed to help meet government climate change targets.

In 2008 the Climate Change Act was introduced. This commits the UK to a 34% reduction in our greenhouse gas emissions by 2020 and 80% by 2050. As impossible as these targets may seem, the growing numbers of renewable energy projects in the UK means these commitments can still be achieved.

In order to do so investment in renewable energy is key. In a speech delivered in November 2014 at the RenewableUK conference in Manchester, Secretary of State for Energy and Climate Change Ed Davey explained the government's commitment to renewables, and what progress has already been made to make Britain a renewable nation.

"Over this last year we have moved to cement the framework for our renewable energy future," said Davey.

"First at European level. The 2030 Framework agreed last month is ambitious – but it's realistic and fully achievable. A target to reduce Europe's domestic greenhouse gas emissions by at least 40% by 2030.

"That's a target that our research suggests will continue to require a major expansion of renewables here in the UK and across Europe. And it's backed up by a European-wide renewables target of 27% – that

combines flexibility for member states to judge their own power mix, with a strong long term signal for the industry."

European 2030 policy

Davey went on to explain that the new European 2030 policy provides additional certainty to the targets set in the Carbon Budgets. He also confirmed that climate change commitments had been met, and the 4th Carbon Budget was at its original level.

"People had speculated we would go soft on our climate change targets and revise the 4th Carbon Budget upwards. We didn't. So, by the period of the 4th Carbon Budget – 2023 to 2027 – Britain will continue to have to up its low carbon game still further.

"And I remember, when we last met, the Energy Bill was going through Parliament. It's now the law. The 2013 Energy Act represents the biggest revolution in our energy sector since privatisation in the 1990's."

Not only can renewable energies reduce carbon emissions and help meet climate change targets, they can also create economic growth and jobs for the UK. Investment into renewable energy is key in order to help meet the government's objective to supply at least 30% of our electricity needs from renewables.

"We are attracting more new build renewables asset finance than any other country in Europe – behind only China and the US Globally," explained Davey.

"But the key economic challenges and opportunities of our renewables strategy go beyond this investment record. I've been determined to build up Britain's own



Ed Davey, Secretary of State for Energy

supply chain in renewable power. To attract more investment. And to provide a stronger UK renewables supply chain for the global market.

“The decision by Siemens and ABP Ports to invest in new manufacturing facilities in Hull was a massive step forward. And I am delighted that MHI Vestas Offshore Wind have today announced the first part of their UK industrial strategy.”

Offshore wind

Offshore wind is just one example of a renewable energy source that is growing throughout Britain. However, the Secretary of State pointed out that there is a false perception that profits collected from UK offshore wind are spent abroad.

“Over 40% of lifetime costs if a UK windfarm are dispersed in the UK supply chain. And UK capacity in the offshore wind supply chain is growing – so we can grow that proportion higher.

“That is a challenge for both government and industry, working together through the Industry Council. Building a strong supply chain needs the commitment and expertise of local partners.”

Although wind farms are successful in the UK, Davey believes that it is important to draw on expertise from other countries in order to collaborate and learn. Within his speech, he announced that the UK

has led the successful bid for more than €10m of European Funding to help finance DemoWind. “This is an innovation competition for collaborative offshore wind demonstration projects between UK businesses and counterparts in Denmark, Spain, Belgium, Portugal and the Netherlands.

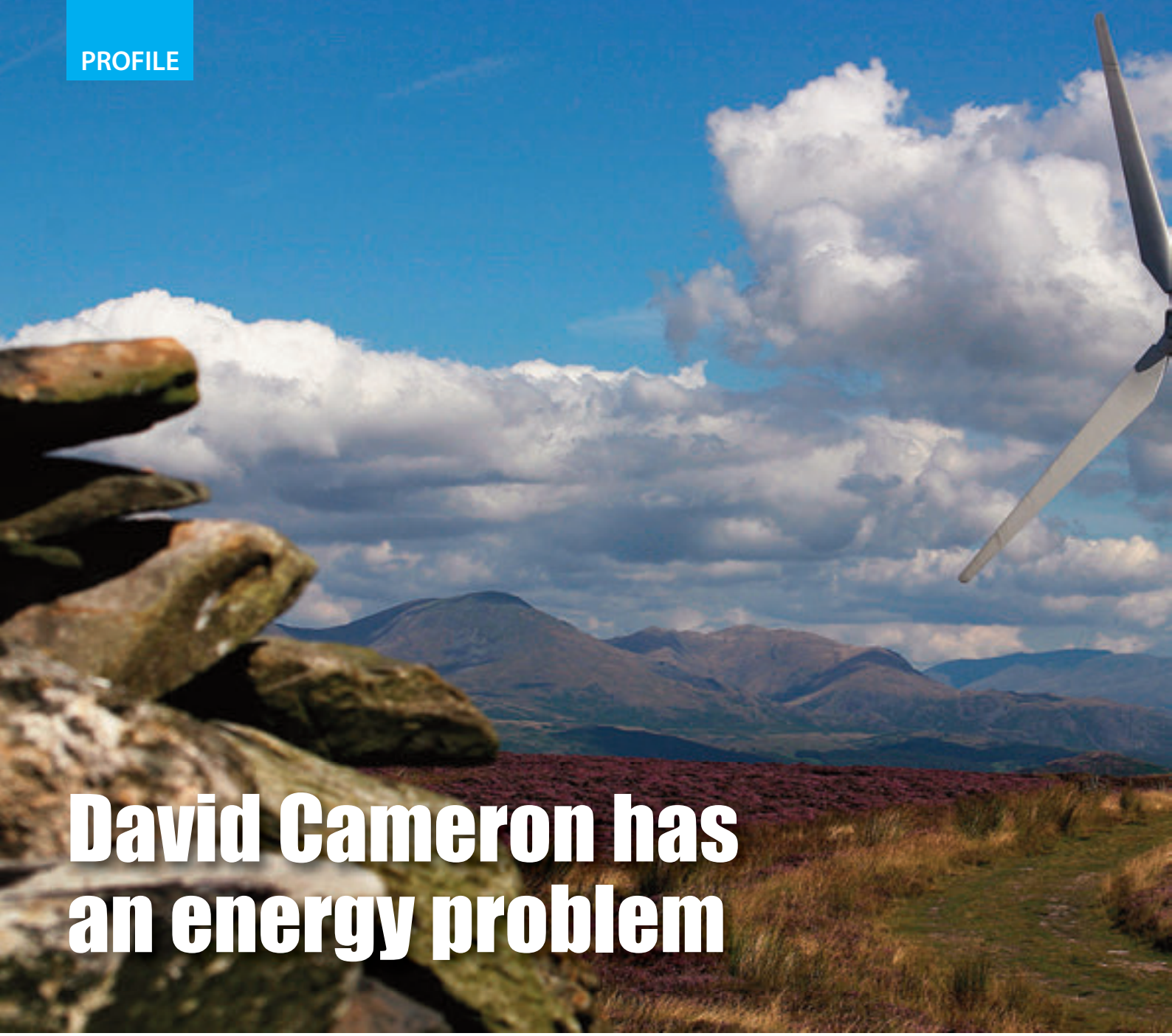
“And we are partnering across government to leverage economic advantage from our renewables programme. Today the UKTI’s Offshore Wind Investment Organisation are publishing this guide for investors.

“This unique collaboration between UKTI, The Green Investment Bank, The Crown Estate, RUK and the Offshore Wind Programme Board, sets out why the UK is the best place in the world for doing business in offshore wind.

“What gets me excited and inspired by this investment story is the story of the jobs it’s creating and the people it’s benefiting across Britain.

“So renewables are a great British success story.” ■

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David Cameron has an energy problem

Renewable Energy company, RWE Innogy, urges the Prime Minister to maintain his support for wind farms and suggests reforms that would increase efficiency and reduce the number of turbines.

How do you cut the number of wind turbines, reduce their reliance on subsidy and increase the energy produced?

That's the challenge we in the onshore wind industry face. The Prime Minister says people are "fed up" with the number of wind farms and there ought to be no more subsidy in the next parliament.

As it happens, the polls show strong public backing for onshore wind power, but we recognise that some people have an issue with wind farms.

However, there is a way out of the conundrum that will satisfy almost everyone: fewer, more efficient and visually improved turbines.

Like all good businesspeople, we're constantly looking to lower costs and be more efficient in our operations, something that will reduce subsidies over the long-term.

There are two ways in which we can

reduce the number of turbines while boosting their output.

Firstly, we want to replace older turbines at existing sites with newer, more efficient models, as we propose to do at our Kirkby Moor wind farm in Cumbria. Secondly, we're looking to introduce slightly larger turbines at new build projects. As a general rule, adding an extra 5 metres of height would boost the energy output of a turbine by over 10%.

Taller turbines can access 'better' wind – that is, wind unaffected by low-level turbulence – and carry bigger blades.



Kirkby Moor wind farm – which is now being repowered



Mike Parker, Head of Onshore UK, RWE Innogy UK

That reduces the number of wind turbines you need at a site, cutting manufacturing costs, but increasing the amount of electricity produced.

Unfortunately, planning precedents in the UK make it difficult for a wind turbine to be installed on land if it is more than 125 metres from base to tip, and it means we can't buy from a standardised set across the European supply chain.

If The Department for Communities and Local Government issued updated guidance to local planning officers, a number of opportunities would open

up. By permitting a small increase in height, the UK could reduce the number of turbines at wind farms, see an increase in electricity produced, and reduce its dependence on foreign fossil fuels. The move would also help us reduce costs and therefore subsidies, whilst creating a British wind turbine supply chain that could sell to a wider market across Europe.

None of this means people will see 'monster turbines' springing up across the countryside. We only need to go a little bit higher, an additional 5 to 10 metres. People will see little discernible visual difference in the size of turbines.

Back in 2012, the Prime Minister told planners to "get off people's backs" or face the consequences. Embracing that reforming approach on wind turbines, as well as in dealing with the

backlog of onshore wind applications stuck in the planning system, can deliver the results we all want to see – less subsidy for onshore, less impact from developments and cleaner domestic energy that keeps the lights on.



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Power up with Power-on Connections

It's hard to believe that it has now been over a decade since the UK construction industry has truly had the freedom to select an independent alternative to the local electricity utility – for example WPD, UKPN, Scottish & Southern Energy etc., (now known as Distribution Network Operators, DNO's) to provide the new connections to their developments.

Prior to this, developers and main contractors seeking new electrical connections for their developments could only do so through the DNO's. This, usually because of high demand, was often time consuming, expensive, problematic and frustrating. Although the provision of competitive connection facilitators had been developing for some time, it was not until late 2003 that the sector saw a real breakthrough, when an accepted industry wide standard of accreditation for Independent Connection Provider's (ICP's) came into place.

The revolution began...

The revolution was underway... the new system not only satisfied the DNO's that standards of quality and safety would be upheld when an accredited ICP undertook to deliver the electricity connection for a development project, it also helped to open up a whole new area of competition, meaning that developers had a choice. This in turn meant that these companies could focus on the interests of the client!

Today, the ICP's role is to provide competition alongside the DNO's in the provision of assets required to connect new load to the distribution networks. The opening up of this activity was a direct result of persistent lobbying by user groups consisting largely of developers and main contractors frequently frustrated by poor service levels.

“Over the past ten years Power On has provided new electricity supply connections totalling over 1000MW on over 2500 contracts, with a current repeat order success rate of over 80%. These include many landmark developments across the regions' cities, major city living projects as well as a growing track record with national developers for distribution hubs across central England.”

In more recent years Independent Distribution Network Owners (IDNO's) have provided additional competition in that they would own and operate these newly connected assets. This new arrangement presented our clients with additional benefits of reduced contributions as each connection has a future recognised value to the asset owners.

Attitudes are changing...

DNO's have had to accept the changing position although even now today

the competition market place is not fully open and operating effectively. Barriers still have to be overcome and challenged albeit that the end may be in sight.

Emerging as a force...

Power On's strategy has been to take ownership of the works from start to finish, offering a complete turn-key service from the initial enquiry, through to energisation of the project using their own teams; Giving their clients the simplest, possible interface for construction co-ordination.

Power On operates a highly trained design, project management and construction workforce from their operational centres in Leicester, London, Stafford and Leeds enabling the company to work strategically across the whole of the UK. The company prides itself on a high level of service, having easily contactable staff, offering a quick turnaround of proposals to clients, with guaranteed cost certainty, completion dates and improved project cash flows compared to those offered by all of the UK's DNO's.

Working on behalf of many national and regional companies, Power On has achieved an invaluable reputation for delivering on time and to budget. The emphasis on flexibility and certainty, with staged payments and terms and conditions that enable effective risk management.

To date, Power On projects have covered all types of development, from speculative light industrial, commercial, educational and retail, to large-scale manufacturing and freight distribution warehousing. Power On also specialises in connections for high-density apartments, whether that be city living, student accommodation or retirement homes. The high density of this type of development, combined with the locations selected, pose many challenges, one of which is arranging the new electrical supplies for building.

Our sister company the Electrical Network Company (ENC) operate as an IDNO and therefore within each of our quotations we are able to provide the financial benefits of IDNO ownership back to the customer. This is clearly a winning approach as over 80% of our projects won are adopted by ENC.

Other service offerings within the Group....

Through a number of market leading brands at Brookfield Utility UK (BUUK) we can offer residential and commercial gas connections, heat and hot water systems, clean and foul water connections as well as fibre connections.

This makes BUUK the only multi utility operator across England, Wales and Scotland. We currently operate over 3,000 electricity networks and over 30,000 gas networks and have over 1.3 million customers with another 500,000 contracted connections.

This capability, competency, financial security and track record of delivery provides our customers with the secu-

rity and peace of mind to know that we are a credible and dependable force in the connections arena.

Building on a track record...

Over the past ten years Power On has provided new electricity supply connections totalling over 1000MW on over 2,500 contracts, with a current repeat order success rate of over 80%. These include many landmark developments across the regions' cities, major city living projects as well as a growing track record with national developers for distribution hubs across central England.

“Today, the ICP’s role is to provide competition alongside the DNO’s in the provision of assets required to connect new load to the distribution networks. The opening up of this activity was a direct result of persistent lobbying by user groups consisting largely of developers and main contractors frequently frustrated by poor service levels.”

Last year Power On commissioned two 33kV primary substations on time and to budget, whilst really putting a stamp on the company’s capabilities and benefits offered.

Power On has extensive experience assisting Local Authorities & Main Contractors with their LIFT and PFI building projects including health centres and schools across the UK.

Working closely with the customer from an early stage to ensure minimum requirements are inherent in

the design, Power On enables clients to make informed decisions when alternative solutions exist.

The future...

‘Self-Assessment’ for the Point of Connection eliminates the need for the DNO to determine where on their network a connection is to be made.

‘Self-Connection’ eliminates the need for the regional electricity company, or DNO, to complete the final connection and power up the site.

‘Higher Voltage Capability’ as load demands increase, we are developing our competency to include 132kV design and project management capability.

This increased flexibility allows customers to benefit from a ‘one stop shop’ solution provided by one company, thereby avoiding unnecessary delays to construction programmes.



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Investment in energy efficiency

Paul King, Chief Executive of the UK Green Building Council highlights why infrastructure investments for energy efficiency should be a priority for the government...

Blind spot. These are the words I used to describe government’s thinking on the energy efficiency of UK homes and the various infrastructure projects it considers worthy of investment. When the National Infrastructure Plan (NIP) was published last December, it included a list of the Coalition’s Top 40 priority infrastructure investments... energy efficiency didn’t make the grade.

So what did make the list? It was a case of the usual suspects. Transport in the form of roads, railways and airports; flood defences; communications; water – areas that most of us would agree fit the classic definition of infrastructure – all got a look in. Energy generation also featured heavily, occupying 4 of the Top 40 places.

While all these areas rightly fit the bill for infrastructure investment, domestic energy efficiency should not have been ignored. Why?

Firstly there’s the economic rationale, from both a consumer and wider economic perspective. Not only could a national programme of home energy efficiency deliver savings of up to £300 on the average annual household energy bill, it could also contribute to economic growth by creating thousands of jobs across the UK.

Then there’s the environmental benefit. The scale of the retrofit challenge means we must retrofit one home every minute between now and 2050 if we are to meet our legally binding climate change targets of reducing emissions by 80% mid-way through the century. And our current efforts are falling short of this. Energy efficiency offers by far the most cost effective way of meeting our carbon targets and combating climate change.

Government’s own analysis suggests that investment in energy efficiency could save the UK the equivalent of 22 power stations of energy by 2020 and around 9% of estimated total demand by 2030.

Cold homes are estimated to cost the NHS £1.36bn each year. Improving the energy efficiency of the coldest homes can also lift the vast majority of households out of fuel poverty and improve the health of residents.

Together with a coalition of 20 other partner organisations such as the Aldersgate Group, Green Alliance and WWF, we have campaigned for “a housing stock fit for the future”. Others have joined this growing chorus such as Kingfisher’s outgoing CEO Sir Ian Cheshire and the CBI from the business community, Labour’s shadow energy team and even senior Government ministers such as Energy Secretary Ed Davey.

Overall, there’s a compelling case for elevating the status of energy efficiency to an infrastructure priority and allocating significant capital investment on it. It was therefore frustrating that government effectively ignored the “significant opportunity” for greater energy efficiency which it identified within the NIP itself. A future government must think more broadly about what it considers infrastructure if it is to truly capitalise on the benefits energy efficiency can offer. ■

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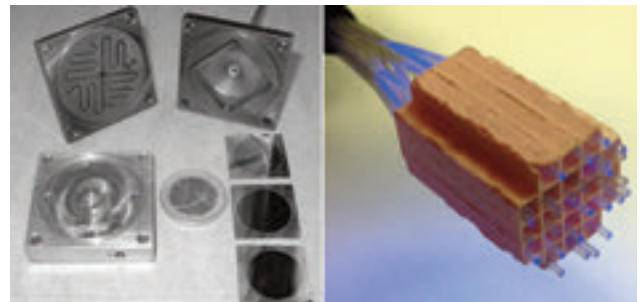
Institute of Energy Technology

Scaling down the hydrogen production in microdevices for portable applications

Hydrogen is deemed to be a useful energy carrier in the foreseeable future. It can be produced by using a variety of energy sources and it can be efficiently converted into useful energy forms without detrimental environmental effects. Hydrogen can be used as a fuel in internal combustion engines, turbines and jet engines, even more efficiently than fossil fuels. Hydrogen can also be converted directly to electricity in fuel cells, with a variety of applications in transportation, portable, and stationary power generation. Recent research advances in nanoscience, catalysis, modelling, and bio-inspired approaches offer exciting new opportunities for addressing the challenges of hydrogen and fuel cell technologies.

At the Institute of Energy Technologies, Technical University of Catalonia (UPC, Barcelona), we are working actively in the generation of hydrogen through catalytic reforming technologies with specific catalyst design, production of bio-hydrogen with micro-organisms attached to catalytic surfaces, photogeneration of hydrogen from water and sunlight with new nanomaterials, and the simultaneous production and purification of hydrogen using catalytic membrane reactors. So far, our success in these areas has resulted in the publication of high-impact articles in reputed journals like *Science* or *Nature*, in addition to several patents.

Recently, we have focused our attention in miniaturized fuel cell systems, since market analysts expect portable applications to enjoy widespread market success sooner than other applications. This has moved us to investigate in the development of miniaturized fuel reformers for the on-site generation of hydrogen. At present, portable electronic devices show remarkably improved performances, which lead to greater consumptions of electrical power. Moreover, the tendency towards miniaturization and the wireless revolution is being restrained by battery life. Already existing prototypes demonstrate that fuel cells about the same size as lithium-ion batteries pack almost four times as much power. However, fuel cell implementation



in handheld electronics could be restrained if hydrogen feeding and/or refuelling is not properly solved. Microreactors constitute an invaluable technology for boosting the implementation of on-board, on-demand generation of hydrogen for portable applications, thus avoiding limitations imposed by hydrogen storage.

We have accomplished a new turn of the screw in miniaturization of systems for hydrogen production by using silicon micromonoliths with millions of parallel micron-sized channels per square centimetre. By means of precisely designed methods, the channels walls can be successfully coated with homogeneous thin layers of appropriate catalysts. With the resultant geometry, the specific contact area increases ca. 100 times with respect to conventional microreactors reaching fabulous values of $10^6 \text{ m}^2/\text{m}^3$, which results in an increase of specific hydrogen production rates of about 500 times. This novel concept represents a landmark in miniaturization technology in general and in micro-scale energy production in particular.

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A fairer system for prepayment energy users

Currently 1 in 6 customers with a prepayment energy meter disconnect their services as a result of not being able to afford payments, some of whom remain disconnected for months on end.



Citizen's Advice have flagged the issues pre-pay energy users face by publishing a paper called 'Topping up or Dropping out'¹. They argue that the service is second-rate compared to the mainstream market of credit energy users. So, taking into account the evidence from the report and other sources, is it right that a vulnerable market should have to settle for second-rate services?

Within the paper, Ofgem state that 16% of the electricity and 14% of the gas markets use prepayment meters, unfortunately this portion of customers are paying on average £80 more a year when compared to credit customers. This means over 4.5 million UK households are using a service that is not in-line with credit methods.

Those who believe there is room to make a fairer pre-pay energy system have cited three key areas for improvement: a better price for pre-pay customers, more control and ease of use. As an independent energy supplier focused solely on delivering a prepayment service, Utilita understands the needs of this market demographic. The implementation of these key service benefits are an important step in alleviating some of the financial burden felt by over two million households living with 'fuel poverty'.

A better price

From an ethical standpoint, it is unsettling to think that the lowest income groups (therefore the most vulnerable consumers of the energy market) are the most likely to self-disconnect their services as a result of not being able to keep up with payments. It seems

only right that the price of pre-pay is fair, in order to ensure customers are given an opportunity to cope with their circumstances. Currently 1 in 6 customers on a prepayment tariff disconnect their services as a result of not being able to afford the payments, some of whom remain disconnected for months on end. Utilita recognises that this is a threat to the customer's wellbeing and have a dedicated team of specialists trained to offer quality prepayment support.

Some critics have argued that the concept of fuel poverty is something that shouldn't actually exist and that using this term is 'missing the point'. They suggest it is not a poverty of fuel but a poverty of equality; supply of electricity and gas isn't running out, it's just that some households cannot afford to pay. The bedrock of Utilita is in offering competitive tariffs and developing user-friendly ways to 'pay-as-you-go', specifically tailored to the needs of the prepayment market. Utilita understands that those on the breadline require an affordable and easy-to-access service. Rates across the nation are continuously monitored in order to ensure that their supply of energy is competitively priced and as low as wholesale and distribution costs will allow.

More control

There has been a call for a more 'hands-on' pre-pay service – one which customers can easily understand and use to their advantage. Utilita seek to achieve this with supportive customer services as well as communications delivered direct to the customer via their smart meter in-home device. The Citizen's



Advice paper has questioned the 'standoffish' billing practices of other mainstream suppliers, issuing large, convoluted bills post energy use. However, Utilita's in-home smart meter display - as part of their Smart Energy service, allows their customers to view their credit balance and usage in real-time, helping them to budget for their energy at every step.

Furthermore, Utilita already recognise that lower income households may unavoidably run out of credit every now and again, and so to protect the customer when this happens they have access to 'Emergency' and 'Friendly Credit', ensuring they do not lose power during evenings, weekends and bank holidays.

Any issues in communication within a prepayment service can have far deeper implications than just a drain on time. If there are problems with the customer's meter and they haven't been able to top-up effectively, then the household can be left without power. It was reported that 16% of prepayment customers had their power shut off over 2014 due to problems incurred whilst trying to top-up funds. Worse still, half of these customers had children to look after, meaning that some of the most vulnerable groups in society are subject to a disturbingly debilitating environment.

Ease of use

Those behind a reform in the delivery of a fairer prepayment service want to see the methods of topping-up made easier. Trekking to the shop with a plug-in key to top-up a prepayment supply is archaic and offers the user little flexibility. As with Utilita's service, more convenient payment methods such as online and SMS options, need to be available.

Recently, energy regulator Ofgem has fined companies in the 'Big Six' bracket for significant call centre

failings. Tackling this issue head-on, Utilita hold extended hours in which customers can reach a knowledgeable Customer Services Advisor and pride themselves on offering comprehensive aftercare.

Over 2,000 smart meters are installed each day in the UK, making it a growing portion of the energy market. How is it then that prepay customers are slipping between the cracks? Some believe that suppliers such as the 'Big Six' aren't built to cater for this demand, with the infrastructure of larger companies based upon serving credit users alone. Bill Bullen, Managing Director & Founder of Utilita explains Utilita's take on the situation:

"The important difference with prepayment smart meters is that you know exactly how much credit you have with your supplier. Over 80% of our customers have smart meters installed and are increasingly recognising the benefits and convenience prepayment smart meters have to offer."

It is reassuring to know that there is a leading supplier in prepayment energy built to cater for this market. Utilita have over a decade of experience in the prepayment field and currently serve over 180,000 prepayment customers. Considering there are over 4.5 million households in the UK on a prepayment supply, the energy market is still dominated by the 'Big Six'. Utilita are pleased to be offering a service tailored to the needs of prepayment customers and continue to be hopeful for the future of the prepayment market whilst they increase the outreach of their services.

1 Topping up or Dropping out - published October 2015 written by Dhara Vyas, part of the Fair Pay for Pre-Pay campaign: http://www.citizensadvice.org.uk/index/policy/policy_publications/er_fuel_water_post_digital_telecoms/topping_up_or_dropping_out.htm

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Smart metering for smart energy

Colin Pearson, Head of Condition Monitoring at BSRIA details the benefits of smart meters to customers and energy providers...

Smart meters bring benefits to both the energy consumer and the provider, but the extent of these benefits varies. This is partly because there is no single definition; a smart meter may just be smarter than the old meter. The most common features are a digital display of instantaneous energy use and the ability to send data to the energy provider avoiding the need for meter reading. For the energy provider there are possibilities for 'time of use' tariffs and these can also be used to the benefit of consumers by delaying heavy energy use until an off peak period. But many customers have concerns about security of data, how it will be used and to whom it will be available.

Most of the news about smart meters in the UK has been about the so called 'smart meter roll-out' which aims to replace 53 million domestic meters by 2020. There have been arguments about costs and benefits with domestic cost savings predicted as between £26 and £152 a year for every consumer, 2 to 12% off their bills. The costs have been estimated at between £10 and 15 billion, but since energy providers must replace meters regularly this may not be a true estimate of their additional costs. Energy providers have the benefit of saving the cost of employing meter readers, but the complexity of the necessary IT infrastructure with suitable security for customers' data should not be under-estimated.

Greater benefits from smart metering can be realised if either the occupants are motivated to save energy or the home appliance incorporates the intelligence to choose to run in off-peak periods. Home energy display units are a key component in the motivation of occupants; they must be able to see the cost of energy they are using and where it is being used so

they can make informed decisions about what to turn off. Research has shown that it is difficult to maintain motivation for energy saving unless the benefits are frequent and tangible. The use of 'intelligent' home appliances is more likely to maintain continued energy savings. Many home appliances are now internet enabled; washing machines can interact with electricity tariff information to choose the best time for a hot wash. These connected appliances become part of the 'Internet of Things' in which appliances can interact with the 'time of day' tariffs and even choose to switch off when demand on the supply network is high. This is a form of Demand Side Management which is also being used on a commercial scale in offices and factories.

The greatest benefits can be obtained by integration of other sensors to provide display to the user of energy, temperature, humidity, CO₂ concentration, window and door opening and water consumption showing instantaneous use and targets.

The good news for users is that they don't have to wait until their energy supplier installs a smart meter. Sensors for all these parameters can be installed now. There is a wide range of home or office display systems for some or all of these parameters. BSRIA has been installing them as part of research or building performance evaluation projects for the past 10 years. They are often provided as part of an energy efficient retrofit project or on a new low-energy dwelling.

Potentially there are greater smart meter benefits for commercial energy users. The small non-domestic smart meter roll-out covers 30 million customers. The Carbon Trust's research¹ has identified 5 key innovation areas that could be enabled before 2020 by the smart meter roll out for non-domestic customers:



- Non-domestic energy switching groups (so-called Power of Attorney services);
- Automated checks of a building's ideal energy performance versus its actual energy use, to find wasted energy consumption;
- "Software engines" which match up smart meter stats with fabric information and weather data;
- Device disaggregation in which the electrical load profile of individual devices is recognised so that the pattern of use for individual plant items can be found from measuring just the total demand, but at very short intervals of a second or less;
- Demand response.

"Greater benefits from smart metering can be realised if either the occupants are motivated to save energy or the home appliance incorporates the intelligence to choose to run in off-peak periods."

With smart meters installed, the energy provider can add these benefits to their contracts or if they make smart meter data available to third parties these

are areas in which consultants may develop business in advising non-domestic consumers on building performance relative to benchmarks. The correlation with temperature and other operational data can help to explain differences from benchmarks and promote best practice.

Until smart meters have been installed, many of the benefits can be achieved using either a pre-installed BMS (Building Management System) or temporary monitoring equipment available for hire and used by suitably qualified consultants. ■

1 Forward Look: Smart Metering-enabled Innovation in energy management in the non-domestic sector, DECC, 2015

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Auto-consumption and energy self-sufficiency...

...now within reach for social housing

Solar power provides an opportunity for social housing associations and landlords to improve the long term energy prospects of tenants by alleviating fuel poverty and greatly reducing their carbon emissions. And, whatever the outcome of 2015's general election and the new government's energy and carbon policies, the benefits of reduced electricity bills for tenants offered by renewable energy will only increase as prices increase.

However, there are other measures that photovoltaic (PV) installation owners and their tenants can put in place to achieve greater benefits. Mark Elliott, director of energy monitoring specialist Energeno, explains how auto-consumption and monitoring technology hold the key to unleashing PV's full potential and how its own range of equipment can help landlords and tenants alike combat fuel poverty.

Providing heating and hot water through renewably generated power and home automation is not just for the "home owning" cash rich, retiree, but is also a financially prudent and positive choice within the rented sector. We also know that the full benefits of renewable energy can only be achieved if they are supported by efforts to encourage people to be energy efficient.

Landlords and tenants alike need to gain a true insight into energy use in their buildings, to give them the

means to reduce their own heating and electricity bills – a key goal shared in social housing renewable energy strategies and something we incorporate into all our heating and energy monitoring technology offerings."

Heating and hot water from Solar PV

Heating and hot water are key expenditures for social tenants and ones that can lead to rent arrears, non-payment and ultimately a court summons and eviction. Relief is at hand, with hot water provision being a simple addition to the of Solar PV installation. Systems such as Energeno's Optimersion convert free surplus electricity into hot water. Optimersion is installed between the immersion tank and the consumer unit and supplies variable power for hot water, depending upon the excess energy being generated.

Typical annual savings for Optimersion users are around £125 with larger savings being achieved for higher cost oil and biomass systems. Because the PV generated electricity is cost-free due to the FiT mechanism, tenants immediately save money on hot water bills. The installation of these types of products means that the benefits of Solar PV are delivered directly to the tenant without the need for tenant action.

But the benefits of Solar PV are not limited to properties with an existing

immersion tank, surplus power can supplement existing wet heating and hot water systems by pre-heating the water supply, and for electrically heated properties by feeding existing storage heaters formerly using Economy 7, Economy 10 or other off-peak electrical tariffs.

New Heat Storage technology is also being used in some pilot projects around the country. Heat stores, as the name suggests, store low cost and renewably generated energy as heat, and release the heat later when it is required, either as hot water or as room heating. The energy that is stored can be provided from a combination of sources such as Solar PV, air source heat pumps optimised by Optimersion. Energeno work with all of the UK's Heat Storage companies.

The benefits of energy monitoring – introducing Wattson Solar Plus

Even in properties which have new, low cost, efficient heating systems, the benefits of free electricity can be shared by Social Housing Landlords, as long as tenants are aware of when and how much electrical power is available. In-home displays have long told users how much power is being consumed within a property, but houses with Solar PV require a different sort of monitor, one that compares energy use with energy generation, and showing them when electricity is free. The Wattson Solar



Plus literally gives PV users the green light to use free electricity. Connected to an installation, it fits on a shelf or even next to the TV, and shows in real time, how much electricity is being generated by an installation, how much energy is being used around the house and the carbon emissions being produced by that energy use.

When surplus power is available, Wattson glows green to tell people that they can use free electricity or sell it back to the Grid. Giving tenants transparency in this way enables them to avoid using high energy consuming items, such as washing machines, when it's most costly to do so and choose a time when it's free. Not only does this aid with the ever present issue of fuel poverty facing many tenants by helping to reduce their electricity consumption by up to 60 per cent, but it can also increase the profitability of an installation for the property owner.

Mike Harrison, Director of Technical Services for Poole Housing Partnership (PHP), says "Wattson Solar Plus for Social Housing allows tenants to see when they can use free electricity which is vital for people to needing to save on their bills. We have slotted Wattson in our Your Solar Power campaign and tenants love the

changing colour display which is understood by all the family, including the little ones"

"By educating tenants about their solar electricity, Wattson has boosted our FiT income as PV systems are restarted" Some residents believed their PV systems were actually costing them money as they did not see the bill reductions they expected, so they turned them off. Poole Housing Partnership have installed Wattson Solar Plus for Social Housing in these households to make it easy for tenants to see when the PV system was giving them free electricity, and how much. Now, tenants can clearly see the benefits of their system and so it stays on, helping reduce their bills as well as boosting PHP's FiT revenues.

Building on behavioural change with Energeno's auto-consumption tools

"We've demonstrated how our products can change people's attitudes towards energy use, however, we wanted to bring something else to the market that would assist users in their mission to become completely energy efficient and reduce their outgoings.

"Using 'free electricity' becomes easy with monitoring technology, and many of our users have become experts.

However this is only the case if you're at home at the same time the energy is generated. Our latest innovation is Optiwash, a smart socket that listens to the Wattson system and learns how much power appliances use around a building. It then automatically diverts enough energy to power an appliance, when there is free energy available."

"We're seeing more and more renewable installations fitted as standard on new housing. However, we know that the biggest driver for installations is the financial benefits. When landlords invest in solar PV, they're freeing tenants from utility companies, enabling them to secure their own energy use, and in some cases, lifting them out of fuel poverty.

"But when they combine this with the right monitoring technology and smart metering, the results can be far greater than they'd hoped."

To find out more about Energeno's range of products visit: www.energeno.com



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The Energy Centre at Kings Yard on the Olympic site is a District Energy scheme



The district energy renaissance

As the uptake of district energy rises, more urban areas can future-proof their energy systems. However, challenges do remain as explained by Simon Woodward, Chairman at The UK District Energy Association...

District Energy is in renaissance, if you recall the many dozens of networks that used to exist in the 1960's/70's, or if you do not remember those old schemes you will see it as a new solution which is currently bursting onto the UK heating and cooling market as the golden bullet to solve low carbon heat supplies in dense urban areas. Either way, it is a method of delivering low carbon energy which is clearly seeing a considerable increase in uptake in the last two to three years.

However, there are still barriers to implementation which include high initial capital costs, lack of understanding of how to design networks, apart from a few specialists, and almost no fiscal support for the implementation phase.

Fortunately, the situation is changing. As the uptake of district energy (district heating and/or cooling) rises, the market expects installation prices to fall as new entrants move into the industry and increase competition.

There are steps being taken to introduce codes of practice and training and considerable attention is now being drawn to the issue of secondary network losses in new build residential developments. This is particularly a problem where a lack of thought has been put into the design of the heating network from the point it enters the apartment block, up to each dwelling. With unit dwelling annual heating and hot water consumptions in the region of 4,000 kWh or less, the amount of energy lost in transmission of that



A relatively simple installation of district heating network in the highway. The pipes have been laid in place and are yet to be jointed

heat to the dwelling is becoming proportionally higher and a major issue. Consultants are solving this by ventilating risers and even in some cases I have heard of air conditioning being added to overcome the overheating problems resulting from these heat gains. However, in reality sensible network design including routing, levels of insulation and operating temperatures can do much to reduce these losses to acceptable levels, removing these rather cumbersome engineering solutions to a problem which should not exist.

What is certainly true is that once an urban area has a district energy network, it has essentially future proofed its energy system. When the initial source has reached the end of its useful life, e.g. gas fired CHP, then other energy systems such as localised energy from waste, waste heat recovery or other LZC emerging technologies can then be bolted into this

network to effect an “energy generation heart transplant”.

However, the industry still needs support to deliver this expected level of growth. Detailed analysis of every urban area in the UK carried out by the UK District Energy Association demonstrated that it would be realistic to take the percentage of homes connected to a network from 2% to 14% by 2050. This analysis however assumes the implementation of a low carbon heat network incentive sitting alongside the RHI. The government is currently considering a RHI Network Uplift – which is fantastic news – but as many schemes currently being delivered are using gas fired CHP as their initial source, this will not apply, requiring further work.

There has been an impressive number of over 80 local authorities taking up DECC’s Heat Network Delivery Unit (HNDU) funding, to explore the feasibility of a network in their area. However, as the former Head of the HNDU commented at the 2014 UKDEA AGM, the success of the HNDU will not truly be judged by the feasibility funding it has awarded, but by the pipes which are being installed as a result of that funding in four years’ time.

Coupling this HNDU funding with the GLA’s push for heat networks in all new developments across London means that it is clear that the district energy landscape will be very different in 2018 from where it is today, the question is just how different. ■



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The European energy challenge

Adjacent Government looks at the European Commission's key priorities in regards to energy, and the challenges ahead...

The EU is facing a crisis of confidence that has settled over it like low cloud. Trust of citizens is in short supply as is faith in the future. The new Commission, which began its work at the end of 2014 under the presidency of Jean-Claude Juncker has recognised that belief in the EU has to be rebuilt as a matter of urgency, and that Europeans need to see a route forward to employment and economic growth.

At the beginning of his term in December, Juncker set out his political priorities and published a work programme to be achieved by the Commission within 12 months.¹ It is a statement of intent in which delivery and practicality are policy essentials and in which Juncker has chosen to tackle one of the biggest long-term problems facing the Union, that of energy and the challenge of imposing sustainable solutions to rising costs and insecurity of supply.

Currently the Union imports 53% of its energy at a cost of €1bn a day² feeding into markets that are neither integrated nor working under common rules. Juncker's chosen solution is to create an Energy Union and give fresh impetus to climate change policies. To achieve these objectives he has taken the unprecedented step of reinforcing the Commission's energy portfolio by appointing Maroš Šefčovič vice president for Energy Union to act as team leader co-ordinating the work of several Commissioners including those for Industry and the Internal Market, as well as Miguel Cañete, who now fills the combined role of Commissioner for Climate Action and Energy.

The Energy Union is meant to impose an element of strategic decision-making over the EU's energy import trade, particularly as regards natural gas supplies

from Russia. As President Juncker set down in his mission letter to Maroš Šefčovič in November, "we need to pool our resources, combine infrastructures and unite our negotiating power vis-à-vis third countries."³ About 30% of the EU's gas currently comes from Russia, in a set-up where suppliers, owners of pipelines and countries they transit, all have their own political and commercial agendas, most of which conflict more or less all of the time, with Europe coming in a poor fourth as buyer.

The most recent gas dispute between Ukraine and Russia resulted in severed supplies in June 2014, but it is only the latest in a series going back to 2006. In each of these the EU has been overtaken by events. The 2014 shut-off was ended by an agreement moderated by Energy Commissioner Günther Oettinger in December, and was the most effective intervention by the EU to-date, however, the agreement only lasts until March 2015, after which, given the current armed conflict in eastern Ukraine, supplies to Europe could once again be under threat.

Oettinger's work to broker the December deal signalled the EU's commitment to get a grip. As the June crisis developed, President José Manuel Barroso introduced an Energy Security Strategy, framed by a hardening of language, Oettinger describing the current state of the energy trade in undiplomatic terms, "We want strong and stable partnerships with important suppliers," he said, "but must avoid falling victim to political and commercial blackmail."⁴

A certain way of avoiding this is for the EU to develop its own sustainable sources of supply, a point President Juncker stressed in his letter to Maroš Šefčovič in which he told the vice president, "We need to strengthen the



Jean-Claude Juncker, President of the European Commission



Maroš Šefčovič, Vice President of the European Commission, in charge of Energy Union

share of renewable energies on our continent. This is not only a matter of responsible climate policy. It is, at the same time, an industrial policy imperative if we still want to have affordable energy at our disposal in the medium term.”⁵

The Commission isn’t short of guidance for this. The EU has emissions reduction targets to meet by 2020, as well as a climate action framework leading to 2030 and a low carbon roadmap out to 2050. Vice President Šefčovič and Commissioner Cañete are also working towards delivering proposals to the UN’s Climate Change Conference in Paris in December 2015.

On a more practical level and in line with President Juncker’s policy objectives, the EU is currently investing over €2bn in renewable energy projects under the NER 300 programme. NER 300 concluded its award process in July 2014, launching 42 projects across 20 of the 28 Member States.⁶ They are investigating the commercial viability of a range of technologies including concentrated solar, wind and bioenergy. A carbon capture project based in the UK receives the largest single award of €300m. Given the Commission’s efforts to achieve Energy Union, NER 300 however has only funded one cross border project. GEOSTRAS is a French-German collaboration to generate geothermal electricity and heat from a source near Strasbourg. It

is one of 3 geothermal energy projects that have been awarded a total of €60.8m, large in terms of research investment, but still cheaper than €1bn a day. ■

¹ http://ec.europa.eu/atwork/pdf/cwp_2015_new_initiatives_en.pdf

² <http://ec.europa.eu/energy/en/topics/imports-and-secure-supplies>

³ http://ec.europa.eu/commission/sites/cwt/files/commissioner_mission_letters/sefcovic_en.pdf

⁴ http://europa.eu/rapid/press-release_IP-14-606_en.htm

⁵ http://ec.europa.eu/commission/sites/cwt/files/commissioner_mission_letters/sefcovic_en.pdf

⁶ http://ec.europa.eu/clima/policies/lowcarbon/ner300/index_en.htm

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BFS blue Enterprises technology. The solution “Converting CO₂”

Because of the human cycles of production and consumption, our food, energy and environment are intricately linked. According to the projected growth of the world population (9.1 billion people by 2050) and consistent global development, it is increasingly difficult to satisfy our world with sufficient food and energy. BFS blue technology presents a realistic proposal to address those 3 pressing issues with a feasible business model that can be applied starting today.

Healthy planet

Meeting the food and energy demand has a direct impact on the environment, especially through the emission of greenhouse gases, particularly atmospheric CO₂, which is currently at an unprecedentedly high concentration of nearly 400 ppm (September 2013).

According to the global scientific and environmental community (UN, NASA, IPCC, EPA, etc), if current emission rates continue, we will soon reach a point of no return with irreparable damage resulting in a lack of potable water, changes in food production conditions and increased mortality rates from natural disasters such as floods, storms, and droughts. Climate change is not merely an environmental issue, it has deep economic and social implications. Though many of these natural phenomena have already been documented, energy from fossil fuels has allowed for most of society's modern comforts, making it difficult to implement changes in behaviour.

According to the International Energy Agency, \$1trillion is roughly the

amount of investment needed worldwide each year for the next 36 years to stave off the worst effects of global warming and keep the Earth habitable.

BFS technology presents a unique technology (3rd Cycle of CO₂) to accelerate CO₂ reduction based on Carbon Capture Conversion and Neutralization (C³N). C³N is an alternative, or in some cases complementary, to the CCS technology. In BFS technology CO₂ is captured, but instead of being buried, this is used to feed marine phytoplankton (the building blocks of life) that capture the CO₂ via photosynthesis and transform it into valuable bioproducts.



Figure 1. BFS' tested and certified (SGS) Industrial plant that absorbs CO₂ emitted from an adjacent cement factory.

Plant Tour:
http://www.youtube.com/watch?v=Qha_6RaDF18

A clean renewable source of energy

Fossil fuels are non-renewable, and it is estimated that by 2025 the demand will be 120 million barrels a day. With this projection we will see the oil reserves gradually decrease, and in the not too distant future, we will have supply problems. The increase in prices will affect the global economy, and if we add the environmental

damage involving combustion, the search for clean renewable energy as an energy source is clear to see.

The current green energy solutions don't have the capacity of sequestering or neutralizing CO₂. Additionally, they do not account for more than 10% of our global energy demand. As they will not significantly reduce the global level of fossil emissions, the risk of surpassing the 400 ppm of CO₂ accumulation in the atmosphere will continue.

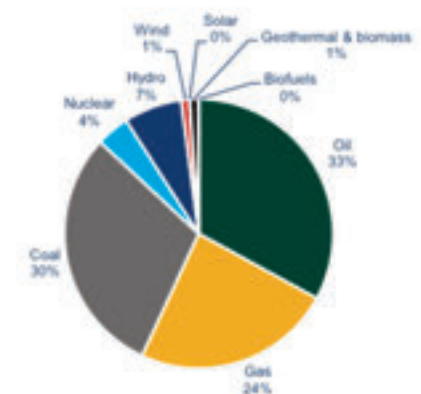


Figure 2. Origin of the energy produced

The growth of agricultural products to produce bioethanol and biodiesel have two big problems:

- Huge extensions of arable land are necessary. This technology competes with food and water, and to substitute the crude oil with this technology is not feasible (the land and water required is bigger than the real availability).
- These systems have the ability to recycle CO₂ but not to permanently sequester or neutralize it.

In contrast, BFS blue technology has the ability to produce a clean renewable

source of energy. To produce 1 BBL of crude oil, BFS technology permanently neutralizes 1 ton of CO₂. Given the average combustion emissions of one barrel of oil being 390kg of CO₂, BFS completely offsets 2.5 barrels for every barrel of blue petroleum, ensuring net emissions of 0 from the combustion of the 3.5 total barrels.



In this way, we can maintain our current energy model without changing our current lifestyle or infrastructure, even after the end of fossil energy.

In essence, 3.7 Million of BBL per day of BFS blue oil will neutralize the CO₂ emissions of the EU from the crude oil (EU crude oil consumption is 12.7 MBBL/day).

To reach this production of 3.7 MBBL per day of BFS blue Petroleum would require a much lower investment than \$1Tn/year (According to the International Energy Agency, \$1Tn is the amount of investment needed worldwide each year for the next 36 years to stave off the worst effects of global warming and keep the Earth habitable). In fact, the investment in total,

from 2015 to 2050 would be €1.4Tn; €38.3Bn/year, around 0.4% of the GDP every year up to 2050; from this point on, no additional investment would be needed anymore and the plants would generate a revenue of €544Bn per year.

Nutrition for a growing world

According to the projected growth of the world population (more than 9.1 billion people in 2050) it is estimated that food production will be double by 2050. This implies that nutritional problems in the world will worsen.

An increased demand for food, implies a greater demand for water and arable land. All in a time when the natural resource base for agriculture is degrading, large areas of land is being used for purposes other than agricultural production (biofuels), and climate change threatens to further reduce the amount of land suitable for cultivation.

BFS technology can be a source of proteins, energy and micronutrients; malnutrition is characterised by an inadequate intake of those proteins, micronutrients and calories. Figure 4 shows an example of a product with a really good ratio of proteins (high quality according to the aminoacid score).

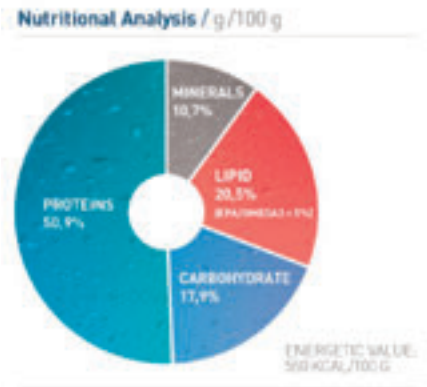


Figure 4. Nutritional Analysis and Energetic value

Conclusions - Reflexion

The BFS business model gives the opportunity to produce high value products, blue Petroleum (fully competitive with fossil oil) or a combination of both depending on the market demand (see below example for 10 ha plant. The technology is also feasible in small plants), but always reducing CO₂ from Industrial emissions:

	Case 1	Case 2	Case 3	Case 4	Case 5
H. Value P.	20%	40%	60%	80%	100%
Petroleum	80%	60%	40%	20%	0%
Payback period	6	4	4	3	3
EBITDA (M€)	19	29	32	40	45

Table 1. Different business opportunities for different strategies based on the % of crude oil to produce in a plant

Authors: Eloy Chapuli and Bernard A. J. Stroôazzo-Mougín

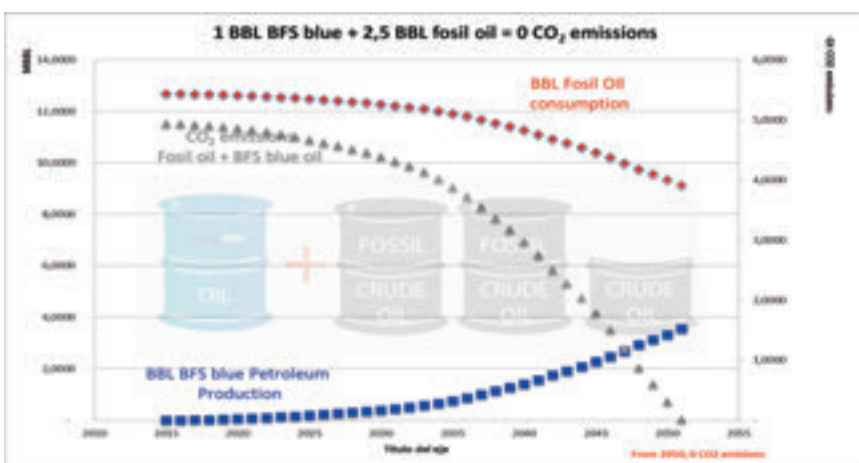


Figure 3. BFS crude oil production to get 0 CO₂ emissions



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Chemistry reaching out

Professor Erling H Stenby, Head of Department at DTU Chemistry, Technical University of Denmark, highlights the importance of nursing the entire chain of scientific talent from high school students to excellent young scientists

Media and government reports frequently mourn the lack of interest in the natural sciences in the young generation. However, more than 200 students began a chemistry related education at DTU in the year 2014/2015. For a series of years now, DTU Chemistry has not only kept on breaking its own records in attracting applicants, but is also one of the top priorities for students of engineering and natural sciences in Denmark.

DTU Chemistry owe this success to a systematic approach to attracting and nursing scientific talent, encompassing a focused dialogue with the entire chain of scientific talent from high school over BSc and MSc level and sometimes all the way to a PhD degree. Our efforts are based on the idea that it is important that the most talented young people get the flavor of advanced chemistry already during their high school years. When they study at DTU they should then be exposed to both the deepest knowledge and challenges in society that requires the combination of insight and innovation.

Like the success of high profile athletes will spur interest from kids and youngsters, so do excellent young scientists function as role models. For instance, several of our staff has achieved prestigious grants such as the Sapere Aude program from The Danish Council for Independent Research. The program

is geared for allowing extraordinary talents a fast-track, and much in the spirit of the program a number of our younger scientists have established themselves and their groups at the international scene over a short span of years.

International Master Students

In order to maintain a high international level we recruit our student for MSc and PhD internationally. The international MSc students from within Europe do not pay any tuition at DTU, and PhD students are paid a regular salary since they are employees. We are demanding when recruiting but in return the conditions are very attractive. This is reflected in the growing interest in our MSc education in Advanced and Applied Chemistry.

Boom in external interest

The blend of scientific excellence and interest from young people is an ideal breeding ground for attracting funding for groundbreaking research projects. We are able to enroll approximately 25 new PhD students annually. We note with great satisfaction that a steadily increasing part of these new projects are financed from sources outside DTU. Public funds, private companies, and private foundations all take growing interest in our Department. This aids us in carrying out excellent research and proving top level training to our students.

Furthermore, collaboration with

external partners provides unique opportunities for testing solutions under realistic conditions.

The interest from external partners has not come over night. First of all, we have given priority to sharing knowledge. Most of this outreach is done by devoted, individual scientists in their daily contacts with students and external partners. Also, the Department maintains a strong history of success in scientific publications.

For some years now, the Department has held a high level of patenting, and I am pleased to see that a growing number of inventions are taken into industrial use. Sometimes this is done in cooperation with existing industry, while at other occasions spin-outs are created.

For instance, the company Specshell has recently spun-out from the Department based on an invention by one of our talented PhD students, Andreas Kunov-Kruse. The company develops technology for attenuated total reflectance infrared (ATR-IR) spectroscopy. Several other potential spin-outs are currently in the incubator stage.

Building the Future

I am pleased to say that we are ready to encompass the interest from young scientific talent, which we have been so fortunate to achieve, not only in terms of providing thrilling intellectual

challenges, but also when it comes down to providing them with a physical space from where they can start their new careers.

This year, we will inaugurate a new building at the DTU Campus. This will not just be a highly needed extension of our existing office and laboratory space, but also take us a giant step up when it comes to state-of-the-art equipment and standards for environmental and work environment conditions.



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Young talented scientists are the primary driver for transforming science into innovation. The program entitled International Master in Advanced and Applied Chemistry attract some of the best brains in the field from a range of countries.

Technical University of Denmark



DTU Chemistry

Department of Chemistry

Research at DTU Chemistry

The trademark of DTU is scientific excellence founded in fundamental research within engineering sciences. This has brought DTU international recognition as seen for instance in the Leiden ranking. At DTU Chemistry the research is organised in three sections.

The Inorganic Chemistry section reaches from developing novel chemistry and improving industrial processes over focus on the roles of metals in biological systems to design of re-combinatory metallo-proteins in genetic engineering. Recent years have shown increasing interaction between inorganic chemistry and the research in biological systems. Classic catalytic chemistry is mixing with nano scale medicine, and inorganic chemistry has an important role to play.

The Organic Chemistry section focuses both on catalysis and chemical biology. In chemical biology, organic chemistry is used as a tool to learn more about biological systems with the ultimate goal of suggesting new drug candidates for treatment of bacterial infections and cancer. Homogeneous metal catalysts are able to improve a number of chemical processes, making them more efficient, sustainable and environmentally sound. The section has strong competence in NMR spectroscopy.

The Physical Chemistry section focuses on biophysical chemistry and femtosecond chemistry, complemented by analytical chemistry and spectroscopy. In biophysical chemistry, metallo-proteins related to various neurological diseases are being synthesized. Femtosecond chemistry is in-between chemistry and physics. Applied quantum mechanics are used to describe atomic movements, fundamental to chemical reactions. The section is devoted to become a strong link between DTU and the new large facilities MAX-IV and ESS being built in Lund, Sweden.

Volcanoes and geothermal energy

Taking advantage of the power of the Earth interior



Prof. Joan Martí is the leader of the Group of Volcanology at the Institute of Earth Sciences Jaume Almera, CSIC, of Barcelona, Spain. The research of his group addresses different aspects of the volcanological science, including dynamics of volcanic systems, hazard assessment and characterisation of volcanogenic geothermal and mineral resources. His work on 3D modelisation aims at improving the imaging of the interior of volcanic systems, thus helping to understand their behaviour and the distribution of geothermal reservoirs, as a way to define better exploration and exploitations guidelines.

Volcanos are one of the most evident manifestations of the Earth's energy. Volcanic eruptions are a fascinating natural phenomena, which have attracted the curiosity of humans since the earliest times. Volcanos have

created spectacular landscapes that today attract millions of visitors from around the world. However, volcanic eruptions may have significant impacts on society and the environment, showing us the worst face of the Earth's power. However, this same power may also show a very different side when we consider its role in creating the Earth's atmosphere, allowing life to develop on our planet, and the important energetic and mineral resources associated with volcanoes.

Volcanoes are the main source of geothermal energy. Compared to the normal geothermal gradient of about 25°C per km of depth in most of the world, when magma (i.e. molten rock generated at the Earth's interior) enters the crust, for example, as a shallow intrusion beneath a volcano, this normal gradient is perturbed locally as temperature rises around the intrusion. The extent and duration of such a thermal anomaly depends mostly on the temperature and volume of the intruded melt. The presence of hot magmas below the surface of active volcanic regions offers the prospect of harnessing a huge amount of geothermal energy. The geothermal energy is a renewable resource, as it exploits the abundant Earth's interior heat and water, which once used and cooled, is then piped back to the reservoir. Having the use of this natural energy source has important implications for preserving the environment.

The economic and energy crisis that today affects modern society pushes us to look for cleaner and more sustainable energy sources, among which geothermal energy occupies a prominent place. Geothermal energy associated with volcanoes is of much higher enthalpy (i.e. energetically efficient) than other sources such as tectonic or the geothermal gradient itself, so it offers a much better option where available. However, there are some questions we should ask ourselves to ensure that geothermal energy is a suitable and recommendable alternative to the hydrocarbons derived from other renewal energies. Where does geothermal energy originate? What does it take for a geothermal deposit to be economical? How do we estimate reserves? How can we recover this thermal energy, and how can we use it in practise? Are there any adverse effects for the environment as geothermal energy is tapped and recovered, in particular in comparison with other types of energy? How can we discover that an important geothermal reservoir is nearby? Answering these questions requires us to conduct detailed research on the volcanic systems that host the geothermal reservoirs, in order to establish correct exploration and exploitation strategies. Otherwise, the lack of knowledge on the characteristic of a geothermal reservoir and of its container, as well as on the causes that it originated from, may conduct to extremely expensive and



unproductive strategies. It is necessary to improve and standardise the geophysical, geological and geochemical technologies needed to characterise and monitor enhanced geothermal systems in order to minimise the exploration and exploitation costs by reducing the drilling uncertainties. A better characterisation of the reservoirs should result in reducing the amount of drilling required to set up a new geothermal power plant. Geological, geophysical and geochemical information on the volcanic systems and their hosted geothermal reservoirs must be combined to obtain realistic and reliable 3D simulation and visualisation models that should help to improve the efficiency of exploration and exploitation strategies significantly reducing their costs.

Europe was pioneering in the exploration and exploitation of geothermal energy with the experience of the Larderello, Italy, in 1904 where geot-

hermal steam was harnessed to generate electricity. Other projects have been developed later in Italy and in other European sites to exploit geothermal energy. The most successful being Iceland, where more than 26.5% of the nation's energy is geothermal, as well as nearly 87% of home heating and hot water requirements of the country. The European leadership in this field should be promoted by improving exploration strategies, making them more effective and costless, to help make geothermal energy accessible less favourable regions, which are located in active volcanic areas, thus contributing to improve the sustainability of our planet. In fact, several countries in Latin America (México, Costa Rica, El Salvador, Guatemala, Nicaragua, Chile), Asia (Indonesia, Philippines, South Korea, Thailand, Japan), or Africa (Kenya, and Ethiopia) have already opted for the use of this type of renewal energy. Clearly, the use of geothermal energy

is an important investment in the future in which Europe can not be excluded.



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Geothermal energy: a renewable, low carbon resource for the UK

Jon Busby, Team Leader Renewables, Energy Storage and Clean Coal at the British Geological Survey details the benefits of deep geothermal heat sources in the UK...

In simple terms 'geothermal energy is the energy stored in the form of heat beneath the earth's surface'. Most people will associate it with steam emanating from mineral encrusted fumaroles, but even in non-volcanic regions such as the UK there is great potential for geothermal to contribute to our energy mix. It is carbon free, sustainable and is not subject to intermittent supply as are some renewables, e.g. solar, wind and wave.

The temperature increases in the ground with depth at an average rate of 26°C per km. At depths of 4-5km power generation is possible, but this is mainly consigned to regions with large masses of high heat producing granitic rocks. These granites have very slightly raised levels of the natural radiogenic isotopes of potassium, uranium and thorium, whose radioactive decay leads to a small heat anomaly at depth. Cornwall is the most prospective region for power generation and 2 companies, with the support of the county council, are actively pursuing power projects with generation capacities of between 3 and 10 MWe.

Of greater (and more widespread) potential is the utilisation of geothermal heat for district heating and agricultural purposes. There are 3 fundamentals required for exploiting deep geothermal heat. The rocks must contain water (or brine) within the voids (pores) between the mineral grains; the pores must be interconnected so that the water can flow through the rock (the rock is permeable) and the rocks must be at a sufficient depth for the temperature to be high enough for the direct use application. At a depth of 1km temperatures of around 36°C would be expected (sufficient for agricultural heating), but depths of 2-3km (temperatures of around 60-90°C) are needed for district heating. A group of rocks, referred to as the Permo-Triassic sandstones, are known to have favourable

porosities and permeabilities and therefore, at depth, are a potential direct heat use geothermal resource. These rocks underlie a number of regions at favourable depths, most notably east Yorkshire and Lincolnshire, Cheshire, Gloucestershire, Dorset and the eastern counties of Northern Ireland. The UK's only deep geothermal facility is at Southampton where a legacy borehole from the early 1980s was brought into production in 1987. It exploits the Permo-Triassic sandstones in a depth interval of 1,725-1,749m. The brine is extracted at a temperature of 76°C and provides part of the heat to a city centre district heating scheme.

The distribution of Permo-Triassic sandstones at depth is limited and does not coincide with many of the main urban centres. However, many regions are underlain by older sandstone rocks that still have favourable porosities and permeabilities, albeit less so than the Permo-Triassic sandstones. Water can also flow through fractures in the rock and many of these older rocks contain ancient fractures. Evidence of this can be found at the 2 localities where there are warm springs; Bath/Bristol and the Peak District. Here, water flows through fractures in limestone relatively rapidly from depth, at Bath the temperature of the water is 46°C and at Buxton it is 27°C. The possibility of finding similarly fractured limestone elsewhere is being explored as a potential heat source for district heating. In Manchester, planning permission has now been granted for boreholes that would intersect limestone at 3km depth. There is also evidence that water may flow laterally along ancient fractures within the crust. Buried granitic rocks to the west-southwest of Newcastle-upon-Tyne are known to have high heat producing characteristics. Warmer water around the granite may migrate eastward along an ancient fault zone. This water may then recharge

sandstone beneath Newcastle which may have favourable porosities and permeabilities. This has been investigated recently beneath a brownfield site in the centre of Newcastle where a measured temperature of 73°C at a depth of 1,767m was recorded, indicating a geothermal gradient of 36°C/km. The higher than expected temperature at depth clearly suggests that heat may have been transported by migrating groundwater.

“Cornwall is the most prospective region for power generation and 2 companies, with the support of the county council, are actively pursuing power projects with generation capacities of between 3 and 10MWe.”

At the end of 2012 the UK's exploitation of direct use geothermal heat was a paltry 0.01TWh/yr (from the Southampton scheme). By contrast, in mainland France the direct use of geothermal heat was 1TWh/yr and Germany 0.7TWh/yr. Neither of these countries has a fundamental geological advantage when it comes to geothermal. Now that a deep geothermal tariff of 5p/kWh has been introduced for the Renewable Heat Incentive, perhaps it is time for the UK to catch-up on its exploitation of geothermal heat. ■

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Success story on mineral carbonisation of CO₂

Pushing academic research towards industrial scale through advanced modelling and piloting

At Aalto University, School of Engineering, Professor Mika Järvinen's Energy Engineering and Environmental Protection research group is conducting pioneering research on biomass combustion, CO₂ sequestration and storage by mineral carbonation, circulating fluidised bed gasification of waste and also advanced modelling of industrial processes, mainly on energy and metallurgical applications.

To have good industrial collaboration, we aim to carry out research both on full and pilot scales for avoiding the problems in up-scaling and to have immediate solutions for companies. The latest process we have been developing deals with the CO₂ sequestration and storage by mineral carbonation, using steel slag (a by-product from steelmaking) as a raw material.

The principle of our carbonation process is simple. We first dissolve the calcium from steelmaking slag with an ammonium salt solvent selectively, and then, bubble or spray the Ca-rich solution with CO₂ containing gas. In 2011 Aalto University Foundation, together with Abo Akademi and Rautaruukki Oyj, successfully secured a patent for a technique that produces calcium carbonate (CaCO₃) from alkaline by-products. This CCS approach aims to reduce CO₂ emissions by using alkaline industrial waste materials and by-products and



Carbonation pilot team: Upper row from left: Timo Laukkanen, Sanni Eloneva and Seppo Poimuvirta. Lower row from left: Pertti Kiiski, Mika Järvinen, Arshe Said and Vadim Desyatnyk

flue-gases rich in CO₂ to create a CaCO₃ product that is marketable to the paper or plastic industry for example.

The conventional production of this precipitated pure CaCO₃ requires limestone to be mined, transported and then submitted to highly energy intensive calcination processes that also emit CO₂, but by substituting limestone as the raw material with industrial alkaline by-products, this patent method extinguishes the need for such wasteful activities.

Before we can begin to think about up-scaling to an industrial scale, it is imperative that the processes are first understood at every level in the pilot

plant. We need to test all the process parameters. This way we will find out the actual energy consumption, the chemical consumption, the steel slag residue's quality, as well as the quality of the end product (PCC), and the amount of CO₂ we can fix.

In order to sell CaCO₃ as a filler or coating material, it is essential that the end product is up to scratch. During the spring 2014 we were able to produce several successful batches of CaCO₃ from the new pilot plant at the Aalto University – and it is working really well. Once the process has been optimised at every level, we can begin to translate the method to a larger scale. We are currently looking for the best ways, and new partners to grow towards production on a commercial scale.



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Extreme events in deterministic systems

Prof Dr Henk W Broer and Dr Alef E Sterk from the University of Groningen discuss how mathematical modelling offers a fruitful approach towards understanding climatic extremes...

Dynamical systems are mathematical models for everything that evolves in time. For example springs and pendulum clocks. More complicated examples are the atmosphere that produces the everyday weather, and the celestial bodies comprising the solar system. These systems are deterministic in the sense that the present state of the system completely determines its future. Time series produced by deterministic systems often look random, and probabilistic tools can be very useful in studying deterministic systems.

Since the seminal work of the mathematician and meteorologist E.N. Lorenz in the 1960s it is well known that deterministic systems can be very unpredictable: small errors in the initial state may lead to large errors in later states. This phenomenon, which is colloquially known as chaos, hampers long-term weather forecasts and stimulated the development of mathematical research on nonlinear dynamics and chaos theory. A recent development in the theory of deterministic dynamical systems is the study of extreme value statistics. This is particularly useful for applications in weather and climate.

Mathematical modelling offers a fruitful approach towards an understanding of meteo-climatic extremes. Models for the atmospheric and oceanic circulation are typically derived from first principles, such as Newton's laws, conservation of energy, global balances, etc. This approach leads to a set of equations describing the evolution of quantities like pressure, temperature, and wind speed. Often these equations can only be solved numerically using high performance computers. Although the model itself is deterministic, its evolutions can be studied using a combination of geometric and statistical techniques.

The statistics of large values in a time series are described by the generalised extreme value distribution.

A particularly important parameter of this distribution is the so-called tail index because it determines the tail width of the distribution and therefore the frequency and intensity of extreme events. The tail index is often estimated by running long simulations and applying statistical inference methods. It is still an open question how much data is needed in order to obtain an accurate estimate. Research has shown that already for very simple models the computation of the tail index requires prohibitively long time series. If this is also the case for state of the art climate models, then quantifying the extreme behaviour in such models might be a serious problem.

Studying the statistics of extremes in climate models is an interdisciplinary problem and requires the joint efforts of both climate scientists and pure mathematicians. Future research could be aimed at developing novel techniques for estimating the tail index that do not rely on computing long time series. ■

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Promoting fair and sustainable growth

Karmenu Vella, Commissioner for Environment, Maritime Affairs and Fisheries at the European Commission gives an overview of his priorities for the coming year...

The overall aim of the new European Commission, in office since November 2014, is to help improve the everyday lives of people across the continent. Creating and investing in quality jobs is central to this task. As a Member of this Commission, I have been given a specific mandate by President Juncker. That is a mandate to assure the sustainability of our environment, the preservation of our natural resources, the conservation of our marine biological resources and the management of our fisheries policy.

The challenge, which I think we can meet, is to ensure that these responsibilities compliment the growth and jobs agenda. I strongly believe that growth will be impossible if it is not fair and sustainable. The contribution that the green and blue economy can make to stimulating investment is therefore hugely

significant. This is why I am so encouraged that President Juncker decided to combine the Environment portfolio with that of Maritime & Fisheries. To promote good environmental standards, and for strong green and blue growth, there is no point in drawing lines between land and sea. There is, after all, only one planet – 70% of whose surface is water.

The EU has had a sustained period of economic travails. Yet despite this, 95% of its citizens still care deeply about the environment. I intend to use my mandate to promote innovative ways to reflect the expectations of citizens.

I think that if we are going to look at the future we cannot talk about the economy in isolation: we have to start talking about a more affordable and resilient



Karmenu Vella, Commissioner for Environment, Maritime Affairs and Fisheries

economy. It means looking at the long-term viability of a business model by ensuring the continuity of resources. This is why the concept of the circular economy is so exciting. The commission has committed, in its work programme, to tabling a more ambitious proposal in this area during 2015.

Success can only be achieved by us working together, as EU institutions, as policymakers with member states, and, most importantly, as fellow citizens. I have already started working with my fellow commissioners towards a European energy union.

We have, with my colleague Neven Mimica, the Commissioner for Development, already adopted the Communication on eradicating poverty and boosting sustainable development. This year is the European Year of Development (EYD), which provides an excellent focus as we move towards the definition of the post-2015 sustainable development goals.

With our global partners, I will be leading in defining the management and governance of our planet's oceans. Ocean governance should include both an environmental aspect and an economic aspect. This will mean strong cooperation within the Commission, and internationally, on security, research, innovation and energy issues.

The 'blue' economy' represents roughly 5.4 million jobs and generates a gross added value of almost €500bn a year. There is a lot of potential and we are already working to multiply those numbers. Blue growth and the green economy will be key building blocks of the competitive Europe of jobs, growth and fairness, both because of the jobs that they will create and because of the potential for reducing Europe's dependence on imported resources.

The issue of marine litter is one that needs to be addressed. With the right political focus and international cooperation, progress can and will be made. Increasing evidence of the damage done by litter, and particularly micro-plastics makes tackling this issue ever more urgent.

2015 is the Year of Natural Capital. To make this fully visible, there will be an important sequence of events, starting with the State of Nature Report in spring, consultations on the Fitness Check of Nature Legislation at different points of the year, and the mid-term review of the EU Biodiversity Strategy in the autumn.

The plans for this year are rich and varied and already well underway. My responsibility, like my fellow Commissioners, is to meet the needs of Europeans. I am delighted to play my part in defining and ensuring a sustainable green and blue future. ■

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Karmenu Vella
Commissioner for Environment, Maritime Affairs and Fisheries

The European Commission
www.ec.europa.eu/commission/2014-2019/vella_en



Preparing for the unexpected

Mountain hazards severely affect population and values world-wide. Since the International Decade for Natural Disaster Reduction proclaimed by the UN concerted action was promoted to reduce loss of life, property damage and economic disruption not only with a particular focus on developing countries, but also with respect to most developed countries. Increasing numbers of natural hazards and associated losses have shown to the European Commission and the Member States of the European Union the paramount importance of protecting the environment and the citizens from the adverse impacts of

mountain hazards. Mountain regions are exceedingly prone to changing environmental conditions, which alters the magnitude and frequency of hazardous processes.

The main challenge of risk reduction is rooted in the inherent connected systems dynamic driven by both geophysical and social forces, calling for an integrative risk management approach based on a multi-disciplinary concept taking into account different theories, methods and conceptualisations. Therefore, there is a need to expand our vision on hazard and risk management integrating mitigation approaches

into the broader context of sustainable development and related governance arrangements.

“Our core competencies include the knowledge, skills and focus necessary for mountain risk management, spanning from hazard assessment to vulnerability analysis and mitigation design.”

Historically, strategies to prevent or to reduce the effects of natural hazards in areas of settlement and economic activities trace back to the mediaeval times. In the second half of the 19th Century, protection against natural

hazards was mainly organised by implementing permanent measures in the upper parts of the catchments to retain solids from erosion and in the release areas of avalanches. These measures were supplemented by silvicultural efforts to afforest high altitudes. Since the 1950s, such conventional mitigation concepts, which aimed at decreasing both, the magnitude and the frequency of events, were increasingly complemented by more sophisticated technical mitigation measures. Until the 1970s, mitigation concepts were mainly aimed at the deflection of hazard processes into areas not used for settlements. Watershed management measures, forest-biological and soil bio-engineering measures, as well as technical measures (construction material: timber, stone masonry, concrete and reinforced concrete) were implemented. Structural mitigation inevitably has its limitations, and conventional technical measures against mountain hazards, such as deflection and retention walls as well as torrential barriers, were supplemented by land use control through planning instruments, i.e. hazard zoning, since the 1970s. Further approaches include warning and monitoring, evacuation procedures, civil protection and disaster management norms and codes. Despite considerable efforts undertaken to reduce the effects of natural hazards and associated expenditures in mitigation measures, considerable damage has repeatedly occurred in European mountain regions. This suggests that there is a need for a

more sophisticated method to deal with natural hazards based on the concept of risk.

“Mountain regions are exceedingly prone to changing environmental conditions, which alters the magnitude and frequency of hazardous processes.”

Risk allows us to quantify the consequences from mountain hazards. The assessment is based on the computation of frequency and magnitude of a hazard times the consequences, and therefore includes economic considerations of cost-benefit analyses for hazard mitigation. Additionally, we have to promote the self-responsibility of citizens in order to help them to protect their individual values wherever possible. Bearing risks and sharing responsibility is pillared on multiple action and requires financial commitment of the public and private sector. Simultaneously citizens should be informed about governmental action undertaken for risk reduction in order to raise awareness on vulnerability, and to be prepared for the unexpected. This is also foreseen by the European Flood Risk Management Directive.

For more than 130 years, the Institute for Mountain Risk Engineering provides support for protecting citizens, infrastructure and buildings from natural hazards. Our core competencies include the knowledge, skills and focus necessary for mountain risk management, spanning from hazard

assessment to vulnerability analysis and mitigation design. Further expertise and services offered significantly contribute to up-to-date solutions in natural hazard management, including a laboratory, a gauging station network used for early warning and monitoring campaigns using unmanned aerial vehicles. The Institute is responsible for the education of engineers working in all fields of mountain hazard risk management, both on the national and international level.

For more information on how to prepare communities and residents for mountain hazards, of how to take action and how to rehabilitate please visit our website:

<http://www.baunat.boku.ac.at/en/ian/>



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TreeForJoules, securing bioenergy supply from trees

Within the global focus on reducing reliance on non-renewable fossil fuels, decreasing environmental degradation, mitigating climate change, and developing robust knowledge-based bio-economies, interest in sustainably produced bio-energy and bio-based products has skyrocketed. The increasing concerns about the sustainability of biofuels produced from food crops has resulted in an increased interest in utilising lignocellulosic biomass such as agriculture and forestry residues, and dedicated energy crops, as a renewable fuel feedstock for second-generation biofuels i.e. liquid transport fuels such as bioethanol from biochemical fermentation or bio-oil from thermo-chemical conversion.

Among other second-generation renewable bio-energy feedstocks, dedicated forest plantations are perceived as an attractive option as they offer the potential for generating a lower carbon footprint than annually produced crops, and minimised land use requirements by increasing ethanol yields per hectare. They offer secondary benefits such low nutrient input and are able to grow on marginal or poor lands not dedicated to food production, avoiding direct impact on food production or prices. Tree plantations also play an important role in delivering other environmental and social benefits, including protection of native forests, biodiversity, bioremediation, and carbon sequestration.



Fast-growing tree species such as poplar and eucalypts grown as short-rotation coppice represent one of the most appealing sources of renewable biomass feedstock for Northern/Western and Southern Europe, respectively, as they are easy to establish, produce high yields of lignocellulosic biomass that can provide a multi-functional fuel source.

A challenging issue: the lignocellulosic biomass recalcitrance to degradation

The chemical composition of wood is a key factor influencing the efficiency and therefore the cost of conversion into biofuels. For bioethanol production for instance, lignins that are cell wall phenolic polymers play a negative role by impairing the accessibility to cellulose to the hydrolytic enzymes during the saccharification process. On the other hand, lignin, the only aromatic carbon source generated in nature, can be converted pyrolytically to bio-oil, boosting the economy of the process. To render the conversion process into bioethanol more efficient and competitive, it is therefore important to select trees presenting

optimised wood composition for this downstream use.

The TreeForJoules project

The long-term goal of the Plant KBBE TreeForJoules project coordinated by Dr J. Grima-Pettenati, is to improve the genetic constitution of eucalyptus and poplar species to make their uses as second-generation biofuels more efficient and sustainable.

As a first step to breeding new varieties with optimised wood properties, Treefor Joules addresses a prerequisite that is to understand the genetic control and architecture of wood quality traits in these two genera.

The project "TreeForJoules" (2010-2015) brings together 13 partners from four countries (France, Germany, Portugal and Spain). This multidisciplinary proposal gathers scientists from academic organisations at the forefront of their disciplines (genomics, bioinformatics, genetics, wood chemistry...) as well as industrial and public partners directly involved in tree breeding such as AltriFlorestal

(PT), FCBA (FR), CIRAD (FR), INRA (FR) and ENCE (SP) that bring to the project unique advanced generation full-pedigree breeding populations.

One major achievement of TreeForJoules project has been to identify both in Eucalyptus and poplar candidate genes regulating wood properties relevant to bioenergy through a combination of functional genomics and genetics approaches. Functional characterisation of more than twenty genes using poplar has been performed.

The environmental (cold, drought, salinity, nitrogen nutrition) and seasonal impacts on the expression of bioenergy-relevant genes have been assessed and correlated with biomass production and wood properties of high-performing poplar and Eucalyptus genotypes.

Advanced high throughput spectroscopic phenotyping methods have been developed for detailed wood analyses including all key cell wall constituents (lignin content and composition, hydrolysable sugars, extractives...). These high throughput tools have allowed detection of genomic regions (QTLs, Quantitative Trait Loci) related to wood chemical components within breeding populations available in the project. Methods to measure the bioenergy potentials such as the saccharification yield for bio-ethanol generation and the bio-oil production including a mini-steam treatment device have been developed and adapted to small quantities of materials.

Comparative mapping between Eucalyptus and poplar revealed the presence of only scattered micro-synthetic regions along their genomes. Alignment of Eucalyptus maps from different species revealed some key QTLs

and a major region for wood properties has been identified. Several candidate genes have been found to colocalise with some QTLs

In conclusion, the TreeForJoules project has achieved some important breakthroughs in our understanding of the regulation of the wood composition in two major hardwoods for Southern and western/Northern Europe, respectively.

This knowledge paves the way to find favourable alleles associated with these bioenergy related traits and to use them as molecular markers within the breeding process.

In addition, the high throughput tools will be instrumental to accelerate the screening of the best performing varieties in the breeding process.

TreeForJoules web site:
<http://tfj.lrsv.ups-tlse.fr/>

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Jacqueline Grima-Pettenati is a CNRS Research Director, leading the "Eucalyptus Functional Genomics" team at the Laboratoire de Recherches en Sciences Végétales (LRSV), a joint unit between CNRS and Toulouse III University Paul Sabatier. Her team is well-known for pioneering work on lignin biosynthesis and secondary cell wall formation in trees and model plants.

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Climate change: An unimaginable calamity

We stride confidently toward a vast catastrophe. Willingly blind to the consequences of our profligate burning of fossil fuels, we speak in hushed tones, if we speak at all, of the accelerating changes in the world's climate that will wreak havoc for humanity and many other species for centuries. We don't want to think about climate change. Energy is a prime need and we'll take it wherever we can get it cheaply, and put off the problems we are making for the future to that future time.

Why do we think and act this way?

One principal issue is the ease with which denial of climate change permeates our society. The media often facilitates such denial by presenting arguments from both sides as if they were equally supported by evidence and knowledgeable opinion, but the sides are not equal. The evidence overwhelmingly supports that climate change is real and accelerating. But to

make the story more interesting, the media often presents it as a great wrestling match, giving far too much credence to the position of the climate change denier.

People are left wondering: Is there scientific consensus on climate change? Scientists do their work by arguing and submitting a variety of hypotheses to explain observations. The hypotheses are tested and the evidence judged. Rarely do 100% of scientists agree on any single explanation. But in the case of climate change it is estimated that 97% of people with expertise in this area agree that global warming is taking place, and that humans are the principal cause. That's about as good an agreement as we're ever going to get. To top it off, no major scientific institution in the world disputes anthropogenic climate change.

Yet people may ask: Hasn't the climate always been changing? The fact is that

CO₂ and methane in the Earth's atmosphere are increasing faster than ever. This increase is correlated with a recent rate of warming of about 0.2°C/decade, which is 40 times higher than it was during a warming trend 10,000 years ago. CO₂ is at its highest level in 600,000 years, and it has never changed so rapidly as now.

But sceptics point out that Antarctica is gaining ice, which is not exactly the truth. To understand ice in Antarctica it is necessary to recognise that there are two main forms: "land ice" that has accumulated over thousands of years on the continental land mass; and "sea ice" that forms in salt water. The real worry about Antarctica ice is the land ice, which is melting at a high rate and contributes new water to the ocean, causing the ocean level to rise. While data may show the extent of sea ice increasing in recent years in Antarctica, data also indicate a significant acceleration of melting land ice. It is the land ice on which we



must focus. Don't be fooled by increases in sea ice, which is influenced by the input of cold meltwater coming from the land ice. Sea ice formation doesn't affect the ocean level much, but the melting of Antarctica land ice affects it greatly.

So, if the scientific information is clear, and if the predicted consequences are so dire, then why are people neglecting to take action? Humans, like other animals, respond very well to an immediate crisis. But, despite our ability to plan and analyse, we do not respond well to crises that take a while to develop. One reason for this is that we are currently occupied by many challenges that appear more pressing. Another reason is that our ability to imagine the future is clouded by a belief that we have already experienced bad weather. When we are asked to imagine the global temperatures rising by 4°C, we recall the heat waves we have gotten through. When we are asked to imagine severe storms, we think of the bad tornados, hurricanes and typhoons we have survived. What we cannot imagine is the unrelenting heat, the increased frequency and

severity of storms worldwide, and the scale of flooding or drought in the near future. We cannot imagine hordes of refugees and the absence of food and medical supplies to assist them. We are caught, according to George Marshall, in 'Don't Even Think About It', having confirmation bias, "... leading people to hugely overestimate the dangers of recent events and disregard the threat posed by more distant ones that they have not experienced."

Also impeding our ability to imagine the future is our misplaced reliance on our current economic model of continued growth. We are fully invested in this world economic framework and any threat to it being sustained must be removed rapidly. We do not see that continuing to rely on growth via unregulated industry is itself unsustainable. One way or another, by our own choice or by nature's laws, continuing to burn fossil fuels will stop. Either we start to do it now, or we will be forced to by nature.

Our leaders are absent, and we absent ourselves from them. Kyoto, Copenhagen, and Lima demonstrate

that few people are asking their governments to take strong action, and governments themselves are taking little action. Despite hopeful signs like the recent US-China trade agreement, leaders continue to focus on short term economic gains, employment, GNPs, balances of trade, etc. so that they can look good for re-election.

Climate change is the defining challenge for the next few generations. In her book 'This Changes Everything', Naomi Klein writes: "...the real truth we have been avoiding: climate change isn't an "issue" to add to the list of things to worry about, next to health care and taxes. It is a civilisational wake-up call... telling us that we need an entirely new economic model and a new way of sharing this planet. Telling us we need to evolve."

Are we listening or are we asleep?

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Climate cooperation in Europe's first macro-region

Maxi Nachtigall, Adviser Sustainable Development, Council of the Baltic Sea States, CBSS sheds light on how the Baltic Sea Region is taking action to limit the impact from climate change...

The Baltic Sea region (BSR) is Europe's first macro region. Since 2009, the European Union Strategy for the Baltic Sea region (EUSBSR) and its action plan defines the main areas of cooperation for the 8 EU countries that make up the Baltic Sea Region¹. Climate change is one of them.

The Baltic Sea and its drainage basin constitute a specific eco-region with a projected warming that is higher than the global mean. Future climate scenarios show increasing annual and seasonal temperatures of about 3-4 degrees by the end of this century. Precipitation is generally projected to increase, especially in the winter. In addition the models show a general increase in precipitation extremes. Both increased temperature and precipitation will trigger other indirect environmental impacts, both on land and sea. Furthermore socio economic impacts are foreseen to be considerable with various degrees of adaptive capacity among regions, sectors and individuals.

All BSR countries are therefore concerned about vulnerability from a changing climate. Many countries, municipalities and cities in this region have made cutting green-house gas emissions their main environmental priority. While effective mitigation action is crucial, adaptation has to be the other aspect of comprehensive climate protection, on all levels of governance, also in the Baltic Sea region.

Climate change has been at the heart of Baltic Sea cooperation for many years, especially through inter-governmental cooperation in the Council of the Baltic Sea States (CBBS) and its Expert Group on Sustainable Development, Baltic 21.² By becoming a horizontal issue for cooperation within the framework of the EUSBSR, climate change was even more streamlined across the region.

However, awareness and preparedness to climate change still differ across the Baltic Sea Region³.

Some countries like Finland, Germany and Denmark, are early adapters and some are already going through first revisions of their strategies. However, according to the European Adaptation Platform Climate-Adapt⁴, out of the 11 European countries that do not have a national adaptation strategy, yet, 3 are located in the Baltic Sea Region. Both the EU strategy on adaptation to climate change and the Council's conclusions emphasise the importance and value added of knowledge and good practice exchange between member states, regions, cities and other stakeholders.

To facilitate increased transnational cooperation and knowledge exchange on adaptation, the EU strategy for the Baltic Sea Region called for the development of a macro regional approach to adaptation to climate change. In September 2012, member states were presented an adaptation strategy and action plan as a result of a 3 year transnational cooperation effort between scientists, policy makers and the grass root level, a project called 'Baltadapt'⁵. The project also delivered impact assessments for sectors of main importance for BSR economic development.

The strategy and recommendations for actions resulted in a follow-up cooperation process, the so called 'BSR climate dialogue platform', established by CBSS. Here, member states, from EU and non EU countries meet regularly with pan-Baltic organisations and scientists to discuss concrete joint activities. After one year of existence, the cooperation can already impress with a number of positive achievements:

- Improved information and knowledge exchange on elaboration, monitoring and evaluation of National Adaptation Strategies, supporting countries to update or develop national strategies and action plans;
- Improved cooperation with non-EU countries in the Baltic Sea Region such as Russia and Norway;
- Stronger cooperation between civil contingency agencies, climate scientist and policy makers in the matter of civil preparedness;
- A joint macro-regional knowledge base on adaptation, on the Baltic Sea region part of the EU Climate-Adapt platform.

But much remains to be done.

There is a need for more political leadership that would enable cooperation on climate change on all relevant levels and acknowledge the value that transnational cooperation adds in facilitating climate mitigation and adaptation efforts.

One needs to focus even more on awareness-raising and capacity-building for local and regional stakeholders. National adaptation strategies can only reach as far as they are workable on those levels of governance where actual adaptation is taking place.

Mainstreaming climate change to develop distinct, science-based sector policies must remain a priority. One cannot ensure a thriving energy, transport, tourism or agricultural sector if their future is not thought of in the light of a changing climate.

The private sector has to play a more distinct role in adaptation efforts. This means adapting existing businesses to a changing climate and developing new businesses based on expected future adaptation needs. Macro-regional cooperation in this respect can facilitate innovation, increased competitiveness and market access.

CBSS with its relevant expert groups, networks and strategic partners will carry on to intensify its work in this respect. We will continue the taken path of actively supporting the transition of the Baltic Sea region into a climate resilient, sustainable, low emission region. ■

¹ Sweden, Denmark, Estonia, Finland, Germany, Latvia, Lithuania and Poland

² Declaration on the reform of the Council of the Baltic Sea States CBSS Ministers' Deputies Meeting, 3 June 2008, Riga & Declaration of the 16th CBSS Ministerial session, 7th June 2011, Oslo

³ EU Environment Council Conclusions, 18th June 2013

⁴ <http://climate-adapt.eea.europa.eu/>

⁵ www.baltadapt.eu

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EUROACADEMY'S RECTOR, since its inception, is Jüri Martin, Academician of the Estonian Academy of Sciences, DSc. The vice-rector is Peeter Karing, DSc.

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The Arctic Basin – a challenging shipping lane

The central parts of the Arctic Basin (the waters at and around the North Pole) may, in a few decades, be nearly ice-free during the warmest months of the year. This provides new possibilities for transport routes by water. However, thinner sea ice may provide new challenges for shipping in the Arctic due to increased variation from year to year in the extent of the sea ice.

The expected growth in traffic will increase the risk of long-term damage to marine flora and fauna. As of today, the international regulatory framework is not in place to meet this challenge. Neither is the necessary capacity for

rescue operations. At the Fram Centre in Tromsø, Norway, a Flagship Research Programme, headed by the Norwegian Polar Institute, addresses these challenges and opportunities.

The German ship *Beluga Fraternity* was in 2009 the first non-Russian ship to pass through the North-East Passage (partly along the Russian coastline) on its way from South Korea to Western Europe. This was a milestone in international shipping which provided an idea of the possibilities that lie ahead in an ice-free Arctic Basin.

Polar nations are not yet ready to fully handle such a new shipping lane

between the continents, Norway included, but the likelihood that the Arctic Basin will be navigable for ships during parts of the year, for the next 10 to 20 years, is so big that finding solutions to the challenges of increased traffic is much needed. These challenges are both many and complicated. Safety, search and rescue are vital issues, as well as mitigating damages to the environment due to accidents. These issues are of crucial importance to all the 5 nations that border the Arctic Basin. More oil and gas installations may be constructed in the Barents Sea and in north-west Russia during the years to come, and this business activity will lead to increased navigation.



Person on a pressure ridge in the Arctic Ocean

Photo: Nick Cobbing, Norwegian Polar Institute



Pancake ice in the Arctic Ocean (thin ice formed in rough seas)

Photo: Paul Dodd, Norwegian Polar Institute

In addition, less ice in these waters will attract more cruise-liners and lead to more scientific cruises and fishing. Traffic will be further increased as container ships and freighters make use of the new intercontinental shipping lanes across the Arctic Ocean.

The Svalbard archipelago (with Spitsbergen as the main island) is the Arctic Basin's northern-most outpost of civilization. Due to its strategic geographical position it is easy to imagine the archipelago as a future base for monitoring, safety, search and rescue and oil pollution services.

The issue of varying ice conditions between summers provides a special challenge. The thickness of the sea ice is now typically 2m, whereas is used to be up to 3.5m only few years ago. This thinner ice is to a greater extent driven by weather conditions. Hence, the weather will play a more important role in determining the ice conditions,

meaning that there may be a practically ice-free Arctic Basin one season, while there will be a substantial ice cover the next. The years 2012 and 2013 were good examples of this; while September 2012 was an all-time low for known ice extent, there was an increase of 50% in September 2013. It may seem like a paradox, but this shows that with less sea ice in the Arctic, the need for ice prediction and knowledge about sea ice is growing.

This means that the need for further climate research and technology development is increasing. The Norwegian Polar Institute has monitored the thickness of the sea ice between Greenland and the Svalbard Archipelago for 24 years. Starting in January 2015, the Institute's vessel Lance will be frozen into the ice north of the archipelago to serve as a floating platform for climate research. Scientist from Norway, Russia, UK, Germany, France, South Korea, USA and Japan will be

on board with their projects. This will provide new and important knowledge about climate conditions and physical processes in the Arctic sea ice.



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The United Nations University Fisheries Training Programme

Your partner for capacity development in fisheries projects

For 17 years the United Nations University Fisheries Training Programme has promoted the sustainable use of living aquatic resources in partner countries. Through the work with partners in 50 countries and with our partner institutions in Iceland, the UNU-FTP has identified key problems and opportunities in fisheries in partner countries. The core element of the UNU-FTP is a six month training which is conducted in Iceland, where fisheries has developed into the backbone of the economy; a knowledge-based industry.

The UNU-FTP's close cooperation with the industry, academia, and research entities in Iceland illustrates to fellows the value of human capital to development and success of fisheries. This also gives fellows an appreciation for the potential development possible through careful management of fisheries resources.

Fostering the sustainable use of marine environments is a priority area highlighted in the proposed post-2015 development agenda of the United Nations.

One major challenge facing fisheries development relates to resource management. The benefits people and societies derive from resources depend on how we manage them. Fisheries resources are renewable, but not if they are overexploited, and undermanaged as is the case in many developing countries. Excessive fishing pressure has both biological and economic consequences. Fewer fish



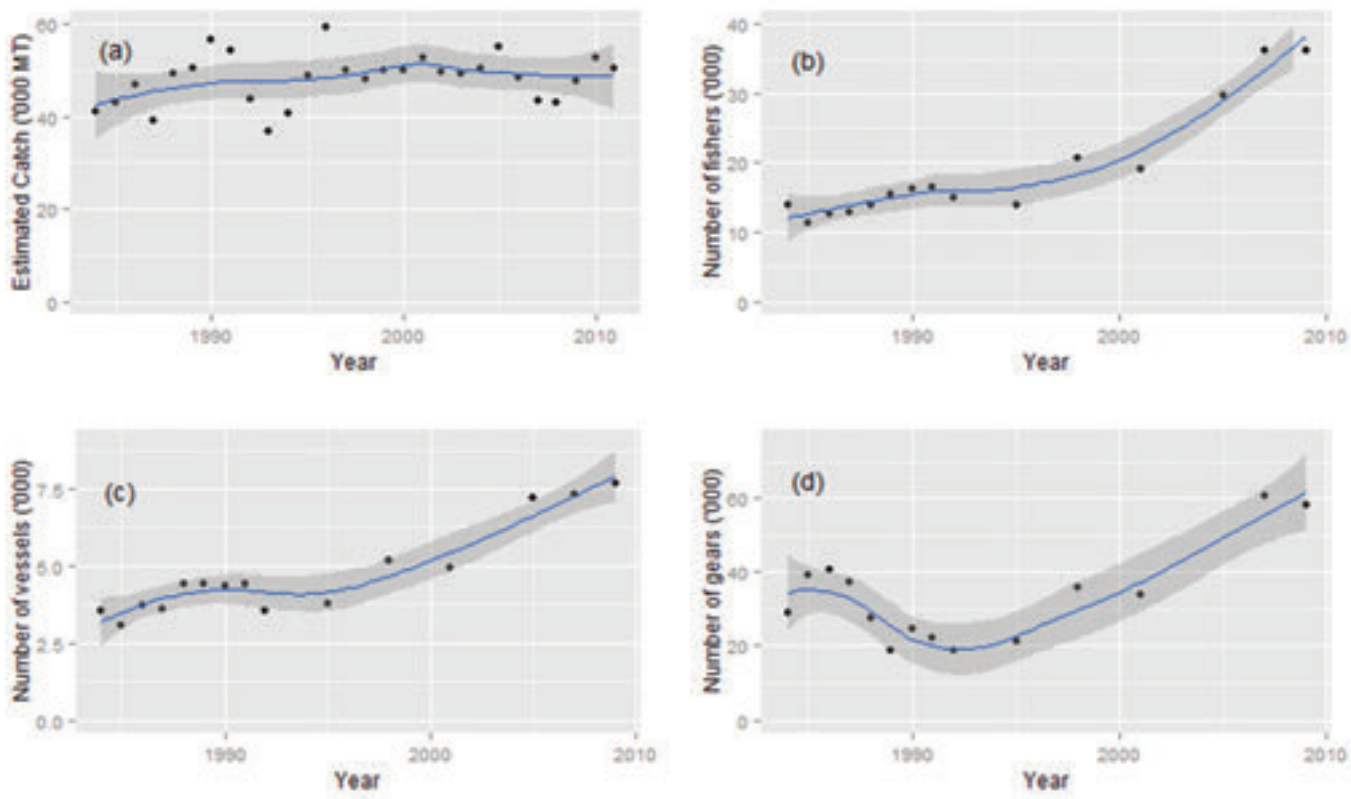
Fostering the sustainable use of marine environments is a priority area highlighted in the proposed post-2015 development agenda of the United Nations



Fellows undertaking six month post-graduate training in Iceland have good access to various actors in the fisheries sector

are brought ashore and food security is compromised. Lower profits are generated which leads to less money to pay for essential societal services, such as health and education.

Most of the fish produced in the world today originates in developing countries where fish is an important source of nutrition, employment and income. It is also an important export



UNU-FTP data from Tanzania, where people are fishing more, and getting less per person; a worrisome trend with serious implications for food security and poverty alleviation efforts in Tanzania. From Hamidu, U.M. 2013 <http://www.unuftp.is/static/fellows/document/upendo12prf.pdf>

commodity. Still, lack of appropriate policies and capacity to evaluate the status of stocks make it challenging to formulate and implement adequate management measures.

When fellows come to the UNU-FTP, they typically bring data from their home. Often, the data is not satisfactory as input into complex and sophisticated stock assessment models, but they are nonetheless usable and give good insight into how the stocks and fisheries are developing. For instance, the data from the coastal small scale fisheries in Tanzania collected by the Department of Fisheries is useful. Through this fellow's data, we see the total catch has remained constant, while the number of fishing vessels and fishers has increased 3-4 fold over the last couple of decades. Over the same period the annual catch of each fisher has gone from 3.5 to 1.2 tonnes and

fishing has become more dangerous as fishermen go further off shore and resort to more dangerous methods.

The trend shown in the analysis using data from Tanzania are seen in many small scale fisheries in developing countries with increasing fishing effort and decreasing returns.

Since the establishment of the UNU-FTP about 300 professionals from 50 countries have completed the 6 month training in Iceland, specialising in fields such as fisheries management, stock assessment, fish handling and processing, aquaculture, fishing technology and management of fisheries companies. In addition we develop and deliver a number of short courses in cooperation with our partners in developing countries each year. The programme in Iceland is funded through the ODA budget of the Ministry for Foreign Affairs. Each

year 18 fellowships are awarded, leaving 4-6 places available to externally funded fellows.



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A future flood resilient built environment

One in 6 homes are now under threat of flooding from rivers, sea and surface water. BRE's Centre for Resilience is calling for a new approach to dealing with the risks along with investment and the development of innovative technologies to improve flood resilience. Director of the Centre, Dr Stephen Garvin reports...

From weather bombs to hurricane Bawbag our climate is becoming ever more unpredictable and the threats to property and infrastructure significant.

Climate change may have significant implications for the built environment, with impacts likely on buildings, energy, transport, ICT and water infrastructure.

Analysis from the UK Climate Change Risk Assessment (CCRA) indicates that the built environment will be affected by extreme weather events with flooding as one of the highest order of risks.

With this in mind BRE's Centre for Resilience recently launched its flood resilience policy paper 'A Future Flood Resilient Built Environment' which calls on government to adopt a new approach for tackling flooding which is a risk to over 5 million homes in the UK alone.

In the past it was thought that a flood defence strategy could protect communities and individuals, and their property. Government recently announced £2.3bn spending on improving flood defences – this investment will protect 300,000 homes which is great. We also need a new approach to flood management to reduce the risks further as climate change and increasing urbanisation create greater exposure to flooding. This should be based on resilience where we make space for water and adapt our infrastructure for the inevitability of flooding. Critical factors are investment in research and innovation to support this paradigm shift.

The paper urges the government to think about the rise in surface water flooding, prevalent in urban areas

as this requires a more adaptive flood management approach. Surface water management needs to be embedded in the new developments we construct with things like sustainable urban drainage systems, green roofs to decrease water run off as well as localised flood resilient technologies.

“Government recently announced £2.3bn spending on improving flood defences – this investment will protect 300,000 homes which is great.”

It raises questions about the thousands of new properties built each year in flood risk areas, increasing the overall exposure and vulnerability of the built environment. There are currently no building regulations and standards that adequately cover the design and construction of resilient buildings. Research and innovation in this area would result in the development of resilient buildings that meet high sustainability standards in other aspects. Current thinking needs to be converted into a series of demonstration and test sites to provide technical solutions that can be adopted by designers and builders.

The paper identifies the lack of effective guidance documents, tools, standards and certification schemes related to the resilience of the built environment, therefore the construction industry does not have the capacity and capability to provide effective resilience solutions for new and existing buildings. Education, training and CPD for designers, builders, product manufacturers and property managers is necessary. Dedicated resources should be put towards education in current courses, through to current managers and directors in the industry.

It explains how research and innovation on the management of water at neighbourhood/community to city level is required. BRE has carried out research on the Life project which demonstrated potential sustainable master-planning opportunities, but further research and implementation is required to develop viable (economic, financial, social, technical and environmental) solutions. Discussions should take place on the need for a compulsory assessment of flood risk for all buildings in the UK. The opportunity for PLP and other flood resilience measures should be determined.

“There are currently no building regulations and standards that adequately cover the design and construction of resilient buildings.”

The aim of the White Paper is to encourage successful approaches that address existing and future developments in the built environment. Resilient solutions can be developed through research and innovation, but there is a need to address policy and practice in order for such solutions to be implemented.

Things are already moving in the financial services sector, who move quickly in response to risks. One area of change is in the insurance sector, from 2015 the current approach, the ‘Statement of Principles’, will no longer apply and instead a scheme known as ‘Flood Re’ will be adopted. It will provide a fund to offer people at high flood risk who might otherwise struggle to get affordable flood insurance with cover at a set price. Insurers will put into the fund those high flood risk homes they feel unable to insure themselves, with the premium to cover the flood risk part of the household premium capped.

Customers should not notice any difference and will continue to be insured. However, the changes will result in a need for insurers to better manage their risk, especially for high risk areas. As a result investment in property level protection may need to be considered by owners, and at least better information on where such measures have been installed will be required.

Research by the University of Dundee for the Scottish government involved a survey that made a preliminary assessment of possible societal implications of the insurance change. A particular area of concern expressed by insurance industry representatives is that they have had difficulty to date in accessing information on improvements which may substantially reduce the flood risk for individual properties in a format that would enable those data to be used for commercial purposes.

On this point BRE is working with AXA Insurance and Lexis-Nexis on the difficulty of insurers accessing information on improvements to buildings to manage flood risk. The Property Flood Resilience Database (PFR-d) project is funded by Innovate UK and will result in the means to inform insurers of relevant measures that have been taken.

What the insurance industry is currently not able to take into account is the investment made by the insured and the government on protecting properties through implementing flood resilience. The project will be undertaken to develop a prototype, involving the gathering and sorting of information on Property Level Protection and resilience of buildings, it will develop the framework for the PFR-d (combining existing datasets with the new PFR-d) and will then pilot the process through a trial area in the UK.

The white paper will be further presented to government departments throughout the UK, as well as leading industry organisations. A copy can be found at www.bre.co.uk/resilience. ■

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Bristol – UK’s first European Green Capital

Mayor of Bristol, George Ferguson discusses how the City will build on its new international status as 2015 European Green Capital, leading the way in the UK for environmental change...

The year 2015 marks a new chapter in Bristol’s history as it becomes the first European Green Capital in the UK.

Bristol has long been a pioneer in sustainable city living with over 9,000 people employed in its low carbon economy, the lowest carbon emissions of major UK cities and around 50,000 residents (over 10%) already involved in green activities.

After 40 years of innovative environmental efforts with real successes in areas such as food, travel energy and waste, Bristol’s new international status will build on the blueprint for city living worldwide and serve as a catalyst for change locally, nationally and globally.

The European Green Capital Award was established in 2008 to promote and reward the efforts of cities working to improve the environment. The Green Capital judges commented on the city’s ‘sense of fun’, one of our approaches to solving environmental problems that has been recognised.

Our vision is that Bristol will become a test-bed for environmental ideas, developing pioneering practices, which will become a model for cities around the world. A complex historic city with a population of around 500,000 and a city region of over £1m, means what works here will be replicable in many other European cities. 2015 is a pivotal global moment for sustainability with the UN Conference on Climate Change hosted in Paris at the end of the year. As the



We also plan to launch our own energy company in partnership with an energy supplier later this year giving residents a unique opportunity to buy their energy locally and more ethically.

“Our vision is that Bristol will become a test-bed for environmental ideas, developing pioneering practices, which will become a model for cities around the world.”

By 2021, all of Bristol’s council houses will be fully insulated, with new heating systems installed.

The Turn Off The Lights initiative has received a Bristol 2015 neighbourhood grant to encourage more people to make a small contribution to sustainability. After starting in the Dundry View area, residents are encouraging more of us to spread the message to friends and neighbours about how even turning off electronic items normally left on standby can save them cash and make a significant difference.

Whether it’s smaller ideas or thinking about large scale partnerships, our cross-border cooperation opens up all sorts of doors and helps put Bristol on the international map. Let’s make the most of this great opportunity to bridge the gap between what we know we need to do to ensure a safe climate and the action we are taking in everyday decisions and in individual homes across the city, in order to get there. ■

only city in the world with an official and significant ‘green’ title, Bristol has the potential to be at the centre of global discussion and debate.

Bristol’s greatest strength is its people – they are the ones who helped it to become a green city and a green capital. We want everyone – families, communities, businesses – to get involved, and to feel excited about playing their part in creating an even better, greener, more connected city.

We will be focusing on 5 core themes for the year: nature, food, energy, resources and transport. Each theme will be supported by Bristol 2015’s £2m environmental grant programme which is the largest ever offered by a European Green Capital.

Bristol is fast becoming the UK’s most energy efficient major city and we plan to take this a step further in 2015 with ‘Warm Up Bristol’. Thanks to the support of the European Investment Bank, Bristol City Council is implementing the UK’s largest home retrofit and local renewable energy programme – investing in practical measures that will not only create warmer homes and save our residents money but also help us achieve our ambitious carbon targets.



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George Ferguson

Mayor

Bristol City Council

www.bristol2015.co.uk

Estonian environmental charges

Mati Raidma, Minister for the Environment in the Republic of Estonia explains why environmental charges are crucial to help reduce the effects of climate change...

The purpose of imposing environmental charges is to prevent or reduce the possible damage relating to the use of natural resources, emission of pollutants into the environment and waste disposal. Areas covered include ambient air protection, water resource management and pollution control, mineral resource extraction, waste management, climate control.

Environmental charges are a supplementary instrument to other regulatory means. Their more specific purposes are:

- **to promote:**
 - A sustainable use of natural resources;
 - The use of environmentally friendly material and fuel;
 - Renewable energy and reuse solutions;
 - Users of the environment to apply protective measures to limit the extent of damage to the environment and human health.
- **to assist in**
 - Internalising environment related external costs to production cost.
- **to gather finances for**
 - The restoration and sustainable use of natural resources, environmental protection and maintaining the state of the environment and to finance ecological diversity protection.

The proceeds from environmental charges are divided between the state budget and the budgets of the local authorities where the environmental use is located. Charges to local authorities compensate for the environmental impacts inflicted on the region, and charges to the state budget enable environmental tax reforms, and transfer taxation from labour to resource use and pollution.

Part of the state budget revenue obtained from environmental charges is also allocated to the Estonian Environmental Investment Centre, for the purposes of maintaining the environment, restoration of natural

Table 1. Paid environmental charges divided between state budget and local authorities

	2011	2012	2013	2014 prog	2015 prog
Environmental charges, sum	75,847	78,790	92,025	84,942	98,673
To local authorities	19,553	20,137	18,125	15,331	16,356
To state budget, incl	56,294	58,652	73,900	69,611	82,317
Environmental Investment Centre	40,645	35,680	36,223	35,056	35,055
State budget, free purpose	15,649	22,972	37,677	34,555	47,262

Table 2. Environmentally related taxes and environmental charges compared to Estonian GDP and in the state budget.

mIn eur	2011	2012	2013	2014 prognosis	2015 prognosis
GDP	16,216	17,415	18,435	18,988	19,557
Taxes	5,026	5,509	6,935	7,143	7,357
Environmental taxes	398	427	421	434	447
Fuel excise duty	361.4	389.8	383.7	395	407
Electricity excise duty	32.3	32.6	33.0	34	35
Heavy vehicle duty	3,680	3,895	4,018	4	4
Packaging excise duty	0,197	0,276	0,374	0,385	0,397
Environmental charges to the state budget	56	59	74	69,7	82
Environmental charges to local authorities	20	20	18	15	16
Environmentally related taxes altogether	473	505	513	519	545

resources and remedying environmental damage, using a project-based financing model.

The role of environmental charges and environmentally related taxes is illustrated in Table 2.

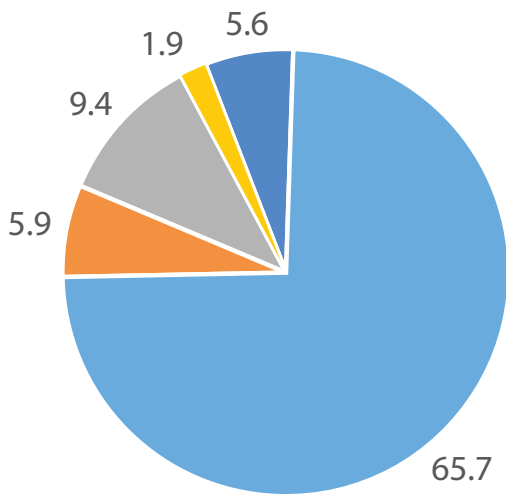
Environmental regulation and charges are important in order to reduce environmental impacts. A short overview of environmental usage in the year 2013 is given below:

- Charged emissions into the ambient air: 1.255m tons of CO₂, 4,000 tons of volatile organic compounds, 17,000 tons of NO_x, 36,000 tons of SO_x, 12,000 tons of particulates;
- Mineral extraction: 983,000 tons of peat, 2.16m m³ of sand, 750,000m³ of clay, 2.9m m³ of limestone

and dolomite, 773,000m³ of gravel, almost 16m tons of oil shale;

- Water abstraction: water from mines and quarries 167m m³, 1.49bn m³ of cooling water, 82m m³ of water from aquifers;
- Water pollution: 119 tons of phosphorous compounds, 11,000 tons of suspended particles, 81,000 tons of sulphates, 1.38 tons of monophenols, 2,500 tons of nitrogen compounds, 60.1 tons of oil products and 30,124 tons of other hazardous substances;
- Waste disposal: 1.87m tons of mine waste from oil shale extraction, 8.3m tons of oil shale fly ash, 406,000 tons of oil shale semi coke, 102,000 tons of municipal and non-hazardous waste.

Environmental charges paid by sector in 2013



- Oil shale industry and heat generation
- Mining other than oil shale
- Other industry
- Industrial water management
- Waste management

In 2006 these quantities were much higher in some cases.

Environmental regulation has thus made an impact, but environmental usage in these amounts still takes place every year. One also has to take into account, that most of this takes place in one specific location in Estonia called Ida-Virumaa, which is where the oil shale industry is located.

Estonia has national goals that have to be achieved by 2020:

The ambient air:

- SO₂ – reduce emissions 32%
- NO_x – reduce emissions 18%
- PM_{2,5} – reduce emissions 15%
- VOC – reduce emissions 10%
- NH₃ – reduce emissions 1%

Water:

- The good state of all water sources;
- Cut emissions to the Baltic Sea by 1,800 tons for nitrogen oxides and 320 tons for phosphorus.

Waste:

- 50% of recycling for municipal waste.

Environmental charges are a market-based incentive for enterprises to change their pollutive activities and take measures for cleaner production.

It has been concluded in many research papers, that there is little evidence to suggest that strengthening environmental regulations deteriorates international competitiveness. The costs of environmental regulations needs to be weighed up against the benefits they provide and which justify those regulations in the first place. The benefits are often important and severely underestimated.¹

That is also the reason why in years to come, the external costs of the greatest environmental impacts in Estonia will be calculated to better take into account the benefits and costs to society. ■

¹ OECD. Sustainable Bioeconomy Horizons, flashnote 2015/01. Smart Bio-Green Tape.

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Air quality in Europe

Air pollution impacts all living species and can have a detrimental impact. Dr Valentin Foltescu EEA Project manager – Air quality reporting and assessment at the European Environment Agency (EEA) explains more...

Europe is still far from achieving levels of air quality that do not pose unacceptable risks to humans and the environment. Even though there have been considerable improvements in the past decades, air pollution is the most significant environmental risk, causing premature death in Europe. Moreover, it also increases the incidence of a wide range of diseases, particularly in cities, and has an impact on the wider environment, damaging vegetation and ecosystems. This constitutes a substantial loss for Europe: for its natural systems, its agriculture, its economy, the productivity of its workforce, and the health of Europeans.

Exposure to air pollution and impacts on human health and ecosystems

European citizens often breathe air that does not meet European standards. Current pollution levels, especially for particulate matter (PM), ozone (O₃), and benzo(a)pyrene (BaP), impact large parts of the urban population.

The most health damaging air pollutant is fine PM, similar to dust or soot but with fine particles, capable of penetrating deep into lungs. Long-term exposure to fine PM is responsible for the vast majority of air pollution-caused premature deaths in Europe, while high levels of ground-level O₃ over short episodes also causes a significant number of deaths.

Fine PM concentrations in 2011 were responsible for around 430,000 deaths in the EU, according to EEA estimates. The estimated impact of exposure to O₃ concentrations in 2011 was about 16,160 premature deaths in the EU.

Nonetheless, it should be noted that most air pollutants have declined slightly over the last decade, including PM and O₃. Nitrogen dioxide has not fallen as fast as expected, partly because vehicles are an important source of NO₂, and vehicle emission standards have not always led to the anticipated reductions.



Valentin Foltescu, EEA Project manager – Air quality reporting and assessment at the European Environment Agency

The pollutant which increased fastest over the last decade was BaP. Emissions of this pollutant increased by more than a fifth between 2003 and 2012 as urban use of woodstoves and biomass heating increased. In 2012 almost 9 out of 10 city dwellers were exposed to BaP above World Health Organization (WHO) reference levels.

This is not the only reason for concern. An increasing body of scientific research shows that air pollutants may be more harmful than previously thought. Air pollution's effect on respiratory illnesses and heart disease is well known, but new studies have shown that it can also affect health in other ways, from foetal development to illnesses late in life.

Alongside health, these pollutants also have a significant effect on plant life and ecosystems. Air pollution impairs vegetation growth, which has an effect on both natural ecosystems and agricultural crops. The nitrogen in air pollution can also reduce biodiversity, as the process of eutrophication disturbs the delicate balance in ecosystems. This is a particular problem in sensitive ecosystems such as grassland.

Eutrophication, acidification and plant damage have decreased in recent years. However, they are still widespread – for example the long-term objective for limiting O₃ was exceeded across 88% of Europe's agricultural area in 2012. Ozone is considered to be the most damaging air pollutant for vegetation, significant affecting the growth of trees, on vegetation in general, and on important crops including wheat, soybeans and rice.

“Alongside health, these pollutants also have a significant effect on plant life and ecosystems. Air pollution impairs vegetation growth, which has an effect on both natural ecosystems and agricultural crops.”

Air quality analysis in Europe

The European Environment Agency (EEA) regularly reviews the status and trends of air quality in Europe. The evaluation is based on ambient air measurements which are combined with data on anthropogenic emissions and their trends. This allows the EEA to review progress in meeting the requirements of the 2 air quality directives currently in force and the air quality guidelines set by the WHO. Analysis also provides estimates of the effects of air pollution on human health and on ecosystems across 38 European countries, including the 28 EU Member States. ■

European Environment Agency



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Good indoor climate AND energy efficiency = TRUE

Poor ventilation is a growing health risk in today's society. Poor ventilation in offices, schools and healthcare facilities often causes discomfort and impair work performance, making it an economic issue as well.

Fresh air for all is not a matter of course. Good ventilation and a proper indoor climate cost money, but poor ventilation will also cost you. Because staffing is the main cost factor in an office environment, because impaired learning function harms a child's education, and because a poor working environment reduces the productivity and performance of healthcare personnel, indoor air quality is very much an economic issue. This is a scientifically proven fact. In some cases it has been shown that the effects of a poor indoor climate can impose costs greater than the energy costs for heating the same building.

Proper ventilation eliminates these problems and reduces not only the cost of operating and maintaining the buildings, but also complaints about the indoor climate. Many unnecessary allergy problems can be eliminated from schools by a simple fan filters inspection.

Major energy efficiency gains possible

Rising energy prices and the demand for sustainable construction make it important to minimise energy consumption and use the right materials. A building should only be

ventilated as much as it needs to be! Empty areas should have a considerably reduced airflow. This can be accomplished using demand-controlled ventilation. This saves electricity for the fans and reduces heat loss. Ventilating spaces when it is not necessary is like deliberately making a hole in the wall and pushing out the heat.

Holistic thinking and flexibility

The combination of a good indoor climate and low energy consumption requires advanced technology – and also user-friendliness and flexibility. In 2002, Lindinvent developed an award-winning product with these considerations in mind. Providing the air terminal device with multiple integrated sensors and a smart regulator to control ventilation, heat and lighting based on actual need, marked the creation of a new kind of product. The product requires no wall-mounted sensors, simplifying the wiring process and allowing walls to be placed arbitrarily.

By meticulously simplify everything from installation of the air terminal device and wiring, to intuitive web-based presentation of data, costs were halved compared to earlier solutions of a similar type. The patented airflow controller also eliminates all draughts, even when intake air is cold.

The web interface is crucial for building services staff to be able to understand the indoor climate, and is



a guarantee of good long-term functionality. It also gives a better basis for making decisions and working efficiently, thereby lowering costs. Advanced optimisation algorithms to calculate the most economical options for controlling the indoor climate reduces costs further still.

We have hundreds of installations showing that this works. One example is the solution at Swedbank's headquarters in Stockholm, which was named Sweden's "Best Green Building of 2014". One of Europe's 5 best renovation projects, was presented an award this summer, also features our solution – with 64% less energy consumption.

LINDINVENT 

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SMHI

Airviro – the world's most complete AQM-system

Allow us to introduce the advantages of a complete air quality management (AQM) system, an essential tool when working with sustainable development. Join us on a tour of effective and state-of-the-art air quality management.

An AQM-system is essential in order to improve and render more effective the work with all air quality related issues and thus save money and time.

Air quality management is a complex task which affects and is affected by several factors, such as health, traffic planning, industrial activities and climate change. To get a complete overview of the situation you need a competent AQM system that allows you to get on top of all three main instruments in the air quality management assessment cycle:

- Monitoring
- Emission inventories
- Air quality modelling

Let's have a look at a few examples on how some actors have chosen to put their AQM-systems to use.

Air pollution – no borders

Air pollution knows no boundaries, and tearing down unnecessary administrative boundaries is essential. The Air Quality Management Association of Eastern Sweden is a brilliant example. Here several municipalities, county councils, institutes, universities, companies and civil service departments located in the region collaborate. The main tool used by the Association is their Airviro AQM-system (<http://slb.nu/lvf/>).

The main objectives of the Association are:

- Map air pollutants, control air quality and check against air quality standards



- Make environmental and health impact assessments in urban planning
- Contribute to research on health and air pollution
- Provide the public and authorities with information on air quality

Airviro – no limits

Just like air pollution, a good AQM-system should have close to no limits. Each installation should be tailor-made according to the customer's needs. An impressive example is found in central Chile. Here a copper melting company and an electricity generating company have a shared Airviro installation, used to keep track of maintenance, calibration and operation actions for the stations, in accordance with national requirements. The system generates alarms based on information from the plants operational networks and all validated air quality information is sent to the plants. The same information is then sent online to the Chilean national Airviro-based air quality portal (<http://sinca.mma.gob.cl/>).

Traffic in Airviro

In most cities traffic heavily affects air quality. The Leicester City Council Airviro installation is enhanced with real time data on traffic flow for approximately 300 roads. The information is used to produce hourly air quality maps of the impact of current traffic. In Santiago, the GPS coordinates from 6000 buses are sent to Airviro and then used to calculate emissions from the bus fleet on an hourly basis.

Shipping emits considerable amounts of air pollutants. Shipping emissions are calculated in Airviro using AIS-data. The Airviro shipping module, used among others by the Ministry of Transport, Maritime Affairs and Communications in Turkey, provides information for decision-makers regarding:

- Environmental impact for ports or coastal regions
- Comparison of emission scenarios
- Refinement of methodology used for international reporting of emissions
- Indicators for regional or national environmental objectives
- Input to regional or national emission inventories

Climate change - we can handle it

Air quality and climate change are closely linked. Air quality is therefore included in the SUDPLAN project which aimed to develop a planning and prediction tool to support decisions in long term urban planning. Through the SUDPLAN web tool, based on Airviro, the risk of storm water local runoff, river flooding and elevated air pollution levels can be evaluated for planned or existing urban areas subject to a changing climate. SUDPLAN services were demonstrated for four city pilots, including Stockholm (<http://sudplan.eu/>).

Big data - not an issue

A strong AQM-system has to be able to store and quickly process great amounts of high



resolution data in time series format. Data collection, monitoring, validation and dissemination of the information from the UK Automatic Urban and Rural Network, AURN, (<http://uk-air.defra.gov.uk/networks/aurndata-sites>) is being made using the potent Airviro data collection module, as are the about 130 one-minute-resolution precipitation stations in Singapore.

Complete, flexible, secure and stable

Airviro is an integrated system for time series data handling, emission inventories and air quality modelling, suitable for large amounts of data, a large number of users and satisfies high demands on security, performance and stability. Its modular design allows you to adapt the system to your needs - start out small and expand the system at your own pace. Airviro is in the cloud and can be accessed from any computer connected to the internet. Airviro has been developed continuously by the Swedish Meteorological and Hydrological Institute (SMHI) (www.smhi.se) and Apertum IT AB since 1990.

To learn more visit www.smhi.se/airviro or attend our next User Group Meeting in Doncaster on the 24th of February (<http://www.smhi.se/airviro/news-archive/welcome-to-the-airviro-user-group-meeting-in-doncaster-1.83929>).

Tackling air quality issues in the Turku region

According to the Finnish Environmental Protection Act, municipalities are responsible for enhancing air protection within their region. Turku is a regional capital of the third largest urban area in Finland and an important business and cultural center. The City of Turku must therefore organise the necessary air quality monitoring system in the area.

Co-operation group as a key

In 1988, the Turku Region Air Protection Co-operative Group was established. Through this group, ambient air quality monitoring was initiated in 1989 in 7 monitoring stations, using sulphur dioxide analysers. Today in total 8 air quality monitoring stations and a weather station operate in an urban area with 275,000 inhabitants. The substances that are measured are sulphur dioxide, nitrogen oxides, thoracic particles, ozone and carbon monoxide.

The co-operative group consists of the environmental authorities of Turku, Raisio, Naantali, Kaarina and Parainen, together with 12 industrial partners encompassing the energy industry, oil refineries, shipyards, harbours, the building materials industry and others. The enterprises' willing to participate is based on their environmental permits, which oblige them to monitor the effects of their emissions on the ambient air.

Strong decline in emissions

In the Turku region, the pollution of the ambient air is caused by the sources in the region as well as



Electric vehicles are used for servicing the monitoring stations

transboundary emissions. Since the beginning of the co-operation, the emissions caused by energy production and industry have declined strongly, due to the centralisation of the energy production (e.g. district heating), reduction of the sulphur concentration in fuels, and the air protection investments in the larger plants.

The most significant factor in reducing air quality is road traffic. Even though the quantity of the emissions from road traffic is lower than the energy production and industrial emissions, road traffic emissions have a greater impact on the ambient air due to the low altitude of their emissions.

Nowadays, the worst air quality occurs during the spring when the concentrations of thoracic particles might exceed limit values, due to the road dust. The problem is enhanced by winter sanding and depressed by

dust suppression and street cleaning later on in the spring. In winter the national guideline values set for the nitrogen dioxide may be exceeded. However, when compared to the other European air quality monitoring results the pollutant concentrations in Turku are low.

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Working together for cleaner air

Christian Friis Bach, Under Secretary-General of the United Nations and Executive Secretary at the United Nations Economic Commission for Europe details the importance of renewing efforts against air pollution...

Breathe in and breathe out. Hold your breath. If you do this too long, you can feel a strong urge to gasp and fill your lungs with fresh air. But the air we breathe is often not as fresh as we think it is. Essential for our vital functions, it often contains pollutants that we inhale without realising it. Air pollution is mostly invisible, but it can harm our health and the environment around us greatly.

I remember the debate about air pollution in the 70s and 80s vividly. The forests and lakes in Northern Europe were dying from “acid rain” and stirred heated discussions. Realising that air pollution does not halt at national borders but can affect communities and citizens thousands of kilometres away, the countries in Europe and North America decided to cooperate to solve the problem. In 1979, 32 countries signed the Convention on Long-Range Transboundary Air Pollution under the auspices of the United Nations Economic Commission for Europe (UNECE). Over the last 30 years, additional countries have joined, bringing the number of parties to 51 to date. The number of substances covered by the Convention and its protocols

has also been gradually extended, notably to ground-level ozone, persistent organic pollutants, heavy metals and particulate matter.

The result of this collective effort has been spectacular: emissions of a series of harmful substances have been reduced by 40 to 70% since 1990 in Europe ¹. In North-America, reductions of 30 to 40% have been registered. The air we breathe today in Europe and North America is much cleaner than it was 30 years ago.

However, despite this success, a lot remains to be done, as evidenced by the regular peaks of pollution registered in big cities like Paris, London or Madrid. The impacts of air pollution on the environment continue to be worrisome. It is still destroying forests and soils, causing fish loss in lakes, and putting entire ecosystems at risks. Air pollution, especially black carbon (or soot) – a component of particulate matter – is also contributing to climate change. The resulting economic impacts often go unnoticed but they are huge: according to an assessment by the European Environment Agency ², the societal costs of air



Christian Friis Bach, Under Secretary-General of the United Nations and Executive Secretary

pollution from Europe’s largest industrial facilities amounted to at least €59bn in 2012, and possibly as much as €189bn.

Recent research has also shed some disturbing light on the negative impact of air pollution on human health. In 2012, around 7 million people in the world died prematurely as a result of air pollution exposure, according to the World Health Organization (WHO) ³. Some 600,000 alone in the European region. This makes it more deadly than malaria, tuberculosis and AIDS combined, and by far the world’s largest single environmental health risk. The majority of air pollutant-related deaths occur in developing countries. The Western Pacific and South East Asian regions bear most of the burden with 2.8 and 2.3 million deaths, respectively. According to WHO studies, exposure to fine particulate matter, a major component of air pollution, in the Asian region is highest in countries like Pakistan, Afghanistan, Bangladesh, Mongolia, India, Nepal and China. In addition to causing respiratory and heart diseases, exposure to air pollution can also lead to cancer, as evidenced by the International Agency for Research on Cancer in 2013 ⁴. It found that in 2010, some 223,000 deaths from lung cancer worldwide were attributable to air pollution.

We must therefore strengthen our joint efforts – across national boundaries, but also across sectors –

in our action for cleaner air. Tackling air pollution is a key priority in the pan-European region. This is why air quality will be one of the 2 main themes at the Environment for Europe ministerial conference in 2016. If governments renew their firm commitment to implement the legally binding emission reduction targets, and set further targets, they will send a strong message to the world and help save tens of thousands of lives. Tackling air pollution is also a key priority for the world, from Asia to Latin America, as evidenced by the proposed Sustainable Development Goals. To respond to this challenge, we must share experiences and inspire global action.

The major sources of air pollution are well known: power stations and industrial installations emit sulphur dioxide and heavy metals; traffic is a source of nitrogen oxides; ammonia emissions from agriculture contribute to the formation of particulate matter. Likewise, wood-burning stoves in individual homes, if not equipped with appropriate filters, are also a major source of particulate matter and other pollutants. Countries all over the world will need to take drastic, and sometimes unpopular, measures to significantly curb the emission of air pollutants across all these sectors. This will require the active engagement of all these industries, and also behavioural change by each and every one of us. But we have proven that we can get cleaner air, if we work together.

Breathe in, breathe out and let’s get to work. ■

¹ http://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/2014_submissions/

² <http://www.eea.europa.eu/publications/costs-of-air-pollution-2008-2012>

³ http://www.who.int/phe/health_topics/outdoorair/databases/FINAL_HAP_AAP_BoD_24March2014.pdf?ua=1

⁴ <http://www.iarc.fr/en/publications/books/sp161/index.php>

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Clean air for all

Dr Eva Csobod, Project Coordinator at the Regional Environmental Center details how the SINPHONIE project is helping to deliver clean air for school children...

The indoor environment in schools constitutes a particular cause of concern, since schoolchildren are a particularly vulnerable group of the population. In Europe, more than 64 million students and almost 4.5 million teachers spend many hours each school day inside pre-primary, primary and secondary schools. Children spend more time in school than in any other place except home. There is much evidence regarding the potential detrimental effect on health of a variety of indoor pollutants that can be found in school environments, either originating from the ambient air or produced indoors from materials, products or activities. The presence of pollutants in schools may also affect children's growth, opportunities and learning performance, as well as their cultural and social development.

The WHO Guidelines for indoor air quality specifically state that clean air is a basic requirement for life. It is also emphasised that the primary aims of the WHO guidelines are to provide a uniform basis for the protection of public health from the adverse effects of exposure to indoor air pollution, and to eliminate or reduce to a minimum exposure to those pollutants that are known or likely to be hazardous. The guidelines are targeted at public health professionals involved in preventing health risks from environmental exposure, as well as at specialists and authorities involved in the design and use of buildings and the materials and products used inside them.

The SINPHONIE project (School Indoor Pollution and Health-Observatory Network in Europe), established a scientific/technical network to act at the EU level with the long-term perspective of improving air quality in schools and kindergartens, thereby reducing the risk and burden of respiratory diseases among children and teachers potentially due to outdoor and indoor air pollution. At the same time, the project supports future



policy actions by formulating guidelines, recommendations and risk management options for better air quality and associated health effects in schools.

SINPHONIE was more ambitious than earlier projects due to its integrated approach to health and environment issues related to the school environment, and due to the large number of parameters assessed. This justified the special efforts dedicated to the preparation of the field studies and campaigns in the 23 participating countries, which were preceded by well-prepared environment and health training for over 80 scientific and technical staff at the European Commission's Joint Research Centre (JRC) in Ispra, Italy. An important element in the SINPHONIE methodological framework was the setting up and population of the SINPHONIE database. The database supported the creation of the observatory network for Europe on school indoor pollution and health by generating significant amounts of high-quality data in line with the SINPHONIE objectives, while also feeding into future similar projects and actions to be undertaken in European countries.

An analysis of the SINPHONIE results confirms that IAQ in schools is a very important issue and has an impact on children's health, including respiratory problems such as asthma and allergies, as well as

attendance and performance. The SINPHONIE results show that indoor air pollution in schools is complex and variable, that it can have different origins (outdoor, indoor) and nature (physical, chemical and biological), and that it can be caused by a variety of sources (such as combustion processes, building materials or components and consumer products). Air pollutants were found in classrooms in concentrations that in several cases exceeded WHO guideline values and that were thus harmful to schoolchildren's health.

The SINPHONIE findings clearly show that Indoor Air Quality is a real problem in schools in many European countries. There is evidence that many schools have high levels of air pollutants (above the recommended guideline values in the case of PM2.5, formaldehyde, benzene and radon).

SINPHONIE has produced guidelines for healthy school environments. The translations of the guidelines are available on the SINPHONIE project's website (www.sinphonie.eu) and on the JRC website (<http://publications.jrc.ec.europa.eu/repository>).

The guidelines are intended to be generally applicable in most school environments in Europe. However, as each school environment is unique (in terms of design, climatic conditions, operational modes, etc.), the guidance needs to be adapted at national or local level. The guidelines for healthy school environments in Europe are primarily directed to relevant policy makers at both European and national levels and to local authorities aiming to improve the indoor school environment in their countries while respecting the specificities (environmental, social, economic) of their national and local situations. A second target group that is expected to benefit directly from these guidelines includes school building designers and managers (responsible for the design, construction and renovation of school buildings). A third target group comprises schoolchildren and their parents, teachers and other school staff.

SINPHONIE was initiated and funded by the European Parliament. It was carried out under a contract with the European Commission's Directorate-General for Health and Consumers (DG SANCO). The current 7th Environment Action Programme and the Clean Air

Policy Package of the EC were developed and came into force in late 2013. These documents provide the policy framework for potential follow up activities of the SINPHONIE project. ■

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The Coordination Committee of the project: Éva Csobod, REC, Eduardo de Oliveira Fernandes, IDMEC-FEUP, Peter Rudnai, NIEH and Stylianos Kephelopoulos, JRC.

The final reports of the project summarise the work performed by a consortium of 38 partners from 25 countries that involved around 300 people of specialised scientific and/or technical background. The authors of the reports wish to express their deep gratitude to all of their collaborators for their outstanding contribution to the execution of the SINPHONIE project. Names of all contributors can be found at the end of the final reports as well as on the SINPHONIE project's website (www.sinphonie.eu). Special recognition goes to the teachers, pupils and parents who participated in the SINPHONIE project, for their enthusiasm and close cooperation.

Reference

SINPHONIE (Schools Indoor Pollution and Health Observatory Network in Europe): Executive Summary of the Final Report.

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A Polish agriculture transformation

Following Poland's accession in 2004, their agriculture sector has seen a transformation in terms of growth, but the desire for improvements continue. Adjacent Government outlines the latest developments...

Poland's accession into the European Union in 2004 has enabled the country to transform its agriculture sector. From the initial concerns from farmers fearing they would drown in a sea of subsidised produce, what has actually happened is an increased spend, with payments from the Polish state nearly tripling since accession. One expert, Jerzy Wilkin, an economics professor at Warsaw University even commented that "This is a golden age of Polish farming," adding that "Never before has such large amounts of money flowed into agriculture."

The process of accession gave farmers access to funds from the Common Agricultural Policy, and in particular to direct payments that came with a threshold set at just one hectare. The dairy sector, for instance has flourished, partly fuelled by a need to comply with costly regulations governing any modernisation plans. This, in turn, has attracted international agri-food companies to Poland, and helped prompt an export boom.

However, Poland is currently in a battle with the EU following a French accord with Russia to lift its ban on live pig and pork imports, saying they broke the "principle of European solidarity". Pressure is mounting on the European Union to consider tougher sanctions on Russia following the continued crises in Ukraine. France is expected to see the ban on live pigs, offal and fat, that was imposed by Moscow a year ago, to be lifted for France.

Poland's Agriculture Minister Marek Sawicki has said that both the EU health commissioner, Vytenis Andriukaitis, and the farm commissioner, Phil Hogan, said they didn't give a green light for bilateral deals with Russia. Britain, Germany, and the Baltic states are backing the Polish stance, demanding that the EU retains its solidarity.



Aside from the current political fighting, Minister Sawicki continues to fight for the rights (and payments) for Polish agriculture. Looking ahead to the financial perspective to 2020, funds are likely to be similar to what has been spent so far. The Rural Areas Development Programme will have a consistent system of payments, which has been focussed on active farmers, so that the highest number of family-owned farms will be able to become permanently bound with the market and at the same time, gain financial stability. This should allow for the further development of Polish, and European agriculture. The demand for food will grow, as will high quality food. With around 30% of Polish agricultural production exported, Poland will still be looking for new target markets – the Russian embargo introduced in 2014 confirming this approach as a necessity. ■

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Animal nutrition in the company of physiology

The Kielanowski Institute of Animal Physiology and Nutrition (KIAP&N) of the Polish Academy of Sciences is one of the leading research centers, whose mission is to conduct fundamental and applied research in the fields of farm animal nutrition and physiology. Pigs and ruminants, as well as poultry and laboratory animals are the main subjects of interest. Studies are carried out by a staff that includes 9 professors and 25 researchers with doctoral and doctor habilitated degrees, working in five departments and two interdepartmental laboratories.

The studies related to animal nutrition encompass both physiological fundamentals and elements of feed science. Their objective is to determine the nutritional requirements of animals, which change as the result of genetic improvement and consumer expectations as to the health-promoting qualities of animal products. To reach these goals it is necessary to understand the metabolism of particular nutrients in the digestive tracts of animals, including the involvement of microorganisms colonizing its various sections, and the role of these nutrients in the metabolism of the animal itself. As the digestive tract is formed at an early age, the influence of various feed components on its development and functions is investigated, including the quality and quantity of protein, fiber and biologically active supplements.

A well-developed stream of research concerns modifying diets in order to



The Kielanowski Institute of Animal Physiology and Nutrition (KIAP&N) in Jablonna administrative and laboratory building

obtain a functional product with health-promoting characteristics. This applies to supplementation of diets with vegetable and/or fish oil, as well as antioxidants protecting against oxidation of unsaturated fatty acids. The final meat product is to have a balanced omega-3 and omega-6 fatty acids ratio and a high nutritional value, thus playing a role in prevention of cardiovascular disease. It is also important that these health parameters could be maintained after food processing, since numerous treatments may reduce the health promoting traits.

An important social problem is the lack of acceptance for using feed containing genetically modified crops (GMO) for livestock. The results obtained at the KIAP&N showed the safety of GMO materials used in

animal feeding, however it is possible to partially replace them with non-GMO legumes which meet expectations of substantial group of consumers. If we do not want humans to consume GMOs directly, the discussion on GMOs must include their favorable role in animal nutrition.

The main research areas on animal physiology are those related to the mechanisms regulating growth, maturation, and reproduction of animals, as well as the development of the structure and function of the digestive tract. The topics of studies include the activity of neural tracts at the central nervous system level and secretory activity of the pituitary gland and other endocrine tissues (gonads, adrenals, pineal gland, thyroid, and pancreas) in various physiological states.



Laboratory of Molecular Biology: mRNA isolation (top) and tissue sectioning (bottom)

The KIAP&N is a recognised entity in the study on the functioning of the hypothalamic-pituitary neuroendocrine axes of sheep and rats.

Much attention is being paid to environmental factors, especially those that disrupt the normal functioning of organism (nutritional deficit, stress, inflammation). Biologically active substances that are ingested with feeds and interact with endogenous regulatory compounds are also an important research topic. Modern research techniques, especially from the field of molecular biology and confocal

microscopy make it possible to study cellular signalling pathways and the genes activated by them. Detailed knowledge about regulatory mechanisms may enable better control over important life functions and may also have a bearing on human physiology and be of value in the treatment of diseases stemming from the disordering of these mechanisms.

The KIAP&N conducts studies within the framework of projects financed by the Polish Ministry of Science and Higher Education, the National Research and Development Center,

and the National Science Center. Some of the resources used to finance the Institute's research come from EU structural funds. Broad co-operation with scientific institutions in the country and abroad allows for the exchange of scientific ideas and experience in the implementation of those objectives.

The KIAP&N publishes its own quarterly international scientific journal, *The Journal of Animal and Feed Sciences* (IF = 0.591 for 2013), in which papers on animal nutrition, breeding and physiology, and feed science, submitted from Poland and abroad, are published. It has also authorised to confer the academic degree of PhD in agricultural sciences.

The KIAP&N is open to co-operation with scientific institutions, feed and food producers, as well as the pharmaceutical industry in terms of participating in research and implementation.

In 2016, The KIAP&N will be a co-organiser of the scientific conference 'The 5th EAAP International Symposium on Energy and Metabolism and Nutrition' to be held in Krakow, the former capital of Poland.



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21st Century agriculture

Adjacent Government looks at the key areas the European Commission is focusing on in regards to agriculture, and how new Commissioner for Agriculture and Rural Development Phil Hogan hopes to bring the agriculture sector into the 21st Century...

The agriculture sector is integral to European society in order to meet the challenges of an ever growing population. As well as providing food and raw materials for countries, agriculture also provides job opportunities, and a great source of livelihood for many rural communities.

Tasked with overseeing agriculture and rural development throughout Europe, is the new Commissioner Phil Hogan. Previously the Minister for Environment, Community and Local Government in his home nation of Ireland, Hogan is preceded by Dacian Cioloş.

In meeting the many challenges facing the agriculture sector – including growing world food demand – the new Rural Development Policy will be a key driver. The policy aims to encourage investments in rural areas and support innovation projects.

In his first speech at the Brussels, 6th Knowledge and Innovation Summit, European Parliament, in November 2014, Hogan highlighted the importance of innovation in the agriculture industry, which is a key priority in his mandate.

“Agriculture has always been an innovative sector. Most of the farms today have little in common with the farms of the 1950s. And the farms of 2050 will probably differ significantly from the farms of today,” he said.

“European Farming is an innovative sector: farmers have delivered on the societal goals of food security, food safety and quality. They have achieved this whilst protecting the environment and being more resource efficient.

“However, the challenges and also the opportunities that are ahead of us are as great today as they were 60 years ago.”

The global population is expected to reach 9.6 billion people by 2050, and one of the many challenges facing the agriculture sector is food security, which Hogan believes is bigger than ever.

He continued: “World food systems will have to increase in efficiency and productivity to ensure that people have access to the food they need. We will have to do more with less through greater use of recycling, up-cycling and above all, wasting less. EU agriculture should be at the forefront of this efficiency drive.

“Part of this will encourage young innovators to see farming as an attractive, high tech and rewarding career. I am glad that the new Common Agriculture Policy goes a long way to increasing the appeal of farming as a career.”

The Common Agriculture Policy (CAP) was first launched in 1962 in order to help improve agricultural productivity, so that consumers have a stable supply of affordable food, and ensure that farmers can make a reasonable living.

In 2013 the CAP was reformed in order to strengthen the competitiveness of the sector, promote sustainable farming and innovation, and support jobs and growth in rural areas.

“Innovative agriculture should also ensure the protection of natural resources, biodiversity, landscape, soil, and water, and increase the environmental and

climate benefits that farming provides,” explained the Commissioner.

“Innovation is the key to sustainable rural development: through innovation, we can maintain the competitiveness of the agri-food sector and create more and better jobs in rural areas, all the while safe-guarding the planet for future generations.”

Alongside the Rural Development Policy, the Horizon 2020 programme will also provide a considerable boost to agriculture and forestry. The programme aims to improve the productivity and sustainability of agriculture and forestry while strengthening related food and non-food industries.

In his speech, Hogan expressed the commitment to agriculture and forestry research through the Horizon 2020 programme, which expects to see funding reach €4bn for 2014-2020.

“In parallel to our efforts in rural development policy, we are delivering a considerable boost to agriculture and forestry research through Horizon 2020. The budget has been doubled compared to the previous programming period.

“Support to research and innovation is coupled together to develop cross-thematic activities and avoid traditional research in “silos”. The goal is to ensure that Europe produces world-class science, removes barriers to innovation, delivers research from universities and institutes to the farm gate and the rural economy, and makes it easier for the public and private sectors to work together in making innovation happen.”

In December 2014, the European Commission gave the green light to 6 Rural Development Programmes (RDPs), which will help to provide different forms of support and investment in rural Europe between 2014 and 2020.

“The new Rural Development Policy will be a key driver to encourage investments in rural areas and support business start-ups and innovation projects,” said Hogan in a speech in December 2014 to the European Parliament.

“With the boost to agricultural research, European farmers will have better access to knowledge and increase productivity.”

As well as providing a much needed boost to farmers already in the throes of their careers, the European Commission is keen to help improve support for young farmers as they start their career in agriculture. Making the sector an attractive place to find employment and carve a career is a base for achieving future goals, as supported by the Commissioner.

“Young farmers are important for the future of EU’s agriculture with a view to growth, competitiveness, jobs and investment. The agricultural sector in the EU is still characterised by an aged – and in many Member States ageing – farming population, though recently there have been signs of improvement.

“There is a wide range of support measures for Young Farmers under the new Rural Development policy, for example the business start-up aid for young farmers subject to a business plan, a higher support of up to 90% for investments in physical assets, support for information, advice and training, for cooperation activities and so on.

“With these measures, we can help ensure that farming remains an attractive career choice for young people across Europe.”

Hogan has certainly made a good start in his tenure as European Commissioner for Agriculture and Rural Development, by showing the Commission’s commitment to ensuring the agriculture sector is well placed to make a central contribution to the new economic agenda.

The proof, as they say, will be in the pudding. ■

Comments take from the following speech:
http://europa.eu/rapid/press-release_SPEECH-14-1885_en.htm
http://europa.eu/rapid/press-release_SPEECH-14-2343_en.htm

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Climate change and the impacts on forest trees

The Intergovernmental Panel for Climate Change (IPCC) identifies climate change as one of the most serious global challenges to ecosystems and societies. A crucial feature is the rise in mean ambient temperature. Models predict that in the next few decades temperatures could increase by 2-4°C, exceeding what most forest ecosystems would be able to handle. IPCC and the International Union of Forest Research Organizations (IUFRO) project that as a result forest distribution and species composition will drastically change. This is a worrying prospect, as the importance of forests can hardly be overestimated. In North-Europe, forests cover as much as 55-75% of the land, 50% of which is coniferous, 25% is broad leaved, and 25% mixed. These forests are not only reservoirs of biodiversity, providing crucial wildlife habitats, they also represent substantial economic value, and provide societal, health and recreational benefits. Moreover, they mitigate climate change by storing carbon dioxide and holding water.

Warming affects forests

Elevated levels of carbon dioxide, a significant driver of temperature increase, might initially benefit temperate and boreal forests, but eventually alter their geographical location and compromise species diversity. Projections indicate that temperate forests will migrate northwards and invade the boreal zone,



thereby reducing the competitiveness of boreal species. Because climate change will outpace the natural migration rate of many tree species, the more aggressive, adaptable and fast-growing species will become dominant in the newly established areas.

Instability reduces tree survival

Global warming will not only raise the mean annual temperature but also give rise to weather instability, characterised by unusual fluctuations in humidity and temperature. Some areas will become drier and hotter, resulting in draughts, while other areas will experience increased precipitation and waterlogging. The frequency of storms and pest outbreaks will increase,

resulting in die-off and decay of many trees. Although currently temperate forests are carbon sinks, increased migration-related forest destruction and warming-induced conversion of organic soil matter could turn forests into carbon dioxide sources. A different and potentially serious effect of weather instabilities is that they compromise the ancient and fine-tuned interplay of trees with the environment to which they are adapted. Fine-tuning is crucial for survival, as it allows trees to maximise their short growth period as well as timely preparation for winter. That climate change might compromise this fine-tuned relationship has received little attention in climate models. Our investigations focus on how photoperiod- and temperature-

driven signaling events schedule growth and survival strategies. Understanding how trees regulate their seasonal cycle in response to a changing environment will help to prognose and mitigate the effects of climate change.

“A crucial feature is the rise in mean ambient temperature. Models predict that in the next few decades temperatures could increase by 2-4°C, exceeding what most forest ecosystems would be able to handle.”

Seeing light and sensing cold

Deciduous trees use their responsiveness to the day-night cycle to foretell the arrival of winter. They utilise photosensitive pigments in their leaves that give input to a genetically controlled clock. When a critical shortening of the light period is registered, the clock sends a signal to the growing points to trigger preparations for winter. Each local tree population (ecotype) has its own ‘daylength set value’ at which it responds, giving it just enough time to prepare for winter in their local environment. When the signal arrives, the growing point ceases apical elongation and switches from leaf to bud scale production. Inside the bud, a dwarfed shoot system emerges that arrests growth and establishes dormancy when the bud is completed. Essentially, the bud is a survival package that allows a rapid start in spring. Winter buds are crucial to survival and longevity, and without them temperate and boreal forests would not exist. Dormancy not only arrests growth, it also primes the bud

for freezing-tolerance to protect cells during winter. Our work established that growth arrest is governed by genes that block communication between cells in the growing point, transforming a functionally integrated cell society into a collection of isolated individuals. At the same time, other genes are expressed that direct cellular physiology towards a freezing-tolerant state. The chill of the approaching winter has 2 effects: it breaks dormancy by re-opening the communication channels and reversing the capacity of cells for networking, and it further deepens tolerance to freezing. The result is that the arrested system is now highly freezing tolerant, but poised for rapid growth once temperatures rise in spring. Thus, interestingly, Northern trees have turned the pre-winter chill from foe to friend.

Compromised fine-tuning

The mechanisms that fine-tune the growth and survival strategies function well in the stable climate in which trees evolved. However, the unusual weather fluctuations projected by climate change models may seriously compromise the environmental scheduling of these strategies. Longer warm spells in mid-winter can awake non-dormant buds and remove freezing-tolerance, thus leaving them unprotected from returning frost. This could result in considerable damage to both wild and domesticated tree species. We therefore urgently need to improve our understanding of the survival strategies forest trees rely on, the degree of resilience they confer, and if they can be modified to better fit changing conditions. It requires coordinated efforts of cross-disciplinary

teams to integrate knowledge – from genes to cells, trees and forest ecosystems. Presently, we know too little of how individual forest trees will cope under a changing climate, and how their distribution and survival will be affected. Fortunately, there is a growing awareness among policy makers, the public, forest owners and forest-based industries of the urgency of these problems. Norway actively supports forest research, but to obtain an integrated view of climate change impact we urgently need to strengthen investigations that elucidate the genetic and cellular mechanisms that trees use to fine-tune their relation to the environment.



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Going for growth for agriculture in Northern Ireland

Michelle O'Neill, Minister for Agriculture and Rural Development in the north of Ireland gives an overview of her priorities for 2015 including tackling rural isolation and progressing the 'Going for Growth' strategy...

A difficult budget for 2015/16 means we will face a challenging year ahead. This is why I remain committed to work diligently to protect services for farming, agri-food and fishing industries and rural communities through 2015 and beyond.

We ended 2014 with a record performance of 95% of approximately 30,000 farmers receiving their Single Farm Payment (SFP) in December. These are the best results the department has delivered since the introduction of SFP in 2005. While this is very welcome, I want to see the remaining claims processed as quickly as possible.

Last year, tough decisions were required under reform of the Common Agricultural Policy (CAP). I undertook comprehensive engagement before reaching balanced decisions for the betterment of all farmers across the north of Ireland. This year sees significant changes in payments to farmers so my Department is focussed on communicating the new rules.

The Greening Payment will have particular implications for farmers who have larger areas of arable land and the Young Farmer Payment is intended for younger farmers with a qualification who are taking control of the farm. A considerable amount of information is available on the Department's website. I have also committed to investing in the information and communications technology to comply with Europe's requirements and help farmers avoid penalties. My simple message to claimants is: claim online, ensure your maps are accurate and that you meet the eligibility rules.

Tackling rural isolation and progressing the 'Going for Growth Strategy' are key priorities. I will allocate £3m

to initiate the actions identified in the 'Going for Growth' strategy including the delivery of the Farm Business Improvement Scheme (FBIS). This represents an initial step towards delivering longer term investment. I am also committed to delivering a range of measures within the new Rural Development Programme including establishing the new Local Action Groups under the LEADER programme, and delivering payments to farmers through the Areas of National Constraints scheme. I will also ensure funding is available for Tackling Rural Poverty and Social Isolation (TRPSI). I also intend to bolster rural economies through the Department's programme of relocation.

There is a Programme for Government commitment to advance the relocation of my headquarters to a rural location by 2015. Work is ongoing to relocate DARD HQ to Ballykelly. The preferred option points to a phased approach to construction, with 400 workstations being completed by the end of 2017 and a further phase of around 200 workstations being completed in 2020.

This is a considerable programme of work which will help to share wealth across the economy and contribute to better-balanced economic growth, by commencing to address disparities in the distribution of public sector jobs in the north of Ireland. The proposed relocation will also stimulate the local economy through increased local spending, provision of high quality and high value public sector jobs and potentially jobs associated with the construction of and the ongoing servicing of a new building. I remain committed to taking all reasonable steps to effect the transition of a Belfast based Headquarters to one based in Ballykelly.



Michelle O'Neill, Minister for Agriculture and Rural Development

The relocation of DARD headquarters to a recognisably rural location is part of a wider programme which will see Forest Service move to Enniskillen, Co Fermanagh and Fisheries Division to Downpatrick, Co Down by June 2015, and also Rivers Agency to the Loughry Campus in Cookstown, Co Tyrone by March 2016. This will also help contribute to the further distribution of posts across the north.

Individuals want to find a better work/life balance and a job position closer to home. I, along with my officials, will continue to drive forward this programme of change.

Over the coming months, I will work with my counterpart in the south, Simon Coveney, to target new markets for our agri-food produce and to maximise these opportunities through all-island cooperation.

In 2015, we will apply to the European Commission seeking Official Brucellosis Free (OBF) country status and we will continue to work to eliminate TB in cattle.

The Executive's draft budget for 2015/16 has been a focus of debate over the last number of months, particularly given the scale of Tory cuts, which have forced me to reduce my budget by £29.9m. This will be very difficult as we need to reduce staff by about 10%. We have already put a hold on recruitment and promotion and shortly we will be offering a voluntary exit scheme. Nonetheless, my Department will adapt to a new model in order to maximise delivery.

My Department leads on flooding and we work with the south to manage the flood risks across Ireland. We are progressing flood alleviation works across the north, investing some £11m in Belfast alone.

I welcome the opportunity to work with the fishing industry on the implementation of the Inshore Fisheries Strategy and the European Maritime and Fisheries Fund, which will replace the current European Fisheries Fund.

While I face difficult decisions, I will remain true to commitments I have made and will not be deterred from delivering my policy priorities under the north's Programme for government

I will build for the future, supporting the vision of the agri-food sector and developing a leaner, more modern and more efficient department, and I will continue to direct resources to high priority programmes and services. ■

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Integrated farming delivers sustainable farming

Patrick Wrixon, President of the European Initiative for Sustainable Development in Agriculture (EISA) gives thought to integrated farming, and its positive impact on the environment...

With global population growth, increased focus on addressing food security and concerns about environmental impact and biodiversity loss, it is essential that farming systems are sustainable. Sustainable farming delivers a site-specific farming system supporting the integration of the environment, society and farm economic viability over the long term (LEAF, 2012).

Integrated farming is a whole farm business approach that delivers sustainable farming. It uses the best of modern technology and traditional methods to deliver prosperous farming that enriches the environment and engages local communities. A farm business managed to IFM principles will demonstrate site-specific and continuous improvement across the whole farm (Fig 1).

The European Initiative for Sustainable Development in Agriculture (EISA) was formed in May 2001 with the aim of promoting sustainable farming systems, through integrated farming (IF), which are an essential element of sustainable development. EISA is an alliance of National Organisations of 7 European countries (Austria, France, Germany, Luxembourg, the Netherlands, Sweden and the UK) as well as Associate Members from across the industry (including ECPA, FEFAC, ELO, Fertilisers Europe, GOSZ, IFAH-Europe and SAI Platform).

Across the National Members, there is a network of Demonstration Farms which show integrated farming in practice. Alongside other management tools, this offers the opportunity: to share IF with other



Fig 1

farmers; to support knowledge exchange between researchers and farmers; and to discuss the system with stakeholders and policy-makers.

Integrated farming promotes the efficient use of natural resources and provision of positive environmental impacts whilst also meeting the needs of a growing population. Due to the great diversity of individual farming businesses across each country, Europe and the world, sustainable farming relies on the ability for individuals to understand the range of techniques available to them alongside the knowledge which will allow them to choose the most appropriate combination for their site-specific situation.

Businesses farming to integrated farming principles use the above framework (Fig 1) as a means to make the right decision for productive farming while reducing the impact to the environment. Some growers use interactive management tools such as the LEAF Sustainable Farming Review. Good soil and water management are critical and within the decision making process and framework of IF specific practices are increasingly adopted in the pursuit of more sustainable farming, driving attention to detail in a site specific manner. Such practices include: precision farming; reduced and zero tillage; good scouting of insects and taking action based on threshold levels; the development of field margins, in-field habitat banks and conservation areas; new skills and a hunger for knowledge; protection and enhancement of valuable habitats and key resources, including

biodiversity, soil and water. Increasingly our farmers also manage conservation like a crop, meeting the requirements and needs of wildlife, namely the big 3: a safe nesting habitat; summer food; and winter food.

It is imperative that we improve the working relationship between scientific research and farmers such that the knowledge exchange facilitates better understanding of the issues for which practical solutions are needed as well as the knowledge required for optimal implementation of such practical solutions.

As part of the development of IF in the UK, LEAF (Linking Environment and Farming) has felt it important to understand the drivers for change in encouraging more sustainable farming practices and one critical aspect has been the market place. The LEAF Marque is an assurance system, recognising sustainably farmed products and is based on the principles of IF (of Integrated Farm Management, IFM, as it is known in the UK). Good food produced with care and to high environmental standards is identified in-store by the LEAF Marque logo. 22% of UK fruit and vegetables are now LEAF Marque certified and LEAF is now working in some 33 countries across the globe include 10 countries in the EU.

Sustainable farming is a global issue, one where we share the problem, as well as solutions. What is critical is engagement among farmers, environmentalists, educationalists, industry, government and society when addressing agricultural and conservation issues. Sustainable farming is forward looking, planned, practical and productive. Policies and practices need to integrate environment, food, education and health more succinctly with clear engagement and communication among farmers and consumers. Integrated farming is one such model. ■

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THE EVOLUTION OF YIELD IN CORN

*Dr. Ronnie Heiniger
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Why is Corn Yield so Important?

The key to feeding a growing world with less demand on scarce resources and lower environmental impacts lies in increasing yield. Research has shown that increasing corn yield results in better efficiencies in nutrient and water use thanks to the fact that corn plants that yield more also have bigger root systems and more effective leaf area. The challenge for corn producers is to find management practices that allow them to maximize yield given the soil and environmental constraints they are operating with. Among the many management options that corn producers have what practices will provide the best return on investment in terms of increasing yield with the lowest cost and risk. This publication discusses some of the key principles and practices corn growers should consider when seeking to increase yield in corn.

It is All About Intercepting Light

At the most basic level corn is a starch factory that depends in turning light energy into starch. Therefore the most critical practice in managing for higher yield is maximizing light interception. There are three management practices that can be used to increase light interception. These are growing longer season hybrids, increasing seeding rate and plant population, and decreasing row spacing. Of these three the most effective practice is increasing seeding rate and plant population. While growing hybrids that require a longer growing period increases the amount of light intercepted it also increases water requirements and does not improve root mass or leaf efficiency. Using narrow rows only increases light interception for a short period of time. In contrast high plant populations increase light interception across the entire growing period, result in improved efficiency in light interception, and along with other key management practices increase root mass in the field. Figure 1 shows the impact of increasing plant density on the morphology of corn plants. As plant population increases the corn

plant grows taller resulting in more effective placement of leaf area to intercept sunlight. This results in optimum yield potential. However, there is a limit to this response. As plant density increases so does the need for water and nutrients. When the demand for water and nutrients exceeds the ability of the environment to provide these to the plant the corn plant responds by reducing its height and yield potential is reduced. Note that in Figure 1 there is a narrow range of plant densities over which the plant reaches maximum height and productivity. Corn producers must precisely match plant population to the environment of the field.



Figure 1. Change in plant density from 29,343 plants ha⁻¹ on the left to 107,593 plants ha⁻¹ on the right.

Supporting Plant Density with the Right Management Practices

As is apparent in Figure 1 planting at a higher seeding rate is not the only step producers should use to achieve higher yield. Higher plant densities result in individual plants that have smaller root systems and thinner stalks.

These negative effects must be compensated for. There are two key practices that must be used in a systems approach along with higher seeding rates to make higher corn yield possible. These two key practices are starter fertilizer and multiple applications of nitrogen. The root is the first plant part to be developed in the growth cycle of the corn plant. The faster the corn plant grows from germination to flowering the more root mass will be produced. Since the root system is the key to better nutrient and water use efficiency this is a critical component of a high yield corn plant. Starter fertilizer which contains small amounts of nitrogen and phosphorus increases the early growth of the corn plant (Figure 2). Research shows that increasing early growth by using starter fertilizer results in a plant with more root mass and thicker stalks overcoming the negative effects of higher plant populations.



Figure 2. No planting or starter fertilizer was used on the four-row plot on the left while 22.5 L ha⁻¹ of 11-37-0 was applied in a 2 x 2 band at planting to the four-row plot on the right.

Likewise, a corn plant depends on nitrogen to maintain leaf chlorophyll levels and efficient conversion of light into starch. Unfortunately, most growers only apply nitrogen at the beginning of the season or, at most, twice at planting and again at canopy closure. Since nitrogen is mobile in the soil and subject to loss these applications often don't cover the full season nitrogen demands of the plant (Figure 3). Growers often apply more nitrogen than the plant actually needs to cover the fact that some nitrogen will be lost by the time the plant reaches the reproductive stages. A better system for producing high yield corn is to apply small amounts of nitrogen throughout the season. This approach allows growers to just meet the needs of the plant at a given time resulting in little or no waste while ensuring optimum growth and

yield. Furthermore, nitrogen rates can be adjusted as the growing season progresses to match changes in weather (particularly rainfall) resulting in maximum nitrogen use efficiency.



Figure 3. Nitrogen was applied at four different times during the growth cycle of the corn plant to the four-row plot on the right while nitrogen was only applied at planting to the four-row plot on the left.

In Summary – A High Yield Corn System

Capturing more light while increasing root mass and light use efficiency requires a systems approach to corn production. The future of high-yield corn production lies in precisely matching plant population with the environment of the field and then supporting that population with starter fertilizer and regular feeding with small amounts of nitrogen. This approach has the potential to increase yield resulting in less demand on land resources. Research at the Vernon G. James Research and Extension Center at North Carolina State University over the past three years documents that this systems approach consistently produced maximum corn yield ranging from 21.1 to 23.7 mt ha⁻¹. Only by using a systems approach can growers increase water and nutrient use efficiency in corn production resulting in better utilization of scarce resources and improving the amount of carbon fixed in a corn field resulting in less climate impacts.

Organic – keeping it natural

Only put in what you want to get out: Clare McDermott, from the Soil Association describes how an organic system keeps it natural...

Organic is a term defined by law. Any food labelled as organic must meet a strict set of standards so even if produce has been grown organically, to organic standards, with organic principles in mind, it still needs to be certified organic by a registered body like the Soil Association Certification. To become certified, the farm or processor must be checked against a set of standards required under EU law, which must be met as a minimum. The standards, rigorously checked annually by an inspector, cover all aspects of food production, from animal welfare and wildlife conservation, to food processing and packaging. This robust certification process means you can be sure that organic products are the genuine article.

Organic certification also means that food is produced from farming systems that are working with nature, are kind to animals, avoid the use of pesticides and prohibit synthetic fertilisers and GM ingredients – and that these aspects are checked, inspected and monitored to keep in line with EU regulation. When processed foods are certified as organic it means that hydrogenated fats and controversial additives including aspartame, tartrazine and MSG are banned, keeping the food free from unneeded synthetic additives.

Driving the change

But 'organic' is more than just avoiding additives; organic agriculture is based on living ecological systems and cycles, and works with them to help sustain our environment. A big part of our work at the Soil Association involves working in the field with farmers to learn how we can make more natural changes. So much of farming is pioneering and innovative, and programmes such as the Duchy Originals Future Farming programme helps discover more sustainable techniques to help us harness our natural resources, restore our soils and increase yield without wreaking havoc on our existing farming systems.

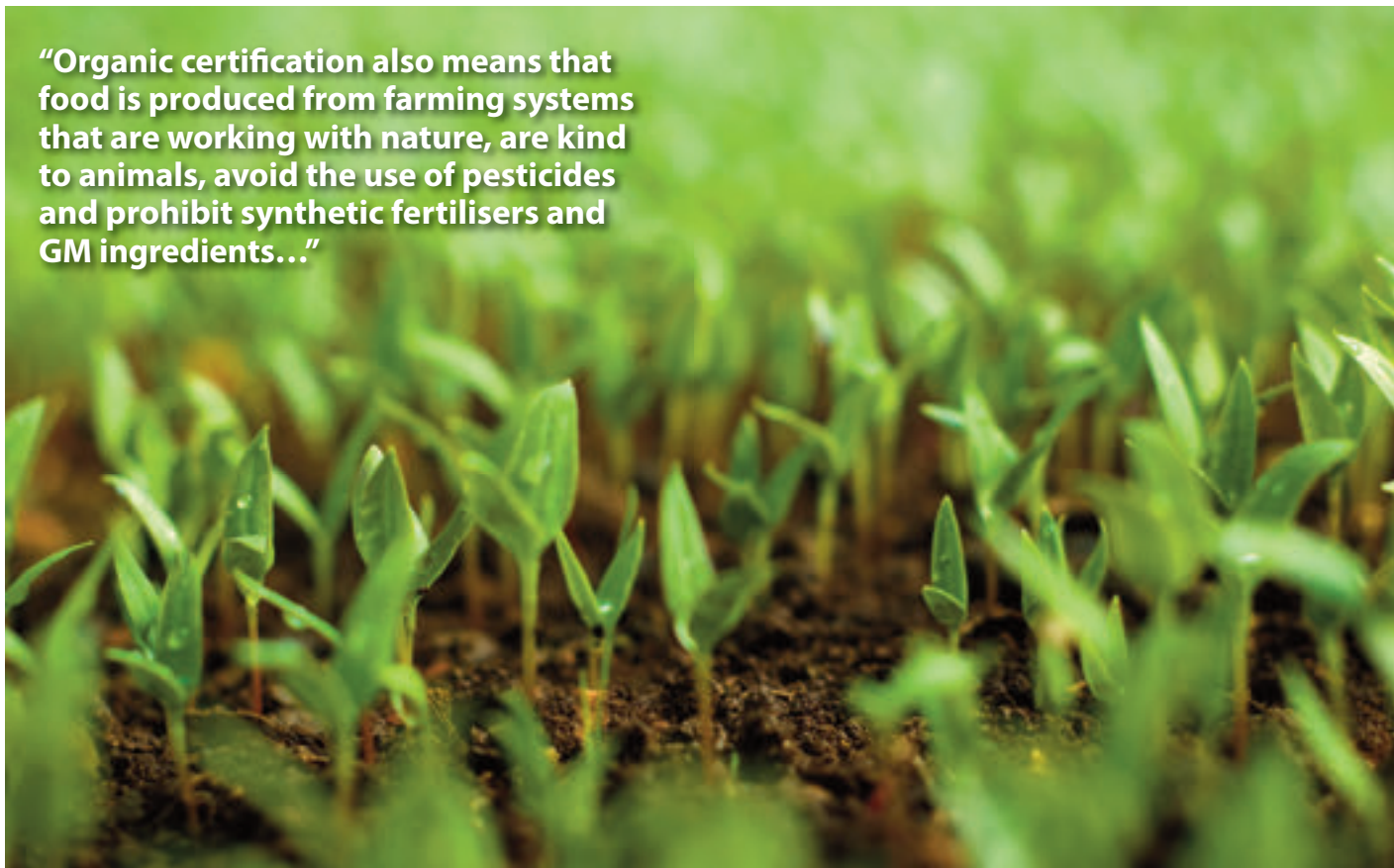
Over the last 50 years farming in the UK has had a huge impact on our wildlife and the consequences are barely understood. We have witnessed a sharp decline in biodiversity, however now we have clear evidence that wildlife is 50% more abundant on organic farms ¹. By encouraging nature to inhabit the hedgerows around farmland, by rotating crops and by the knock on increase in wildlife, organic farmers can maintain soil fertility and keep pests under control without the use of fertilisers or pesticides.

Keeping it natural

Livestock is at the centre of organic practices – giving animals as natural a life as possible. Standards ensure they are able to fully express their innate behaviours by requiring that they are genuinely free-range. The aim is that every animal should have a truly good life and a humane end to it when the time comes. Animal feed is as natural as possible, which means no GM ingredients, and the routine use of drugs is not allowed. The Soil Association is one of the pioneers of an innovative animal welfare programme called AssureWel ², providing a framework by which to measure animal behaviour to maintain the best possible environment for the animals.

Natural environment means natural products and we now have tangible evidence about the nutrient quality of organic food. The British Journal of Nutrition ³ published last year proves unequivocally that there are significant differences between organic and non-organic food. The study found that organic crops, such as fruit, vegetables, cereals, and crop-based foods are up to 60% higher in a number of key antioxidants than non-organic crops. The findings shatter the myth that how we farm does not affect the quality of the food we eat. Organic crops (cereals, fruit and vegetables) have significantly higher concentrations of antioxidants compared with non-organic produced counterparts.

“Organic certification also means that food is produced from farming systems that are working with nature, are kind to animals, avoid the use of pesticides and prohibit synthetic fertilisers and GM ingredients...”



They also contain fewer pesticides, a staggering 48% less cadmium, the heavy metal that can remain in your body for up to 10 years, and less nitrogen.

Why choose organic?

There are many reasons people choose organic, a belief in better quality, a holistic approach to farming and animal welfare, or concern about our environment. The organic market is growing all over the world, and even though the UK trails behind the rest of Europe, our market is growing too – figures from the Organic Market Report 2014 show an increase of 2.5%, outperforming overall grocery sales, which were down 3.2% ⁴.

You can feel assured about the future of organic in 2015 with renewed pressure on the food and farming industries to reduce greenhouse gas emissions, new research on nutritional differences between organic and non-organic meat, and continued growth in the organic market world-wide. Overall we are positive that organic food and farming systems will continue

to expand, indeed they must if we are to address the environmental and economic problems of our country. ■

¹ Bengtsson, J., Ahnstrom, J. and Weibull A-C. (2005) ‘The effects of organic agriculture on biodiversity and abundance: a meta-analysis’ Journal of Applied Ecology, 42(2), 461-269

² <http://www.assurewel.org/>

³ Source Information: “Higher antioxidant concentrations and less cadmium and pesticide residues in organically-grown crops: a systematic literature review and meta-analyses.” Baranski, M. et al. British Journal of Nutrition, July 15th 2014.

⁴ Nielsen Scantrack, Grocery Multiples Unit Growth, 4 weeks to 1st February 2014.

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Rail and ISO 55000: An Overview



With the new dynamics in the Rail Industry Asset Management has become a very important topic. The leading European Rail companies are organising themselves to cover Asset Management as an integrated part of their operations. Several as guidance use ISO 55000. This article gives the outlines why it is used.

ISO 55000 is the new international standard for asset management, released in January 2014. Simply put, the essence of this standard is value realisation from your assets, which achieves the desired balance of risk, cost and performance. It will provide assurance that the right things are being done right, and that these activities support the achievement of the mission and objectives of your organisation.

ISO 55000 requires that an Asset Management System (AMS) be developed and documented which is the “Set of interrelated or interacting elements to establish asset management policy, asset management objectives and processes to achieve those objectives”. Asset Management (AM) is defined as the “Coordinated activity of an organisation to realise value from assets”. The organisation’s assets, which are within the scope of the AMS, must be identified.

The standard calls out the following benefits that organisations will achieve from adopting ISO 55000:

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- ❑ Improved financial performance taking account of the short term and long term view
- ❑ Managed risk reducing financial losses and liabilities, improving safety, reputation and environmental impacts

- ❑ Improved services, e.g. punctuality and output through better asset performance
 - ❑ Demonstrated social responsibility with respect to environmental and societal impacts
 - ❑ Demonstrated compliance with legal, statutory and regulatory requirements
 - ❑ Enhanced reputation through improved customer satisfaction and stakeholder confidence
 - ❑ Improved organisational sustainability effectively managing short and long term effects
 - ❑ Improved effectiveness and efficiency by improving the organisation’s ability to reach their objectives
- ISO 55000 is a strategic approach as opposed to a tactical approach and encompasses the following aspects:
- ❑ Organisation: ensuring that asset management objectives are consistent and aligned to the organisational objectives, that the stakeholders are identified and satisfied, and the scope and boundaries of the AMS are defined.
 - ❑ Leadership: ensuring that the asset management leadership is put in place by top management, the asset management policy has been defined and reviewed, and the AM leadership is given the authority, responsibility and resources to achieve the identified objectives.
 - ❑ Planning: ensuring that risks and opportunities are identified and plans are put in place to address them and support the achievement of the organisational objectives. These integrated plans should address what will be done, when it will be done, by whom and how it will be undertaken and evaluated. These plans should address risks and opportunities and how

they change over time achieving a balance of risk, cost and performance.

- Support: ensuring that competent resources required to achieve the plans are made available, the information systems are available to support the process and the information is documented, controlled, communicated and auditable.
- Operation: ensuring that the plans, implementations and processes are reviewed and controlled, including any activities that are outsourced, and encompasses change management activities as well. Evidence that the organisation carried out the plans and processes is required.
- Performance evaluation: ensuring that the asset performance and the effectiveness of the AMS is monitored, measured, analysed, evaluated and auditable. Top management should review the AMS for suitability, adequacy and effectiveness.

Improvements: ensuring that non-conformities or incidents with respect to the assets, asset management or the AMS are documented and evaluated, and corrective action is taken. Asset management and the AMS should be continually improved.

Asset Investment Planning and Management (AIPM)

AIPM is focussed on solving the problem of how to realise the highest value from your assets while balancing cost, risk and performance. If you want assurance that the right things are being done right, and that these activities support the achievement of the mission and objectives of your organisation, then AIPM is a best practice to help you decide what are the right things to do.

In the case of ISO 55000, the right things to do are those that collectively create the most value for the corporation given the cost, risk and performance objectives. Investments must be evaluated based on how they contribute to the achievement of the corporate objectives. AIPM efficiently identifies the optimum mix and timing given a myriad of potential investments and their alternatives and any organisational constraints or timing requirements.

Realising value from your assets with AIPM starts with:

- Bringing all the knowledge within the organisation to bear on the decision-making process in an integrated manner: what risks you are facing and how will these risks evolve over time, the opportunities that are possible, and creating a risk-informed evidence-based approach to decision making
- Understanding the corporation's values, defining these items explicitly and adopting them as your decision-making criteria
- Identifying "the right things to do" with your scarce resources that will deliver the highest value
- Efficiently create, compare and contrast multiple what-if scenarios to understand the risk, value and benefits of various investment strategies
- Gaining organisational buy-in through collaboration and transparency in decision-making
- Arriving at defensible decisions using a rigorous, consistent, repeatable and auditable process
- Learning all along the way, to continually improve based on: evaluating how you are doing, and how you did, with respect to the value creation you planned to achieve and the actual cost to achieve it. AIPM supports every aspect of the process above and Copperleaf's C55 is an excellent example of how to realize that today.



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Keeping Europe's roads safe

Michael Cramer on the Committee on Transport and Tourism at the European Parliament discusses safety on Europe's roads, and how effective measures are needed...

Every day a catastrophe is taking place on Europe's roads – but most people barely take note of it. In 2013, more than 26,000 people died in road accidents in the EU. Even though there has been a significant improvement in previous years, the price we pay for our mobility is still unacceptably high.

This is why road safety needs to be among the top priorities in transport policy. The European Commission put it on the agenda in 2010 by setting up "Road Safety Policy Orientations", a framework which aims at reducing road fatalities by 50% by 2020. The first steps go in the right direction but there is a lot more to do to reach this goal and provide safe and sustainable mobility on Europe's roads.

It is important that measures do not rely on technology only but also target the behaviour of drivers. The 2

most frequent accident causes are speeding and drink-driving. Autonomous car technology suggests that responsibility is taken from the drivers – but we first and foremost need "intelligent drivers".

With simple and very effective measures we can take the issue of road safety a great step forwards. Already in 2011 the European Parliament recommended the introduction of a default speed limit – of course with exceptions done by local authorities – of 20 miles per hour (mph) in urban areas. Local authorities know best on which streets a higher speed can be permitted – and they should be the ones to decide, not the national governments.

A reduction of traffic speed on roads would have a huge impact not only on road safety but also on the environment and the quality of life in Europe's cities.



The probability that road accidents have deadly consequences is 8 times higher at a speed of 30mph compared to a speed of 20mph because the braking distance and reaction time is cut by more than half. At the same time sustainable mobility is encouraged as cyclists and pedestrians can move more safely and quickly.

To disprove many critics, the time loss of drivers is also marginal: with a speed limit of 20mph drivers lose about 10 seconds per kilometre. As 90% of all the distances made by car in cities are less than 4 miles, the average time loss would be about 1 minute. And, in many cities, car drivers could even save time if traffic flows became smoother and the average speed is increased.

Not only does this have a positive impact on road safety, the environment would also benefit from such traffic regulation, as a speed limit of 20mph would reduce the CO₂ emissions by 12%. Drivers would save fuel and the quality of air improves. Noise pollution would also be reduced by at least 3dB, an effect that is perceived as a 50% reduction of noise. Traffic noise is an underestimated health risk and its reduction would foster public health and save costs on the long run.

Quality of life in European cities would be clearly enhanced as traffic becomes smoother and less stressful and in addition, more cyclists, pedestrians and children would appear in the cityscape.

The simple and effective regulation of a speed limit of 20mph would thus have huge positive impacts on road safety, the environment and life quality. It is a much more intelligent investment than only betting on vehicle technology. In Berlin e.g. nearly 80% of the roads have a speed limit of 20mph and they all have to be signposted. If we change this we will save money and the acceptance of lower speed will be encouraged.

The only difference then would be that you will not find a car driver who drives at 20mph on a road where 30mph is allowed saying: "I didn't see the 30mph sign". ■

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Cost effective solutions in difficult times

Speedar Limited is committed to providing cost effective solutions for the measurement of speed in campaigns to increase road and site safety

Speedar Limited was formed out of Ottery Electronics in 2004, encapsulating the wealth of experience gained by Ottery Electronics staff over a period of 30 years. A designer and manufacturer of speed measurement systems for Evaluation, Education and Enforcement in traffic applications, its core business has historically been in the field of hand held and tripod mounted radar units and Vascar systems. Speedar Limited are the only United Kingdom manufacturer of hand held radar equipment and hold United Kingdom Home Office approval for our Speedar range of equipment.

Speedar products have an enviable reputation worldwide and have been exported to over thirty countries in Europe, USA, Australia, Middle East and the Far East.

Speedar products have been sold to a high number of U.K. Police Forces, and Local Authorities in the United Kingdom as well as NATO forces. It has an increasing presence in the industrial market and can count some of the major corporations among its customers. In addition a recalibration and repair service as provided.

With the commitment by U.K. Government and Local Authorities to make the UK roads safer and reduce the incidents of death and injury, they have funded the provision of equipment to create community



speed watch groups. These groups provide a valuable contribution by monitoring motorists' speed through the villages.

Speedar Limited have supplied hand held radar units and associated training to several speed watch groups. The Speedar range has the advantage of being very robust, easy to use and considerably cheaper than Laser units. This makes it a cost effective choice for Speed watch groups.

A small but flexible company it has some notable achievements:

- **first** to use direction sensing Doppler radar.
- **first** to produce a cordless hand held radar.

- **first** UK designer of the VASCAR system.
- **first** standalone Laser Jammer Detector.

Speedar has a policy of continued product development and continually looks for new products in the fight to make roads safer.

Construction and Industry

Recognising the increasing Health and Safety requirements on Industrial and Construction sites Speedar Limited has developed its highly successful SpeedVision range. The new SpeedVision SV3R is a standalone unattended unit that can be tripod, post or wall mounted and battery or mains powered. This enables the effective monitoring and recording



of speed violations whilst not endangering operatives standing roadside to operate the equipment. Recording of violations is to a CF card from which photographs with overlaid data can be produced using dedicated software. This has completed tests and literature will be available shortly.

For larger site applications, Speedar Limited is now developing a network version with speed cameras relaying data back to a central control room.

Police 'In Car' system

Speedar has also produced a new range of Vascar systems.

Vascar is a tried and tested method of speed measurement, computing distance and time to measure the average speed over a minimum distance.

This has the advantage of measuring the average speed rather than the 'spot' speed as measured by radar or laser. It also has the advantages of not being able to be detected or jammed.

Now, in line with the modern demand for Video evidence, the new Speedar range of Vascar includes video recording and display, with the Vascar information superimposed on the video.

Integrated with any in-car existing computer system they have the facility to enable the screen to be used as a normal pc display for ANPR and/or Sat. Nav. programs.

The hand held controller is equipped with positive 'feel' switches and audible indication that the switch has

been activated. These systems are designed for easy retrofit into existing vehicles, expanding the functionality and extending the life of existing equipment, thus eliminating the need to change whole systems. Furthermore the Vascar system can easily be removed and transferred when the vehicle is replaced.

Some clever design features and sourcing of quality components ensure that this unit meets the stringent requirements of the UK Home Office HOSDB/CAST specification. These systems have now completed U.K. Police trials, test house testing and have been submitted to the Home Office CAST department for final approval.

The objective of the new Vascar systems is not only to provide a means of speed measurement but also to provide a cost effective solution.

SPEEDAR
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Implementing road safety management

Tim Sparey BSI Tutor Delivery Manager and Janine Behrens Senior Global Portfolio Manager, Risk at BSI discuss the benefits of implementing road traffic safety management systems and reducing road risk...

Road safety management is a concern not just for businesses and organisations who need to ensure that it is part of their workplace occupational safety strategies, but a factor for government policy makers to consider in keeping the public safe. If we look at just the work-related motor vehicle accidents, we see that a large number of deaths and long-term injuries in the workplace are associated with driving. Employers can help prevent these incidents by implementing a Road Traffic Safety (RTS) program using standards such as the BS ISO 39001 Road Traffic Safety Management System standard, or its 'sister' standard the generic safety management system BS OHSAS 18001 Occupational Health and Safety Management. Not only does this make an important societal contribution to road safety, it helps reduce the substantial costs associated with their own road crashes.

Consequently a tighter RTS strategy is at the forefront of many business agendas particularly if they are

heavily involved in this sphere. Punitive measures are not unheard of and this can act as a deterrent toward those who have more relaxed strategies in place. Although measures are put in place to protect workers, they are also intended to safeguard members of the public coming into contact with that environment.

BS ISO 39001 specifically provides focussed requirements and guidance into what is a very broad area of road traffic safety (which has and still is covered by BS OHSAS 18001). An important, achieved objective was to align the standard requirements and guidance with the good practice road safety management system models used internationally in objectives, processes and key terminology.

The key features of the standard involve adoption of the long-term Safe System goal to eliminate death and serious injury supported by interim, quantitative targets and the duty of consideration of a range of key road safety performance factors. The standard

also highlights the importance of senior management leadership and sets out a range of key top management responsibilities and accountabilities and adopts the range of institutional management functions considered important for the continual improvement of road safety.

It allows any road user group to access guidance and implement controls to help design their own road traffic safety framework. Together with the ISO family of management systems and alongside BS OHSAS 18001, BS ISO 39001 offers in-depth approach to implementing the outlined protocols in a targeted and more detailed manner. It is designed to help an organisation focus on its RTS objectives and targets and guides the planning of RTS activities as follows:

The standard requires organisations to follow a Plan-Do-Check-Act methodology and a process that reviews its current road safety performance, determines the risks and opportunities, selects road safety performance factors to work on, analyses what it can achieve over time and sets appropriate road safety objectives, targets and plans to achieve them.

Guidance on the standard can be found outlined clearly in Annexes A and B. The former focuses on providing key guidance on the implementation of the standard and is an informative piece of documentation with clear interpretations of Clauses 4-10 of the standard. Ultimately, establishing the RTS using BS ISO 39001 results in improved RTS performance which can be achieved using an internationally recognised 'Safe System' approach to managing RTS. This strategy places the emphasis on organisations to focus on RTS results with an aim to improve them beyond just legal compliance. Countries that are already using this approach which is promoted by the World Health Organization, the World Bank and the OECD, and adopting this into their RTS programmes include Sweden, the Netherlands, New Zealand and some parts of Australia.

Annex B emphasises the importance of the 'Safe System' and sees it as fundamental to the successful adoption of the standard. This approach aims to develop a road traffic system that can better accommodate everyday human error and known human

tolerance to injury thresholds. It aligns safety management systems decision-making with societal decision-making and incorporates many strategies for better management of crash forces with a key system-wide strategy of improvements in the road network, vehicles, the emergency medical system and user behaviour. Other key benefits of Annex B are that it not only describes categories of RTS results, it elaborates on good practice RTS management frameworks.

As many businesses currently use BS OHSAS 18001, integration of BS ISO 39001 is a key element of using both standard standards in tandem. The National Annex pages of BS ISO 39001 make provision and offer guidance on how this can happen and defines the correlations between them. The 2 standards synchronise on management commitment, resource management, competence evaluation, performance monitoring and measurement, continual improvement and the implementation of improvement actions.

They require also require documentation to be in place to ensure a consistent approach to health and safety management and to provide evidence of the effectiveness of the system. Documentation requirements of BS OHSAS 18001 and of BS ISO 39001 are similar in terms of the need for policies, procedures and records therefore many organisations will be able to effectively link existing health and safety documentation with their road safety management system, as outlined in the aforementioned National Annex of BS ISO 39001.

Ultimately adopting BS ISO 39001 alongside BS OHSAS 18001 allows an organisation to link health and safety and road safety as a holistic management system approach in much greater depth. ■

.....
Tim Sparey
Tutor Delivery Manager

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Senior Global Portfolio Manager, Risk

BSI
<http://www.bsigroup.com/>



Simple navigation

Responsive design

➤ An unparalleled level of access

So many companies currently believe that by keeping their knowledge secret they will retain their place in the market, right?

Wrong. We decided that as one of the leading designers and manufacturers of permanent **Vehicle Restraint Systems (VRS)**, one way to help our client base was to offer an unparalleled level of access to our 30+ years of industry knowledge.

With our principal focus on delivering a 'safety critical' product into the UK and wider global markets, we believe that our duty of care to our clients and ultimately the end user 'the public' is paramount. If knowledge really is power then we believe this should lie in the hands of the infrastructure designers, consultants, contractors and local authorities and not behind the closed doors of manufacturers.

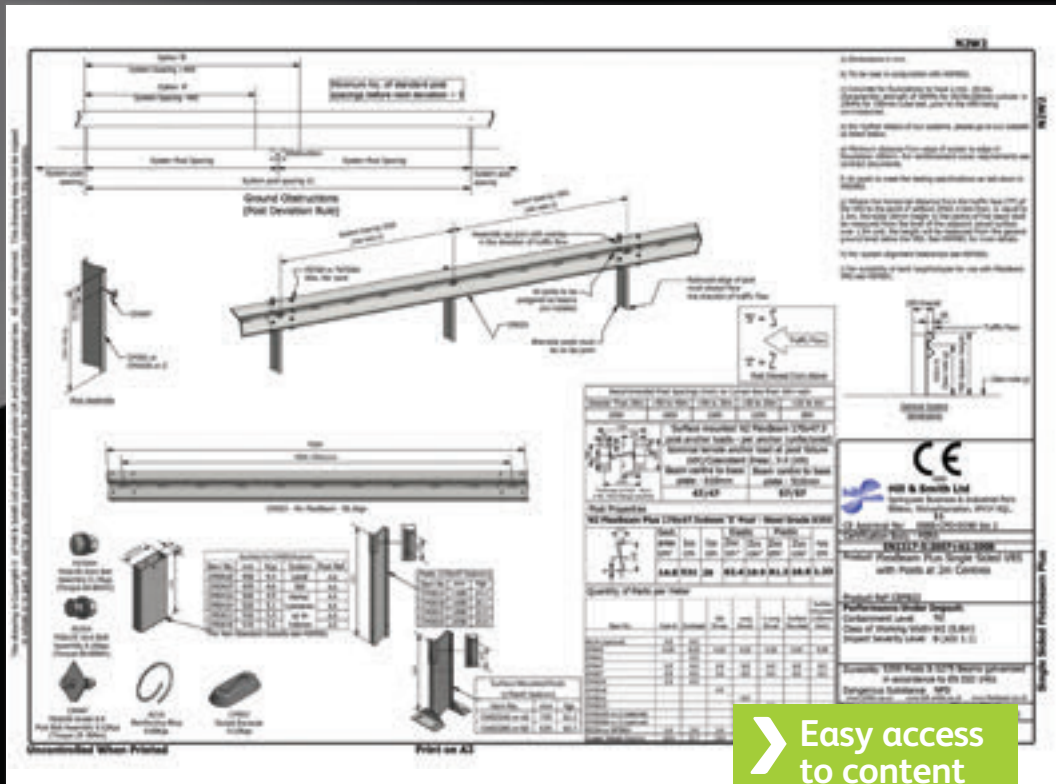
➤ Radically changing the way we access data

Hill & Smith will radically change the way our industry will access the data they need with the launch of our new **Xtratech web based portal**. This will be a single entry point for our registered clients to draw on our many years of experience – designing, testing and manufacturing compliant VRS systems.

One of the many challenges we faced was how to condense the process of accessing all this data, whilst still making the interface user friendly. Having spent a considerable amount of time discussing our web portal idea with our clients, it became apparent that if all this knowledge was to be hidden in a drop down after drop down menu system, it just wouldn't be used – hence our '3 click' challenge was born.

xtratech

Hill & Smith to offer an unparalleled level of access to over 30 years of barrier system knowledge



Search parameters that reflect exactly what you want

The primary consideration was how to engage with new users. As a well-known and reputable company with an established product and client base, Hill & Smith needed to ensure visitors could easily navigate the site and knew exactly what to search for.

So, how do you support the Market and enhance their visitor experience? Simple, you design search parameters with identifiable icons that reflect the site content – within a few clicks you find exactly what you want on the site.

If a consultant or designer wants to find a system to achieve a specific working width or containment level, the search facility will offer a relevant and compliant product line. In addition the site will suggest other items that have a commonality or synergy with the users initial search criteria.

The whole portal concept allows visitors, with varying levels of computer ability, to be confident and able when designing and ultimately specifying a fully tested and compliant permanent VRS system.

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Resilient aircraft for delivering aid

Defence Journalist Tony Hall sheds light on how indispensable military aircraft have become in emergency situations to dispense humanitarian relief...

The first international response to any humanitarian crisis today is the dispatch of transport aircraft carrying aid. Whether they are providing emergency medical supplies to the Ebola-stricken states of West Africa, or rescue equipment to typhoon-hit Philippine islands or parts of Japan or Haiti devastated by an earthquake, the sight of aircraft and emergency supplies at the scene of a disaster has come to be expected. In fact their absence during the early days of a crisis is now taken as the first sign that a relief effort is failing.

The need for resilience in the face of disaster has made transport aircraft an indispensable resource and in terms of their worldwide deployment a global commodity, one that nations both large and small have shown themselves more than willing to invest in. Despite obvious advantages in providing humanitarian relief primarily that investment is made for military purposes. As opposed to commercial freight carriers

specialist military cargo aircraft, providing what is known as airlift, are designed to operate in areas of conflict making them well suited to successful operations in disaster zones: places of infrastructure breakdown, often in remote locations with an absence of working airports or even paved runways and a total lack of support services to help load and unload equipment and supplies. Most types are also capable of dropping cargo and personnel from the air by parachute from fuselage doors or rear ramps if landings prove completely impossible. Tests of the new Airbus DS A400M for example show that it can successfully drop 24 tons of equipment at a single pass.

These are robust aircraft, developed and built specifically to fulfill vital missions in dangerous places, and although their utility is a selling point, the drawback is they don't come cheap. At the smaller end of the market twin-engined turbo-prop types such as the C-27J Spartan, made by Italian company Alenia, and

one of the world’s most widely used medium-sized airlifters, is capable of carrying around 10 tons up to 1,500 miles, and costs around \$49m a plane. The bigger heavy-lift four-engined aircraft like Boeing’s C-17 Globemaster III jet can transport 85 tons up to 5,000 miles, and is also able to refuel in-flight making its range practically unlimited. Each C-17 will set a customer back around \$240m.

Manufacturers understand that costs cause difficulties for customers and work to mitigate them where they can. Boeing, Alenia and Airbus DS, all offer buyers in-service support contracts to supply full maintenance and overhaul facilities. They also work to ensure that their aircraft can be of maximum use by developing their humanitarian roles. The drawback to military aircraft is that they are essential to airlift troops, vehicles and materiel, but the task is not an everyday one. Give these planes other essential tasks to fulfill and it increases their value to a buyer.

Alenia for example now promotes its C-27J as a “multi-mission transport system” rather than as a military transport, emphasising that the aircraft can be quickly reconfigured to ‘civic’ roles such as medical evacuation, or even firefighting, by changing the types of pallet-mounted equipment it can roll into its fuselage over its rear ramp.

Alenia is not alone in promoting its aircraft like this. Lockheed Martin has introduced the C-130J-30 a new, longer ‘stretched’ variant of its C-130 Hercules that it says can carry over 40% more medical evacuation stretchers than older versions. Medical evacuation is also a capability of the A400M, which says Airbus DS comes readily equipped with 8 fitted stretchers but can also be reconfigured to carry 66 NATO standard stretchers and up to 22 medical personnel.

Highlighting the civic tasks transport aircraft can fulfill led in November 2014 to the arrival of a US Air Force C-17 to China’s biggest air show. Breaking the spirit, if not the letter of a US ban on demonstrating military technologies to China, the decision to send the aircraft explained a Pentagon spokesman was its role in delivering humanitarian help and disaster relief in a region that witnesses 70% of the world’s natural disasters.

Sending the aircraft was politically controversial, emphasising the point that versatile and useful or not military aircraft in emergency situations are being used in the civilian world for civilian purposes. Airbus recently acknowledged this reality. In developing the latest versions of its twin-engined C295 turbo-prop – a competitor to the C-27J – the company drew attention to the fact that the C295’s navigation and communications systems are fully compatible with standards used in civilian airspace. Solving an important issue that if an aircraft can’t fly to wherever it’s needed it’s of no use in an emergency.

While some manufacturers are taking their military aircraft and adapting them for civilian use, others are taking a different approach, developing aircraft that are adaptable and versatile enough to fulfill both military and civic roles at once. This is the strategy of Ukrainian company Antonov, best known for the An-124, the largest transport aircraft in the world. The An-124 has, as standard, cranes and winches built into its fuselage allowing the plane to be loaded and unloaded without assistance from equipment on the ground. It is an essential ability in delivering emergency aid, and are features that is also now seen in Alenia’s C-27J and the Airbus DS A400M.

The ability of transport aircraft to arrive when and where they are needed delivering rescue equipment and aid, and evacuating the injured, has raised expectations that these capabilities will simply always be available. It would be best for the future if it is remembered that our global ability to respond relies on a commercial market, and the manufacturers’ ability to sell these versatile aircraft to customers and make them affordable while they are doing it. ■

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When minutes feels like hours

A traumatic scenario

“ I’m sitting next to my severely wounded soldier comrade waiting impatiently for the field ambulance. A traumatic situation for all of us – what to do? We are in desperate need to do something for our friend and also for ourselves – it’s horrible to just wait. It feels like an eternity”.

Unfortunately this is not a unique scenario. Traumatic incidents affect everyone involved both the injured and bystanders. However, research has shown that ‘eliminating’ the feeling of uselessness by proceeding with determined actions minimises the risk of being severely traumatised.

The last four decades the focus of casualty evacuation (CASEVAC) and medical evacuation (MEDEVAC) has increased as a result of nations being engaged in conflicts far away from their own countries, an increasing number of terrorist actions and large nature catastrophes. With an almost ever-present media transmitting images of people in distress or of seriously wounded or even deceased into our living rooms, it is vital for nations to have satisfactory routines, procedures and equipment. Authorities need to assure soldiers and citizens that they are able to take care of their own people when wounded abroad, and bring them home for treatment and recovery.

After more than 60 years developing the routines and procedures, both within each nation and within coalitions, one would assume that terms



Photo: Erik Skjervén Defence Media Archive

and abbreviations as well as equipment interfaces would be harmonised between nations to ensure interoperability, flexibility and cross training.

A lot has been done in the past 20 years to achieve this. NATO has developed standards for equipment as well as terminology; several yearly conferences – both military and civilian organised – contribute to the transfer of knowledge and experience between services and nations.

Nevertheless, most nations still have huge areas of improvement before they can claim perfection.

Standardisation and harmonisation between services and nations

While trying to ensure interoperability of services as well as national forces,

we know that it is impossible to meet all interests. For example, the infantry soldiers want super-light and compact stretchers. For the vehicle operator it is vital that the stretcher fits into the actual stretcher support in the vehicle. The helicopter or aircraft operator needs a stretcher approved for aerial evacuation, while the wounded soldier has the best chances of survival and least pain if he is brought throughout the chain of evacuation on the same stretcher. Very often the result is different stretchers in different services, which arguably does not serve the patient.

Can the industry contribute to the process of harmonising, equipment, and assist armed forces in developing and maintaining flexible solutions with high capacity across services and nations?

Some potential CASEVAC-units:



There is a significant level of expertise and knowledge in the industry as well as in the medical services. NODIN Aviation suggests that this knowledge can catalyze the best solution for the customer and the industry can further improve their services to their customers by:

- Developing collaboration between companies to extend competence and capacity;
- Participating in arenas where the customers share their experience in field;
- Knowing, understanding and being loyal to applicable standards when designing solutions;
- Focusing on the patient and the medics, not the equipment, when doing innovative design solutions.

What can the customers do to make the suppliers better prepared to develop solutions, products and services that meet the needs of the patients?

NODIN suggests to:

- Improve the arenas where users share their experience in patient evacuation;
- Allow and encourage informal discussions between users and

industry, enabling industry to fully understand the need;

- Describe the issue and/or the need, not the solution. The best solutions may not yet have been invented.

There is a significant effort in many nations to improve their CASEVAC and MEDEVAC capability and if these activities are fairly coordinated the international community will see a huge increase in the total capacity to bring injured people out of disaster areas.

Back to the introductory traumatised scenario

As a company focusing on products and concepts for CASEVAC and MEDEVAC in wars and catastrophes we are obliged to support with solutions focusing on the patient, the medics and everyone involved when developing innovative and first class solutions.



Our new CASEVAC KIT was developed to change the role of any vehicle and mobile platforms in the battlefield or catastrophe area. The KIT consists of a four-folded Field Stretcher and a Shock and Vibration Damped Stretcher Suspension System, all packed in a handbag. Using this kit, a vehicle or any mobile platform will be converted into a CASEVAC-Unit in 1 to 2 minutes.

The MEDEVAC Field Stretcher is designed and manufactured in accordance to military and civilian requirements for all platforms on land, at sea and in air.

In addition to increase the evacuation capacity this solution enables the comrades of the wounded soldier to contribute in a positive way and the action itself make the soldiers handle the traumatic situation better.



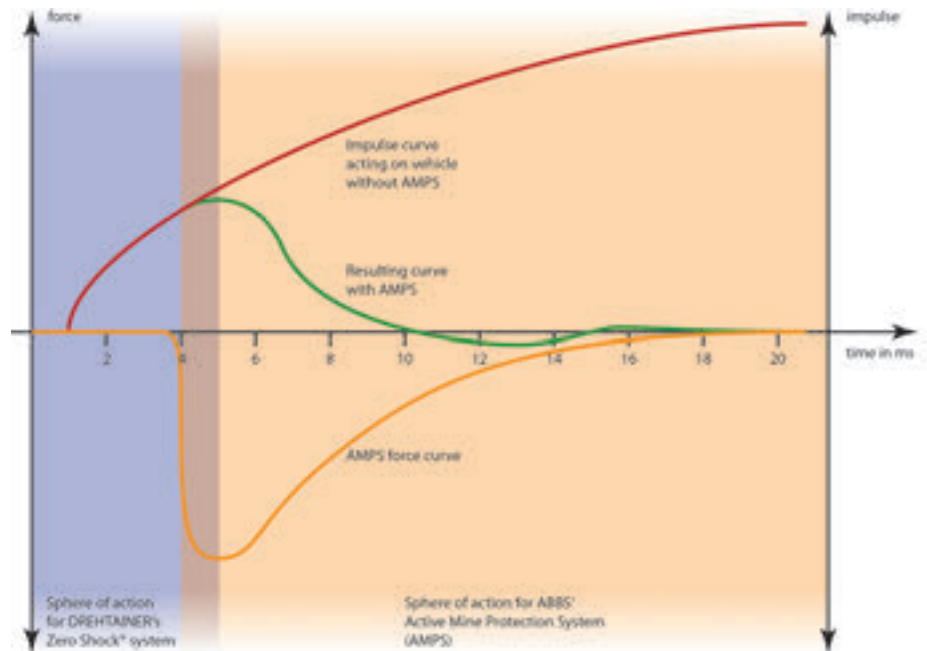
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ABBS Active Mine Protection Systems testing nears completion

Mines and IED's have become the weapon of choice for any terrorist or insurgent organization worldwide and over 70 countries currently suffer from the problem with vehicles regularly being destroyed and people being killed and injured.

To counter those threats ABBS has developed sophisticated Active Mine Protection Systems which counteract the mine blast forces before they do too much damage to the vehicle, and prevent it being blown in the air.

For under belly blasts, even in fully armoured vehicles the rapid deformation of the vehicle floor is a major cause of lower limb injuries, often necessitating leg amputations. To counteract this threat it is essential that the counteraction forces from the AMPS motor systems are transmitted directly into the vehicle floor or belly plate structure to minimise the floor deformation. Furthermore, the powerful



Typical Mine Blast Force and Impulse Curves, with and without counteraction by ABBS AMPS System

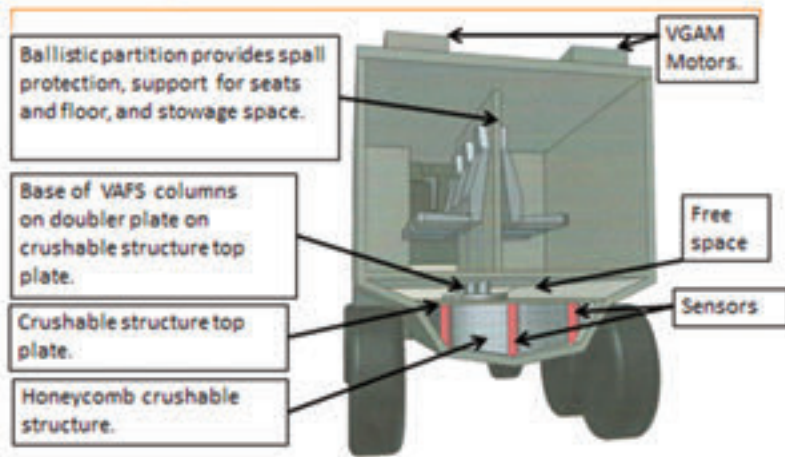
counteraction forces must ideally be applied extremely rapidly, within 1 to 2ms of the mine exploding, although by careful design of the belly plate and lower hull design, incorporating crushable structure, the main deformation effects can be delayed

sufficiently to allow a slightly longer delay before counteraction forces are applied.

This is where the novel ABBS Linear Rocket Motors (LRM's) come into play ...these exceptionally fast-acting, powerful rocket motors developed by ABBS push down on the floor/belly plate structure through columns located along the centreline of the vehicle. This concept of using centreline columns inside the vehicle cabin is not acceptable for current conventionally designed armoured vehicles due to the intrusion into the internal space, but there is a simple answer to this problem. If the vehicle is designed with side-opening doors, with the seats back-to-back on the centreline all the required parameters are met... indeed the ability to mount the seats on the columns may be



VAFS Technology – Integration Design Concept Showing Column/Crushable Structure Interface



Vehicle Conceptual Designs With Full AMPS Technology Protection

particularly desirable in terms of mitigating the global acceleration forces that can otherwise cause severe spinal, neck, and brain injuries.

The LRM's are also responsible for generating the great majority of the total impulse required to hold the vehicle down against the mine blast lifting forces and preventing its acceleration upwards. If the mine blast is within the system design specification, the upwards movement of the vehicle will be completely

prevented, so the occupants will not be subjected to any significant G forces, and will not suffer any significant injuries.

As long as the vehicle belly plate can sustain the blast loads without being penetrated, and the vehicle floor design and the spacing between the belly plate and floor is sufficient to prevent floor deformation effects becoming a problem, there is no theoretical limit to the mine blast specification that can be dealt with by

the combined systems. The ABBS rocket motors are sufficiently small and light that they can be located easily in many different locations on the vehicles and their Linear configuration provides footprint areas large enough to allow mounting on un-reinforced areas of a standard ballistic steel body.


It is therefore now possible for armoured vehicle OEM's and the military vehicle specifiers to consider multiplying their vehicle mine blast specifications by a factor of 2, 3 or even 4 without adding huge amounts of weight to keep the global acceleration threat within limits. The ABBS rocket motors provide 'artificial weight' at just the right time, and for the correct duration to counteract the forces generated by the relatively large IED's that are currently prevalent in many conflict areas around the world. A single VGAM motor 1m long will briefly produce 50,000kg thrust, so four on a 10 tonne vehicle will make it weigh 210 tonnes for just the right period of time to fully counteract the mine blast forces.

The ABBS AMPS technology will be ready for customer testing on vehicles from Spring 2015.

VAFS Technology – Integration Design Concept With Rear and Side-Opening Doors.



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A step forwards in the fight against crime and terror

Antoon Burgers, Program Manager – Special Tactics Equipment at Holmatro details how cooperation between industry and special operations forces is helping with the fight against crime and terror...

A trend that has developed in recent years is that the industry is more frequently approached by Police and Defence special operations forces for help in the development of new tools to improve their tactical operations, and to ensure a quicker, safer way of working.

Because special operations forces have got very specific requirements of their tools, it is very expensive and time-consuming to develop entirely new products from scratch. For this reason, it is increasingly common to look at existing products used by others for similar types of operations. These products can often be adapted relatively easy in order to make them suitable for use by special operations forces. A good example was the need for better tools to break open access doors to houses and/or companies. Modern houses have been equipped with better quality doors and locks, so it becomes more and more difficult to

quickly and quietly (until the very last moment) open these doors. A quick and efficient way of opening an access door is an essential part of special tactics operations in which surprise plays an important role.

The advantages of hydraulic tools

Hydraulic rescue equipment used by fire and rescue services worldwide formed the starting point for fulfilling this need. These rescue tools have been in use for many years for vehicle extrication and saving human lives in all kinds of rescue situations. These tools are of course specially developed to fulfil the requirements of the rescue services and produced with a number of unique properties. Rescue equipment is for example very robust and must be usable on a daily basis. As it concerns saving human lives the tools must be and remain very reliable in various circumstances. They must also be easy to maintain and not liable to malfunction. Furthermore, they must



be safe for the user and his environment. As these tools are also used in emergency response scenarios (e.g. to get access into hard to reach places) they must be very easy to use and suitable for operation by one person. Additionally, they must be able to exert enormous pressure, in order to cut or spread reinforced material and support or lift heavy objects during rescue operations.

Special operations require specialised equipment

The above mentioned properties were also present in the requirements of the special operations forces. However, they wanted to add something extra to the existing range; their operation had to be silent. In order to increase the surprise effect of a raid it is desirable that there is no noise until the very last moment. It is also important for special operations that the tools are given a mat black exterior. Special operations forces often operate in the dark and a conspicuous or reflective colour could give away their presence and position prematurely. The door opener also needed to be strengthened and be able to be pushed itself with great force between the door frames. Then it needs to be able to switch easily from sideway pressure to forward pressure in order to breach the door. With this extreme force any locks and hinges on the door have to break open so that the building can be accessed quickly and efficiently.

Once the requirements had been incorporated the new tactical tools were tested 'in real life situations' by the special operations units for some weeks. As special operations forces are known for only using materials in which they have 100% confidence, only qualitative and highly reliable materials pass the test. Nowadays, hydraulic special tactics tools are an essential part of their daily equipment in many countries for a variety of scenarios.

Once it was evident what could be achieved in close cooperation with the industry and confidence was gained in the strength and applicability of hydraulic tools, other applications for these type of tools are continuously examined. In this way, they try to contribute to a safer and more efficient way of working for special operations forces. This in turn helps maintain a safer and better society in which we all must live. ■



Check out the QR code to witness the power of hydraulic tools.



.....
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www.holmatro.com



New! Ultra-lightweight combi tools for tactical cutting & spreading

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spreading distance)

Watch the video:



Reforming the education system

Nick Gibb, Minister of State for School Reform at the Department of Education details the governments drive to reform the education system...

It is no secret that this government has carried out extensive reforms to the education system. The driving aim behind our plan for education is ensuring every child, whatever their background, leaves school with the knowledge and skills necessary to succeed in modern Britain.

Before 2010 thousands of young people were allowed to fall behind in reading. 15% of 7-year-olds weren't reaching the expected level in reading by the end of Key Stage 1; and one in five 11-year-olds left primary school still struggling to read, after nearly seven years of primary education.

This government's drive to tackle illiteracy is putting a stop to that. We introduced the Phonics Reading check at age six to assess whether children are on track with their reading and to identify from an early age those who needed extra help. When the check was piloted in 2011 just 32% passed. In 2012 that had risen to 58% and last year 74% passed. We also provided £20m of extra funding and advice to schools to help them choose and buy the best phonics programmes, and strengthened the requirement in teacher training for new teachers to understand the theory and teaching of phonics.

I'm pleased to say it's having a real impact, with schools increasingly using phonics. Three years on from the introduction of the check, 100,000 more children are on track to become confident, proficient readers.

We were equally concerned about the increasing drift away from core academic subjects in the choices pupils were making at GCSE. In 2000, for example, 80% of pupils were entered for a GCSE in a foreign

language. By 2010 that had dropped to just 43%. That's why we introduced the English Baccalaureate (EBacc) performance measure to help reverse the decline in the number of pupils taking rigorous academic qualifications. Pupils achieve the EBacc if they secure a C or better in English, maths, two sciences, history or geography, and a language – the subjects most valued by universities and employers.

Recent results show this is working, with schools shifting their focus to academic GCSEs almost overnight. Last month's school level performance table figures show that, since 2010, the number of pupils taking languages has risen by 21%, with 49,858 more pupils now entering language subjects. There are 90,000 more pupils taking the challenging EBacc subjects compared to 2010 – an increase of 71% in 4 years. The number achieving the EBacc has also significantly increased, rising from 15.1% of pupils in 2010 to 24.2% in 2013/14.

We have also removed from school performance tables all the poor-quality vocational qualifications being offered to 14-16 year olds that had no real value in the workplace. Now our young people are being taught vocational qualifications that are not only high-quality, but are relevant to the world of work, ensuring pupils can compete in the global labour market.

Through our new knowledge-rich National Curriculum, introduced in September 2014, young people are now not only getting a solid grounding in the basics, but are also being challenged to ensure they fulfil every ounce of their potential. We are sometimes criticised for our insistence on a higher level of subject knowledge in the new curriculum. What is the



point of knowledge, I am often asked when in the 21st Century what pupils really need is creativity, imagination and critical thinking skills?

The point is that none of these skills can be acquired without a solid grounding in subject knowledge. A false dichotomy is too often made between knowledge and skills. Knowledge and skills are not enemies; they are partners. But they belong in a partnership where knowledge must be learnt first.

There are many who will argue that our reforms are too much and too soon.

In my view these reforms are vital. Why? Because the education system is fundamental to our country's long term economic prosperity. Having a well-educated population is fundamental to the character of our country. Education is a top five political issue for the electorate and has been for many years.

That's why reform has been necessary, and why it's been so extensive. I am confident that at the end of this journey we will have an education system that prepares all young people, whatever their background, for life in modern Britain.



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Nick Gibb
Minister of State for School Reform
Department for Education
www.gov.uk/government/organisations/department-for-education

Why we should proactively develop character in our young people

By Simon Dean, CEO and Founder of Challenger Troop CIC

Secretary of State for Education, Nicky Morgan MP, has defined character development as a key priority in education. She has recognised that the abilities and traits that help young people deal with setbacks, confidently engage in debates, and contribute to the wider community are “equally important” to them as securing good grades.

But what do we mean by ‘character development’? Character development cultivates the virtues of character associated with common morality – understanding the difference between right and wrong, making the moral choice to ‘do the right thing’. In terms of character education, cultivating those virtues in pupils that are vital to enable them to flourish, to fulfill their potential and realise their aspirations. These include tangible virtues such as honesty, courage, integrity and self-discipline, alongside those less so, such as ‘good sense’. These are all big concepts when we are talking about young people and children.

But why is character important – can it be taught? Whose role is it to teach character? Is it something that is taught or largely passed on via role-modelling and emotional contagion? Character development is an ongoing process, beginning at birth and continuing throughout our lives. It is a learning and reactive process based on responding and interacting with those around us, considering the opinions of those influencing us, using sound judgement to make and take



our own decisions and having the strength of character to deal with the resulting consequences of our actions, both good and bad. Therefore, surely the virtues of good character are all around us and reinforced everywhere; in the home, school and playing fields, in interactions with adults – parents, teachers, coaches.

If all of these situations around us are positive, supportive and encouraging then we as a society could sit back and think “Great! This young person will flourish and will become a nice young man or woman”... But what happens when they are not positive? What happens when meaningful relationships in the family home break down, friendship groups are negative and destructive, positive role models are non-existent and relationships with teachers and the school have broken down? In this situation, young people through no fault of their own can become labelled

as “problem children”, “disruptive”, “good for nothing” and thus begins a cycle of negativity from which it can be hard to recover from.

I firmly believe that children are not born bad, they are a product of the behaviours they witness around them. Young people have a tremendous capacity to change given the right support, environment and positive encouragement. I have seen girls who are crippled by shyness in the classroom shout instructions at the tops of their voices to teammates as they race to complete the obstacle course before the opposing team. I have seen a young man who ‘thought only of himself’, stay in a set of underground tunnels to support a younger member of the group who had lost his confidence.

Character development is not just the province of family and teachers, and it is not about ‘fixing’ the child. We all



have a responsibility to build the best social and institutional conditions around our young people so that they can feel empowered and develop a strong sense of responsibility to themselves and others so that they can achieve their potential in school and beyond.

At Challenger Troop developing an individual's character is at the heart of our work. With ongoing support from strong role models, we provide opportunities and experiences designed to challenge young people to move beyond their limitations. By building strength of character, we empower our participants to have a greater sense of self-reliance and to understand and be accountable for the actions they take.

As adults, we understand that we can learn more from our mistakes than from our successes, but young people today are growing up in a 'social world' where every action can be broadcast and commented upon through a variety of social media platforms within minutes. Yet the impact and effect of other people's opinions of us

are just as important now as they ever were. Can our young people take risks, make fools of themselves? Are they so scared of the tweets or comments that they don't even try something new? If so, how will they ever learn from their mistakes? Are they too concerned with what others think of them, rather than just being true to themselves.

Being comfortable and secure within ourselves is vitally important. We talk of virtues such as patience, humility, understanding, honesty and integrity, but it takes a great deal of self-confidence to stand up for what we believe in, to confront our peers in challenging situations, to be resilient when it would be so much easier to give up. These virtues can and should be taught, or at the very least gained through undertaking challenges in planned, structured and supported ways. Playing hide and seek as toddlers teaches us that we can remove ourselves from sight and that our friends will come and find us. Outdoor adventure activities such as expeditions, camping and bushcraft teach us interpersonal

skills, resilience and also valuable interdependence skills.

Understanding our own limitations helps us to be compassionate and patient with others. Teamwork and cooperation not only get the job done but teach us to listen to others, to respect others' opinions and contributions, to learn from and provide support for each other. Many times I have seen a young person, labelled as the playground bully, put an encouraging arm around a younger, less confident team member.

We are encouraged by this renewed focus on developing character in schools. Being described as a successful young person is a label in itself and can be a tough one to live up to. We all have a responsibility to help and support our young people, by ensuring that they have the personal skills and strength of character to make informed positive decisions which enable them to flourish in school and later in the world of work. Then we, as a society, can truly say we lived up to our role in developing the young people we want to see in the society of our future.



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Engaging young people in Kent

Kevin Mullins, Community Youth Tutor at Kent County Council details how they are helping to engage young people into the community...

I have been very fortunate in being involved in the delivery of one of the trial projects for social action opportunities for young people.

The aim is to evaluate the impact of participating on young people to prove the correlation between youth social action and the outcomes on children's lives.

After the London 2012 Olympic Games, volunteering was looked upon in a different way with the benefits for both the recipients and givers being made obvious to all on an enormous scale.

This inspired the campaign for youth social action, 'Step Up To Serve', led by HRH The Prince of Wales, with cross-party support from the Prime Minister,

Deputy Prime Minister and Leader of the Opposition.

The ambition of the campaign is to enable 50% of young people to have the opportunity to take part in social action by 2020.

VAWK (Volunteer Action within Kent) are funded by the Cabinet Office Youth Social Action Fund to facilitate projects around the county.

As a Community Youth Tutor I am employed by Kent County Council and part funded by the Canterbury Academy, where I am based 3 days a week.

VAWK's youth social action manager Kelli Gardner and I assisted the student group from the Canterbury



Academy in establishing their social action project.

Since its formation in May last year, the group have fundraised for and delivered positive activities for special needs students who access the Academy.

They have also benefitted from a celebration event with a Paralympian, and they are planning for a reminiscing project with a local community 60 plus group which is due to start by the end of the month.

The young people have been on a very positive and productive journey. The project is made up of students from different year groups where many met each other for the first time.

The opportunity to volunteer offered a new and different experience; it allowed the students to identify skills they already had while developing new ones, most notably, empathy.

The project encourages a sense of service and responsibility towards others and provides a venue for developing relationships within the group and the wider community.

The various tasks they have set themselves along the way have allowed for reflection and experiential learning and have proven highly beneficial in preparation for future employment.

The importance of recognition has also been witnessed with praise and acknowledgement resulting in bursts of enthusiasm and a topping up of the necessary motivation and dedication essential to succeeding.

Most of all the young people have enjoyed themselves, found a voice, improved the situations of others and made genuine friendships.

Engaging in social action allowed the group to increase their level of social trust; they felt better connected to their communities and became increasingly aware and informed about current events.

It is in this area that Kent County Council excels also. There are huge opportunities for future leaders to hone their skills through youth forums and meetings, which occur in each district, giving young people a chance to speak their mind.

KCC also does a lot of work in supporting the young leaders of the future through its Kent Youth County Council (KYCC) elections and Youth Parliament.

KYCC voices the views and opinions of Kent's young people. It helps young people understand the importance of engaging in the democratic process and learn how their vote can make a difference.

With the continuation of these opportunities, Kent will ensure its young people will have the chance to lead successful and influential lives. ■

For more on the Paralympic visit, see:
<http://kccmediahub.net/celebration-social-action-gb-paralympian745>

.....
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Effective leadership in education

In a conversation with Adjacent Government, Dr Victoria Showunmi of UCL Institute of Education in London, sheds light of what an effective leader is, and why they are integral to the education system...

The school system has undergone vast reform over the last few years. The advent of academies, the overhaul of the curriculum, and performance related pay for teachers have proved controversial changes. For better or worse, the education system has had to adapt, and during these changes effective leadership is imperative.

Educational leaders play a pivotal role in the day-to-day running of schools. They are instrumental in ensuring children leave with the best education possible, but also in implementing policy changes and new government guidance.

But what qualities make a good and effective leader, and is leadership something that can be taught?

Here, Dr Victoria Showunmi, of UCL Institute of Education, London explains why effective leadership is imperative.

“Firstly, because it will enable you to position the school in the community so that there is respect for

that organisation. Secondly, being an effective leader will help staff to understand your vision, but also criticise aspects of your leadership,” she says. “And lastly it enables effective leaders to see what needs to be done within that vision, ensuring that the outcome for children’s learning enables each one to reach their full potential.

“An effective leader will know what is going on in the classroom, how the staff work together, and how the school positions itself politically,” she explains. “Effective is the crucial term here. You want someone who is able to lead, who is able to position the school locally, nationally (in some cases globally) in the political context, and what policies are coming down the central pipeline. At the same time, an effective leader needs to be able to interpret what is best for the school’s individual environment.”

Effective leadership undoubtedly has a significant impact on learning. Dr Showunmi explains that failure to lead sufficiently prevents a cohesive approach to education and says there certainly needs to be more

focus on effective and good leadership within education. If we focus on the need for transformational leaders, there does need to be a balance as the teaching profession has embraced school improvement, but the current approach to school improvement creates a risk aversion culture that discourages collaboration. There has to be recognition, and perhaps acceptance, that the continuous year on year improvements for a number of schools may not be possible in the short term due to financial, material and/other imposed constraints.

Events have had an impact on the development of effective leadership across the country. In 2013, the National College for Teaching and Leadership, the body responsible for promoting and creating effective educational leaders, was merged with the recruitment and training organisation, The Teaching Agency. The amalgamation of the 2 organisations was designed to lay the key building blocks needed to create a school-led system.

Furthermore, the introduction of the academy school has also had a significant impact on the way in which leadership is measured and monitored. Previously, local authorities had the jurisdiction to monitor failing leadership, but this is no longer the case with these autonomous schools.

“Local authorities did have a mandate to support and to monitor effective leadership in schools,” explains Dr Showunmi. “If local authorities felt a particular school had issues they could step in to help. Policy makers could knock on the door of the school and flag up any issues. The school would then be monitored to discern the effectiveness of its leadership.”

This inability to successfully monitor leadership practice does little service in the long term, as leaders that have been proved to be weak and effective may remain unchallenged.

So, what makes an effective leader? This in itself is a difficult question to answer. Leadership means different things to different people, and some organisations

require different qualities in their leaders. Interestingly when we explore effective leadership in more depth The Wallace Foundation (2012) regard and identify the following six characteristics on “Effective Leadership”:

- Shaping a vision of academic success for all students based on high standards;
- Creating a climate of cooperation among teachers and between teachers and students and everyone at schools;
- Engaging parents and the community and ensuring students are safe at school;
- Cultivating and distributing leadership in others so that staff and others assume their part in realising the school’s vision whilst building capacity in others;
- Improving instruction to enable teachers to teach at their best and students to learn at their best by focusing much attention on the quality of teaching and learning;
- Managing people, data and processes to drive school improvement.

When effective leaders put each of these elements in place, and if they can do so simultaneously, they stand a chance of making a real difference for students.

Within the education sector, however, Dr Showunmi says there are a few key elements that make the basis of an effective leader. “As I have previously stated, leaders need to have a vision and encourage people to believe the vision. An effective leader should also be reflective, and understand that they do not have all the answers. Members of their team can offer quality contributions. An effective good leader should also be self-critical, but also confident to follow through with an idea or direction. That is a quality in itself.

“Additionally an effective leader should be able to develop a team and progress their career. Everyone should feel as if they are part of a learning organisation.

“Furthermore, a good leader understands how to get the best out of their team in order to deliver good education.”

Dr Showunmi added: “I think an effective leaders is only one aspect of the equation. There should also be assistance to ensure effective leaders stay effective, as well as support to allow their vision to be passed along to new effective leaders coming through chain.”

However, the stereotypical view of what a leader looks like is an obstacle to overcome. Dr Showunmi says when asked in general if people tend to have the perception of a white male in leadership roles.

“That view is in itself problematic, as people’s perception of what makes a leader is crucial to their success. “We have been talking about this issue for some time, but the current political arena, which touches on migrant immigration, does not help when schools and or organisations seek to select and recruit potential ‘new’ leaders that represent difference.

As Dr Susan Craig, the eminent Trinidadian sociologist argues: ‘it takes consciousness to inform action to change the world’ Using Gus John’s words ‘Leadership in learning is clearly not the preserve of school leaders and managers alone. It is also the responsibility of classroom teachers and of students’.

If we are to develop and embed new leadership paradigms and empower both teachers and students to act with ‘moral purpose’, the onus of responsibility must lie with those that educate future teachers.

Dr Showunmi explains that her research currently examines the notions of identity in leadership and the impact this may have on one’s own leadership style.

“I think it is a unique area which needs to be examined. If you look at Barack Obama and how he came to be president it is very much grassroots leadership, and it is a leadership that is very inclusive. That idea has not really been explored in the industry, and so I’m very interested in that.”

Dr Showunmi also notes regional differences could affect the ability of leaders to be effective. Different schools have, after all, different issues and different tactics to tackle them. It is not a case of one size fits all and can be implemented across the board.

“It is important to learn from different settings,” she observes. “What does an effective leader look like in Wales or Scotland? Are there parts of Birmingham that have effective and diverse leaders?”

“An effective leader could be effective in Cornwall, but if placed in a different context in another part of the UK they could fail because of a lack of experience in tackling diversity in their leadership journey.

Sharing knowledge from other schools and other areas is vital. Ongoing training is also important as there is always something to learn, as well as room for improvement.

Dr Paul Miller’s work on successful and effective leadership in the Caribbean is vital to this ongoing conversation as it enables us to use another lens to view what is meant by effective leadership

“A leader might be identified as the best in that area, but challenges arise when that individual is taken out of that context and put in another area that is more diverse and challenging. Good and effective leaders should be able to transfer that skills base into a new context, and that is where we need to do more work, concludes Dr Showunmi. ■

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Tackling radicalisation in Buckinghamshire

Cllr Martin Phillips, Cabinet Member for Community Engagement at Buckinghamshire County Council talks about the work being done in the County to stop young people becoming radicalised...

Last year, a former Buckinghamshire grammar school pupil went to Syria to join Islamic State. According to reports he was radicalised through jihadis on Twitter.

Training is now taking place in schools across Bucks to help teacher's spot the signs of children at risk of radicalisation.

It comes ahead of the government's new Prevent legislation which comes into force this year, and will make it a duty for schools and other public sector bodies to support young people and adults at risk of exploitation through radicalisation.

Up until now, there has only been an understanding that concerns will be reported but this will change

when the Counter Terrorism and Security Bill becomes law.

Prevent is part of the government's overarching Counter Terrorism Strategy known as Contest. In its simplest form, it aims to stop people becoming terrorists or supporting terrorism.

In Buckinghamshire, we have one of 4 districts – Wycombe – which is considered to be one of 30 high priority Prevent areas in the UK. However, we have been recognised as best practice by the Home Office and Office of Security and Counter Terrorism (OSCT) for the work we have already been doing with our partners to put in place many of the things planned in the new Bill, such as training for schools and the Channel Panel.

“I just wanted to say how relevant, interesting and reassuring I found the training” – Headteacher at Bearbrook Combined School and Pre-school.

The Channel Panel has been operational since 2012 and is a partnership initiative between the County Council, district councils, police, clinical commissioning groups (CCGs), youth offending service, mental health trust and the probation service.

Channel is a key part of our work to prevent terrorism. It provides a mechanism for supporting those who may be vulnerable to violent extremism by assessing the nature and the extent of the potential risk and, where necessary, providing an appropriate support package tailored to an individual's needs.

Channel is about safeguarding individuals at risk; it is about early intervention to protect and divert people away from radicalisation and terrorism.

This keeps both the individual and the community safe. Terrorism can be connected to any extremist groups including the far right, Al Qa'ida and Islamic State.

The Panel takes referrals from schools, the community, and police about those people they feel are at risk of becoming radicalised. All Channel referrals are treated and viewed as vulnerable people requiring support and help.

We have throughout this programme taken the view that children who are at serious risk of being drawn into terrorism are vulnerable and need to be supported – as do their families.

Some of the measures taken to support them are very individual and have included amongst others, assessment related to child sexual exploitation and gang involvement; intervention with parents to encourage appropriate boundaries; challenging intervention with individuals around the theological basis of their belief system; work within educational establishments to improve engagement and outcomes; diversionary activity around sport and other positive activities and/or direct police action to protect individuals.

“As with many of the issues we face, effective partnership working is vital to ensure that our residents, especially our young people, are safe from terrorists who seek to radicalise and exploit them. Raising awareness of Prevent and supporting people through the Channel Panel is something we are all committed to” – Pam Pearce, Cabinet Member for Community Matters at Aylesbury Vale District Council.

Outcomes are measured in terms of reduced vulnerability to the individual and the community, using an evidenced based assessment tool. Young people and adults so far supported in this way have shown a reduced vulnerability and improved outcomes in terms of engagement in education and positive activities.

The Counter Terrorism and Security Act will galvanise this work across all partners to ensure we all identify the vulnerable and can offer a multi-agency support programme.

Numbers of people referred to Channel are nationally small. Since 2007 the Channel Programme has seen 4,000 individuals go through the system. Around 80% of those are under 18. This is also the case in Buckinghamshire.

Individuals referred are assessed to see what risk they pose to themselves and to others and a plan is drawn up to support them.

“Terrorism is a very real threat to all our communities and terrorists and extremists seek to exploit those who are most vulnerable. That is why it is vital that we all work together to support those who are at risk of radicalisation – regardless of faith, ethnicity or background.” – Dick Meadows Acting Detective Chief Inspector, Head of Thames Valley Police Preventing Terrorism Team.

All interventions are provided on a consent basis with individuals being made aware they are being considered by the Panel. Where this consent is not forthcoming and early intervention is not possible other methods may be used.

In addition to having core membership, the group also draws in representatives on a case or by case basis when it is relevant to do so, for example, a district council's lead officer for Prevent and/or Prevent Coordinator and the Prevent lead from the relevant school.

This approach is key to the development of building trusting working relationships between professionals – especially in such a sensitive and complex area. It has been invaluable to the delivery of the successful outcomes achieved so far.

The Bill also introduces a Prevent Duty on local authorities including a requirement to assess risk. In light of this, we are reviewing the role of our Safer and Stronger Bucks Partnership Board, to have county wide oversight for the duty in partnership with the local children's and adults safeguarding boards.

In addition we have established a county wide Prevent network – an operational group which covers both the Prevent priority and non-priority areas, to share knowledge about good practice, problem solve operational issues, identify existing and future training opportunities and the resources to meet them. This is particularly important given that this duty comes at a time when local authorities are reducing budgets.

The network includes 5 Buckinghamshire councils, Wycombe's Prevent coordinator and Thames Valley Police Prevent Engagement Officers.

We have also established our own internal council officers Prevent group which comprises representatives from various council services including Adult learning, HR, Children & Young People's Services, Resilience, Property and Estates and Community Safety.

The group's role is to support the council to meet its Prevent Duty through staff training, agreeing and monitoring actions and reviewing key policies.

Over the last 5 months we have been running a programme of workshops to raise awareness of Prevent (WRAP) with schools across the County. We also hold WRAP training sessions for Chairs of Governors and Governors.



Councillor Martin Phillips,
Cabinet Member for Community
Engagement, Buckinghamshire
County Council

We have an exciting opportunity with SACRE (Standing Advisory Committee for Religious Education) to incorporate British Values into the RE curriculum for schools which will be developed over the coming months.

Individual secondary schools are also taking a whole school approach to the work that needs to be done on Prevent.

For example in Wycombe, schools are engaging with Wycombe District Council who secured funding for specialist providers to work across Year Groups on 'Critical Thinking' which explores perceptions of others.

Through the use of interactive workshop model pupils get an opportunity to reflect on who helps shape their thinking of the world, in which we live.

We are also currently working on a model safeguarding policy for schools to ensure we integrate Prevent as part of this rather than as a separate policy that schools should have in place.

Young people and adults so far supported in this way have shown a reduced vulnerability and improved outcomes in terms of engagement in education and positive activities.

Buckinghamshire is therefore very well placed to take forward the requirements and duties of the new Act and to keep our residents, young and older, safer. ■

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Health in Europe: A matter of good economics

Adjacent Government details the priorities and intentions of the new European Health Commissioner, Vytenis Andriukaitis...

Born in 1951, Vytenis Andriukaitis holds degrees in medicine and history and started his political career just after high school. He is one of the authors of the Lithuanian Constitution of 1992 and a signatory to the 1990 Act of the Re-Establishment of the State of Lithuania. Andriukaitis entered politics in 1976 as an underground Social Democrat, and was among those who re-established the Social Democratic Party of Lithuania in 1989. He was an active member of the Lithuanian Reform Movement *Sąjūdis*, fighting against the Soviet, before becoming an active politician. He has also served as a cardiovascular surgeon for almost 20 years.

Andriukaitis was also the Minister of Health in the Republic of Lithuania from 2012-2014, and is currently the Vice-President of 67th World Health Assembly.

MEPs approved the new college of 27 Commissioners, including Andriukaitis, as presented by its President-elect Jean-Claude Juncker in October 2014, and is a welcome appointment according to The European Public Health Alliance. Andriukaitis spoke at their annual conference in 2014 where he said, "Health is not a consequence of growth but also a condition for growth. Investments in public health increase productivity and boost job creation. Health should not only be seen as product of growth: health encourages growth."

Emma Woodford, EPHA Interim Secretary General reacted to his appointment stating that, "Better attention should be paid to socio-economic determinants of health, health promotion and prevention. Once he is confirmed as Health and Food Safety Commissioner by the European Parliament in October, he should put forward an agenda based on greater investments in health with a focus on social determinants."

Andriukaitis has long held the belief that health policy has a key role to play in economic growth, repeating again the sentiment that "healthy people are more creative and productive. Their well-being sets the foundations that moves societies forward. Health in all policies should be the driving force of our efforts to cut inequalities as it lays the groundwork for social justice and economic sustainability".

In his written answers to questions from MEPs before his official appointment, he provided details of what his top priorities would be in the fields of public health and food safety:

- With regard to past crises such as BSE and SARS, which have shown the economic value of strong health protection, he intends to pursue the highest standards;
- He believes we need 'a new boost for health in Europe' if we are to improve people's health and boost jobs and growth. He therefore intends to "promote investment in health, as an investment in Europe's human capital and an investment in our future";
- The priorities surround promotion, protection and prevention. Andriukaitis intends to deliver real benefits to citizens and support key sectors of the EU economy such as the healthcare sector – as well as the agro-food industry;
- Against a backdrop of population ageing, a growing burden of chronic diseases and increasing demand for healthcare, he will support efforts to make health systems more efficient and innovative; so that they can provide equitable healthcare to all citizens, while remaining financially sustainable;



- To assess the performance of health systems reform within the European Semester;
- To focus on enhancing prevention, as the more health systems invest in this field, the less they will pay for treatment in the future;
- Andriukaitis will seek to make recent EU legislation having an impact on the protection of public health deliver results to citizens. For example, to ensure the timely adoption of secondary legislation foreseen under the Tobacco Products Directive. He intends to work tirelessly with the Member States to ensure the Directive on patients' rights in cross border healthcare translates into citizens' better access to quality care; into in-depth co-operation on e-Health towards better care; and into joint work on Health Technology Assessment to improve patients' access to innovative technologies, business predictability and cost-effectiveness;
- Working with Member States to protect citizens against any cross border health threat;
- Promoting healthy and safe food as a means to prevent unnecessary spending in healthcare and help Member States improve the long term sustainability of their health systems;
- Endeavour to ensure high levels of animal and plant health, providing strict controls on the safety of imported products of both plant and animal origin;
- To work with all stakeholders to maintain and improve food safety systems contributing to President Juncker's plans for a Europe with more jobs and greater prosperity, particularly for SMEs which make up the bulk of the food sector.

Andriukaitis made it clear that all legislative proposals currently under discussion with the European Parliament and the Council are brought to a successful conclusion, including the proposals on animal health, plant health, official controls, novel food, cloning, zootechnics and medicated feed. He also promised that within the first 6 months he would review the legislation applicable to the authorisation of genetically modified organisms.

Health systems performance assessment

In his speech on the 27th January at the launch of the European Health Consumer Index 2014, Andriukaitis reiterated his priority as mentioned above. Namely – promotion, prevention, protection, but also added ‘participation’ in thanks to his young followers on social media. He also referred to the importance of health systems performance assessment – a useful tool to understand how we work and how we can improve. He believes that the assessment will build up knowledge which can help make evidence-based policies at national and European levels. Member States and the Commission have agreed to pursue a set of common goals, the first of which is a forum where they could:

- Exchange their experiences;
- Present their practices;
- Share success stories; and
- Learn from each other.

The second goal is to support national policy makers by identifying tools and methodologies to improve the assessment of their health systems. Cooperation will also take place with organisations such as the OECD and WHO.

“healthy people are more creative and productive. Their well-being sets the foundations that moves societies forward. Health in all policies should be the driving force of our efforts to cut inequalities as it lays the groundwork for social justice and economic sustainability.”

Health information

According to Andriukaitis “health information is at the foundation of good performance assessment”, with the European Commission making considerable efforts to “reinforce and ensure the sustainability of actions on health information”. Data collection

supported by the Health Programmes has led to:

- Improvements of the methodology of statistics collection;
- Development and harmonisation of health indicators; and
- The preparation of health reports.

Andriukaitis recognises that these steps don’t go far enough in themselves and wishes to ensure:

- The sustainability of data collection;
- Transparency in the development of indicators; and
- Full participation of Member States in their selection.

For Andriukaitis to realise the intentions and priorities he has laid out, he will need all the enthusiasm and stamina he can muster. An immediate topic at the forefront is the potential for a US free-trade deal agreement which could equate to the world’s biggest trade deal to date. However, with no clear majority emerging as yet, and with public opposition within Europe apparent, Andriukaitis will have to work hard to ensure buy-in by all national parliaments. No doubt the negotiations needed to ratify this deal would provide him with an early legacy, but there is still much to do, not just with the free-trade agreement, but on his promises made last year. ■

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Innovative brain imaging

Energy defects, neuroinflammatory processes, and abnormal cellular morphology in neurodegenerative diseases (ND) would constitute extremely informative brain imaging biomarkers of disease progression and readouts in clinical trials. Emerging research aims at developing novel brain imaging methods to study these different aspects not only in animal models, but also in patients through a translational process of research. These innovative imaging tools should help to discover new functional biomarkers to be used in clinical trials.

Neurodegenerative diseases: challenges

Neurodegenerative disorders represent a major social and economic burden in Europe. Because the incidence of these devastating illnesses is dramatically increasing with age and the European population is aging, this current health problem is going to dramatically evolve toward an unsustainable situation in the next decades. This is one of the major challenges of the EU research programs for innovation in medicine. Understanding the etiology of these diseases which likely stems from complex interactions between environmental (pathogens, food, exercise, stress etc...) and genetics risk factors, is crucial to develop novel therapies aimed at curing patients, prevent these disorders, or at least retard the onset of symptoms. The validation of predictive biomarkers of disease progression and severity, especially at the brain level is crucial to improve the design of clinical trials.

Why brain imaging matters

Brain imaging methods already exist to study brain dysfunction and degeneration in ND, such as for example Alzheimer's disease, Parkinson's disease, Huntington's disease, and multiple sclerosis. However, these methods need to be further developed to provide information that is more relevant to the complex biological processes underlying the pathogenesis of these illnesses. For example, some biological processes are encountered in almost all ND such as abnormal aggregation of protein (e.g. senile plaques and neurofibrillary tangles in AD related dementia), loss of a region-specific neuronal markers, neuroinflammation and early energy defects. In addition, specific imaging tools and methods are yet to be developed to better determine the biological efficacy of novel therapeutic interventions. To this purpose, it is necessary to develop "probes" that can inform the clinician whether the treatment is actually biologically active. This is a prerequisite before launching clinical trials with large patient cohorts to determine the efficacy of the therapy in terms of symptoms and a patient's quality of life amelioration.

Examples of novel imaging tools

Several imaging methods can be developed to better explore multiple biological processes in the brain of patients. The term "methods" encompass the device (e.g. Scanner) and an object of biological interest that can be detected. The object is

either naturally found in the brain (e.g. glucose, or ATP) or is a molecular "probe" that specifically concentrates in a brain region and indicates a specific biological process. When a process is found to be changed in patients at a given stage of the disease as compared to healthy volunteers, this can be called a biomarker. The imaging biomarker is especially interesting when it correlates with some of the neurological or psychiatric symptoms. The development of new device/probe couples makes possible the discovery of novel, more relevant biomarkers.

Many methods can be first developed in animal models. For technical or safety reasons, these methods cannot always be translated to the clinic. However preclinical in vivo approaches can accelerate the research process because they increase the power of analysis in terms of spatial and /or time resolution. For example pioneering studies showed that two-photon microscopy can be used to analyse the abnormalities of neuronal dendritic spines (that are cellular structures smaller than one micron) in mouse models of Alzheimer's disease. Other non-invasive preclinical imaging methods utilise detection devices that are comparable to those used in clinic such as Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI) or Nuclear Magnetic Resonance spectroscopy (NMRs). After adaptation and optimisation, many of these imaging methods (device/probe) can be translated to the clinic to explore very specific biological processes.



These methods permit the follow up of brain degeneration in a cohort of animals. This represents a real ethical advantage to reduce the animal numbers in experiments. Some of the most promising imaging approaches currently developed in our laboratory can be briefly presented.

Looking at the microscopic scale using novel diffusion NMR spectroscopy is possible thanks to high magnetic fields combined with other improvements of MRI devices. It gives access to the study of groups of brain cells and to subtle morphological abnormalities. DWI (diffusion water imaging) gives access to the movement of water molecules along axons and myelinated fibers and thus, the organisation of white matter and the connectivity within the different region of the brain. Another promising method, called CEST imaging (Chemical

Exchange Saturation Transfer) characterises the specific biophysical properties of the water protons that change depending on the biological molecules (e.g. glucose or glutamate) or chemical “probes” (CEST agents) to which they bind. CEST imaging gives brain maps of these molecules in the brain. NMR spectroscopy can be used to detect different nuclei (e.g. ^1H , ^{31}P , ^{13}C and ^{17}O) and this allows studying the biochemistry of the brain (e.g. concentrations of metabolites). NMR spectroscopy permits to measure complex enzymatic reactions, especially those related to energy metabolism (e.g. the rate of synthesis of ATP in the brain). Very innovative approaches that the measurement of diffusion of brain metabolites by ^1H NMR could permit to quantitatively determine the pathological changes in the microscopic architecture of neurons and astrocytes in ND.

In addition to NMR, nuclear medicine approaches can also greatly contribute to study very specific molecular processes. Novel radiotracers for PET that target biological processes involved in the pathogenesis of ND are being developed (e.g. specific radio-labelled probes revealing abnormal protein aggregation in patients). Novel radiopharmaceutical probes can be developed to study membrane receptors or different types of enzymes genetically involved in ND (e.g. Presenilin, LRRK2) and that are targets of innovative drugs.

Other types of cutting edge developments are emerging in technologies for image processing. The lab also focusses on technological breakthroughs allowing tridimensional (3D) co-registration and analysis of multiple modalities of imaging (at different scales). This has a high potential to characterise the efficacy of a treatment in animal models.

In summary, the innovation in imaging should significantly accelerate the discovery of biomarkers to improve the diagnosis and follow up of patients and optimise the evaluation of novel therapies in clinical trials.



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Why European health systems must overcome the big challenge!

Seemingly unaffected by recent financial crisis and austerity measures, European healthcare keeps improving. Performance, in key terms such as infant mortality, survival of severe conditions, access to services, patient empowerment and the rational use of pharmaceuticals, all show improvement. The dire economic situation in a few countries, hit very severely by financial turmoil, does not change this overall picture.

The Euro Health Consumer Index (EHCI), the independent monitoring of healthcare in 36 countries, published its 8th edition in January this year (www.healthpowerhouse.com). Since 2006 this comparison of key values in healthcare, taking the patient and consumer point of view, has improved the understanding of European healthcare, empowered patients and helped addressing weaknesses. EHCI, and a wide range of disease-specific studies produced by the Health Consumer Powerhouse Ltd. (HCP) set standards for what could and should be achieved by modern, well-serving healthcare.

A widening gap

The EHCI 2014 shows that these performance targets come within closer reach year by year. But it also illustrates widening gaps between countries, with a group of mainly North-Western European leaders, a mid-field of wealthy countries not quite making it for different reasons

and a large group of low-performers with significant need for radical improvement, almost all of them being less affluent Eastern European countries. We are still far from fulfilling the vision of pan-European healthcare equality.

In spite of this general improvement, it is clear that the performance of healthcare not even among the Netherlands, Switzerland, Norway, Denmark and other top competitors will be enough to meet the challenges of tomorrow. Every forecast tells us that the combination of the aging European population, medical breakthroughs, growing expectations of care quality and slowing long-term economic growth will put an accelerating stress on health systems. This is why the discussion how to increase efficiency, in terms of doing the right things in the right way, should be given priority.

Where to find the best value for money healthcare?

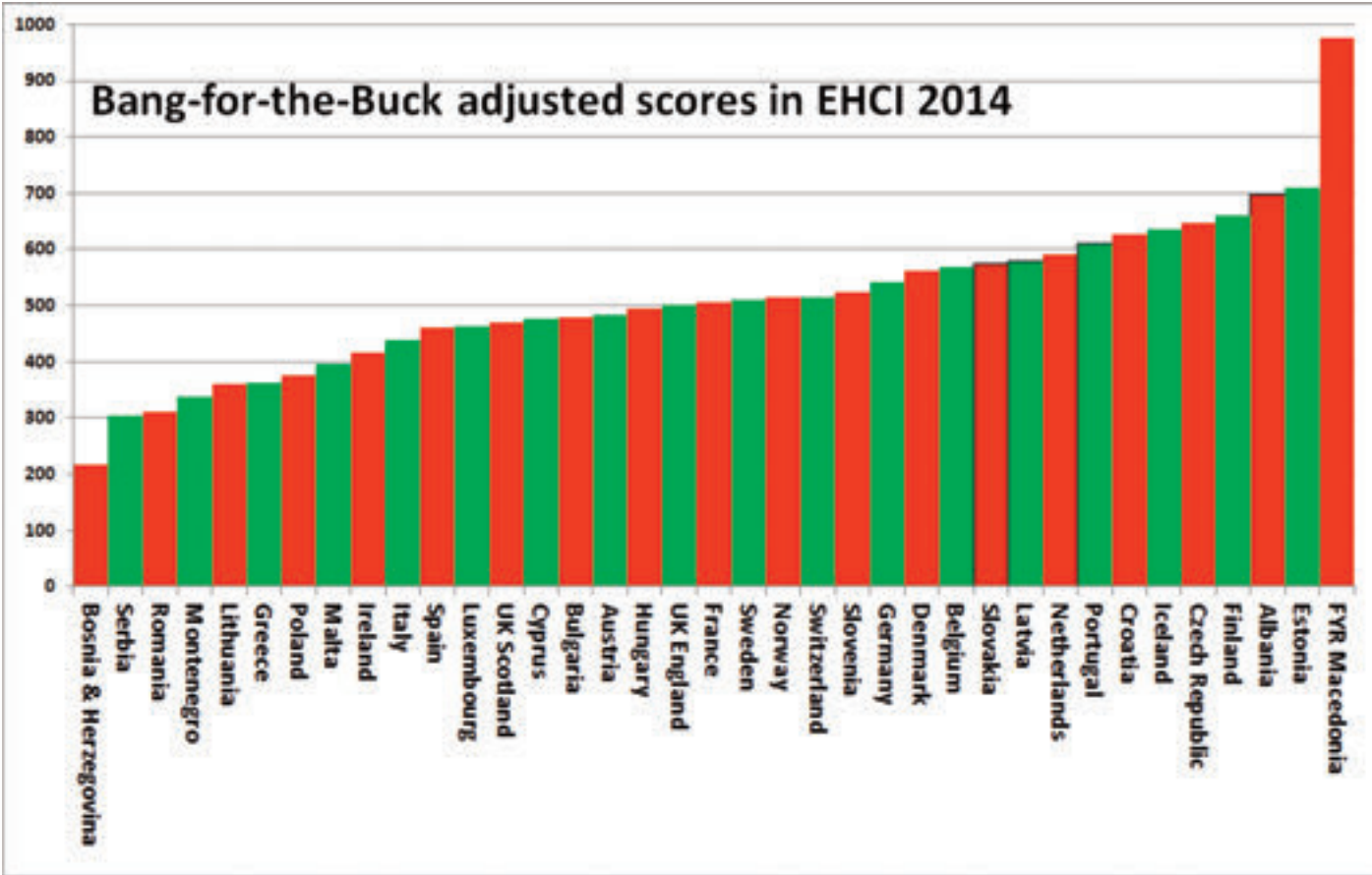
EHCI shows that there is a very large span between countries operating their health systems in an efficient way and others, paying a lot for poor services. Our term is “value for money healthcare” (also expressed as “bang for the buck”). EHCI ranks every country in the comparison from the relation between overall performance and per capita spend on healthcare, as shown by this graph from the 2014 EHCI report:

A few countries such as FYROM*) and Albania must be disregarded in this comparison, as their positions are explained by their extremely low healthcare spending. Looking at examples such as Estonia, Finland and Portugal etc, is of greater interest. The Netherlands, the multi-year EHCI champion, succeeds in matching high costs with excellent outcomes. In the lower end you find countries such as high-spending Luxembourg as well as Italy, Spain and Ireland, evidently in need of repairing their health systems. This approach calls for much deeper analysis and conclusions.

(*) FYROM took a giant leap in the 2014 Index by doing away with healthcare waiting lists by opening up the booking systems for specialists and diagnostics on the Internet!

Health systems assessment a priority

The European Commission has recently declared that improving value for money in healthcare will be a priority for the next 5 years. Practically, this means the development of methods to assess the performance of member state health systems. Such tools will open for discussion how to improve health systems, even for more fundamental or radical reform of the way health and healthcare is funded, organised and delivered. This is about re-shaping and modernising the biggest industry in Europe, accounting for one tenth of European



Gross Domestic Product and aimed at delivering even greater value. There are many questions to make and lessons to learn, from the HCP studies and similar research:

- How come that national health, contrary to large public systems such as education, and every successful private business, is reluctant to learn from the best performers of the world? "Not invented here" is still a strong, harmful culture.
- What keeps some countries away from what should be obvious reform, such as replacing long, expensive in-hospital treatment with cost-efficient procedures out-of hospital?
- What will it take to make many more health systems open for active patient

involvement, allowing interaction between healthcare and users to deliver improved outcomes, satisfaction and value for money?

- What are the lessons from some health systems (crisis-struck Baltic states the best examples) that do the right things to recover while in other countries corruption and deterioration has become the pattern?

Driving the modernisation of European healthcare is a demanding task. Nevertheless, it is absolutely necessary that this huge process of replacing poor and expensive performance with modern, value-for-money health delivery will be successful. This is vital to meet the challenges of ever-increasing expectations on steadily more capable healthcare systems,

resulting in an ageing population. Health Consumer Powerhouse Ltd. would be proud to contribute to this important effort.



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Chromatin remodelling and histone modifications in the brain

Cell function depends on many factors, some are specific for the process or the cell type, and others are general, required for all functions in the cells. Chromatin remodelling is one such general function, required for all processes that need access to the DNA. DNA in all eukaryotic cells is organised with protein in a structure called chromatin. The chromatin structure has emerged to be one of the most important contributors in maintaining genome stability and in regulating gene expression. The chromatin structure is dynamic and can adopt several different states; the compact heterochromatin structure to the more open euchromatin structure. Gene expression requires accessible DNA and actively transcribed genes are mainly found in the more loosely packed euchromatin. The chromatin structure is changed in several ways, by methylations of the DNA, post translational modifications of the specific DNA binding histone proteins, or by moving the histone proteins. Several enzyme complexes are involved and often work together. Changes in the chromatin structure are essential during the development of different tissues, and several types of chromatin remodelling have been associated with each step.

Chromatin remodelling

Each cell has several enzymes that are responsible for chromatin remodelling and histone modification and many of

these complexes are redundant but in certain cases specificity for genes or processes have been demonstrated. Specific enzymes have also been associated with certain developmental transitions, such as the chromatin remodelling proteins ISWI and CHD have been associated with unpacking of the sperm chromosomes during fertilisation, in gastrulation and germ-layer formation. Other chromatin remodelling proteins, such as component of the SWI/SNF complexes, BRG1 (SMARCA4) and BAF155, as well as ISWI and INO80 complexes, are also important for early steps, since knock out mice never reach preimplantation. Similar results have been obtained with knock out of histone modification enzymes.

Chromatin remodelling and brain

One of the most complex tissues in the human body is the brain. It consists of several types of neurons and non-neuronal cells, all of which specifically respond to several environmental signals and neurotransmitters. The response in the brain is heavily relying on remodelling of the chromatin structure, and the different cell types exhibit different set up of chromatin remodelling and histone modifying enzymes. Many of the components are isoforms specifically expressed in the brain, either under the control of specific brain factors or by microRNAs. These complexes in turn recruited to brain specific genes by specific tran-

scription factors to regulate the chromatin structure.

Chromatin remodelling and neuronal development

Embryogenesis is driven by environmental signalling pathways that induce the expression of specific genes at certain stages. During differentiation into different cell types, the chromatin landscape changes due to the activation of developmental transcription factors and chromatin remodelling complexes. This results in the induction or silencing of specific genes, and gives rise to the cell specific expression of the seen in different cell types.

Keeper of pluripotency

Cells early in development, referred to as embryonic stem cells (ES cells), have the capacity to divide and to develop into many different cell types. They are characterised by specific post translational modifications at developmental genes; they carry both active and silent marks (H3k4me3 and H3K27me3, respectively). This bivalent mark gives the opportunity to either close or open up the genes during differentiation. The self-renewal and pluripotent states are kept by activation of environmental signalling pathways, transcription factors, and chromatin remodelling complexes. The transcription factors involved are Oct4, Nanog and Sox2, all of which are important to regulate developmental genes. The expression of these genes also reprograms already differentiated

cells, such as fibroblasts, into induced pluripotent cells (iPS), less mature cells that can differentiate to different cell types. The core transcription factors require several chromatin remodelling complexes to function properly and keep the chromatin landscape in ES cells in the right state. Specific forms of SWI/SNF complex, the esSWI/SNF, with the subunits BRG1 (SMARCA4), BAF155, BAF53a and BAF 45a are required to activate pluripotency genes. A CHD containing complex, NURD and histone demethylases LSD1, are required to silence pluripotency genes and necessary in differentiation. Recently, it was shown that BRG1 and BAF250a interact with NURD, which suggests that the factors act in fine tuning the state of the pluripotency genes.

Driver of differentiation

Different signalling pathways induce differentiation genes, inducing specific lineages. Chromatin remodelling complexes are important contributors in different lineages, for gene activation or repression. Different CHD proteins have been shown to operate in the differentiation of spleen and in osteogenesis, while histone deacetylases are involved in the differentiation into oligodendrocytes. SWI/SNF complexes are involved in the development of neurons and the central nerve system. The neuron specific SWI/SNF complex contains specific isoforms of, such as BAF45c and BAF53b, BAF60c and a further protein, CREST. The switch in subunits depends on the expression of these subunits, but also on the expression

of neuron specific mirRNA. The neuron specific SWI/SNF complex will then be recruitment to neuronal specific genes. Other subunits must also be changed, since a large study of expression of chromatin and epigenetic genes in cortical neurons compared to ES cells, demonstrated that the ATPase BRM (SMARCA2) in SWI/SNF is expressed instead of BRG1. In addition, the histone methylases SET7, responsible for H3K4 me3, and EZD1, for H3K27me3, are highly expressed in adult brain, together with the arginine methylase PRMT8.

“The chromatin structure has emerged to be one of the most important contributors in maintaining genome stability and in regulating gene expression.”

Challenges

All the interactions in the gene expression network driving embryogenesis and development are not fully elucidated. Activating other pathways to activate the core stem cell transcription factors Oct4, Sox2, and Nanog has resulted in a different ES cells, with different DNA methylation pattern and expression pattern of key genes. This 2iES cells has been proposed to represent an earlier state in embryogenesis from the commonly used ES cells. These results raise new questions about the order of events in development. Furthermore, development of the neuronal tissue and the function in the adult brain are poorly understood. Studies of the molecular mechanism underlying disorders

displaying intellectual disabilities and craniofacial dysmorphologies have shown that deficiencies in processes unrelated to the direct neuronal development pathway may contribute to the symptoms. Defects in ribosome biogenesis, a process required in all cells, result in intellectual disabilities and defects in haematopoiesis. We have isolated a chromatin remodelling complex involved in transcription of ribosomal RNA, the B-WICH, complex, whose components are deleted in Williams syndrome. It is tempting to speculate that some of the symptoms are related to a deficiency of the B-WICH complex in ribosomal transcription.



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Predicting drug responses

Luminex xTAG® CYP2D6 Kit v3 and xTAG® CYP2C19 Kit v3 assays may aid in determining therapeutic strategies for drugs metabolized by CYP2D6 and CYP2C19 gene products

Physicians have long been aware of the subtle differences between patients and their responses to medications. The recognition that a part of this variation is inherited, and therefore predictable, created the field of pharmacogenetics several years ago.

Pharmacogenetics studies the influence of genetic variation on drug response. Genetic variation is considered an important source of variability in drug response and contributes to 25-50% of inappropriate drug responses.¹ It has the potential to negatively impact effectiveness of drug therapy ('drug efficacy') and increases the risk for dangerous side effects, termed adverse drug reactions (ADRs). Linking the genetic source of variability to drug response is often clinically significant and meaningful.^{2,3}

A patient's response to a drug is often linked to common genetic variations present in their genes. One type of genetic variation is the single nucleotide polymorphisms (SNPs). Knowing the types of SNPs genetic variations present in a patient can help predict the associated drug response. This can not only help physicians individualize drug therapy, it will also help improve effectiveness of the drug, decrease the chance of adverse drug reactions and reduce healthcare costs.⁴

Accurate prediction about drug response is crucial for individualized treatment. This is best made by combining an individual's genetic data with clinical

findings and classifying patients into subpopulations based on their response to a specific drug.⁵ Using this approach, health care providers can move beyond the "one-size-fits-all" strategy and identify treatments that are more personalized.

The discovery of genetic factors such as the cytochrome P450 (CYP) drug metabolizing genes and several years of subsequent clinical research have added to the understanding of the clinically relevant genetic variations that may help predict drug response.

Genetic Variations and Drug Efficacy

The extent to which patients metabolize drugs has a significant impact on the effectiveness of their therapeutic effect. Genetic variation in CYP450 metabolizing genes plays a major role in variability in drug response.⁶ To a large extent the CYP450 genotype of a patient determines the level of enzyme activity ('phenotype') which can be classified into four groups:

- **Extensive metabolizers (EMs)** have normal enzymatic activity, and carry either two wild-type alleles, or one wild-type allele and one decreased activity or null allele.
- **Intermediate metabolizers (IMs)** have decreased enzymatic activity, and carry either two decreased activity alleles, or one decreased activity allele and one null allele.
- **Poor metabolizers (PMs)** have absent

enzymatic activity, and carry two null alleles.

- **Ultra-rapid metabolizers (UMs)** have increased enzyme activity, and have gene duplications or multiplications of the CYP2D6 gene (more than two copies of the gene).⁷

Typical drug efficacy rates range from 25-80%, with most drugs falling in the range of 50-60%.⁵ For example, only 50-60% of patients experience improved outcome with drug therapy used for depression, schizophrenia and cardiac arrhythmias.⁷

Genetic Variation and Adverse Drug Reactions (ADR)

Adverse drug events due to variability in drug responses are often preventable⁸ and remain an underappreciated clinical issue. The Food & Drug Administration Adverse Events Reporting System (FAERS) estimated 800,000 ADRs in the US and Europe combined for the year 2011.⁹ The incidence of serious and fatal ADRs has been rising with the increase in the number of medications prescribed. An estimated \$3.5bn is spent on additional medical cost associated with ADRs annually and at least 40% of this may be preventable.¹⁰

Cytochrome P450 2D6 (CYP2D6) Enzyme

Drugs may be metabolized by more than one pathway involving several enzymes of the cytochrome P450 class. Cytochrome P450 enzyme 2D6 (CYP2D6) alone is thought to be active

in the enzymatic breakdown of 20-25% of all medicines prescribed¹⁰ including antidepressants, antipsychotics, opioids, beta-blockers, antiarrhythmics, and the drug tamoxifen.

Genetics of CYP2D6

Most individuals have two CYP2D6 alleles, one inherited from each parent. The combination of these two alleles ('genotype') determines the overall level of CYP2D6 enzyme activity, or phenotype, particular to that combination.

Cytochrome P450 2C19 (CYP2C19) Enzyme

Cytochrome P450 enzyme 2C19 (CYP2C19) metabolizes many clinically important drugs including proton pump inhibitors, antidepressants, the antiplatelet drug clopidogrel, and the antifungal voriconazole.¹¹

Genetics of CYP2C19

Like CYP2D6, most individuals are born with two CYP2C19 alleles. The combination of these two alleles determines the overall level of CYP2C19 enzyme activity, or phenotype, particular to that combination. The mutations in the CYP2C19 gene are heritable. Up to 34 different variations in the gene sequence have been described for CYP2C19.¹² The CYP2C19*1 allele is considered the wild-type, or "normal" allele, with "normal" enzyme activity.

Conclusion

Laboratory techniques to detect drug response variability exist currently. Phenotyping and /or genotyping are primary methods used. Phenotyping is carried out by measuring enzyme activity directly using a probe drug whose metabolism is known to be solely dependent on the particular

CYP enzyme. However, using a probe drug to measure individual phenotypes has limitations. Measuring concentration at various time points requires collecting multiple specimens at fixed times (typically at 8 hours post-administration). The individual is also exposed to possible unfavorable side effect of the probe-drug. Additionally, the metabolism of the probe drug may be affected by interfering drugs, disease status and other environmental factors (such as a patient's overall health, weight, age, diet).

The drug-metabolizing phenotype of an individual can also be predicted using assays that determine genotype from a patient sample. Genotyping results are not affected by drugs, diet or environmental factors. Genotyping assays by molecular methods are fast, reliable and accurate. The interpretation of the genotype result to the phenotype is based mainly on literature, and on the physician's judgment.

Identification of patient genotypes for clinically relevant CYP genes can help physicians tailor drug treatment to patients through the selection of appropriate therapies. These measures may improve a physician's ability to impact patient outcome by ensuring maximum drug efficacy with minimal adverse drug reactions.¹³

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The therapeutic implications of Cancer Stem Cells

The cancer stem cell (CSC) concept hypothesizes that a malignant neoplasia maintains a similar hierarchical structure to the normal tissue of origin, i.e., the bulk of the tumor represents differentiated progeny of rarer so-called CSCs with self-renewal capacity. Chronic myeloid leukemia (CML) is universally regarded as providing the strongest evidence in support of the CSC concept.

Fialkow and his colleagues first suggested that CML arose from rare transformed hematopoietic stem cells (HSC) nearly 40 years ago, when they showed that both granulocytes and red blood cells from CML patients were derived from a common cell. The term tumor/cancer stem cell was also first coined nearly 40 years ago to highlight the observation that only a minority of multiple myeloma cells were capable of clonogenic growth. The last decade has witnessed an increasing re-appreciation of the role of these heterogenous cellular cues in cancer development and therapy. This re-evaluation represents a rather crucial detour from the widely held view that the neoplastic phenotype resulted from uncontrolled proliferation of tumor cells.

The CSC concept would explain not only the low clonogenic capacity of most malignancies, but also why complete treatment responses translate into cures in only a minority of cancer patients. Initial responses in cancer represent therapeutic effectiveness against the bulk cancer cells, while rarer resistant CSCs could be responsible

for relapse. Accordingly, improving the results of cancer therapy would require identification and better understanding of the biology of CSC.

Within this framework, fundamental determinants of neoplastic disease are to be found within the CSC and, thus the role of CSC regarding cancer biology, management and therapy needs to be evaluated. It should be noted that partial tumor responses to therapy mean little if CSCs are the major cells determining outcome. Because of the difficulty of assessing the effects of therapies on the rare CSCs responsible for cancer maintenance and relapse, the development of new clinical approaches will require new clinical paradigms and methodologies that should rely heavily on preclinical modelling, using novel preclinical assays to evaluate the fate of CSC. Preclinical studies should assess the effects of therapies on CSC and differentiated cancer cell populations. This could allow us to take a fully functional new approach directly to the patient.

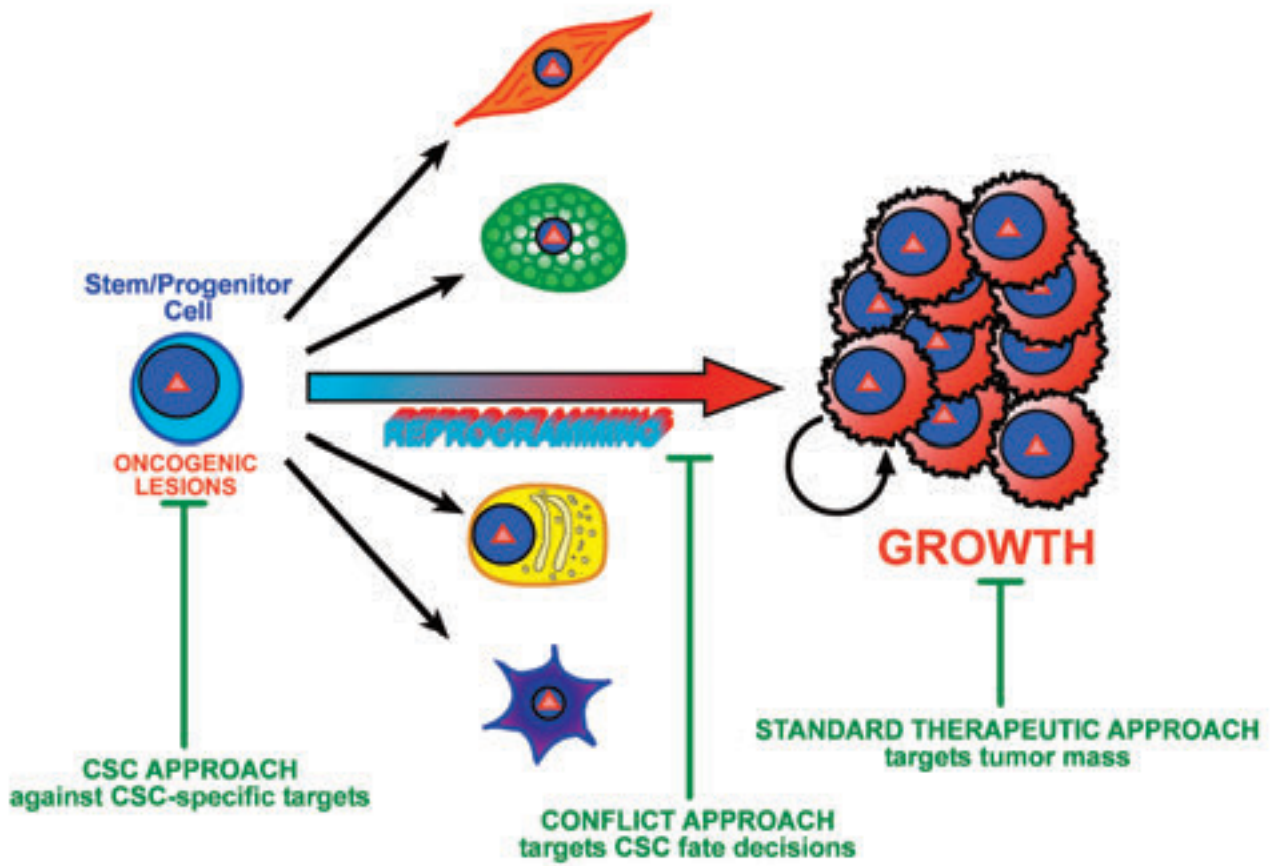
A related concept is that the exact definition of "stemness" is elusive and stemness may be more of a continuum or a property that may be regained in cancer, which would suggest that neither the hierarchical nor the stochastic model are exclusively right.

Furthermore, I must call the attention to the fact that the fundamental concept essential to the CSC hypothesis does not have anything to do with the absolute frequency of these cells

within the tumour; indeed, what the model states is that there is a functional heterogeneity within the tumor cellular components, and that there is only a defined population of cells that can initiate/maintain malignant growth *in vivo* while the remaining cells cannot. Thus, the therapeutic implications of the CSC concept are equally important whatever their frequency is within each tumour type: they are the cells that must be effectively targeted to achieve a definitive cure in the long term. This may eventually allow correlation between CSC frequency and clinical outcome.

It is plausible that the clinical aggressive cancer types may also contain a higher proportion of CSCs. In this regard, it has been recently shown that the proportion of CSCs might underpin differences between poorly and well-differentiated breast cancers. Also a pending question is, would CSCs arising from transformation of a normal stem cell yield a more aggressive cancer than one derived from a more committed progenitor cell? It is our task not only to address this and other questions, but to determine the CSCs relative importance for each stage and type of cancer.

Our group has recently discovered that the growth potential of a cancer depends on CSCs and on oncogenes that can function by a tumor stem cell reprogramming mechanism, suggesting that genetic lesions that initiate the cancer process might be dispensable for tumor progression and maintenance. Thus, it seems important to know



how to eradicate and/or inactivate this tumor stem cell reprogramming mechanism. Similarly, assessing the ability of any candidate therapy to destroy these new mechanism of CSC formation would seem crucial to predicting its efficacy.

The evidence for the existence of CSCs and tumor stem cell reprogramming mechanism in human tumors is based on the creation of mice that are sufficiently immunodeficient to tolerate the growth of primary human cells into them. However, this growth does not exclude the possibility that engraftment rather than cancer stem cell activity correlates with a particular phenotype. Tumor stem cell reprogramming-based models allow bypassing the limitations and experimental variability of the xenotransplant models.

An enormous advantage of our tumor

stem cell reprogramming-based models is that they not only enable syngeneic transplantation but they also allow studying the disease at its early stages in order to analyse the changes in CSCs long before the cancer can be phenotypically, i.e. clinically, detected.

Besides the therapy per se, an essential element in cancer management is the evaluation of treatment efficacy. Therefore, new clinical methodologies need to be developed to evaluate the efficacy of tumor stem cell reprogramming-based therapies and here again the tumor stem cell reprogramming-based models will be pivotal to achieve this aim.

It is to be expected that CSCs from different cancer types will share many similarities, implying that similar tumor stem cell reprogramming-based therapeutic approaches could be used in many different cancers.

The challenge now is to find a way to specifically target the tumor stem cell reprogramming mechanism without causing toxicity to normal cells.



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Stem Cells and immunity

Stem cells, Chromosomal instability and Cancer

Life expectancy in the western world has been on the rise, leading to an upshift in median age that will continue in the next decades¹. As a consequence of population ageing, the incidence of ageing-related ailments has escalated; not only degenerative diseases such as Parkinson or Alzheimer, but also the number of people affected by cancers has risen drastically. Notwithstanding its impact on society, the underlying mechanisms are still not completely understood, translating into relatively coarse and unspecific cancer treatments. Only in the last few years has the treatment of some forms of cancer evolved into a more guided approach, and years of investigation will still be needed to design intelligent treatments for a wide variety of cancers.

Stem cell biology of cancer

Stem cells have a central role in most if not all ageing-related ailments. In most of the diseases studied, the depletion of stem cells and reduction of their proliferative capacity seems to be the main cause of tissue degeneration. In cancer, however, excess growth is the central underlying mechanism. The role of stem cells in tissue homeostasis depends on the equilibrium between differentiation and self-renewal. Whereas stem cell differentiation into more specialised cell types is the mechanism that produces the somatic tissues, self-renewal assures the maintenance of an undifferentiated cell population that maintains a

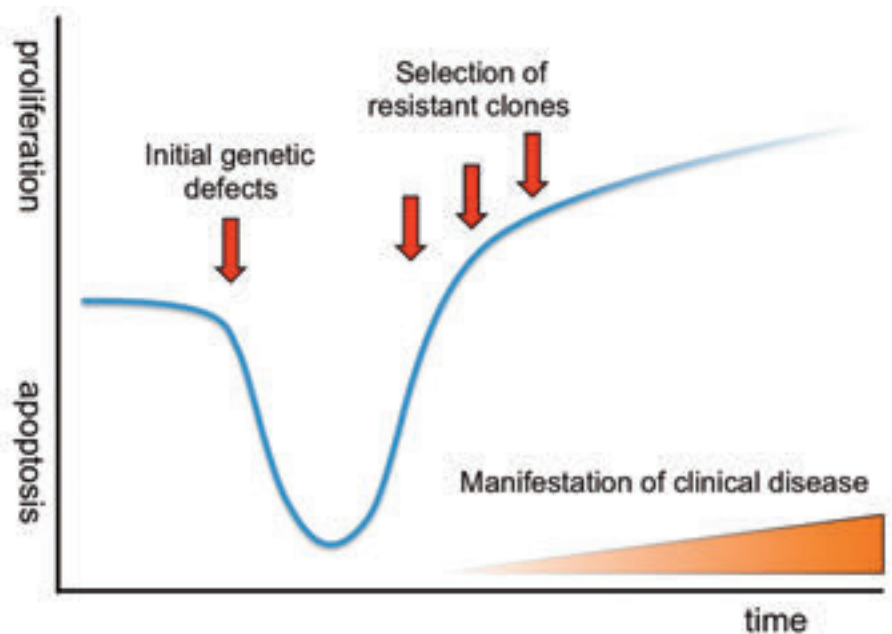


Figure 1. Stem cell depletion and cancer. Whereas the majority of ageing stem cells will enter senescence or apoptosis upon accumulation of genetic defects, a small proportion might survive and evolve into the rapidly dividing resistant population that causes cancer.

proliferative capacity. In cancer, the equilibrium between differentiation and self-renewal is disturbed, provoking the accumulation of a population of poorly differentiated but highly proliferative cells.

The identification of a stem cell population at the heart of tumor growth² comprises yet another link between ageing and cancer; the role of stem cells in cancer is just as important as in degenerative diseases. Whereas stem cell depletion and their uncontrolled growth appear unrelated phenomena, they are in fact closely related; whereas a proportion of stem cells are lost during ageing, the

surviving stem cells have an increased chance of chromosome alterations.

Chromosomal Instability (CIN)

A key difference between healthy, normal stem cells and tumor cells is the acquisition of genomic alterations by the latter. Most carcinomas present some form of genetic instability, either as an accumulation of intragenic mutations or as a large-scale alterations – translocations, deletions and numerical changes – termed chromosomal instability (CIN). Although the hypothesis that CIN itself can cause cancer has taken a long time before being accepted, CIN is frequently detected in tumors before intragenic

mutations and thus comprises a driving force in carcinogenesis³. Current theories suggest that CIN can induce cellular transformation through gene dosage or gene translocation; the genome fragments gained or lost in CIN frequently contain hundreds of genes, each of which can affect a pathway regulation step. The extra copies of many genes in CIN cause a gross imbalance in cellular regulation, which easily spills over into other pathways including cell cycle control⁴. Pathway interconnectedness thus appears to be the Achilles' heel of genomic stability in mammals.

Stem cells, CIN, and cancer therapy

Because of their unique role in tissue renewal, stem cells have a combination of characteristics that renders them susceptible to genetic damage, transformation, and tumor initiation. Stem cells not only undergo rapid growth and division, but also seem to be tolerant for gene dosage effects that would induce apoptosis in other cell types. Notwithstanding their resistance, cancer stem cell theory clearly indicates that this population must be targeted to treat carcinomas efficiently.

Traditional anticancer therapy depends on tumor cell eradication by cytotoxic drugs, through the induction of additional chromosome defects that lead to apoptosis or necrosis. Although the efficacy of the classical cancer treatments has advanced tremendously, they still suffer from side effects, such as the shutdown of stem

cells in skin, intestine, and immune system. Thus, a drawback of many chemotherapeutics is the low capacity to distinguish between cancer cells and rapidly dividing non-cancer cells. In addition, most of the chemotherapeutic compounds favor selection of resistant and aggressive cancer cells.

The last decade has seen the development of new therapies, aimed at a more specific elimination of cancer cells while reducing toxic effects. One phenomenon in particular, oncogene addiction, might yield novel targets for anticancer therapies⁵. In oncogene addiction, the cancer's need for survival leads to activation of the corresponding signal pathways, to an extent where cells become completely dependent. Oncogene addiction has been characterised in only a few types of cancer so far, but preliminary results are promising. Oncogene addiction seems to increase with tumor progression, so targeting survival pathways might be the way to treat advanced cancer, where classical therapies lose efficiency. For example, the high level expression of HER that characterises the most aggressive forms of breast cancer is exploited for treatment with the neutralising antibody Herceptin®, improving the prognosis of HER-positive tumors. Novel targets in signaling pathways must be seen as an addition to classical therapies for now, but further characterisation of pathways might help to treat a wide range of cancers. Especially the targets that overlap with stemness and differentiation are interesting, for the possibility to attack cancer stem cells.

Concluding remarks

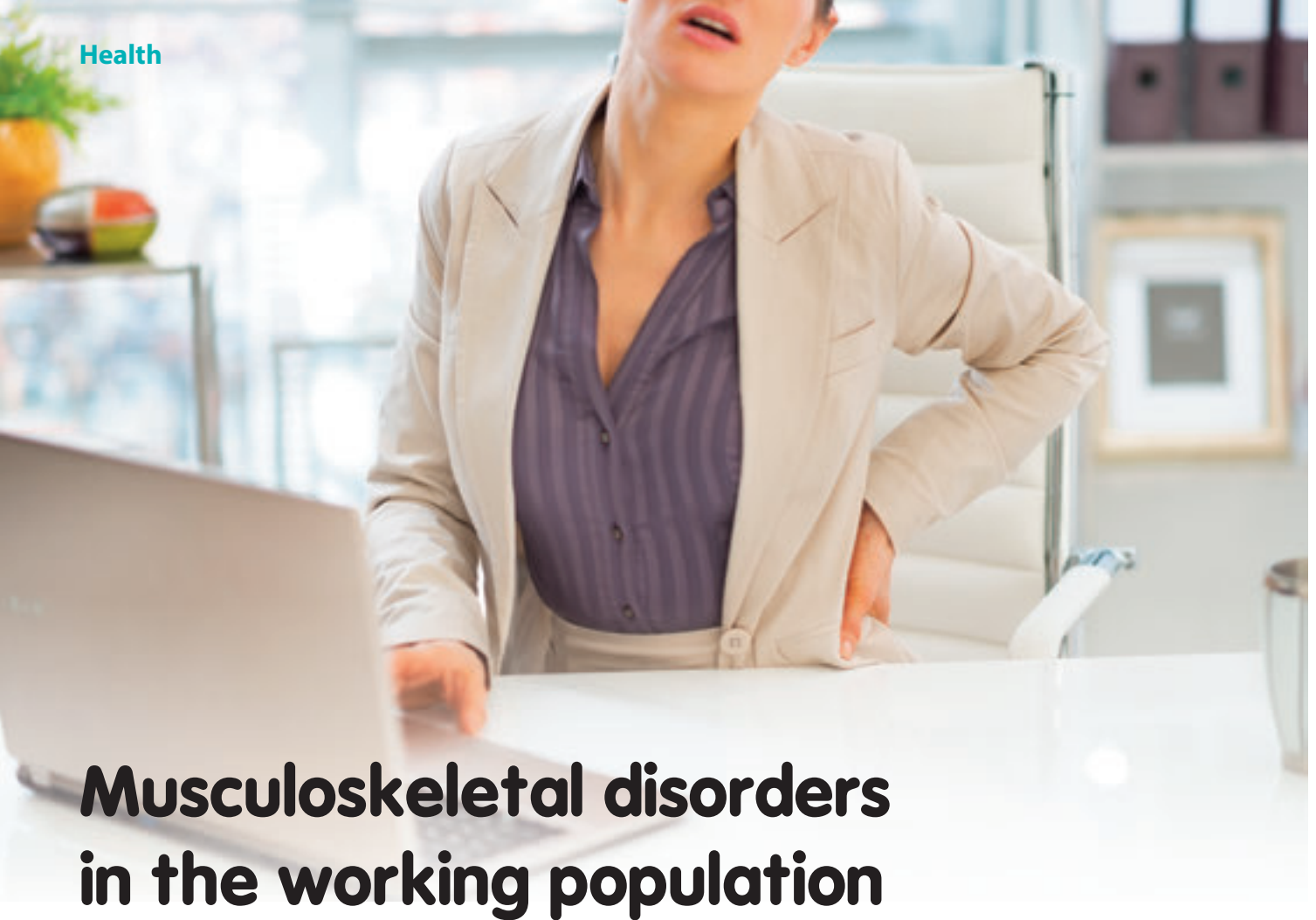
The fundamental way in which cancer is treated is just recently being modernised. New therapies will hopefully be able to discriminate better between cancer cells and healthy stem cells, and be tolerated better by the patient than current treatment schedules. The combination of data from stem cell biology, tumor evolution, and genetic analysis of patient material has greatly improved our understanding of cancer biology. Still, continued efforts are needed to use this knowledge for the benefit of cancer patients.

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Musculoskeletal disorders in the working population

Vern Putz Anderson from the National Institute for Occupational Safety and Health at the Centers for Disease Control and Prevention (CDC) details the risk factors, symptoms and prevention of musculoskeletal disorders in the workplace...

Aches and pains are a part of life, but musculoskeletal disorders, or MSDs, such as back problems, carpal tunnel syndrome, or tendinitis become a problem when you can no longer recover – and in some cases, no longer work. Workers who perform the same tasks repeatedly, work in awkward positions such as stooping or bending, or exert a lot of effort to complete a task, risk injuring muscles, tendons, nerves, joints, ligaments and other soft tissues. These injuries can cause pain and may ultimately impair your ability to work.

MSDs can take a toll on workers, employers, and society. In the United States for example, MSDs accounted for approximately 30% of occupational injuries that resulted in time away from work in 2013 ¹. These injuries also represent one of the top three conditions accounting for the greatest number of “years lived with disability” in the U.S. working population ².

Overexertion, which occurs when you do more lifting, pulling, pushing, or throwing than your body can handle, is one of the most frequent, costly, and disabling workplace injuries. Overexertion accounts for 25% of annual workplace injuries at an annual cost of \$15.1bn ³. In a work setting, overexertion can happen when employees don’t have control over the demands of their job – their work may be paced by machines or customers. Additionally, as workers age, the demands of their job might remain constant, yet their endurance has decreased, and the time they need to recover has increased. In these situations the physical demands of the job exceed the worker’s capabilities and can lead to discomfort, chronic pain, or disabling injuries.

Most workers recognise the signs and symptoms of overexertion within a few days – if not immediately. Common symptoms include pain, swelling, and restricted movement. It’s important not to ignore the

first signs of work-related discomfort because it can lead to a more severe, chronic condition. At the onset of symptoms, workers should alert their employer to identify and assess problems with their job before it leads to an MSD ⁴. This early warning can indicate the worker is not well-matched to the demands of the job. Early recognition and intervention remain the keys for preventing long-term injuries and costly workers' compensation payments.

When faced with prospective hazards, the ultimate goal is to design the work area to eliminate the hazard by changing the workplace, job task, and/or tools. Although MSDs affect workers across a range of industries and occupations, an example of the positive impact of this practice comes from the healthcare industry. According to the US Bureau of Labor Statistics, more than half of all MSDs that occur in the healthcare industry involved patient handling and accounted for 14% of all MSDs that resulted in at least one lost day from work in 2010 ⁵. The single greatest risk factor for overexertion injuries in healthcare workers is the manual lifting, moving, and repositioning of patients – known as manual patient handling.

Evidence-based research has shown that replacing manual patient handling with safer methods guided by the principles of ergonomics, called safe-patient handling, can significantly reduce overexertion injuries to caregivers. The goal of ergonomics is to reduce stress and eliminate injuries and disorders associated with the overuse of muscles, bad posture, and repeated tasks. In the case of patient handling, it involves the use of mechanical equipment and safety procedures to lift and move patients so that healthcare workers can avoid using manual exertions and reduce their risk of injury.

Prior to the introduction of ergonomic principles, employers relied on their workers to meet production and output demands. In short: workers serviced the machines, rather than machines fitting the needs of workers. Today, ergonomic solutions using mechanical equipment that enhances a worker's ability to do a job safely, also called engineering controls, have been developed for a wide variety of occupations and workers including nurses, carpenters, miners, manufacturers, and transportation and retail workers ⁶⁻⁹.

Effective ergonomic solutions in the workplace, like safe patient handling, can lower the incidence and severity of musculoskeletal injuries, which in turn can improve productivity and lower an employer's costs. The National Institute for Occupational Safety and Health, or NIOSH, which is part of the US Centers for Disease Control and Prevention, is a leading source on workplace-related musculoskeletal disorders, their causes, as well as prevention and controls. For more information, visit www.cdc.gov/niosh/topics/ergonomics/.

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the National Institute for Occupational Safety and Health. ■

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Strengthening weak muscle

Who has not experienced muscle weakness after a few days in bed due to illness or injury? A report by Professor Martin Flück from the Balgrist University Hospital inquires on the underlying mechanism of inactivity-induced muscle degeneration. Possible remedies that halt the consequent replacement of muscle with fat tissue with prolonged disuse are discussed.

€500bn are spent per annum in the European Union for days of hospitalisation due to muscle weakness. There is considerable socio-economic potential in the undertaking to empower the musculoskeletal system in affected patients as this reduces costs of care.

The root of physical weakness lies in a critical reduction of skeletal muscle's force producing capacity due to a loss in muscle mass (called atrophy) in conjunction with a deficient neuromuscular activation or a disruption of the functional chain between muscle and bony articulations (or joints) with injury. This develops a pronounced negative impact on mobility and quality of life. Active measures that counter the biological problem are required to allow the affected individuals to exit from their dependence on welfare. In cases of a plain musculoskeletal pathology or injury, orthopaedic surgery readily re-establishes the basic biomechanical aspects of motor function. Subsequent rehabilitation takes care to reset the muscle's functional capacity. However, compared to the maximal effects seen with training of

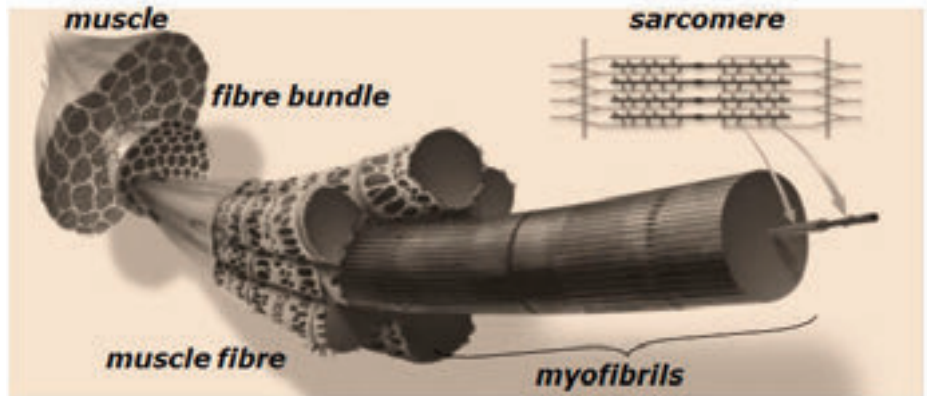


Figure 1: Illustration of the cellular organisation of skeletal muscle. Adapted from Scientific American.

athletes, measures against muscle wasting in patients appear suboptimal. The applied stimulus is often insufficient in magnitude and/or volume and is modulated by individual factors such as constitution and compliance.

In order to tackle muscle loss effectively it is vital to specifically target the mechanisms controlling the build-up (anabolism) and breakdown (catabolism) of muscle matter. In this regard it is important to consider that skeletal muscle is composed of parallel-aligned fibre cells which demonstrate a natural turnover in the order of 0.6% per day (Fig. 1). Mainly

this involves the build-up and breakdown of myofibrils that hold the molecular motors, the sarcomeres, which carry out contractile function. Mechanical loading is a major anabolic stimulus for muscle, enhancing myofibrillar protein synthesis to an amount equalling 1% of the total content in myofibrils (Fig. 2). The impact of loading on muscle mass is amply illustrated in situations when muscle loading is reduced due to bedrest, inactivity and spaceflight (Fig. 3). The resulting disuse gives rise to a net decrease in muscle mass, force and power as the latter relies on the cross sectional area, and length, of contracting muscle tissue.

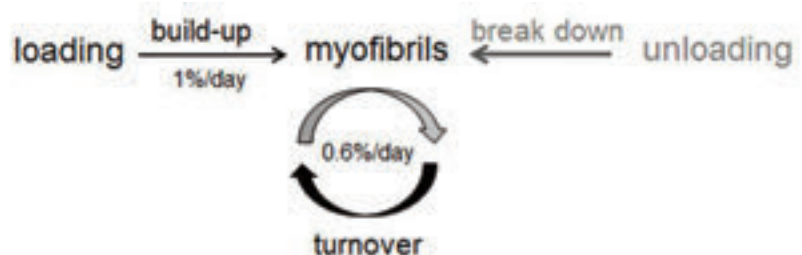


Figure 2: Concept of the load-dependent regulation of myofibrillar protein turnover.

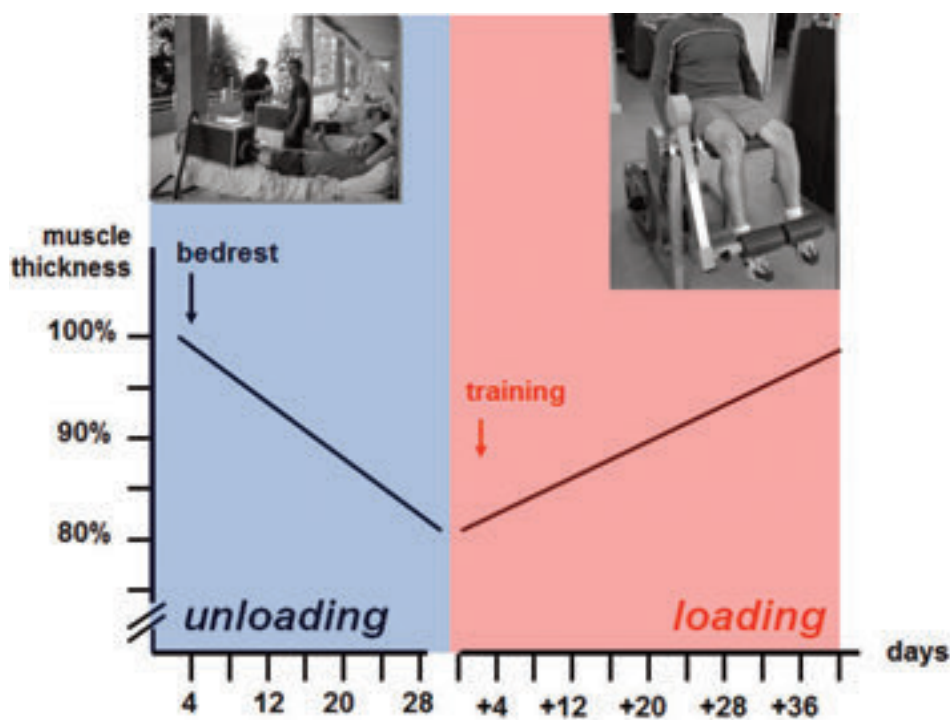


Figure 3: Mechanical loading regulates muscle mass. Illustration of the reduction in muscle thickness through the time course of unloading due to bedrest and reversion with subsequent strength training. Figure assembled from Narici, Seynnes, Flueck et al. (2011), ECSS conference Liverpool (UK) & Vandenborne et al. (1998), Muscle Nerve 21 (8): 1006-12.

Correspondingly, resistance type training produces an increase in muscle force and power and this usually involves a gain in mass of the trained muscle groups. Thereby, the observed muscle plasticity is graded to the time muscle is under tension with contraction. Tension builds up internally in muscle fibres with muscle contraction, and externally via the

pulling of attached articulations. Today, mechano-regulation of muscle plasticity is well accepted. It is therefore largely insufficient that the conditioning of muscle's functional capabilities by use-dependent stimuli is, with the exception of rehabilitation, rarely actively targeted, or maximised, in the many situations of muscle weakness.

Forward to this point, our research explores the molecular events underlying muscle atrophy and tests the effectiveness of pharmacological and mechanical measures to counteract muscle wasting. Using this approach we demonstrated that mechanical factors and gene-pharmacological interventions importantly interact regarding the regulation of muscle mass. We also pointed out that an important down-regulation of mechano-sensory processes becomes manifest in anti-gravity muscles after 3 days after unloading. This has important implications for the therapeutic window when a treatment can, and should be applied. This important interdependence of regulation indicates that a pharmacological approach alone, is probably not efficient to halt and reverse muscle atrophy. However, a multidisciplinary approach does not yet appear to be part of the portfolio of major stakeholders, such as the biomedical research industry, despite their recent strategic investments in research aimed at tackling muscle atrophy.

Towards this end we test the effectiveness of exercise treatments and exposing factors that dictate the individual training response of muscle mass and function in subjects. Our molecular-biological studies highlight that muscle adaptations with reduced or increased loading, are reflected by the activation of a genetic program, which involves the copying (expression) of genes. Measurement of this expression response allows conclusions on the efficiency and specificity of a muscle stimulus (Fig. 4). Specific gene polymorphisms of major structural and metabolic regulators are recognised to explain inter-individual responsiveness to mechanical and metabolic stimuli. Currently we work

Exercise stimulus

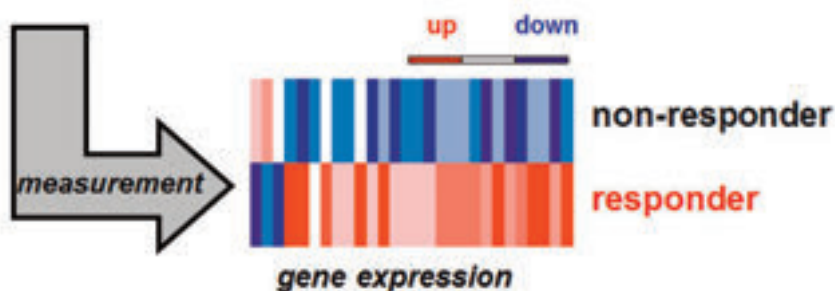


Figure 4: Genome encoded program fortells muscle response. Composite figure illustrating the response pattern of gene expression for a set of markers to an exercise stimulus for two groups of subjects. The two groups differ regarding their responders due to the presence or absence of a gene polymorphism in the gene for angiotensin converting enzyme. Assembled from Vaughan et al. (2013) Eur J Appl Physiol 113 (7): 1719-1729.

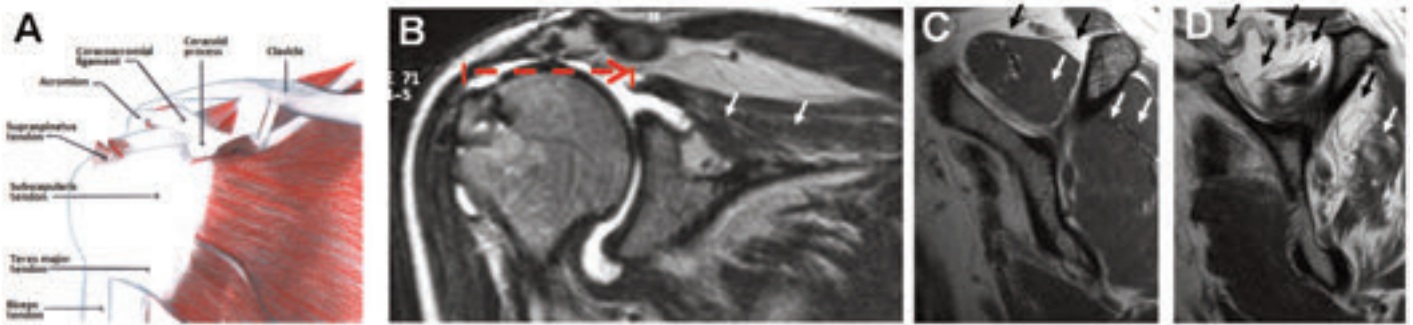


Figure 5: Fatty degeneration with tears of rotator cuff muscle. A) Drawing of the human rotator cuff with the indication of a rupture of supraspinatus tendon. B) Coronal and C,D) Sagittal images of a MRI scan of the shoulder of a patient at two time points after a full tear of the supraspinatus muscle tendon. The rate of retraction respective to the site of supraspinatus tendon attachment is indicated with a stippled, red arrow in panel A. Fat tissue (indicated by black arrows) appears in white above the darker contrast of muscle and bony tissue (white arrows).

towards testing the influence of specific gene polymorphisms on the effectiveness of exercise treatments. The goal is to develop personalised approaches that circumvent, or reverse muscle loss by maximising plasticity of the musculoskeletal system. Our model offers a platform for interactions with commercial partners aimed at tackling this major health problem of our post-industrial society.

An important aspect of our research concerns the clinical observation that the loss of myofibrillar material in fully unloaded muscle goes in parallel with an increase in muscle fat content. This

is for instance indicated after tears of a tendon or ligaments (Fig. 5). This is a relatively frequent situation, affecting as many as 100 per 100,000 persons each year for joints of the locomotor system such as in the anterior cruciate ligament. The highest incidence is seen for rotator cuff muscles of the shoulder, affecting two out of five individuals above sixty years of age. The observations highlight that mechanical factors govern the conversion of muscle into fat tissue. This implies that the muscle unloading produces defects in energy supply, which may culminate into a fatty degeneration of muscle cells.

At the same time, high-load type training of weak muscles based on eccentric contractions appears to reduce the lipid content of muscle tissue. The relationship between muscle atrophy and the accumulation of metabolic stores is poorly understood; yet this has large implications for control of body homeostasis. Nutritional factors aside, the usage and load-dependent preservation of muscle mass may importantly contribute to the variability in the relationship between contractile and fat tissue in healthy human populations (Fig. 6). This observation suggests that mechano-regulation of muscle mass is related to obesity, which is one of the largest co-factors for morbidity in the western civilisation.

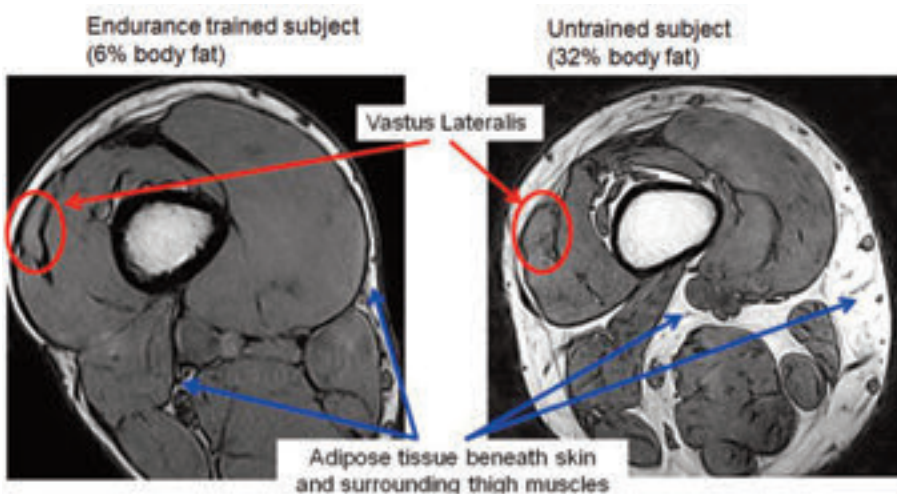


Figure 6: Increased extramyocellular fat with relative inactivity. Magnet resonance images showing the cross-sectional area of the thigh at a standardised, anatomical position in a trained and untrained subject of the same age. The increase in adipose tissue at the expense of the quadriceps and hamstring muscle area can be readily identified from the indications. The area corresponding to the vastus lateralis muscle is indicated by red circles. Picture courtesy of D Vaughan (2012).

The **Balgrist**

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Embracing 21st Century paediatric rheumatology

Dr Clarissa Pilkington, Consultant in Adolescent and Paediatric Rheumatology at Great Ormond Street Hospital (GOSH) sheds light on paediatric rheumatology and how treatment has improved over the years...

Paediatric rheumatology is a vibrant and relatively new specialty with active research pushing forward new therapies and drugs. It now needs to grow to ensure equitable access to good standards of care across the UK. Paediatric rheumatology centres have developed in a geographically haphazard way, though many are based in paediatric centres. However, there are fundamental problems – there are already too many patients for these centres, the centres are underfunded and the shared care networks that they rely on lack proper organisation, let alone funding.

Specialist hospitals and paediatric care are both expensive: paediatric care in specialist hospitals is doubly so. Why is specialist paediatric care needed? Why not provide this care locally?

Any treatment provider will need staff with up to date specialist training. So, the staff need to be trained and

then those trained personnel need to see sufficient patients to maintain the skills gained in this training. Local teams may support their staff to undergo extra training at specialist centres, but it is becoming increasingly difficult for local teams to support the study leave needed to maintain the training. For local teams, the rheumatology patients will be only one part of their job, and if they look after too few patients, they become frustrated by the difficulties in maintaining their skills. Staff turnover is an expensive problem. Undoubtedly better care is achieved for patients if they are known to the local team and that team actively looks after their welfare. However, patient numbers for each paediatric specialty are too small within District General Hospitals to amass sufficient expertise for general paediatricians and the allied health professional staff to look after specialty patients without close co-operation and back-up from the expert centres. The local teams rely on the expert centres multidisciplinary team of specialist

nurses, physiotherapists, occupational therapists, psychologists and doctors to confirm the diagnosis and to initiate or change treatment plans.

It is the expert centres that undertake the research that improves patient care and outcomes. As a new and growing area of medicine these improvements are hard won against the background of underfunding, oversubscribed services and continual reorganisation.

Treatments within paediatric rheumatology have improved out of all recognition. Twenty years ago, patients succumbed to childhood arthritis and many ended up with severely damaged joints, wheelchair bound and unable to lead independent lives. Thanks to specialist centres this is now a rarity for those who are treated. The benefit to society of preventing lifelong disability and dependence is not simply measured in the reduction in the cost of surgery for joint replacements or in hospital stays. We should be able to offer this type of service across the country and not just in convenient pockets geographically lucky enough to be near a specialist centre.

One solution is to embrace the lifelong benefits of proper early intervention for all patients and improve the networks for the shared care of patients between specialist centres and General District Hospitals. This will involve establishing protocols; robust clinical governance and excellent communication through enhanced IT. The countrywide maintenance of patient care can only be addressed at an economically efficient level. The benefit of covering all these patients only is achieved if local teams work well with the specialist centres.

Researchers working on the underlying mechanisms of disease have produced molecules that can target specific points in the inflammatory pathway that results in arthritis. These newer biologic treatments have been far more effective, but they are costly. The drug trials in children often lag behind the adult trials. These diseases are much less frequently seen in children compared to adults, making it difficult to recruit enough numbers. The trials in children often end up being more difficult to do and more expensive to fund. Yet children are not little adults: the drugs are often cleared faster in children than in adults, necessitating higher relative doses. The effects on a

growing skeleton and a maturing immune system can also differ: it is imperative that the trials are undertaken in children too.

At the moment, some charities and funding bodies are focussing on phase 1 and 2 trials: these trials focus on side effects and the pharmacokinetics of drugs rather than their effectiveness at treating diseases. Many parents are unhappy to put their children in these trials, unless the adult trials have shown the drug to be effective. Once a drug has been approved and is being used to treat patients, data needs to be collected to determine what the effects are once the children have matured and are in adulthood. This means 30-40 years of follow up for a cohort of patients. Yet funding for registries or cohort studies is seen as mundane and is difficult to obtain. Funding is more often successful when linked to scientific research projects, which are often only for a few years. There have been funding calls for cohort studies, but these have not been for the 30-40 years time span that is needed.

Specialist paediatric hospital services are often undertaking the research that underpins the “cutting edge” treatments. These treatments are only available within the specialist centres until they become considered “standard”. At this stage, the expert centre will work with local teams to provide these standard treatments closer to home. Local teams will need advice on all aspects of treatment, especially when unexpected events occur. This advice is time consuming and needs to be available at all times. This imposes a significant workload on expert centres. Funding to set up good networks of care, with good communication and support between expert centres and local teams is essential to ensure children have the care that medical improvements have made possible. ■

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Paediatric Rheumatology in 2015

Paediatric Rheumatology has become recognised within the last 20 years as a paediatric subspecialty. Previously the care of these patients was undertaken by interested adult rheumatologists. However, the National Service Framework for children recognised that children should be seen in child-friendly areas by staff trained to look after children. In the UK, there are not enough Paediatric Rheumatologists to see all of these patients, and many are still seen by adult rheumatologists, or are seen by non-specialists. This is no longer acceptable practice.



In the last 20 years arthritis treatments have emerged which have brought fundamental improvements to the outcomes of children. These improvements can be measured not only in the number of adults who are not consigned to life in a wheelchair, but less demonstrably the even greater numbers whose functionality has been maintained through their school days, enabling them to fulfil their potential in life. However, the distribution of areas of best practice is lamentably poor, creating an inequality of access to care. There is no overall grasp of the problems that the current lack of systems throws up. Specialist commissioning is, to a certain extent, addressing some of the issues, but is itself overwhelmed by the huge task it has been assigned.

As a paediatric subspecialty, Paediatric Rheumatology has 2 major drawbacks: paediatricians were not historically taught how to examine the muscu-

loskeletal system, and many of the emerging drug treatments are more familiar to oncologists or immunologists than to paediatricians. Therefore, paediatricians are often unfamiliar with the skills to look after these patients and do not have a ready source of training to close the skills gap. At the moment, there is no added incentive for District General Hospitals (DGH) to provide paediatric rheumatology clinics, and many paediatricians are unwilling to take on the responsibility of caring for these patients.

The conditions that paediatric rheumatologists look after are chronic conditions that are considered to be rare: the commonest of these is Juvenile Idiopathic Arthritis (JIA) with an incidence of 1 in a 1000 children. DGH Paediatricians who start to see children with arthritis are often surprised by the number of patients (80 to 100 per DGH) they see. These children need to be seen frequently within the first

year of their diagnosis (and when their arthritis flares), as well as every 3 months once their disease is under control to monitor their growth and ensure their joints are developing normally. Added to this cohort will be children with musculoskeletal aches and pains that mimic arthritis: most DGHs should be running a regular Paediatric Rheumatology clinic.

BSPAR (British Society for Paediatric and Adolescent Rheumatology), in conjunction with ARMA (The Arthritis and Musculoskeletal Alliance), have published Standards of Care for JIA which have been internationally recognised. These describe the support that children with arthritis need access to: this includes access to physiotherapists, specialist nurses and occupational therapists. Paediatric musculoskeletal physiotherapists are needed for children with musculoskeletal aches and pains, whether they are due to arthritis or the more



common biomechanical problems (such as a muscle imbalance). This care should be provided locally: at the moment, the specialist centres are trying to plug this gap and are being overwhelmed. Patients with difficulties in activities of daily living (due to disease or pain) should have the support of an occupational therapist to help with access to schooling or to help them maintain their independence at home. The patients with arthritis, and other inflammatory diseases requiring immunosuppressant medication, should have the support of a clinical nurse specialist to help them understand their disease, their medication and to oversee the monitoring of the medication.

At the moment, most of this care depends on Paediatric Rheumatology Centres that have developed in a haphazard way. Each centre has been built up by an interested doctor, with no regard to population numbers or geography. Each centre has developed its own model of care with varying levels of support local to the family. Not all patients have access to a specialist centre and these will often be looked after by adult rheumatologists.

This inequality in care leads to a wide variation in outcomes: research has shown that delay to diagnosis is a poor prognostic factor for good outcome in

many inflammatory diseases. Arthritis is often viewed as an unexciting condition which is not life-threatening. Children with inflammatory diseases are at risk of life-threatening events, which are often poorly recognised until too late. Paediatricians, quite rightly, set great store in whether a child looks well or not. Unfortunately, these children often look relatively well, with only the blood tests indicating the severity of their underlying condition, until they collapse and end up in intensive care. Though this only occurs in the smaller number of children with systemic illness (rather than illness restricted to just the joints), the early stages are eminently treatable. Even with children whose disease is restricted to just one joint, such as the knee, the joint damage caused by arthritis leads to an inability to walk, leg length discrepancy and secondary spinal deformity. Children with multiple joints affected used to end up severely disabled with stunted growth, often in wheelchairs and unable to lead independent lives.

The advent of better medication in the last 20 years (methotrexate and then biologic agents such as etanercept) has improved outcomes enormously by controlling inflammation and allowing normal growth and development to take place. Teams looking after these patients have seen a shift from

struggling to keep these patients moving despite their joint problems, to supporting patients to regain normal strength and to maintain full access to their education.

There is a financial as well as a human cost in failing to provide proper care in the early years of disease. Stinting on preventive treatment in early years multiplies exponentially the cost of support and care in the rest of life. Existing Paediatric Rheumatology Centres are all oversubscribed and specialist commissioning aside, there is no attempt by government or the NHS to address the lack of an overall strategy to save children from unnecessary lifelong hardship. Paediatric Rheumatology teams are keen to improve the care of the children, but lack the time to train local teams to set up, and maintain, appropriate care. The tools exist, but we are failing our children by not enabling them to be put to use.



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Skin cancer: deadly but preventable

Jon Pleat MA DPhil FRCS(Plast), Plastic Surgeon and Scientific Advisor at SCaRF details the risks of skin cancer and how it can be prevented...

Skin cancer is the most common form of cancer globally. There are more than 80,000 deaths a year from its different forms. Within the UK, the incidence of skin cancer is doubling every 10 to 20 years. The major killer is malignant melanoma for which there are around 12,000 new cases annually in the UK.

Tragically, the vast majority of skin cancer cases – more than 90% – are entirely preventable. These are skin cancers in which ultraviolet (UV) radiation has damaged the skin. Ultraviolet light in the form of excessive sun exposure or the use of sunbeds, damages the DNA of the skin cells that constantly divide. The DNA damage in the form of a mutation allows the cells to divide at an excessive and uncontrolled rate. Further, both the harmful wavelengths, UVA and UVB, may suppress the immune system and

allow cells that are dividing to escape our normal, natural surveillance mechanisms for detecting cancer.

As with most diseases, it is the combination of our genes and environmental exposures that drive the process. Our genes clearly have an influence for skin cancer. People who have less protective melanin within the skin seem to be more at risk of UV damage, and there are a few rare genetic diseases where DNA repair is deficient. However, there is overwhelming evidence that how we protect our skin from earliest childhood can have a vital influence on the development of skin cancer.

Types of skin cancer

There are a variety of forms of skin cancer depending on which cell divides. Melanoma arises from the pigment cells within the skin and is very aggressive.

Usually, it arises from an existing mole within the skin or a new mole that changes rapidly. More frequently within the UK we see non-melanoma skin cancer (NMSC) and chiefly, basal cell carcinoma (BCC) or squamous cell carcinoma (SCC). BCC's are the most common form of all skin cancers – they grow slowly and are common on the head and neck. They arise as pearly lumps, patches of inflamed skin or non-healing ulcers. SCC's are rarer but more aggressive: if left, they may spread around the body. They can appear as scaly patches which can eventually change to rapidly growing nodules or ulcers. For most skin cancer, change is a key feature that indicates an emerging problem, be it quick growth, altered pigment or new bleeding.

Prevention is vital

A simple operation to remove an early skin cancer can be curative in most cases and a judicious amount of sunlight can be good for growing bones. However, prevention is better than a cure and the vital message is that we need to avoid excessive UV exposure. Our skin needs to be protected from burning as indicated by sunburn. In hot climates, the sun should be avoided when it is most intense around midday, a broad-brimmed hat and protective clothing should be worn, and sunscreen should be applied. Sunscreen should contain UVB protection that is sun protection factor (SPF) 30 or greater. Additionally, it should contain UVA protection as indicated by a 4 or 5 star rating. Moreover, it should be waterproof, given time to absorb into the skin and be reapplied regularly in generous quantities. This is particularly relevant to at risk groups including those with fair skin, people with lots of moles, outdoor workers and children's skin which is more vulnerable to damage – childhood sunburn equates to a much greater risk of skin cancer in later life. Sunhats and sun suits can be invaluable in this respect. For the same reasons, the damage of sunbed usage in childhood is being increasingly prevented by public health campaigns and legislation around the world.

“Tragically, the vast majority of skin cancer cases – more than 90% – are entirely preventable. These are skin cancers in which ultraviolet (UV) radiation has damaged the skin. Ultraviolet light in the form of excessive sun exposure or the use of sunbeds, damages the DNA of the skin cells that constantly divide.”

Role of research

While the adaptation of our behaviour will be key to reducing skin cancer, research is crucial. At its most global, public health research is informing clinicians how best to get the message across about prevention. In terms of diagnosis, modern approaches have looked at the genetic complement (genome) of whole populations to identify those who are most susceptible to damage and potential molecular pathways that have been altered by UV radiation. With regards to treatment, ongoing international trials are investigating the benefit of surgery, radiotherapy, chemotherapy and immunotherapy for different types of skin cancer. There have been spectacular successes in recent years in certain areas such as advanced melanoma where targeting the BRAF gene and its effects have improved the prognosis dramatically. It is this type of work that the Skin Cancer Research Fund (SCaRF; www.skin-cancer-research-fund.org.uk) based in Bristol, UK, have pioneered for the last 35 years. Please visit our website to support our vibrant campaign of basic research, prevention and treatment. ■

For more information, please contact Mrs Caroline Newton on 0117 340 3130, or email: Caroline.Newton@nbt.nhs.uk

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A novel approach to Melanoma

Melanoma is one of the most aggressive cancers in the human population. In addition to its aggressiveness, it is also the only one of the 7 most common cancers that is actually becoming more frequent. World-wide incidence of melanoma is unstoppably rising over the last half of century, reaching a multi-fold increase since 1950s. It is estimated that the number of people directly affected by melanoma is 132,000 per year globally, and that about 30,000 people annually die as a consequence of developing melanoma.

Due to its apparent nature and mostly superficial occurrence, it is subject to identification by pure visual inspection (in most cases). It also makes it one of the most preventable cancers, as it is possible to detect in its early forms, while it is still In-Situ.

To date, the most effective way of preventing melanoma mortality and morbidity relies on early detection of melanoma, before it reaches more advanced stages that are accompanied by metastases.

Not to be underestimated is also the cost associated with late stage detection and treatment of melanoma, with U.S. estimates that a stage IV melanoma costs 2200% more than an early In-Situ melanoma, in treatment terms.

Speaking in absolute terms, the associated costs for Melanoma in Denmark were estimated to be almost €15m per year, but it has to



be noted that the population is just 5.5 million.

Current attempts to combat this lethal issue are mainly composed of primary prevention campaigns, educational brochures, leaflets, and general provision of information regarding the diagnostic criteria (ABCDE, Glasgow 7-point check list) to the lay public, in order to raise awareness about potential suspicious lesions that should be further examined by a professional.

In addition to simply informing the public in order to improve knowledge and awareness, other methods, such as Skin Self-Examination (SSE) have been described as important conveyors of public education and awareness.

As a tool of unprecedented value in the early detection and screening for melanoma, the patient-based Skin Self-Examination is a procedure that consists of thorough inspection of pigmented skin lesions by patients themselves.

A number of additional practices to improve on the basic SSE performed by patients have been developed and documented by studies in the recent years, such as the inclusion of visual images and photography in the process of Skin Self-Examination. These kinds of additional actions have been proven successful and they show that the use of visual images and similar image capturing and storing approaches to SSE by using Skin Self-Photography positively affects knowledge and motivation of SSE, and provides encouragement for the patient to take a more active role in detecting early melanomas.

To no surprise, with the explosive growth and penetration of the smartphones equipped with high-quality cameras capable of capturing high resolution images of sufficient quality, the use of smartphone as a tool for obtaining and storing the baseline images has become a reality. The use of smartphones for such exercises has been published recently,



with the conclusion that new technologies can help and improve Skin Self-Examinations by providing a medium for protocolled images and body mapping.

The time for a new take?

TeleSkin, an award-winning high-tech life science company is introducing a smartphone software application called skinScan, a well-rounded information resource tool to assist the population in appropriately determining the Pigmented Skin Lesions of interest

by interactively delivering useful information to the user. It enables them to recognize and graphically appoint the lesion to a particular location for future references, and also to communicate with a skin cancer specialist in an easy and convenient way.

The availability of this information, but in a form of a smartphone software application, a thing very common, interactive and intuitive, can bring a new perspective to raising awareness and informing the public.

What the almost-present future holds?

With the increasing number of eHealth services and mHealth applications being developed and the ever-increasing number of users over the course of the last 4 years, it is becoming clear that the public is ready to take a front seat in their own health activities and become involved.

This approach just may be a perfect pivotal point in Healthcare Management on a Country-level scale, as it could introduce a whole new way of conducting screening for Melanoma, shifting the burden from the Healthcare Systems to the public themselves, saving valuable time for the patients and significantly reducing the healthcare costs associated with both Advanced Melanoma patients and the surveillance and follow up visits, as it provides a simple, easily available solution.

TeleSkin's app skinScan is marketed as a Class I Medical Device and is bearing a CE mark in accordance with the EC MDD/93/42.



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Putting skin cancer in the shade

Sarah Williams, Senior Health Information Officer at Cancer Research UK sheds light on the increased number of skin cancer diagnoses and the importance of prevention...

More than 100,000 cases of skin cancer are diagnosed each year in the UK. Most of those are non-melanoma skin cancer, which is much more common than malignant melanoma, the most serious type. Over the past few decades rates of melanoma have increased in all age groups – with around 13,300 cases in the UK in 2011. But at the same time we've seen huge strides made in diagnosis and treatment with around 9 in 10 people now surviving malignant melanoma.

There are a number of factors behind the increase in melanoma rates. The boom in sunbed use and popularity of relatively cheap, sunny foreign holidays over roughly the same period are likely to have played a part. Particularly as they are associated with the short, intense exposures to ultraviolet (UV) light that are known to be linked to melanoma development. These are also typical of the exposures people might

experience if they are seeking to sunbathe. So the quest for a tan could be having negative consequences for people's health – despite the popular but mistaken belief that tanned skin is a sign of good health.

Increased detection of skin cancer may also be behind increasing melanoma rates, partly due to awareness campaigns encouraging people to be aware of any changes to their skin and to report them to their GP. Earlier detection of skin cancer greatly improves the chances of successful treatment and, along with ensuring patients have prompt access to optimal treatment, is one of the main ways to reduce skin cancer deaths.

But increasing rates of diagnosis coupled with the much smaller increases in melanoma death rates suggests an additional possibility – over-diagnosis. Some cancers are very slow growing, and would



never have harmed someone within their lifetime. But at the moment not enough is known about the disease to make a reliable distinction between these slow-growing cancers, which can be safely left alone, and more aggressive disease which should be treated without delay. While over-diagnosis doesn't mean we shouldn't improve prevention of skin cancer it does sound a note of caution in rushing to act based solely on incidence trends.

Melanoma is a largely preventable cancer, with more than 8 in 10 cases caused by excessive UV exposure. The picture is complicated by the issue of vitamin D which is produced by sunlight and necessary for bone health – but most people should be able to find a balance and get enough sun exposure to produce sufficient quantities of vitamin D, without increasing the risk of skin cancer. The National Institute for Health and Care Excellence (NICE) is drafting guidelines on how the risks and benefits of sunlight exposure can best be communicated to the public.

The most effective ways to reduce the risk of skin cancer are to limit the time spent in strong sun – such as by spending time in the shade – and to cover skin with protective clothing, such as a hat and long

sleeved shirt, and wearing sunglasses. But, most people tend to rely largely on sunscreen, which can't provide complete protection even when it is used in the best possible way.

There is a need for well-funded prevention campaigns to raise awareness of the most effective ways people can reduce their risk of skin cancer. Such campaigns should also help the public to understand when and where they may be at risk. For example the growing use of the UV Index in weather forecasts is a positive step, but there is a need to educate the public about what it means for the individual.



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Preventing chronic diseases through lifestyle

Chronic diseases account for the vast majority of deaths in European countries. Cardiovascular disease accounts for about 40% of deaths, with about 15% of deaths from ischaemic heart disease, 10% from strokes, and 25% from cancer.

If simple lifestyle changes could reduce the risk of chronic disease, people could live longer, disease treatment costs could be reduced, and work productivity could be increased.

Cancer

I have used multi-country geographical ecological studies to examine the risk factors for many types of cancer.

Smoking, diets with a large fraction of the food from animal products, and alcohol consumption are generally the highest risk factors for many types of cancer.

I have also used single-country geographical ecological studies in mid-latitude countries including the United States, France and Spain to study the role of solar UVB in reducing risk of cancer. I repeatedly find that people living in the sunnier part of the country have lower mortality rates for many types of cancer.

The types of cancer with the strongest evidence for reduction with higher solar UVB doses include bladder, breast, colon, oesophageal, ovarian, pancreatic, prostate, rectal, stomach cancer and non-Hodgkin's lymphoma.

These findings are supported by other types of studies, although such studies are limited by the small numbers of cases included, few measurements of vitamin D concentrations, and low vitamin D doses in trials.

I estimated that rates for many types of cancer can be reduced by 25% in the US and Europe if all people had vitamin D concentrations above 100 nmol/L, which could be achieved by a daily intake of 2000-4000 IU of vitamin D3.

Alzheimer's disease

Alzheimer's disease affects many people in Europe, with prevalence rates rising to 15-20% by age 80 years. I have done a number of studies on dietary risk factors for Alzheimer's disease using the ecological approach starting in 1997. Countries with high amounts of animal products and low amounts of cereals/grains have the highest rates of Alzheimer's disease. Fatty fish are also associated with reduced risk of Alzheimer's disease. Cooking food at high temperatures also increases risk of Alzheimer's disease. I recently published a paper pointing out that the increase in Alzheimer's disease rates in Japan from 1% in 1985 to 7% in 2008 was associated with the nutrition transition from the traditional Japanese diet to the Western diet.

Two recent papers reported that people with low vitamin D concentrations were more likely to develop Alzheimer's disease and other dementias.

Cardiovascular disease

An important risk factor for cardiovascular disease is diet. It is well known that saturated animal fats increase the risk of coronary heart disease. Less well known is that added sugar is also an important risk factor. I confirmed findings from earlier studies in a multi-country ecological study in 1998, but the role of sugar was not generally accepted until about five years ago.

In addition, solar UV reduces the risk of cardiovascular disease, shown in observational studies of vitamin D concentrations and incidence of the disease. One mechanism is by production of vitamin D. the other is by liberation of nitric oxide from nitrogen stores under the skin, thereby reducing blood pressure. Both of these actions help explain why cardiovascular disease rates are higher in winter than in summer.

The roles of SUNARC

The stated objectives of SUNARC are to conduct research into the primary causes of chronic and infectious diseases and help educate the public on the findings. As can be seen from the foregoing, the main interests of SUNARC are related to UVB exposure, vitamin D, and nutrition.

SUNARC constantly scours the scientific literature, the press, and the Internet to find interesting findings regarding health risks and data sets that lend themselves to analysis



regarding health outcomes such as combining with other data sets in ecological studies. Such studies can be done rapidly and yield important findings many years before traditional epidemiological studies do for a small fraction of the cost of such studies.

SUNARC also interacts with the leading vitamin D organisations and collaborates with many health researchers in the US and Europe in doing research and reviews leading to many publications on health.

Recommendations

I translated the vitamin D research findings into estimates of benefits to society if everyone had vitamin D concentrations above 100 nmol/L. For example, my estimates include that all-cause mortality rates could be reduced by about 15%, leading to an increase of life expectancy by two years, and a reduction in the economic

burden of disease in Western Europe in 2007 of €187,000 million/year.

I also helped develop guidelines for vitamin D levels and supplementation for Central European countries and people with neurodevelopmental disorders and intellectual disabilities.

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Creating artificial metalloenzymes

Dr Michèle Salmain from Université Pierre et Marie Curie, Paris gives an overview of the process involved in creating artificial enzymes...

Artificial enzymes or 'artzymes' are man-made constructs in which an active site is implanted within a protein host to endow it with a (new) catalytic activity. In this field we are specifically looking to create artificial metalloenzymes by incorporating metallic species into protein hosts to drive certain reactions to high enantioselectivity and chemoselectivity under environmentally friendly conditions.

The reaction that we are focusing on is the reduction of ketones to produce secondary alcohols using a reaction coined 'asymmetric transfer hydrogenation' that is catalysed by ruthenium and rhodium complexes. This reaction makes use of formate as hydrogen source and can be carried out under smooth conditions in water.

During the design of these novel biocatalysts, great attention was paid to 3 parameters. The first was the protein scaffold, which was selected based on stability, availability and the presence of a binding pocket in which the reaction could proceed. Second, the method of incorporating the metallic entity was considered, and finally, we examined the catalytic activity that the transition metal centre would likely confer to the hybrid. These parameters are highly interdependent, as the surrounding protein environment affects catalysis and how well the metal complex is incorporated.

Initially, the protein papain was selected as the scaffold. Owing to its native activity and 3D structure, this protein is amenable to the covalent anchoring approach. We successfully produced several metallopapains with the targeted catalytic activity, but the resulting enantiomeric excesses were only modest.

Latterly, we selected beta-lactoglobulin, a protein present in the whey fraction of cows' milk. Beta-lactoglobulin has a peculiar 3D structure (known as beta-barrel)

since it folds like a calyx. Interestingly, it can bind fatty acids with high affinity and once bound the carboxylate group of the fatty acids is positioned at the entrance of the calyx while the alkyl chain occupies the hydrophobic tunnel. It was anticipated that appending the metal centre to the carboxylate group of fatty acids might further allow a tight control of its positioning with respect to the protein environment. This kind of process is called supramolecular anchoring. Luckily enough circular dichroism studies showed that some of the metal cofactors synthesised from saturated fatty acids did associate with beta-lactoglobulin. This finding was substantiated by X-ray crystallographic studies that confirmed the metal complex was indeed located at the entrance of the calyx.

After these steps, we tested the catalytic activity of the hybrids on a standard hydrogenation reaction by measuring the conversion rate of the substrate and the enantiomeric excess with high pressure liquid chromatography. Some hybrids gave quantitative conversion rates and other hybrids gave enantiomeric excess up to 32%. For comparison, the popular, ruthenium-based Noyori's catalyst afforded an enantiomeric excess of only 27%.

It is now planned to expand the approach to the design of artificial copper enzymes. Further to this, we are looking to understand the reasons why some of these artificial enzymes have such selectivity and reactivity while others do not, which should in turn improve the artzyme design process. ■

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HIV-1 vaccine remains the best solution

Professor Tomáš Hanke of the Jenner Institute, University of Oxford discusses why the development of HIV-1 vaccine remains a high global health priority...

Since the first report of AIDS in 1981, an estimated 60 million people have become infected with HIV-1, of whom some 25 million have died. Over 90% of new infections take place in countries with limited resources. Globally the rate of new infections has decreased by 33% since year 2001. Nevertheless in 2013, still 240,000 children became newly infected with HIV-1 and 50 young women became infected every hour, thus a control of the HIV-1 epidemic remains one of the global health priorities.

A remarkable progress has been achieved in decreasing HIV-1 transmission and AIDS-related deaths in the last decade due to development of over 30 antiretroviral

drugs. These substances inhibit a number of essential steps in the HIV-1 replication cycle and can serve as a means of both treatment of HIV-1 infection and prevention of HIV-1 acquisition. Indeed, optimism is spreading that the control of AIDS epidemic has become possible: it is now a matter of a 'business plan' to provide drugs to everybody who needs them. These developments may impact on further HIV-1 vaccine development.

First, a perception may arise that vaccines are no more needed because the epidemic can now be controlled by the drugs alone. However, still almost half of people who are HIV-1 positive do not know their status. In



therapy from 2001 to 2012, there are still limitations on antiretroviral treatment for people with AIDS, let alone a provision of antiretroviral prophylaxis as a standard care to an uninfected population. Thus in some settings, to obtain PrEP, an individual would have to join an experimental clinical trial.

In efficacy trials, this ethical dilemma will be addressed on multiple levels. Thus, the study proposal will be submitted for a favourable opinion to all relevant research ethics committees and will be approved by relevant regulatory authorities; all participants will be informed regarding the study and provide informed consent; the trial will be conducted in accordance with national and international regulations regarding research with human subjects; standards of prevention, HIV-1 risk assessment and counselling will be integral parts of the trial; ethical and local stakeholder consultations, as recommended in UNAIDS Good Participatory Practice Guidelines, will be conducted to determine what background interventions will be appropriate. Furthermore, governmental policies and procedures will be taken into account as efficacy vaccine studies begin and progress.

An effective, prophylactic HIV-1 vaccine remains one of the priorities of HIV-1/AIDS research and will always be the best solution and likely key to any strategy for halting the AIDS epidemic. ■

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addition, antiretroviral drugs are not available on a regular reliable basis in many resource-poor settings, they have long-term side effects, their effective use requires rigorous daily compliance and the circulating and/or transmitted viruses develop resistance. Also, there is unwillingness to take drugs in a surprisingly large proportion of infected individuals, even in the US.

The bedrock of experimental medicine is a prospective, double-blind, placebo controlled study, which can deliver the ultimate proof that a medical intervention is effective. For an HIV-1 vaccine efficacy study this means that half of the volunteers in the trial receive placebo and, if the participants remain at risk despite provision of non-vaccine interventions such as counselling and condoms, a proportion of them will become infected with HIV-1; a statistical comparison between vaccine and placebo recipients can then prove that the tested vaccine prevented HIV-1 infections. It may be argued that this is unethical, because all volunteers in any clinical study should receive at least the best available standard prevention care against acquiring infection and there is now a proven efficacy of drug preventive treatment, so called pre-exposure prophylaxis or PrEP, provided the drugs are taken as prescribed. Note that PrEP with antiretrovirals is not currently a standard of care in most countries and despite the 40-fold increase in access to antiretroviral

The many uses of menthol

Phil Richardson a Commercial Consultant to the Dermatology Industry sheds light on the organic compound menthol, and its role as itch relief...

Menthol is used in a vast array of over-the-counter medications, despite this the understanding of the clinical pharmacology of menthol remains incomplete. However considering the extensive use of menthol there have been only few reports of adverse dermatological effects.

Menthol is an organic compound made synthetically or obtained from peppermint or other mint oils.

Menthol is primarily used for its cooling effect when applied to the skin. This effect is observed at low concentrations and it is due to a specific action of menthol on sensory nerve endings, and is similar to capsaicin, the chemical responsible for the spiciness of hot chillies (which stimulates heat sensors, also without causing an actual change in temperature).

In concentrations of 1% or less, menthol depresses cutaneous sensory receptors, while at concentrations between 1.25% and 16%, it stimulates sensory receptors and thus acts as a counter-irritant. This is potentially why menthol is frequently found in a variety of topical pain relief medications because of its counter-irritant and local anaesthetic properties.

Many consultant dermatologist & GP's frequently prescribe menthol, in a range of different strengths, usually in a cream base, for non-specific pruritus, commonly found in elderly patients.

There are many causes of itching. Liver disease can cause itching, and even itching associated with pregnancy – obstetric cholestasis. Obstetric cholestasis is a liver disorder that occurs in around one in 140 pregnancies in the UK. Also referred to as intrahepatic cholestasis of pregnancy, it is a condition in which the normal flow of bile out of the liver is reduced. Chemicals in the bile, called bile salts build up and 'leak' into the

bloodstream. A characteristic of this condition is itching or pruritus, which generally appears in the last 3 months of pregnancy but can appear sooner. It is of variable severity and can be extremely distressing for the mother. Both the raised bile salts and pruritus completely disappear soon after the birth and do not appear to cause long-term health problems for mothers. Itching is often the only symptom of obstetric cholestasis. The itching typically begins on the arms, legs, hands and soles of the feet. It may also occur on other parts of the body such as the face, back and breasts. It is usually worse at night, leading to sleeplessness and exhaustion.

It is important that women who are pregnant and itching, should check with their doctor or midwife. As with all itching it is important to exclude all other possible causes.

Doctors will often prescribe menthol in an Aqueous cream base to help with itching caused by liver disease, including usually temporary conditions such as obstetric cholestasis. ■

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Chemistry helps the fight against bacterial infections

Developing new antibiotics to tackle bacterial infections such as E.coli and MRSA is an important task. Adjacent Government highlights how vital this is and how chemistry plays a role in the development...

Chemistry plays an important role in everyday life and the world round us, including our food and drink, cleaning products, and the clothes we wear. One area that uses chemistry as a key component is the development of new medicines and drugs.

In particular chemistry plays a crucial role in the development of antibiotics for bacterial infections that not only create healthcare challenges in the UK, but worldwide. Over the past 8 decades, the development of antibiotics is said to be one of the greatest success stories in medicinal chemistry. However, the fight against bacterial infections is a constant one, and pathogens are fighting back.

The Royal Society of Chemistry (RSC) hopes to increase the awareness of the importance of antibiotic resistance both publicly and politically, as they believe it is one of the greatest risks to modern medicine.

Since 2000, the RSC reports that only 5 new classes of antibiotics have been discovered, and most of these do not work against gram-negative bacteria, such as E.coli and salmonella.

In order to develop new antibiotics to tackle global health challenges, further funding is needed. In 2014 the UK government announced a review of the economics of antimicrobial research. The Science and Technology Committee warned that the government needed to set clear responsibilities at all levels of the NHS and veterinary medicine to achieve better stewardship of the antimicrobial drugs vital in modern medicine.

At the time of the review, Chair of the Science and Technology Committee Andrew Miller MP said: "Antibiotic resistance cannot be entirely prevented, but it is a

problem made worse by inappropriate use and poor stewardship of antibiotics in healthcare and farming.¹

"We heard concerns, for instance, that antibiotics are often prescribed by GPs simply to achieve a placebo effect or placate patients with distressing symptoms. In farming meanwhile, we suspect that antibiotics may be routinely used in healthy animals."

As well as creating greater awareness in regards to the prescription of antibiotics, the Committee of MPs also stressed that greater public awareness surrounding the necessity for stewardship of antibiotics is crucial in reducing pressure on practitioners to prescribe them.

"All levels of the NHS must be given clear responsibilities for stewardship of antibiotics and better monitoring and reporting put in place to bear down on unnecessary use of antibiotics," added Andrew Miller MP.

In 2014 a report suggested that the true cost of antimicrobial resistance will be 300 million premature deaths and up to \$100trn (£64trn) lost to the global economy if it is not tackled between now and 2050.

The review commissioned by the UK Prime Minister, RT Hon David Cameron MP, shows that the issue goes beyond health policy, and it makes sense for governments to act now. ■

¹ <http://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/news/report-amr/>

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Drug discovery backwards?

There's been a lot written about the slow-down in the marketing of new drugs in the last 20 years from the point of view of the international pharmaceutical industry establishment. But if you asked an Indian physician what is needed to discover a new drug he or she might say, "Very little, actually. We've have plenty of good drugs from Mother Nature in our traditional Ayurvedic medicine". The slow-down is a fact and various reasons have been noted as contributors including an increasingly challenging regulatory environment, a lack of good druggable targets (all the easy ones having been done), increasingly challenging disease states associated with aging populations, a lack of good quality new chemical entities, and so on. Overall an intrinsically risky business has become riskier. It's entirely appropriate and understandable, therefore, that companies should take serious steps to mitigate the risks and thereby increase profitability. It's also very clear that companies have to make choices about what to develop from the many opportunities arising from their own research.

My perception looking at several major pharma companies from the outside is that their response has been to put in place a system for drug discovery to which projects in that company must comply ticking the necessary boxes as they go. Usually this implies having a well-characterised pharmacological target (a receptor or enzyme) with an appropriate assay

and then a sequential series of downstream assays in whole cells, serum, or blood before experiments are undertaken in animal models. That's a lot of work before you get to a proof of concept experiment in an animal model to show that your potential drug has a chance of working in the disease state for which it is intended. All of this is understandable in the industrial context but, if I am being critical, systems and drug discovery paradigms have industrialised thinking and thereby circumscribed creativity.

In this situation, academic scientists can help in the early stages of drug discovery without compromising the rigour needed in a drug development programme and before the big financial commitments have to be made. The pharmaceutical industry itself has made it clear for many years that despite its size it cannot do everything worth doing or interesting. It boils down simply to the academic sector fulfilling one of its prime roles, namely to create opportunity. This is where the title of this piece, Drug Discovery Backwards comes in; you can find something that works and then establish the underlying science. My Indian friends, with their vast resource of traditional medicine, would call it Reverse Pharmacology. My point is that if you have discovered a group of compounds that really work from whatever source, they should be taken seriously as opportunities for new drugs. You won't be following a predefined industrial system but will

be led by the scientific questions and results, and in the Indian situation, by thousands of years of experience.

This more open approach suits the academic environment and, of course, my own interests in heterocyclic chemistry which provides many of the compounds. A particular recent success of ours concerns immunomodulatory compounds that have efficacy in animal models of asthma, rheumatoid arthritis, lupus, and inflammatory bowel disease. You can read more about it in my e-book 'Chemistry, the Queen of Sciences' published by Adjacent Government. However it is proving difficult to find an industrial partner to take this work forward because, being a Drug Discovery Backwards project, it does not yet have all of the system components in place, in order. For our projects and, I believe, for many other opportunities, we need better ways to match opportunity with development and route to market.



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Care in the home

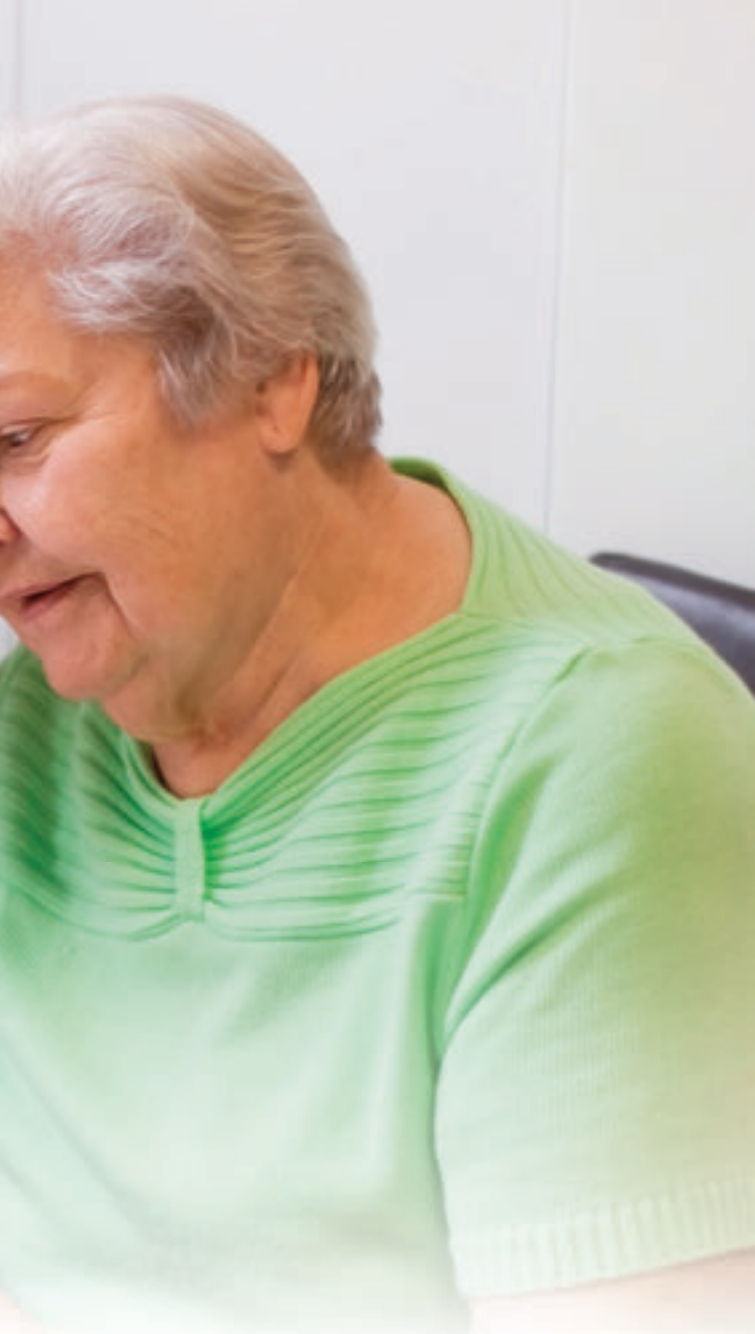
Dominic Carter, Policy Officer at United Kingdom Homecare Association (UKHCA) details how homecare can be more flexible and beneficial to the patient's needs...

Homecare is a growing and varied service, focused on providing care and support in people's own homes, ranging from shorter visits to remind an older person to take their medication, right through to practical support from a care worker living in someone's home.

In a recent survey, 9 out of 10 people aged 50 years or above said they would prefer their care needs to be met in their own home (Saga/Populus 2014). As, fantastically, more people continue to live longer, healthier lives, homecare workers are increasingly taking on complex health related tasks, in addition to more traditional activities like washing and preparing meals. The flexibility of homecare can enable the individual, their family and the care provider to shape a care plan focused on the aims and desires of the individual as the focus.

Quality standards in homecare are closely regulated. Provider organisations are expected to quality assure their own services, through client and family feedback surveys, monitoring care workers and spot checks. In addition there is a dedicated regulator for every country in the UK, who will carry out inspections, monitor a range of information and publish reports on providers' performance. There is a growing pool of resources to help people choose the care they want, with user ratings included on sites such as www.nhs.uk.

Having access to, and remaining a part of, the local community is important for many people using social care. Care workers often help prevent confining people to the home through trips out and signposting of information, events and other services. This can also be a good opportunity to provide respite for



family carers, allowing them to recharge their batteries and in turn remain as a carer for as long as possible. Care workers, ties with the community and refreshed family carers form a strong trio in combatting loneliness and isolation, a significant societal problem and one that has been closely linked with a negative impact on wider health.

Homecare is vital to relieving pressure on hospitals and A&E units. If low-level support is introduced early enough, there is an increased chance that the situation can be managed, helping to reduce the need for stressful, costly hospital visits further down the line. Additionally homecare has a particularly important, if rather undervalued, part to play in people’s recovery after leaving hospital, supporting them to manage their condition, readjust and rebuild independence to do what they wish in their favoured environment.

Despite the vast potential for homecare services to help people, there are significant challenges and obstacles. Around 70% of adult homecare in England is funded by local authorities, who have seen their budgets slashed by 37% in the 5 years leading to 2015/16. A direct result of this, is the fees paid to providers have fallen in real terms. Fees are expected to cover staff, training and office costs, and the unrealistic level of investment risks a sector struggling to keep ahead of national minimum wage, creating real issues in terms of recruiting and retaining care workers.

Furthermore, as councils aim to stretch dwindling finances, eligibility criteria have been tightened and fewer people with relatively high needs now receive state funded care. Reduced eligibility means providers are required to work with more complex needs, yet with the same amount of funding. Sometimes, as widely reported recently, councils will purchase homecare visits of 10 or even 5 minutes.

Thankfully, despite these challenges, the sector is full of dedicated, caring people. As the professional association for homecare, United Kingdom Homecare Association will continue to promote high quality, sustainable care services so that people can continue to live at home and in their local community. ■

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Social care – fit for purpose

Richard Kramer, Deputy Chief Executive at the Deafblind charity Sense highlights the importance of social care for deafblind and disabled people...

Last year was incredibly challenging for many deafblind and disabled people. Changes to the welfare system including the transfer from DLA to PIP and ongoing issues with Work Capability Assessments and Employment Support Allowance have left many struggling financially. But the biggest struggle for many is getting the support they need from social care.

When we talk about social care it is essential that we don't just limit our thinking to helping people get washed and dressed or cooking meals. This kind of support is vital for many, but it isn't where it ends. Deafblind people will often need a much broader range of support; communicator guides to help them move around safely and have the opportunity to get out the house or perhaps the support of an interpreter to help communicate with friends are just 2 examples. Social care can support many different aspects of a person's life, from basic needs to ensuring that they have a social life and the opportunity to make and maintain friendships. This broader support is essential for an individual's emotional and physical wellbeing and should not be overlooked.

At the end of 2014 the Care Act was introduced, a landmark piece of legislation for social care. For the first time it looks at both health and social care and crucially takes in to account the general wellbeing of those that need social care. However, there are several barriers that might prevent it fulfilling this.

Eligibility is a long term issue in social care. This means that those who are considered not to have a high enough level of need, will not receive any support. All too often the bar is set far too high. In fact a recent study by London School of Economics (LSE) showed that there are 500,000 people who would have got care in 2009 but are no longer receiving it. Their

needs may not have not changed, but the threshold at which social care is set means that people can't get into the system of social care in the first place.

This rationing of social care is a false economy. Social care has a central role in delivering cost effective, early intervention services. As people struggle on without the care they need they might become more susceptible to falls, or struggle with nutrition and a healthy diet, leading to hospital admissions and an increased burden on the NHS. This winter overcrowded A&E department's, hospital waiting times and delays in hospital discharge have remained high on the media agenda. Without a social care system fit for purpose this will continue.

One of the main barriers to the Care Act fulfilling its potential is funding. If central government does not release enough funds to local authorities to fully implement the Act it will be built on sand. The NHS is high on the public agenda, and it will be a key issue for the general election in 2015. However, social care will not feature as highly and as a result, securing the funding will always be a challenge.

As the population ages the number of people who rely on social care for support will increase. This makes it an issue for us all. We need to get social care right for the future and in order to do this it must be higher up the political agenda. ■

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DO YOU UNDERSTAND ME?

Findings on four effective communication interventions for children and adults with congenital deafblindness

Persons (children and adults) with deafblindness express themselves and understand others without a formal language on the basis of other communicative acts that may consist of bodily movements, tactile cues, postures and natural gestures (Goode, 1994). The hearing and sighted caregivers find it difficult to participate in this world of proximity and touch. As a consequence this situation can lead easily to severe challenging behaviors in the persons with deafblindness, and in a stagnation of their communication and language development. The most persons with congenital deafblindness get stuck in pre-symbolic communication and never learn to express their thoughts in a more abstract way outside the concrete here and now. Caregivers, families and clients themselves express a huge need for intervention programs to improve interaction, communication and language with persons who are deafblind.

Layered interpersonal communication

In his framework of “innate intersubjectivity” Trevarthen (2001) describes interpersonal communication as the ability to share meanings from a certain “ego-alter” awareness. From the awareness that own intentions can be exchanged with another person, and that “the other” is also somebody with own intentions and purposes, develops a young child very early in life the ability to share thoughts and feelings with the other.

The intersubjective development in relation to communication and language develops in three layers, which are complementary to each other. The first layer is characterised by harmonious interactions and affect attunement, the second layer by joint attention and meaning-making and the third layer by symbolic communication and perspective-taking (Trevarthen & Braten, 2007). Our research group focused the last five years on different aspects of interpersonal communication and developed successful four intervention programs for persons with deafblindness.

Communication-coaching like in top sports

Building on the Intervention program Contact (Janssen, 2003), we developed different intervention programs in which a communication specialist has a central role as coach. The coach analyses a communicative situation. On basis of this analysis the coach trains or coaches the caregivers just as in top sports. Caregivers watch a film-segment of their own behavior in communication with a client and the coach gives comments: what can be done different or better, which skills must be trained more, on which moment a new concept can be best introduced in what way, is the client in this second motivated enough for a new concept, etc.. The caregivers are also coached “on the job”, when they are working with a client. Furthermore they learn skills to consider the life history of a client and to communicate

as a team about this. In four different PhD-studies we saw that by coaching the caregivers, the children and adults with deafblindness made an enormous progress.

Affective involvement and reducing negative emotions: Intervention 1

In this PhD-study is focused on the essential role of affective involvement (mutual sharing of emotions) during interaction and communication. Affective involvement is of crucial importance for well-being because it evokes positive emotions and reduces negative emotions. Fostering affective involvement based on the tactile modality can be challenging for caregivers. As instrument the Intervention Model for Affective Involvement was developed (Martens, 2014). Three intervention studies were performed, in which in total 9 participants with deafblindness and 34 caregivers were involved. This intervention program proved to be effective for: a) fostering affective involvement, fostering positive emotions and reducing negative emotions; b) fostering affective involvement on the first and second layer of interpersonal communication; c) for children and adults with congenital deafblindness across different caregivers, situations, settings and organisations.

Intersubjective communication: Intervention 2

The central aim of this PhD-study was to evaluate the effectiveness of the



Prof Dr Marleen Janssen, Special Needs Education and Youth Care

intervention program on intersubjective development in three layers for the support of communication between persons with deafblindness and their caregivers (Damen, 2015). In two studies in total 6 participants with deafblindness and 25 of their caregivers were involved. All participants demonstrated significant improvements on the first and second layer and four of the six participants showed a significant improvement on the third layer. The most effects were seen during the communication phase in which caregivers were coached in their efforts to transfer and share meanings with the client. In a third study the intervention was evaluated on the effects for 9 dyads (caregiver-client couples). Positive outcomes were measured for all dyads on the first and second layer and in four of the nine dyads for the third layer. It was further more demonstrated that the level of intersubjective behavior was significant related to the level on which the caregiver demonstrated intersubjective behavior. This study proved how valuable it is to support intersubjective communication.

Tactile communication: Intervention 3

The aim of this PhD-study was to foster the use of the tactile-bodily modality in caregivers of persons with deafblindness. Because caregivers of persons with deafblindness lack the natural skills in tactile communicating, interaction and communication is hampered. As instrument the Intervention Model for Tactile Communication was developed (Huiskens, submitted, 2015). Interventions based on this model are evaluated in three studies with 9 participants with deafblindness and 9 caregivers. The intervention proved to be very effective for the participants with deafblindness. They all improved the use of tactile initiatives and tactile gestures and signs. The effects on tactile initiatives and tactile gestures and signs increased in the most cases, but unexpected outcomes were measured also. Suggestions for practice and further research were given.

Interaction and Bodily Emotional Traces: Intervention 4

This intervention study, as part of a PhD-project (Bloeming, submitted 2015), was focused on fostering harmonious interactions and the use and recognition of expressions based on Bodily Emotional Traces (BETs) (Daelman, 2003). Because for persons with deafblindness experiences and tactile impressions of daily activities are important it was assumed that support of caregivers on interactions and recognition of expressions should improve the quality of interaction.

The intervention was evaluated with 5 adults with congenital deafblindness and an intellectual disability and 8 caregivers. During the intervention all target behaviors increased: attention

of client and caregiver, confirmation by the caregiver, affective involvement, number of expressions based on a BET by the participant, percentage of these expressions recognised by the caregiver. During follow-up most target behaviors decreased but stayed above baseline level.

Implications for further research and practice

The outcomes of these studies suggest that much can be done for the improvement of interaction and communication of people with congenital deafblindness by supporting their caregivers. Communication-coaching proved to be effective in preventing challenging behaviors and negative emotions and proved to be effective to bring the communication at more advanced layers of intersubjective communication. However more international research is needed on the third layer of intersubjective communication and language in this population. For daily practice communication-coaching on a more permanent basis proved to be a necessity.



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Is the UK delivering effective mental health services?

Over the last few months, there has been increasing reports of failures to meet the needs of patients with mental illnesses in the UK.

Adjacent Government examines the impact of cuts on the sector...

Mental health services are in trouble, it seems. Last year an investigation by Community Care magazine and the BBC revealed that more than 2,100 mental health beds have been lost since April 2011¹. This amounts to a 12% decline in the total number of beds available.

Funding for the sector has always been sub-par, but the latest string of grievances aired by patients is enough to make your toes curl.

A few months ago, it was reported that mental health services were so underfunded that a 16-year-old girl had been kept in a police cell as there were no beds for her.

The story, which emerged in November last year, caused outcry, and the government pledged to end the practice, agreeing that police custody could only be used in cases where adults displayed extreme behaviour. It was probably of little comfort to the girl who endured the events, but at least going forward things may be better for vulnerable children.

There is no doubt that the mental health care system is at breaking point. The Royal College of Psychiatrist said there were days last year when there were no mental health beds available for adults in England.

President of the college Simon Wessley said: "There is mounting evidence – such as the doubling of the number of patients having to be sent out-of-area for care between 2011/12-2013/14 – that there are simply not enough mental health beds available in some areas.

"This is a system at breaking point, and patients are being put at serious risk as a result. "The college's position is very clear – everyone who requires an acute mental health bed should be able to access one in their local NHS trust area."

Marjorie Wallace, the chief executive of mental health charity Sane, said it was "profoundly worrying" that there are occasions when the NHS had no beds for patients.

She said: "It is a cruel result of a longstanding agenda to reduce mental health beds and treat all mental health patients – no matter how unwell – by already overstretched mental health teams in the community."

A recent report from the NHS's Health and Social Care Information Centre (HSCIC) revealed that more than 400 adults with acute mental health problems were being forced to seek treatment from hospitals more than 30 miles from home.²

Since 2012, sadly 7 people have killed themselves after being told there were no beds for them, and this cannot continue. People must be given the help they need. It is not acceptable for the government to fail to provide vulnerable people with the correct care. It is also not acceptable to expect a vulnerable person to travel miles from home and their family to receive help that should be available to them in their area.

Problems in mental health are hardly new. The service has been woefully underfunded for years, but the problems have been compounded by severe austerity measures across all government departments.

Mental health services for children have, in particular, suffered. At the beginning of the year the Labour party revealed that since the coalition government took power in 2010 nearly £50m has been slashed from the budget.³

In the final year of the Labour government, 2009-10, spending on children's mental health services was equivalent to £766m (at 2013-14 prices). In 2012-13 the figure fell to the equivalent of £717m.

The Care Minister countered this by pointing out that an extra £7m has been spent on more psychiatric beds. New investment will also be plugged into tackling self-harm and eating disorders. Given the scope of the cuts, however, £7m seems like a drop in the ocean.

Charity YoungMinds said problems were so deep because children’s services had been hit with a “double whammy” of cuts to both local government and NHS budgets. The organisation found last year that more than half of councils in England froze or cut the budget for child and adolescent mental health services between 2010-11 and 2014-15.

Speaking in January, Chief Executive Sarah Brennan said: “These are deeply worrying figures.

“Children and young people’s mental health services have been chronically underfunded for decades and the current cuts to their funding have just added to the crisis that many local services face.

“These figures along with YoungMinds’ previous research demonstrates the ‘double whammy’ that children and adolescent mental health services face as both local NHS services and local government cut funding.”

Additional concerns about mental health budgets have also been raised by Healthwatch England, who warned last month that the practice of discharging patients from hospital without the necessary information about their condition and future needs was putting vulnerable people at risk.

The state-funded organisation found that numerous patients suffering from suicidal behaviour and engaging in self-harm were only offered a crisis support phone number after being discharged.

Further research from the science world came last year. A paper published in the Lancet Psychiatry revealed that while suicides on psychiatric wards had more than halved in recent years, patients treated at home by crisis resolution home treatment teams had seen their numbers double ⁴. Researchers said it indicated a need to offer more support to crisis teams on the ground.

Professor Louis Appleby, Director of the National Confidential Inquiry, said: “CRHT (Crisis resolution home treatment teams) has been an important alternative to hospital admission for patients who are acutely ill, but we need to ensure that it is used safely, especially at a time when bed closures are putting pressure on mental health services.”

At the beginning of February, Care Minister Norman Lamb said the government had invested a total of £120m to improve care. He said: “We are pleased that NHS England’s guidance to commissioners for 2015/16 is to give real terms funding increases to mental health.

“I have set about getting data for the first time ever on out of area placements so that we can see clearly which areas are failing.

“I am clear that sending people a long way from home is intolerable. I have asked Monitor and the Trust Development Authority to identify the problem areas and find solutions to these failures.”

But more needs to be done, and it needs to be done quickly. Cuts to mental health services are having a detrimental impact on people who suffer these illnesses. Expecting people to travel miles for a hospital bed or having no beds available at all is not acceptable. Mentally ill children have no place in police cells. The government needs to step up efforts to turn things around, and invest in services that are efficient and offer the right support to vulnerable people. ■

¹ <http://www.bbc.co.uk/news/uk-30236927>

² <http://www.theguardian.com/society/2015/feb/04/mental-health-acute-care-figures-review>

³ <http://www.adjacentgovernment.co.uk/nhs-health-social-care-news/50m-cut-childrens-mental-health-services/>

⁴ http://www.eurekalert.org/pub_releases/2014-06/tl-tlp_1061614.php

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Helping vulnerable adults and young people in Somerset

Advocacy in Somerset has been a registered charity since 2001 and is also a company limited by guarantee. Our mission has always been to provide an independent advocacy service to vulnerable adults and young people in Somerset, mainly but not exclusively experiencing mental health problems. To give a voice to, and protect the rights of vulnerable adults and young people disempowered by illness, disability or the nature of service provision.

We are a grassroots service and make no apology for our dogged adherence to the values and principles of independent advocacy and its role in allowing the most vulnerable in our society a voice where theirs and their rights may be suppressed as a result of often unintentional poor practice or neglect and sometimes as a result of gross acts of discrimination or neglect.

History of the organisation

Our focus has been on establishing a good quality independent advocacy service in Somerset. This has entailed positive and constructive working with commissioners and the development of engagement protocols with service providers so that we have a shared understanding of what advocacy is and the mutual expectations of all parties. We have not just taken a parochial approach to this work but have been at the forefront of developments in advocacy nationally.

We developed some of the earliest training courses in Advocacy Skills, helped to influence policy with regard to the commissioning of advocacy services and had significant input into the consultations around the development of the now statutory advocacy services of IMCA and IMHA.

We were pioneering in our work with Young People and developed the Headspace Toolkit used nationwide by Tier 4 Young People's units to support self-advocacy for young people in these settings. In 2009 we were commissioned by the Republic of Ireland to develop a similar tool for use in their institutions as they begin to recognise the value of advocacy for very vulnerable young people. As a result of work in partnership with Tros Gynnal in Wales and funds from the National Lottery we also developed 'Through the Maze' a toolkit for potential providers of advocacy services to young people.

What for the future?

Independent Advocacy in our view is a significant safeguard at a time where, as a result of austerity measures, public services are 'raising the bar' in terms of access criteria. It is a time when health and social care policies are emphasising as never before the importance of providing services according to properly assessed need and in the most person-centred manner, emphasising health and wellbeing and quality of life while at the same

time coming under immense financial pressure that challenges the ability to deliver such high quality services.

So it can be argued that it is a time like never before when independent advocacy is needed in order to help the many and increasing vulnerable people to have a voice and ensure that their needs are really taken into account and valued when being assessed for services. We stand on the brink of a yet another new piece of powerful legislation in the form of the Care Act 2014 that will extend still further the right of people to access advocacy to support their quest for appropriate and effective health and social care services. Advocacy in Somerset intends to continue at the forefront of services championing the rights of the most vulnerable in our society.



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Dementia – Living together

People with and without dementia share a common world. Yet, their daily lives are mostly separate. The challenge, however, is not to ignore the up to 1.5 million people suffering from dementia and their families in Germany, of which 80,000 are living in Rhineland-Palatinate. We have to understand them as a self-evident part of public life and should integrate them into the community.

This is especially necessary in view of the demographic change. Fortunately, we will all grow older in future. Thus, the number of people suffering from dementia will inevitably rise. The number of dementia cases is expected to double until 2050. Therefore, we have to ask ourselves how we can support and manage social participation for people with dementia and their families, and how we can succeed in living together as one society.

The “Forum for Dementia” is a common work group of the regional care conferences of the district of Südliche Weinstraße, and the city of Landau based on the care infrastructure planning of the government of Rhineland-Palatinate. The Forum is based on the Rhineland-Palatinate Dementia Campaign, which was started in March 2004 by the Minister-president of Rhineland-Palatinate and the Ministry of Labour, Social Affairs, Health, Family and Women under the “Menschen pflegen” (“Caring for



Partners of the dementia campaign in Rhineland-Palatinate that was started in 2004

people”) initiative and other partners. The campaign is implemented by the Landeszentrale für Gesundheitsförderung in Rheinland-Pfalz e.V. (Regional Center for Health Promotion in Rhineland-Palatinate).

The Forum was founded in 2008 during the regional care conference of the district of Südliche Weinstraße. In May 2010, the first common meeting with the members from Landau was held. Now, it is also part of the “Landes-Netzwerk Demenz” (Dementia Network in Rhineland-Palatinate), also initiated by the Minister-president of Rhineland-Palatinate.

The forum helps to inform the public and dilute fears regarding dementia. It aims to make consultation and health care structures more transparent and easily accessible for both the persons

concerned and their relatives. Thus, missing offers can be identified faster and initiated accordingly.

All the members of the “Forum for Dementia” work in areas entrusted with the care of people suffering from dementia. Among them are the Regional Center for Health Promotion in Rhineland-Palatinate as a supporting body, the local representatives of the district of Südliche Weinstraße, and the city of Landau as well as the Rhineland-Palatinate Alzheimer Society. Additionally, nursing homes for the elderly, care support centers, Pfalz-klinikum with its hospitals for gerontological psychiatry and neurology and the Pfalz-klinikum day-care center for the elderly can be named.

After the foundation of the “Forum for Dementia” the preparation of a guide



for the region was particularly important. This guide will raise awareness, inform about dementia and provide an overview of the existing out-patient, day-care and in-patient offers.

Dementia guide 2014

Due to great demand, the Dementia Guide of the "Forum for Dementia", District of Südliche Weinstraße – City of Landau, is currently out of stock and being updated. New offers for ill citizens in the district and the city have been added, especially in the field of hourly-based care and day care.

At present, the Federal Government is launching a law on strengthening care. For January 2015 an adjustment of the long-term care benefits including increased payments is planned. Therefore the new edition of the guide will not be available prior to spring 2015.

Zoo project

The Landau zoo project is probably a unique project in Germany. In in-patient facilities animals have become a familiar sight by now.

The positive response triggered off by animals is effectively used to heal or at least relieve symptoms.

Because of last year's favorable feedback the members of the "Forum for Dementia", District of Südliche Wein-

straße – City of Landau, and the Landau Zoo School want to organise more exciting afternoons in the Zoo for people with dementia and their relatives.

Symposium at Pfalzkllinikum in 2015

For the first time the "Forum for Dementia", together with the Pfalzkllinikum – Service Provider for Mental Health, is planning to organise a symposium. During the all-day event interesting subjects about the care and support of people suffering from dementia primarily in old people's homes and hospitals will be covered. Apart from many other interesting speakers, Bettina Rudert and Bernd Kiefer will hold a 2-hour lecture on "The therapeutic table visit – the esteeming short-term activation as a method of prevention and escalation". These 2 lecturers are highly esteemed among experts.

With this symposium, professional care-givers living in the district of Südliche Weinstraße and the city of Landau are given the opportunity by the "Forum for Dementia" to undergo professional training not far away from home at Pfalzkllinikum.

The symposium will take place on March 4, 2015. The detailed program will be announced in due time by public relations.

Pfalzkllinikum – Service Provider for Mental Health

Rudolf Lentz, Social Worker (MA) (Author), "Forum for Dementia", Clinic for Geriatric, Psychiatry, Psychotherapy and Psychosomatics

Dr. Markus Fani, Medical Director – Clinic for Geriatric Psychiatry, Psychotherapy and Psychosomatics

Sven Kaufmann, Head of Nursing Staff, Clinic for Geriatric Psychiatry, Psychotherapy and Psychosomatics

Rita Becker-Scharwatz, Director, Day Care Center "Living with Dementia", a Facility of "Care – Foster – Life – community-based services"

District Administration of Südliche Weinstraße

Heike Neumann, Office for Health and Social Affairs

Municipal Administration of Landau

Ulrike Sprengling, Commissioner for Senior Citizens



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EU funding for health, demographic change and wellbeing projects

Sarah Collen-Godman, Senior Policy Manager – NHS European Office at the NHS Confederation discusses how the Horizon 2020 programme will help to address major societal challenges...

Horizon 2020, Europe's research and innovation programme, was launched at the beginning of 2014 and will run until 2020. It is the EU's overarching, multi-disciplinary research and innovation funding programme that will see more than €70bn dedicated to support the EU's position as a world leader in science, help secure industrial leadership in innovation, and help address major societal challenges.

Research and innovation for health related topics fall predominantly under the highest funded societal challenge on 'health, demographic change, and wellbeing', which has an indicative budget of €7.5bn for the 7 year period. This will fund activities throughout the whole R&D spectrum, from basic research to market, with a new focus on impact and innovation related activities.

The European Commission is increasingly pushing for research and ideas funded to be translated into practice and demonstrate clear advantages to patients and have a real impact on population health and wellbeing.

Taken together, projects supported by the 'health, demographic change and wellbeing' challenge will contribute to:

- Understanding health, ageing and disease;
- Effective health promotion, disease prevention, preparedness and screening;
- Improving diagnosis;
- Innovative treatments and technologies;

- Advancing active and healthy ageing;
- Integrated, sustainable, citizen centred care;
- Improving health information, data exploitation and providing an evidence base for health policy and regulation.

Historically, the UK, particularly its academia, has significant experience of accessing EU research funding and is the largest beneficiary of EU health research funds. The increased focus on impact and uptake of innovation means there is greater scope for involvement of other stakeholders from outside academia, such as healthcare providers, small to medium size businesses, charities and patients groups.

The European Commission has also made a big effort to streamline the rules – and to apply them across the funding stream. The reimbursement rates of project expenses is simpler, with a single reimbursement rate for most projects. That means less paperwork and fewer audits. It has also limited time from application to grant to 8 months, to encourage this to become more accessible to more stakeholders outside of academia. All projects need to have a European added value – going beyond research at national level and should involve participants from at least 3 EU member states.

EU's 3rd Health Programme

The EU's Third Health Programme 2014-2020 has a budget of €449.4m (2014-2020) to support cooperation projects at EU level; actions jointly undertaken by Member State health authorities; the functioning of pan-European non-governmental networks and



cooperation with international organisations.

Through the different funding mechanisms, the EU's Health Programme aims to strengthen public health across Europe through:

- Promoting health, preventing diseases, and fostering supportive environments for healthy lifestyles
- Protecting citizens from serious cross-border health threats;
- Contributing to innovative, efficient and sustainable health systems;
- Facilitating access to better and safer healthcare for Union citizens.

Overarching operational objectives are to identify, disseminate and promote the up-take of evidence-based and good practices, standards, tools and resources through knowledge sharing activities. Where appropriate, this can also include developing coordinated approaches, for example, for use during cross border health emergencies.

How to apply:

Funding is issued through open calls for proposals with strict deadlines for submission of projects. All proposals are submitted electronically. The website dedicated to the electronic administration of the EU Health Programme and Horizon 2020 projects is: <http://ec.europa.eu/research/participants/portal/desktop/en/home.html> ■

For more information, contact the Horizon 2020 National Contact Points for Health:

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A Comet Tail Commentary: Identification and Significance of Sonographic B Lines in Pulmonary Ultrasound

Portable ultrasound is a powerful bedside tool used to evaluate lung pathology in patients in whom pneumothorax, congestive heart failure, and interstitial lung disease are considered in the differential diagnosis. Portable ultrasound has several advantages over more traditional radiographic imaging modalities used in the evaluation of lung pathology. Thoracic ultrasound lacks radiation, provides real-time and dynamic imaging, and can be taken to the bedside. Thoracic ultrasound is especially useful in Emergency Department or Critical Care settings where a patient's inability to lie flat due to hemodynamic instability or respiratory distress, creates suboptimal positioning and may impair the utility of other imaging modalities.¹ Despite its advantages, a major disadvantage is that thoracic ultrasound is operator dependent. Therefore, performing bedside thoracic ultrasound requires supervised training of physician operators to ensure competency criteria is met.²⁻⁵

An additional disadvantage is that air is a poor medium for an ultrasound waves due to its low density and slow propagation velocity. Healthy lungs contain air, and are surrounded by the bony ribcage. Ribs, like any bony surface, reflect ultrasound waves back to the transducer. Rather than visualising lungs directly, pulmonary ultrasound utilises the "disadvantages" of air and bone densities to create various artifacts and detection of movement. These

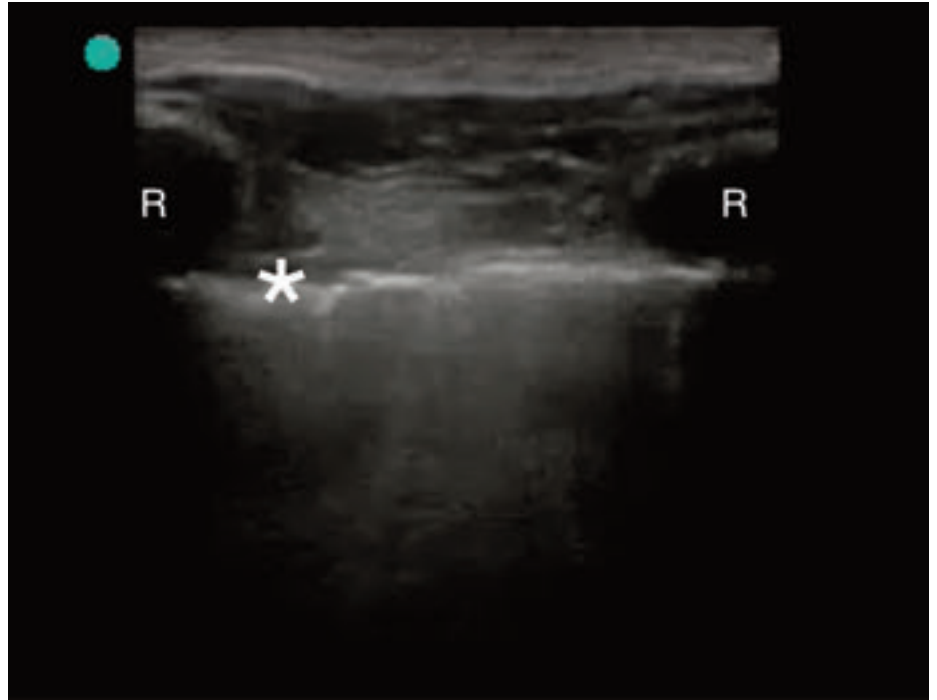


Figure 1: B mode imaging of normal lung. Acoustic shadowing of ribs (R) marks the pleural line (*) in this longitudinal view.

artifacts are discussed below and are key to identification of lung pathology.

Instrumentation and Technique

Several commercial bedside ultrasound machines are widely available, with varying screen and machine sizes, keyboard layouts, battery capacity, Doppler and Motion mode capabilities, and abilities to store clips or still images. Machines with M-mode or Motion mode capabilities and color or power Doppler functions are useful for thoracic ultrasound. A high-frequency 7.5-12 MHz linear probe is optimal for chest wall interrogation, however a phased array lower frequency 2-5 MHz probe with a flat footprint enabling

visualisation between rib spaces may also be used. The lower frequency probe allows for visualisation of deeper structures, which may be an advantage in morbidly obese patients with excessive amounts of tissue overlying bony thoracic landmarks. In most patients, however, the higher frequency probe will allow for the best lateral and axial resolution of pleural and parenchymal abnormalities.

Patients may be scanned sitting or supine, and care should be taken with patients in extremis that their positioning does not contribute to a deterioration of respiratory effort or vital signs. Posterior lung fields are optimally imaged with the patient sitting up, and

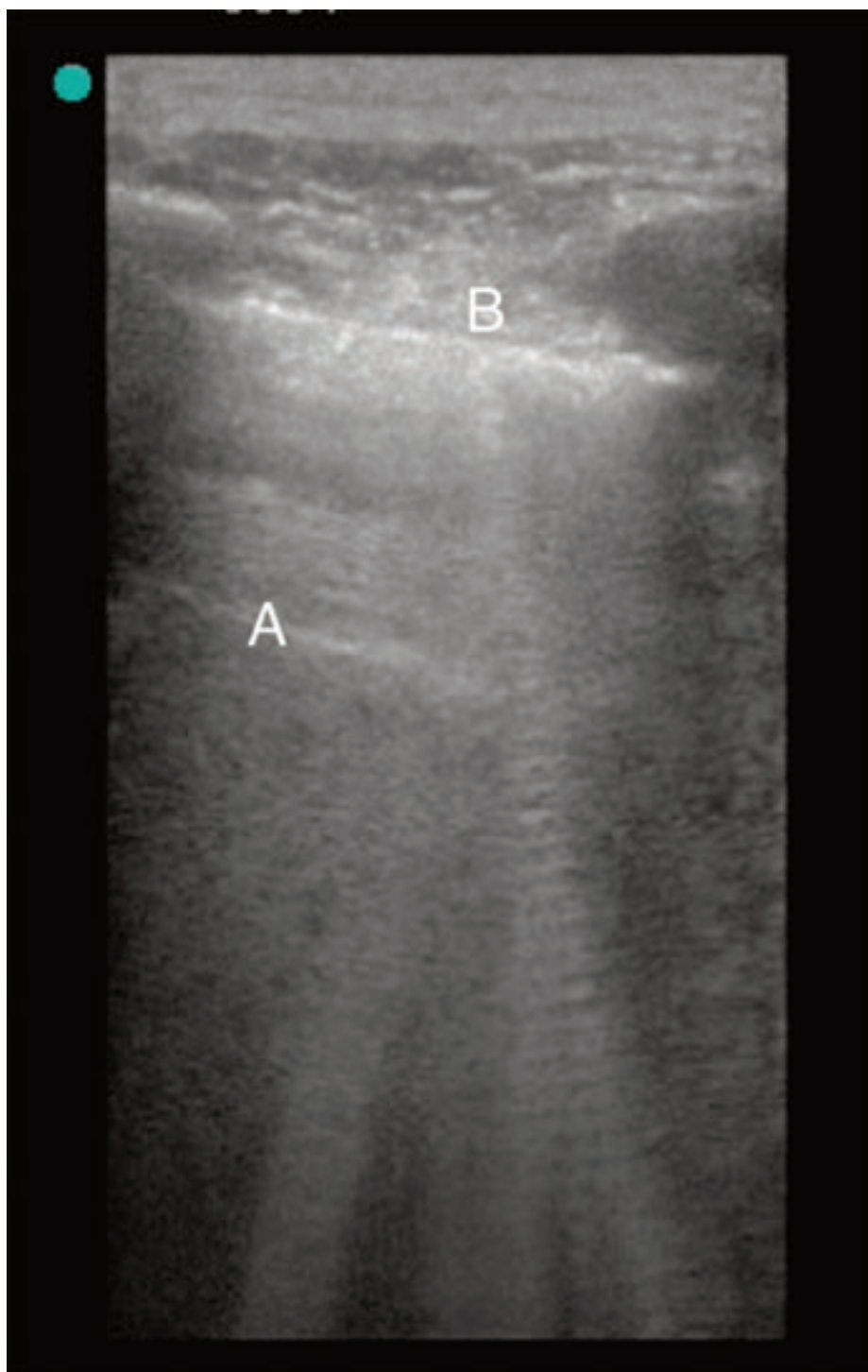


Figure 2: A line artifact (A) and B line or comet tail artifact (B).

anterior lung fields may be visualised with the patient sitting or supine.

Before scanning, the probe marker should be noted. Each transducer has a notched or otherwise indicated marker, corresponding to the screen marker. Screen markers are often a colored dot or the machine company logo on the proximal field (top) of the

screen. The transducer marker should be oriented towards the patient's head, so that the transducer is parallel to the sternum, resulting in a scanning field that visualises the ribs on each side of the pleura. Water based ultrasound gel applied to the probe allows for propagation of the ultrasound wave from the transducer surface to the target tissues.

Anatomic Landmarks

To identify lungs with ultrasound, the acoustic shadowing of the ribs marks the space or margin where the pleural line may be identified. In Figure 1, the transducer is held parallel to the sternum in this long-axis view. The acoustic shadow of the ribs (R) is created by the strongly reflective bony cortex. The pleural line (*) lies between the rib shadows. Higher resolution probes demonstrate 2 echogenic lines between and deep to the rib cortex. The 2 lines correspond to the visceral and parietal pleura, which appear to slide over each other. Generally, the visceral pleura appears thicker.^{1, 6, 7} Many bedside ultrasound machines, including machines used by this author in a busy Emergency Department, lack the axial resolution differentiate between visceral and parietal pleura. The pleura line is seen as one line, up to 2mm thick.⁸

Ultrasound Appearance of Artifacts and Pathology

The pleura surface itself creates an ultrasound artifact. A reverberation artifact is created when the ultrasound beam encounters a strong reflective surface and there is a difference in acoustic impedance between two tissues, such as the pleural line and the less dense lung. The ultrasound beam is transmitted back to the transducer several times, each time the signal is slightly weaker. This gives the appearance of the reflective surface being distal to, or in the far field from the actual structure. A lines are the reverberation artifact of the pleural line (Figure 2).



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B line artifacts, also known as “comet tails”, start from the pleural line, and are hyperechoic, or brighter than the surrounding field (Figure 2). B lines move with lung sliding, whereas A lines are static. In normal lung the B lines appear to wipe side to side over the stationary appearing A lines. The lack of B line movement indicates pneumothorax.

B lines are also key to identifying interstitial lung diseases including pulmonary edema (cardiogenic and noncardiogenic), neonatal and adult respiratory distress syndromes.⁹

Several authors have identified different anatomic and causal mechanisms for the sonographic appearance of B lines. In 2009, Soldati et al conducted a 3 part study that included a retrospective analysis of pulmonary ultrasound images in patients with interstitial syndrome, a literature analysis, and an experimental model of artificially made lung tissue. This study concluded that reverberation artifact creating “ring-down” phenomenon is responsible for the appearance of B lines and this acoustic phenomenon is likely created by proximity of air bubbles with a critical radius.¹⁰ Comet tails are useful in

identifying patients with shortness of breath due to congestive heart failure versus chronic obstructive pulmonary disease. The absence of comet tails indicates the presence of chronic obstructive pulmonary disease.^{7,11}

Due to the pleural traction created from underlying fibrotic lung and thickening of the interlobular septa, B lines appear at least 7mm apart in interstitial lung disease.^{7,12,13} Ground glass appearing lung on chest tomography appear on ultrasound as B lines that are at least 3mm apart.¹⁴

The lack of B lines is seen in pulmonary consolidation due to the replacement of the alveolar air with fluid or blood. Consolidated lung may appear with homogenous or heterogenous echo texture on ultrasound. Acute Respiratory Distress Syndrome (ARDS) demonstrates rib spaces with multiple B lines, few B lines or no B lines. ARDS, while a diffuse lung disease, on CT imaging demonstrates areas of normal appearing lung interspaced with focal areas of edema. These “skip lesions” on CT imaging correspond to the presence of varying numbers of B lines per rib space in a patient with ARDS.

In contrast to ARDS, Respiratory distress syndrome (RDS) of the neonate lacks areas of normal lung. RDS is identified by a high density of B lines, also described as “white lung”, pleural line abnormalities, and the absence of “spared areas”.¹⁵

In addition to the aforementioned pathologies, comet tails identify the pleural line for procedural guidance in

central venous cannulation, pleuracentesis, and other thoracic procedures. Comet tails also help to identify the lack of pleural sliding seen in post-procedure pneumothorax.¹⁶ Ultrasound is more accurate than supine chest x-ray in the detection of pneumothorax.^{17, 18} After interjugular or subclavian central line placement, the lung apices may be scanned to evaluate pneumothorax immediately post-procedure, or for unexplained hypotension or ventilation difficulties. After pleuracentesis, lung fields inclusive of, above and below the puncture site should be imaged for pneumothorax.

In summary:

- **A lines:** stationary, reverberation artifacts of the pleural line
- **B lines:** a quick ‘rule of thumb’ is that > 3 per rib space is indicative of interstitial lung disease
- **Pneumothorax:** No pleural or B line movement across A lines
- **Pulmonary edema:** B lines < 7mm apart (or > 3 per rib space)
- **ARDS:** “Skip lesions” with varying numbers or absence of B lines
- **RDS:** high density of B lines (white lung) with no “skip lesions”
- **No B lines:** Consolidated lung due to infection, neoplasm, or other cause

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Cancer imperialism – how to diagnose bone metastases?

Cancer is an unreliable disease. Just as you think you are familiar with it and can begin treating and hopefully curing it, it is no longer as you thought it was. It has coloured its hair, carries other garments, or has changed its lifestyle making it unrecognisable and impossible to manage efficiently.

A much feared feature of cancer is its ability to metastasize, i.e., establish new colonies close to or far from its starting point in the body. Some primary tumours like brain cancers kill the patient because of their size. Most other cancers kill by spreading and harming in other places of the body. Once the cancer starts to spread, it is the beginning of the end.

When the surgeon proclaims: “I cut it all out, so now you’re cured,” he speaks against better judgment. The patient has received a respite until the cancer finds an opportunity to grow again, spread and metastasize. In a few lucky instances, the patient’s natural mechanisms will kill the remaining cancer cells, with or without radio and chemotherapy. Unfortunately, this is the exception.

Cancer stem cells

The explanation seems to be that most cancers, presumably all, harbour a few particularly tough cells, often termed cancer stem cells, which hibernate and resist chemotherapy. When needed, they begin to divide and move to reach the vascular bed. Cells of most cancers or their DNA have been identified in the blood

stream, which is the highway of cancer spread. Most likely, circulating cancer cells are still present in the body, no matter how much cancer tissue has been removed by surgery or radiation therapy.

Cancer stem cells are a prime target for today’s biochemical and radiochemical diagnostic and therapeutic approaches. However, to detect them and their metastases is not a trivial task, as this requires profound knowledge of the mechanisms of their development. An example is the story of bone metastases and how best to detect them.

Bone metastases

It should go without saying, although it doesn’t, that bone metastases originate from circulating cancer stem cells settling in the bone marrow. Here they live, divide and grow due to an enormous supply of blood and food. When they grow large enough the surrounding bone substance reacts by an iterative destruct-and-build process creating focal changes visible by CT, MRI, bone scintigraphy and PET/CT.

Of these, scintigraphy and PET/CT are less recognised modalities, but based on multipotent principles. CT and MRI scanners use x-rays and magnetism/radio waves, respectively, for making snapshots of structural changes. Scintigraphy and PET/CT are nuclear medicine modalities applying molecules labelled with a radioactive tracer making them visible by gamma camera or PET/CT during their targeting of



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specific processes in the body following intravenous administration.

PET scans are not ultra-sharp like CT and MR images since radiation is transmitted in all directions. Yet PET is 1000 times or more sensitive with regard to detecting subtle changes. Moreover, it registers dynamic changes over time and the degree, extent and severity of disease. These options are not available with other techniques, but pertinent for treatment triage and monitoring therapeutic efficacy.

Nowadays, PET is always performed in combination with CT or MR using hybrid PET/CT or PET/MR scanners, which are the diagnostic modalities of the 21st Century. It is said that PET is

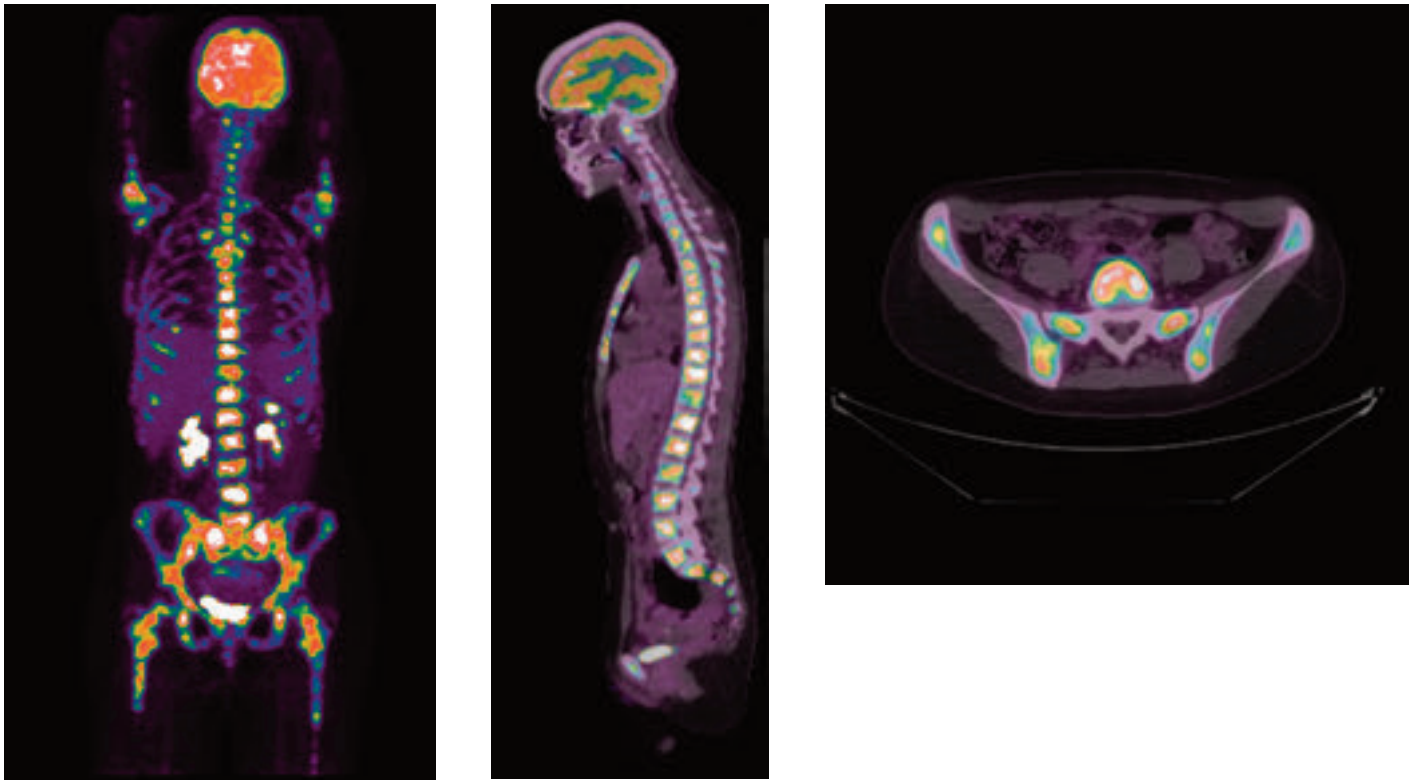


Figure. 35 year old women with varying symptoms from muscles and joints and atypical blood samples. CT was normal, but FDG-PET/CT showed multiple foci in the bone marrow due to malignant melanoma according to biopsy. A primary tumor could not be identified.

not readily available, cumbersome and expensive. However, as the potential of PET becomes known to physicians, hospital owners, and health politicians, this may change dramatically.

Part of the nuclear medicine community uses PET to detect bone metastases applying a sensitive tracer, i.e., sodium-fluoride where the fluoride part is the common radioactive isotope ¹⁸F, because this molecule is rapidly built into crystals which make up the bone substance. However, like CT, MRI and bone scintigraphy, this tracer depicts only what is happening in the bone matrix and not in the marrow, and such changes may persist long after the cancer cells were killed by for instance chemotherapy.

What can we learn from this?

All this leads to one conclusion: When looking for bone metastasis, one

should start in the bone marrow and not the bone matrix, since the marrow is where it all begins, and still may be treatable if targeted early enough. For this purpose, the most common PET tracer of all, ¹⁸F-fluoro-deoxyglucose (FDG) seems ideal as it depicts focally increased glucose consumption, a hallmark of cancer (Figure).

Things are often not as we think, and university hospital medicine can make mistakes if guided by misperceptions and outdated thinking. Instead, we should examine relevant new techniques and judge when they should replace traditional thinking and methodology. Today, this change of attitude is more necessary than ever, because the possibilities of the healthcare system are legio. Therefore, we urgently need more cost-effective ways to bring simplification in improvement.



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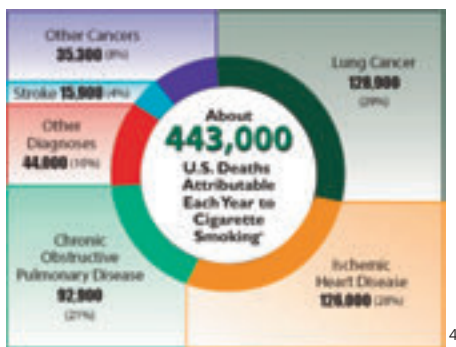
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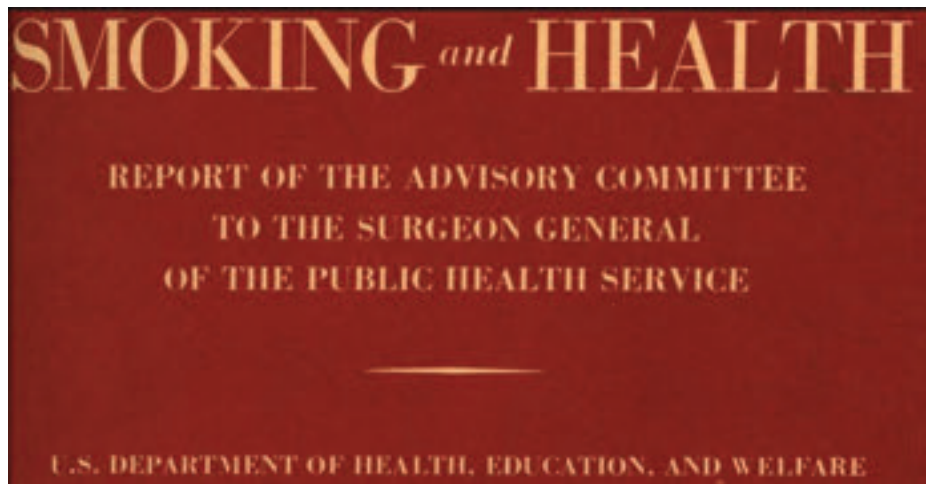
Why quitting smoking may not be a safe alternative to harm reduction

Last year saw the 50th anniversary of the US Surgeon General's Report Smoking and Health, and triggered global efforts to prevent tobacco use. Over those 5 decades, US smoking prevalence has fallen dramatically from around 45%¹ to just over 18%². Europe has seen similar falls, but there remain a stubborn 28%³ who will not or cannot quit. What is to be done about them?

Tobacco control education efforts have been forceful; few smokers today can be unaware of the risks of smoking. Yet significant numbers of people continue to smoke – despite knowing that smoking dramatically increases the risk of premature death from a smoking-related disease.



In the US, for 2000-2004, the Centers for Disease Control and Prevention (CDC) reported that ~443,000 US deaths were attributable each year to smoking. By 2014, this has risen to ~480,000 premature deaths. The CDC reports that overall mortality among smokers in the US is about three times higher than among never smokers⁵. In the EU, smoking is “responsible for nearly 700,000 deaths every year.



Around 50% of smokers die prematurely (on average 14 years earlier).⁶

But if roughly a quarter of the population resolutely refuses to quit smoking, how else can these premature (and frequently particularly drawn out and distressing, not only for the sufferer, but also for their loved ones) deaths be avoided? The Tobacco Harm Reduction (THR) approach recognises that the harm from smoking comes from the smoke, and not from the nicotine, as first identified by Professor Mike Russell in 1976:

“People smoke for nicotine but they die from the tar. Their risk of lung cancer and bronchitis might be more quickly and effectively reduced if attention were focused on how to reduce their tar intake, irrespective of nicotine intake.”⁷

Unfortunately, however, those who hold fast to an ‘abstinence only’ approach suggest that adopting THR is less healthy than quitting smoking

via total abstinence from tobacco products – but according to epidemiologist Dr Carl Phillips, this is factually incorrect:

“Unless the quitting to total abstinence were going to occur immediately, switching to a low-risk alternative is usually lower risk than trying to quit completely, even if the alternative has non-zero risk. This is because even a few more months of smoking before quitting poses greater risk than a lifetime of using the alternative product.”⁸

Indeed, Dr Phillips has produced a paper⁹, estimating the fraction of an eventually-averted premature death due to smoking, attributable to every smoker who switches to e-cigarettes (or any other very low-risk alternative). While acknowledging that this is a ‘back-of-the-envelope’ calculation, Dr Phillips demonstrates that doing anything other than fully embracing the THR approach immediately is a deadly mistake.

In very brief summary, Dr Phillips examines the period from the first quarter of 2008 to the last of 2014. He begins by estimating the “expected value of premature deaths averted for each smoker who switches to e-cigarettes.” He then “calculates how many Americans have already avoided premature death thanks to e-cigarettes.” His method follows the approach used in his 2009 paper, *Debunking the claim that abstinence is usually healthier for smokers than switching to a low-risk alternative*, and other observations about anti-tobacco-harm-reduction arguments.¹⁰

He starts from the generally accepted estimate (of the US CDC) that 50% of smokers will die prematurely from smoking, and “roughly reducing it to account for the possibility that [a smoker] will still die from smoking even if she quits now.”

He calculates that:

“Adding up the resulting avoided deaths through 2014Q4 gives approximately 16,000 premature deaths already avoided, 13,000 from CVD [cardiovascular disease] and 3,000 from other causes. About half of these would have occurred in the last 20 months.”

Furthermore:

“another 19,000 smoking-caused premature deaths have already been averted but would not have occurred yet.” (Naturally, deaths from other causes occurring subsequent to the averted death from smoking are not taken into consideration).

These are quite startling estimates, and perhaps a re-examination of the precautionary principle is needed on this issue. Clive Bates made this argu-

ment even before Dr Phillips’ calculations were published:

“if a regulator wants to come down heavily on a product like e-cigarettes because of hypothetical dangers, it has to take into account the lost benefits that might arise if it bans, restricts, or otherwise reduces the positive potential of the product. For e-cigs this is particularly salient as the benefits are to health, not just economic.”¹¹

Bates points out that “this symmetry is almost always overlooked when activists make arguments using the precautionary principle.”

The message for regulators and policy-makers seems to be quite clear: look before you leap, and think before you introduce an Act – especially if you intend to fully uphold the precautionary principle¹².

Dr Phillips also comments on this:

“If the FDA had succeeded in banning e-cigarettes in 2009, over 10,000 Americans who are now alive would be dead. It is in the order of four to six times as many people as were killed on 9-11, killed by the stroke of a regulator’s pen (and saved by Judge Richard Leon overturning the ban). Even if everyone quit smoking in 2015, or if e-cigarettes somehow were allowed back onto the market then, those people would still already be dead.

[...] There is a lot of work to be done to stop those who would choose to let smokers die rather than have an attractive alternative. But for the moment, we can celebrate the new year on this positive note.”⁸

One of the major long-term failures of smoking cessation is the high rate of relapse, so adopting a lower-risk alter-

native for the rest of the lifetime has the potential not only to reach more people sooner, but also to change the entire pattern of nicotine use and relapse.

Encouraging smokers to switch to a safer alternative could achieve the long sought-after tobacco ‘endgame’. Embracing this new disruptive technology could bring this about quicker. Is this an opportunity we can afford to miss?

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Rehabilitation Robotics: What are the benefits?

Dr Thierry Keller Director of Rehabilitation at TECNALIA Research & Innovation discusses how robotic technologies can help assist rehabilitation...

Rehabilitation robotics includes a wide range of stationary and portable electromechanical-assisted training devices with the main purpose to train lost body functions caused by neurological or traumatic events. Although a number of systems have already been developed 50 or more years ago rehabilitation robots became wider-spread and clinically accepted only in the last decade.

In neurorehabilitation robots are mainly used as gait trainers for lower limbs and as arm and hand trainers for reaching and grasping. They primarily support physical therapy as a tool to optimise interventions. So far strongest evidence could be shown for intensive high repetitive task-oriented and task-specific training¹, functions that can be performed by robots with high precision and endurance.

Five years ago more than 80 European or multinational projects on this subject were counted, which led to the implementation of the COST Action TD 1006: European Network on Robotics for Neurorehabilitation.

The main objective has been to enable the development of innovative, efficient, and patient-tailored robot-assisted therapies for neuro-motor recovery, incorporating the latest findings from clinical neurorehabilitation, rehabilitation robotics, computational neuroscience, and motor neuroscience.

More than 100 researchers, clinicians, and engineers from 23 European countries participated in the Action to:

- Coordinate, streamline interdisciplinary research to better understand robot mediated rehabilitation and recovery;

- Facilitate multicenter studies to prove evidence of new approaches;
- Provide clear, evidence-based guidelines for patient selection and application of robot-aided therapy;
- Recommend necessary features for new and efficient robot-based therapies.

A number of randomised controlled trials and systematic reviews have recently been published^{2,3,4} with the main conclusion: there is evidence that rehabilitation robotics improves recovery of function both in upper and lower extremities. Meta-analyses showed that robot-assisted arm training did improve activities of daily living as well as arm function³ and that people who receive electromechanical-assisted gait training in combination with physiotherapy after stroke are more likely to achieve independent walking than people who receive gait training without these devices⁴. Although these conclusions are all positive many promises and expectations have not been proven yet. There are critical voices that ask for more specific research⁵. The role and type of device one still not clear, optimal training duration (dose responses) but also the effects of specific training paradigms (specificity) are unclear, so far it has been shown that the training intensity matters.

In a position paper Action TD1006 members have listed a number of research directions and combinational therapies to unveil the power of neuroplasticity by using robotic device⁶. The combination of specific task-oriented training guided by surrogate markers from the brain and the application of neurostimulation might impact neuroplasticity. Such training strategies may include perturbation/adaptation, assistance

control, adaptive gravity support, brain-computer interfaces and targeted/augmented feedback.

Another approach to increase effectiveness of neurorehabilitation with robotics simply lies in the availability and inclusion to therapy. Here robotic technologies can strongly contribute. As a therapeutic tool, robotics increases training intensity, can be combined with engaging social and gaming features, enables a higher patient throughput by allowing the treatment of several patients by one therapist in parallel, and can facilitate guided motor training remotely through telerehabilitation. Therefore rehabilitation robotics is considered as a tool to overcome the demographic challenge in neuro-rehabilitation.

From the economic side rehabilitation robotics looks attractive. The field is growing with considerable 2-digit growth rates. Some of the conservative market reports estimate a Compound Annual Growth Rate (CAGR) of 20% ⁷. The most optimistic estimate has been published by the Wintergreen Research report and foresees a growth in rehabilitation robotics, active prostheses and exoskeletons from \$43.3m (2014) to \$1.8bn (2020) US\$ (CAGR 86%) ⁸.

The International Industry Society in Advanced Rehabilitation Technology (IISART) founded in 2011 by a majority of European rehabilitation robotic manufacturers and suppliers have identified 2 main tasks to transfer the field from a research driven area to a successful Medtech business: Education and Standardisation. With training and competency guidelines, checklists and documentation for therapists and clinicians, and training support for higher education schools and PT/OT programs, the education working group provides tools to ensure proper training and evaluation of therapists on the safe and effective use of these devices. Standards that are for the benefit of the patients but also applicable by the industry and unified (EU wide) regulation and reimbursement policies are necessary for the field to grow. To achieve this IISART offers a platform for promoting the cost-benefits of advanced

rehabilitation technologies to care providers and to payers, as well as to position the outcome of advanced rehabilitation technologies to healthcare authorities and health technology assessment agencies. ■

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Wearable gait exoskeletons

For the therapy of neuromuscular diseases

Maintaining walking ability is key for the survival of children affected by Neuro-muscular Diseases (NMD). There is currently no etiological treatment for the majority of these affections, although several clinical trials on drugs are on the way, but at present with no definitive result. The current multidisciplinary treatment of NMD focuses on maintaining the physical state of the patient, delaying the onset of musculoskeletal complications derived from the progressive weakness and loss of mobility. Joint deformities, muscle spasms, osteoporosis and scoliosis – among others – contribute to a decaying life quality and to accelerating the deterioration of the respiratory function, yielding a short life expectancy in most diseases. Neuromuscular diseases affect 4 million children in the World, 800,000 children in Europe.

Wearable Gait Exoskeletons are the therapeutic solution that clinicians are demanding to improve the therapy of these patients, and they are simultaneously the technical aid that affected families are demanding to restore the life quality of their children. When attached non-invasively to the legs and trunk of the patient, the robotic device provides locomotion, neuro-muscular rehabilitation, and spatial mobility.

Marsi Bionics is the first Global Company commercialising paediatric wearable exoskeletons. Model

ATLAS2020, ready for release, targets paraparetic children (having all four limbs paralysed). The exoskeleton is composed of 10 motors providing force and motion to the joints of the patient, a number of sensors acquiring the state of the user and of the robot itself, and an on-board controller ensuring adequate locomotion. Variable-stiffness joints at the knee ensure efficient adaptation to natural ground by mimicking the performance of human musculo-tendinous system and minimise power consumption. ATLAS2020 is assisted by a supporting frame that provides postural balance during walking, standing up and sitting down manoeuvres.

Model ATLAS2030 is the evolution of ATLAS2020, targeting diseases that show a progressively deterioration of strength and mobility. The exoskeleton will assist the patient as needed, thus adapting to the variable symptoms of NMDs. EXO-TRAINER project, financed by ECHORD++ (an FP7-EC funded initiative, www.echord.eu), will demonstrate ATLAS has no negative impact on NMD-affected patients (not causing fatigue, nor skin-injuries or pain) and that it really allows them walking. For this purpose, Marsi Bionics is working together with renowned roboticists at the Centre for Automation and Robotics (CSIC) to optimise the robotic technology, and with children's hospitals of reference worldwide like Sant Joan de Deu Children's Hospital. Medical doctors are involved in the whole project



workplan providing their knowledge, expertise, and assessment, and certifying the resulting exoskeleton in a clinical trial. Focus will be on children with Spinal Muscular Atrophy (SMA), first cause of infant mortality in rich countries. Tests will involve 8 children during 3 months, taking us to technology readiness for CE labelling.

Wearable Gait Exoskeletons will have an impact on children's quality of life and life expectancy. Moreover, the new therapy can potentially reduce the welfare costs to families, estimated at €25,000 per year, per family and even reduce the cost to the National Healthcare Systems by an improved and personalised therapy.



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Moving towards a paperless NHS

Scott Sommerville, Chief Information Officer at Essentia, Guy's and St Thomas' NHS Foundation Trust, considers the benefits a paperless NHS could bring...

Technology has become an essential part of almost every aspect of our daily lives. We rely on it to improve the speed, efficiency and ease with which we do things – from shopping and booking holidays to keeping in touch with friends. There is much debate about how quickly we can bring this level of technology to the hospital environment – and the impact it will have. Some remain wary or even sceptical, but I believe it's the only way forward for a modern NHS trust.

At Guy's and St Thomas' NHS Foundation Trust, the ambition is to become a paper-light and data-rich organisation creating a truly digital health system. I see 4 main benefits for the paperless trust:

- Improved patient care – A paperless system is patient-centred, with improved patient safety and a reduced margin of error, as well as integrated, seamless care with records and information transferred quickly and easily between departments and healthcare organisations.
- Improved efficiency – saving time and resources, with less time spent waiting for records to arrive or tracking them down. Patients do not have to repeat their medical history for each clinician.
- More time for staff to spend with patients – reducing the paperwork burden frees up staff time considerably, resulting in better patient care, higher motivation levels and staff retention.
- Cost savings – Increased resource, faster turnaround times, and better patient care, will lead to financial savings for the NHS.

We are seeing this in action already, for example, the introduction of paperless prescriptions has led to safer and faster medicine prescribing. Our electronic

system gives an integrated view of a patient's medication history which can be seen by all staff involved in administering or supplying medicine.

Our paperless rota system enables staff to create, manage and change rotas electronically, including swapping shifts and booking leave. This has saved a huge amount of time and effort and the increased efficiency has helped the Trust to meet the ever increasing demands on its service.

We are also piloting our own innovative paperless patient records system. The system captures clinical observations electronically, replacing the paper records and documents currently handwritten and filed in patient folders. Patients are enjoying not having to give their personal details and medical history repeatedly, while staff are spending less time completing, chasing or interpreting notes.

Alongside all this, we are putting in place the rigorous infrastructure needed to provide round-the-clock support and full mobile working. Paperless systems are only useful if operational performance and business continuity are assured.

The total investment in technology at Guy's and St Thomas' is significant. I have no doubt the investment will be worth it for the savings it will generate, not to mention the improved patient safety and the significantly better experience for our patients and our staff. ■

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Scott Sommerville
Chief Information Officer

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Main strategies in active and healthy ageing in Europe

The importance of identifying the users groups and their profiling

Active and Healthy Ageing (AHA) is a main direction in the HORIZON2020. One of the basic tasks is to face the challenge of turning existing research efforts to reality for healthy and chronic diseased elderly people across Europe. Existing flexible ICT solutions could assist elderly users in organising, carrying out and completing daily tasks and functions having been part of their life for years and provide essential stability and adjustment factors for continuing to be and feel independent. Thus, within AHA we will need to develop all-around, personalised, multi-faceted existing ICT solutions and services addressing diverse daily activities (shopping, eating, physical activity, commuting, mental stimulation, communication, social interaction, etc.) to elderly users taking largely into account cognitive impairments and their carers living in their own home or in care centres.

Current practices

As aforementioned, ICT solutions are existing applications and services which will be improved and most solutions are considered to be at technology readiness level 7 and above. Several solutions are already commercial or open source products and available for use and others were developed within the framework of European projects and are prototypes.

It is expected that we start from a relative mature level 5 (levels: 1-9) for the

majority of tools and we anticipate to reach a TRL of 7 more for around 75% of tools within the next 7 years.

It is clear that the needs and requirements for the addressed user groups at an early stage of developing chronic diseases or changing states in their organism functioning are essential and are a cornerstone within an extended and flexible evaluation framework.

For example in the case of cognitive impairment, the main user groups are:

1. Mild Cognitive Impairment (MCI)

people are usually elderly who have lost cognitive functioning on at least one aspect, with no sign of dementia, and who still function in daily activities. People with MCI are estimated to account for 20% of the elderly over 65. ICT solutions as interventions might have more potential for people with mild cognitive impairment, as these are still in the early stages of forgetting and are still active, eager, and can learn new functionalities.

2. Early stages of Dementia, people have been diagnosed with dementia but they are still maintaining some aspects of their daily functions (early signs of dementia are apparent) and users have been diagnosed by specialists (i.e. neurologist, neuropsychologist) and might be under medication. The improvement in daily functioning is usually rather limited compared to

the deteriorating effects of the disease. Since early and moderate dementia users can still carry out certain activities with assistance.

3. Cognitive impairment as a co-morbid condition

users with other conditions and diseases with cognitive impairment as a co-condition is a common situation among the elderly. Increased medical co-morbidity is evident in elderly. High rates of medical co-morbidity are evident in elderly living at large urban areas due to low socio-economic status (SES) and poorer access to health services.

4. Caregivers, either formal (i.e. healthcare, social, etc.), or informal (i.e. family members and friends) that need to be empowered with knowledge and tools to support the elderly in their everyday life activities. Informal caregivers often struggle combining work and caring for their relatives, resulting in strains on their own health and coping mechanisms.

In addition, there are many **stakeholders** with an interest in, but not a direct involvement in day-to-day care provision. Some main stakeholders, are described briefly below:

Regulatory authorities on local, national or international level, regulating a wide range of aspects from device safety and essential performance, via legal, ethical and privacy related issues. This group

includes an Ethics Control Board with external expertise and representatives from all the pilot sites for ensuring applicable regulations are respected.

User interest organisations work to serve the interest of their members. This group involves care centres and organisations for elderly people and dementia centres with experience in working with and for users with cognitive decline.

Standardisation bodies are organisations that define how AAL care systems should work in a consistent manner (i.e. members of Continua Alliance). Furthermore, another important standardisation body is INFOTERM, aiming to promote and support standardisation actions in the AHA area.

Public bodies, insurance companies and care organisations are important as they define care standards offered and the reimbursement levels provided. We need to interface these stakeholders primarily via on-site care centers, outpatient clinics, hospitals, organisations, dementia research centers and their networks.

It is in the domain of consumers' study that the move away from the 'medicalisation' has been more radical with the introduction of the concept of **resilience** in opposition to that of frailty. The concept of resilience can be defined and measured along two dimensions: a) capacity to function in terms activities of daily life or of disability-free status; and b) Socio-Economic Status (SES), where we include not only more tangible dimensions (income, education attainment) but also social support and networks.

Using these two dimensions we can determine the taxonomy. We identify four archetypes (so in qualitative and ideographic fashion) that have different needs, should be the target of different interventions, and possibly of more granular monitoring indicators. For the sake of simplicity we describe the four segments considering the extreme (low/high) and neglecting the nuanced and intermediate situations.

Dependent. These are individuals with low SES and with poor health severely hampering the capacity to function. They may also suffer from isolation and lack of social support, which means little or no access even to informal care. They need public support for immediate care.

Assisted. These are individuals with good SES yet suffering from health related limitations. Since they can afford it, they are likely to seek quality of life improvements and can afford to buy care and other support, or can rely on social support and networks. They can potentially demand and pay for assisted living and other aides to independent life. They may be the target of some of the services that can be brought to market and can afford to pay for them.

At risk. These are individuals with low SES but holding onto normal life due to their good health status enabling resilience at least in one dimension. They are at risk in the sense that lack of SES resources may bring them easily in the condition of the dependent elderly, when and if, a health problem emerges and limits their functioning capacities. They may be the target of pre-empting public policies such as for instance health

awareness and prevention services or skills building measures

Active elderly. These are individuals with high resilience they are ageing well and actively and we could also call them the 'discerning old'. They are likely to seek quality of experience and demand for luxury goods and leisure such as smart homes.

Based on the above baseline for user profiling, the main innovation that is needed is to estimate the real life depiction of a large-scale effort to estimate the potentially positive effect of ICT solution on AHA such as in cognitive decline and multi-morbid elderly for statistically adequate number of users which reflect the diversity of real users with actual cognitive impairments for a long period of time. Ensuring the inclusion of significant indicators for assuring successful assessment and investigation of the Quality of Life indicators ensures the extrapolation of findings and the viable transfer of knowledge to business modelling and health service provision with measurable and generalisable indicators as ROI and SROI have been accepted to be.



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Network Convergence

Voice and data convergence, also known as Network Convergence refers to the provision of telephony, video and data communications services over a single network.

Traditionally, for many decades, voice and data services have been provided by separate infrastructures both internally and externally to an organisation. Voice services were, and still are to a large extent provided by circuit switched technologies. This means that when a telephone call is made a circuit with dedicated bandwidth is opened between the source and destination of the call. This provides a very reliable connection, but it is inefficient in bandwidth usage (the circuit remains open even if there is silence on the call). Circuit switched networks are unsuitable for data communications because of the inefficiency, which is why packet switched technologies were developed starting in the 1960's to support computer to computer communications.

Historically, speech communication dominated business interactions, but today businesses and customers demand a plethora of different types of business to business and business to customer interactions including voice, email, SMS, web technologies. Sophisticated, high speed converged data networks have been developed to support these interactions.

Technology and business drivers for network convergence

Technically, voice processing has become less of a challenge to support within modern data networks. The standardisation and wide spread adoption of the Session Initiation Protocol (SIP) has been key to enabling voice to be successfully integrated into data networks. However, the key inhibitor for voice integration into data networks in the early 2000's has been the lower reliability – or perceived reliability of data networks. Yes, it was technically feasible, but data networks were simply not as reliable as traditional circuit switched telephony.

So, it is the improvement in reliability of data networks in the last decade that has truly enabled network convergence to be a realistic goal for enterprises. The reliability of a network can be measured by:

- Quality of Service – Converged networks must have predictable delay, jitter and latency.
- High availability – Converged networks must target availability levels equivalent to ISDN systems which are exceptionally reliable.

The business driver and the real prize for implementing a converged network is the cost savings of maintaining a single network infrastructure which support all media types.

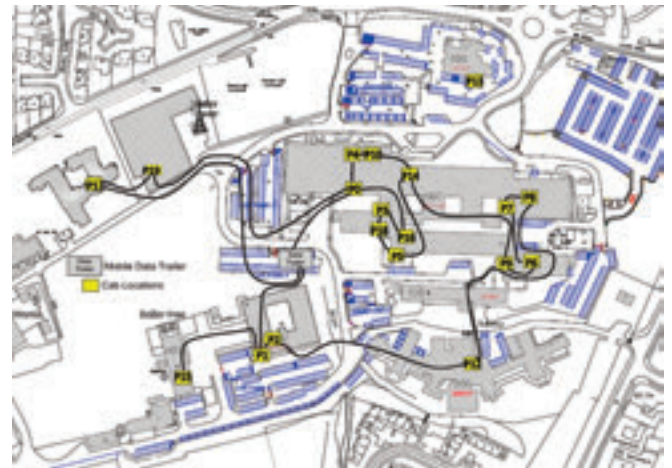
Implementing converged networks

In a series of articles, we will explore various aspects of implementing a fully converged network by reference to an example of an acute NHS hospital trust making the transition towards convergence:

- Infrastructure resilience
- Converged network architecture
- IP telephony in the cloud
- Ultra high WAN resilience

Infrastructure resilience

The trust's data infrastructure comprises a central data centre housing core network and server infrastructure with approximately 20 communications hubs around the hospital housing edge switching equipment and patch panels for connecting end user devices.



Security and environment

Very often, especially in older buildings, data networks were not planned into the buildings from the start. Sometimes communication hubs can be found in cupboards, riser rooms, loft spaces and other locations which are not ideal for active equipment. It is usually expensive and impractical to move a communications room, but as a minimum, air conditioning and security must be addressed to provide a truly high availability converged network. Our upgrade program specified air conditioning with temperature and humidity monitoring as well as secure swipe card access for all communications hubs.

Fibre resilience

Prior to the upgrade, each hub was connected back to the data centre via 1Gbit fibres. The trust had suffered some data outages when fibres were broken during refurbishment work as workers accidentally cut through unmarked fibre routes.

A new fibre infrastructures was specified and deployed using armoured 10Gbit fibre in a ring architecture so that each communications hub had 2 diverse routes back to the data centre (Fig x). This means that two fibre breaks are needed to isolate a communications hub and it has therefore dramatically reduced the possibility that a communications hub can become isolated by a fibre failure.

Power resilience

Probably the most common cause of failure of a communications hub is loss of power. Although, in this case study, the entire hospital was backed up by generator, isolated fuse board failures were a significant cause of loss of service. This is an important point when comparing service levels for separate voice and data infrastructures. Typically, traditional voice services are provided directly from the data centre or telecommunications hub without the need for active hubs (that have risk of power failure) for distribution. In order to achieve equivalent resilience in a converged data network it is important to ensure there is resilient power supply at each active hub.

In our case study example, each hub was upgraded with power feeds from two separate distribution boards. In addition, two UPS units were installed in each hub and redundant power supplies fitted to all installed data switches.

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Very often, especially in older buildings, data networks were not planned into the build from the start. Sometimes communication hubs can be found in cupboards, riser rooms, loft spaces and other locations which are not ideal for active equipment. It is expensive to move a communications room, but as a minimum, air conditioning and security must be addressed to truly provide a high availability converged network. Our upgrade program specified air conditioning and secure swipe card access for all communications hubs.

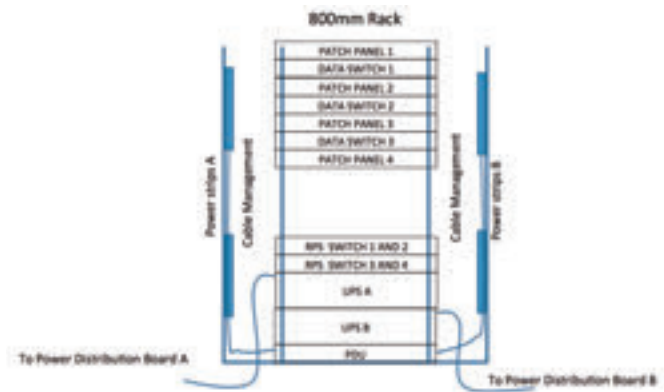
Network monitoring

Usually, a large organisation will have an internal IT help desk which responds to calls from users regarding service disruption. However, it is possible to monitor converged networks very closely these days. In our case study example, we installed a network monitoring system to monitor vital signs not only in the data centre itself, but also in the every communication hub around the hospital trust. As a minimum, the following vital signs are monitored at each communications hub:

- Temperature/Humidity
- UPS health
- Dual 10Gbit fibre links back to data centre
- All data switches
- Data switch power supplies
- Wireless access points

When redundancy is built in to a network it is, in fact, essential to monitor both the primary and backup functions. If this is not done it is possible, for example, for a primary power supply to fail without any impact on service because the back power supply takes over. However, the loss of resilience must be detected by network monitoring and restored before the backup system fails.

The result of comprehensive service monitoring is that the IT department are usually aware of any service disruption before the first help desk call is received from an end user. This leads to faster time to fix and a better service to end users.



The figure above shows a standard communications hub rack layout fed from two separate power distribution boards, with dual UPS, data switches, RPS units to provide backup power to the data switches, patch panels and horizontal cable management panels and vertical cable management trays.

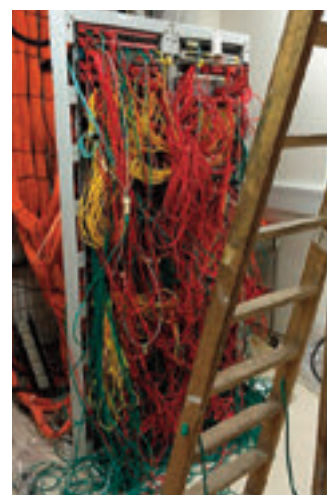
Finally, please keep it tidy!

Day to day maintenance of a communications hub is kept much easier if short, colour coded patch cords are used to patch from data switches to patch panels. It is good to specify a different patch cord colour for each function. IT engineers can see at a glance what function each patch cord is performing. An example colour code is provided below:

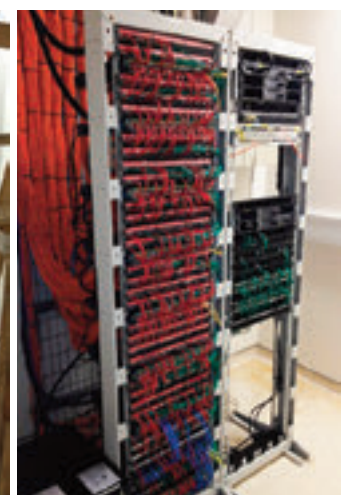
Function	Patch cord colour
Data + IP voice	RED
Analogue Voice + Fax	GREEN
Wireless	BLUE
Medical/ Patient monitoring	ORANGE
Cameras and Access Control (security)	MAUVE
Third Party Equipment	GREY

Appropriate patch cable lengths should be used. Too often we see 3m patch cords where 0.25m will do. The two photographs below show a communications hub before and after the upgrade process. I hope the comparison speaks for itself!

BEFORE



AFTER



The importance of effective wound care

Alexandra Bishop, Tissue Viability Nurse Specialist at Plymouth Wound Care discusses how effective wound care can make all the difference to a patient, and the NHS...

The importance of effective wound care cannot be underestimated. Wounds in complex patients and those that are poorly managed can lead to the development of a chronic wound. This subsequently results in a significant social and financial burden to the community and the National Health Service (NHS). Accurate cost is difficult to ascertain, but estimates from 8 to 10 years ago suggested that the cost to the NHS of caring for patients with a chronic wound was £2.3bn to £3.1bn per year, approximately 3% of NHS expenditure¹. In 2009 in the USA, approximately 6.5 million people required medical intervention for chronic wounds at a cost of \$25bn². These figures do not consider the social burden created by people with such wounds, including inability to work, mental health problems and the treatment of recurrent infections.

Wound care should always address the needs of the patient, promote normal healing and prevent complications. A priority in wound healing should be good communication. Dressings applied to acute wounds may require review by the patient themselves so clear instructions are necessary on what to do, when to do it and what should be raised as a concern. Surgical wounds are usually left covered for up to a week after surgery. In the case of graft donor sites, the dressing is left for up to 2 weeks. Discharged patients will need appropriate instructions to be sent with them regarding postoperative care and follow-up.

More complicated and chronic wounds involve the care of a number of health care professionals. Communication can easily break down when clinic letters are delayed or the patient misunderstands planning. Multidisciplinary clinic appointments are advantageous for more complicated wounds, such as diabetic foot ulcers which require input from a vascular

surgeon, diabetologist/endocrinologist, podiatrist, orthotist and sometimes an orthopaedic surgeon.

In areas where they are accessible, tissue viability teams provide nurse led expert advice on wound care and associated issues. However, many wound problems that occur could be prevented or addressed early in order to avoid chronicity developing. Therefore, a common role of tissue viability nurses is to educate and share expertise, not least on the wound care options available.

“A priority in wound healing should be good communication. Dressings applied to acute wounds may require review by the patient themselves so clear instructions are necessary on what to do, when to do it and what should be raised as a concern.”

A host of innovations, dressings and technologies are obtainable for assessing, diagnosing and treating wounds with the list growing. They range from Doppler assessments to protease testing to topical negative pressure therapy to ultrasound treatments. Clinicians turn to more innovative applications and treatments for a variety of reasons. The concern regarding antibiotic resistance has led to an increase in the use of antimicrobial dressings including those impregnated with silver or poly (hexamethylene) biguanide hydrochloride (PHMB). Problems associated with surgical wounds dehiscing has seen the development of more compact topical negative pressure devices suitable for closed surgical wounds^{3,4}.

Although the National Institute for Health and Clinical Excellence (NICE) advise that there is no robust clinical evidence supporting the use of antimicrobial dressings⁵, these applications are becoming more



frequently favoured by clinicians and published case reports demonstrate a beneficial effect. All trials require financial support, which can be difficult to obtain and wound care studies are notoriously difficult to manage due to the individuality of patients and their wounds and the difficulty of blinding patients to the treatment given^{6,7,8}. Often this leaves case studies and case series as the best available evidence. Health care professionals subsequently use their experience and expertise along with the patient's individual needs to select the care plan required. Ultimately, clinicians must have clear aim and objectives of care and select the treatment accordingly. ■

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INNOVATION – HELPING DELIVER BETTER CARE TO PATIENTS

Looking into the future of healthcare there are a number of challenges to be addressed. These challenges include a shortage of nurses, an ageing population, more people who need surgery, a bottleneck within our emergency departments: all of which increase costs and add pressure into the NHS. To manage this we need to think differently: Healthcare needs to be smarter, more cost effective and ultimately innovative.

At Mölnlycke Health Care, innovation is part of our DNA. We have been innovating since the 1800's right up to today. It helps us to deliver better care to patients by offering new and distinctive products that evolve to suit their needs, while maintaining the highest ethical and compliance standards.

Our vision is that our passion for excellence and innovation will make us the most trusted healthcare brand in the world. But what really sets us apart in our practical approach to innovation?

While building a corporate culture that embraces innovation, our activities are driven by identifying unmet or unknown customer needs. Innovation, apart from being misinterpreted as an idea rather than an outcome, is also often misunderstood in many companies as purely R&D or marketing-owned activity. For Mölnlycke Health Care it is represented by, cross-functional sleuthing, gathering and taking apart clues and evidence to uncover customer needs. This process can be nebulous, requiring an ability to ask questions that in turn lead to more and less obvious questions that ultimately uncover the unknown. There is a lot of reading between the lines and finding out what is not being said. We use our expertise and know how to analyse complex problems and understand a pathway, a condition, a diagnosis or type of wound.

Customer insight and the belief that even small, incremental ideas can also be innovations, reside at the

heart of innovation. It's possible that a customer needs something that s/he does not necessarily realise, and it might be a small thing that makes a big difference to his or her work. These discoveries are not headline-news exciting, but that is the fascinating part about innovation, you never really know when something is really game changing.

In the end, innovations often come to life based on a long, iterative process informed by our work to really know our customers, what they do and why. We do this by following them and following the patient journey. This is our detective work, which aims to anticipate what is needed today and what will be needed tomorrow and ultimately delivering on these needs.

With the prevailing pressure ulcer crisis we recently helped to address the problem by developing an evidence based solution to help reduce the risk of pressure ulcers occurring when they were avoidable.



Figure 1. Mepilex® Border Sacrum



Our dressing Mepilex® Border Sacrum (figure 1) has been demonstrated to impact four extrinsic factors that can contribute to developing pressure ulcers; these being to redistribute shear, redistribute pressure, reduce friction, and to maintain an optimal microclimate^{1,2,3}.

We are also changing the way patients are treated after surgery with our advanced wound care dressings made using Safetac® technology. Every day, hospitals are converting from traditional wound-closure products such as tape, gauze and conventional dressings to Mepilex® Border Post-Op (figure 2), helping to minimise blistering and associated complications whilst reducing pain during dressing changes^{4,5}.



Figure 2. Mepilex® Border Post-Op

Innovation is a catalyst for our growth because it drives expansion but this means we can invest back into the business, deliver more cost-effective solutions and help even more patients.

Mölnlycke Health Care is one of the world’s leading providers of wound care and surgical solutions to the health care sector. For more information please visit: www.molnlycke.co.uk

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Watch the video below on Mölnlycke Health Care's Innovation time line, from 1849 through to 2015.



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Revising cleanliness in hospitals

Anne Hayes, Head of Market Development for Governance & Risk at BSI shows that the latest revision of the hospital cleanliness specification is not only about improving hygiene levels but patient trust...

According to the Mid Staffordshire NHS Foundation Trust Public Inquiry by Robert Francis QC in February 2013, "A well-run ward has very high standards of cleanliness and hygiene. Not only is a clean ward more likely to be a healthy one, it is an environment which will improve morale and confidence."

He could not be more correct in his appraisal as the 2 issues directly impact each other. Especially since an already unwell patient can not only physically but emotionally deteriorate if their care surroundings are poor. Therefore the provision of a clean and safe healthcare environment is a top priority for all healthcare organisations. It provides one of the major elements for effective infection prevention and control, promotes patient confidence and demonstrates the existence of a positive safety culture.

So crucial is this point, the absolute requirement to provide clean, safe healthcare is now written into a range of key legal processes and documents which govern the delivery of NHS-funded care. NHS organisations in England that provide regulated activities must be registered with the CQC (Care Quality Commission) and have to meet the requirements specified

in the Health and Social Care Act 2008 (Regulated Activities) Regulations 2010b) in order to be registered. Regulation 12 specifies requirements for cleanliness and infection control. The Health and Social Care Act 2008: Code of Practice on the prevention and control of infections and related guidance, December 2010, contains guidance about demonstrating compliance with the CQC's registration requirements for cleanliness and infection control.

Additionally, the NHS Constitution pledges that the NHS will commit to ensuring that "services are provided in a clean safe environment that is fit for purpose, based on national best practice." The Secretary of State for Health, all NHS bodies as well as private and voluntary sector providers supplying NHS services are required by law to take account of the NHS Constitution in their decisions and action.

With this in mind, BSI worked with the Department of Health (DH) who sponsored the revision of PAS 5748:2011 Specification for the planning, application and measurement of cleanliness services in hospitals for its use in NHS hospitals in England (published November 24 2014). As with all standards developed

by BSI, there is no mandatory requirement for their implementation. As such, NHS hospitals can choose whether or not to use this specification as there are currently no statutory or procedural requirements to do so. Organisations may wish to adopt PAS 5748:2014 as part of their governance strategy and risk-assessment protocol and to provide evidence of intention to comply with part of the CQC’s registration requirements for cleanliness and infection control.

As Robert Francis states in his 2013 report, “It is not just the responsibility of cleaning staff to keep the ward spotlessly clean, but of all staff. Consultants and senior executives should be just as alert to picking up and disposing of waste on the floor as cleaning staff. All who detect something that needs cleaning should alert those responsible for taking action immediately.”

PAS 5748:2014 recognises this wider accountability and takes a top-level to grass roots view. Key staff such as chief executives, directors of infection prevention and control, directors of nursing, lead nurses or matrons are some of the people who can ensure patient safety is a priority within the NHS in England. This framework for a risk-based cleaning system takes a continuous improvement approach to hygiene, taking into account the number of problems that can occur due to poor cleaning. It provides for the planning, application, measurement and review of cleanliness services in hospitals.

Some of the things that it covers:

- Governance of cleanliness service;
- Assessment of the risk of a lack of cleanliness;
- Providing cleaning tasks;
- Measuring cleanliness on the basis of visual inspection;
- Implementing corrective action;
- Conducting performance analysis and implementing improvement actions.

The specification builds on the experience and content of the national specifications for cleanliness in the NHS (NSC) ¹, the most recent version of which was published by the National Patient Safety Agency in April 2007. It does not replace it but will exist alongside to provide an alternative means of demonstrating an intent to comply with part of the registration requirements of the CQC. It is expected to be used in conjunction with The Revised Healthcare Cleaning Manual ², which gives general and specific guidance on how to operate the provision of cleaning services within a healthcare environment.

What it includes:

- An update to the risk assessment clause (Clause 4) to include supportive material based on work carried out since the 2011 publication;
- This work is represented as a completed risk assessment of all 50 scored elements (Annex C) as well as a range of typical functional areas likely to be found at all hospitals (Annex D);
- An example of overall risk category outcomes using the completed risk assessment of elements and functional areas is provided at Annex E

PAS 5748:2014 is free to download for NHS staff in England at the following link:

<http://shop.bsigroup.com/pas-5748> .

¹ The national specifications for cleanliness in the NHS:
<http://www.nrls.npsa.nhs.uk/resources/?EntryId45=59818>

² The Revised Healthcare Cleaning Manual:
<http://www.nrls.npsa.nhs.uk/EasySiteWeb/getresource.axd?As-setID=61814>

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Anne Hayes
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Engaging the new world

Nita Clarke OBE, Director at IPA details why employee engagement has never been more imperative for the sake of the UK economy and public sector...

As David Macleod and I were writing our 2009 report *Engaging for Success*, there was a widespread view that engaging employees, while possibly an interesting workplace approach, was nevertheless a nice-to-do. Many leaders, if they thought about it at all, probably considered it was a typical HR soft and fluffy initiative, which had nothing to do with the hard bedrock of profitability and productivity that kept them awake at night.

But as the impact of the financial crisis hit all sectors of the economy, something began to change. It became clear that those organisations which engaged with their workforces in meeting the challenges of collapsing markets and the credit crunch – in manufacturing particularly, – stood a fighting chance of coming out of the recession on their feet, rather than their knees. There was an increasing realisation that perhaps tapping into the wisdom of the crowd – employees in this case – could help provide solutions to improving

efficiency, improving customer relationships and finding new markets. And subsequently in the public sector, the herculean efforts made for example in local government to reconfigure services in the face of unprecedented financial pressures demonstrated clearly that deep engagement with staff could produce a positive outcome for services, even in the most difficult circumstances.

Today as the UK economy builds again, companies and organisations face a whole extra set of challenges, as the impact of the extraordinary changes in the global economy hit home. The pace of change, driven by increasing international competition is bewildering. New technology disrupts established industries at a breakneck pace – just look at the effect of the move to internet banking on employment in the financial sector; think of the likely effect of driverless cars on the automotive sector and drones for delivery on logistics; witness the impact of social media on taxi

services, remote control operations and biotechnology on health care. At the same time, customers whether of public services or private utilities have become more demanding, less likely to be fobbed off with the argument 'but we've always done things like that', or 'we're offshoring to increase our profitability', even if the call centre drives customers to distraction.

In the face of the breakneck change, too many organisations are trying to run 21st century organisations on last century's styles. Yet it has become crystal clear that the old view of how people behave at work, based on deference and trust, which command and control and carrot and stick management styles rely on, just does not hold water any more. Neuroscience tells us why these approaches backfire, because people will only embrace rather than resist change – and change their own behaviour – in an environment where it is safe to do so. In the immortal words of Daniel Kahneman: 'the brains of humans contain a mechanism that is designed to give priority to bad news.'

People are no longer willing to hang their brains on the door when they come into work, they seek meaning and fulfilment, and if their organisation does not or cannot provide a deeper purpose in an authentic way than simply meeting the bills, many will walk to another that does. How telling that in the recent Sunday Times survey of the top 100 graduate employers voted for by graduates themselves, no less than 4 were public sector, with the Teach First programme in second place. Also in the top 10 were the NHS, the Civil Service and the BBC; service sector organisations (including PWC on the top spot) took up another 3 places and although Aldi and Google made the list, they were joined by Britain's leading retail mutual, the John Lewis Partnership at number 10. Also making an appearance in its first year was Frontline, the new fast track scheme into social work. Hardly a ringing endorsement of our private sector from our future leaders. No wonder the CBI has embarked on a ground breaking campaign to restore trust in British business.

Of course this provides a tremendous opportunity for our public services to proudly proclaim their noble

purpose, and place it front and centre in both their recruitment and their operations. Now is the time for public services to convert this in-built advantage of a strong story founded on meaning and purpose, into a prime engagement strategy with both employees and the communities being served.

And of course overlaid on all this complexity is the challenge of transparency with Glassdoor receiving over a million hits a month in the UK alone, and Twitter and Facebook open forums for real-time feedback, exposing the reality that can lie behind the corporate spin. It has become clear that reputational risk is the greatest danger facing even the mightiest organisations today, as the recent experience of Tesco demonstrates.

In this new world, employee engagement is a must have, not a nice to do. Deep engagement with employees, giving them a clear purpose aligned with the organisation, and space and opportunity to grow and flourish; managers and leaders who understand people and how to motivate them; employees with a respected and heeded voice about the work itself but also about the organisation's strategy and future; and an organisational culture driven by values which are reflected in day to day behaviours, from the top to the bottom. These are some of the key elements that will change organisations from being composed of sullen, despondent and intermittently effective employees, to ones where people face the future with confidence.

Remember, the world will not wait for us to get this message. For the sake of individuals at work, organisations themselves, and the UK economy and public sector, we need to start engaging now. ■

Nita is also the Co-chair, national employee engagement task force

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Improving performance and agility

The role of business processes

All businesses, in whatever the state of development and maturity will use business processes to deliver services and goods to their customers. These processes evolve over time as companies and public bodies become more mature, complex with embedded fixes for problems in the past and are conducted with implicit rules by front line staff. In the case of public bodies they are constantly impacted by changes in government policy also.

Documenting processes is seen as a painful process, because it takes a long time, involves a wide variety of staff and requires a number of tools to document the outcomes. Businesses are driven to provide this documentation for certification, supporting work instructions and training materials and in some sectors this documentation is a differentiator for winning contracts or demonstrating good public services. However senior management still consider this activity low added value.

In manufacturing it has long been recognised that viewing, reviewing and streamlining processes is the key to improving quality, customer service and reducing costs. A number of key tools and techniques have been developed around this requirement, such as TQM, Six Sigma and the 5S for example. Manufacturing processes tend to be very visible and as a result can be more easily visualised and subsequently transferred into words and diagrams. Also use of visual aids

and problem solving techniques is well understood.

Applying these sort of techniques to public bodies and back office functions, such as finance or HR, and creative functions such as engineering or project management is much more difficult. So how do we raise the value of documenting business processes in the mind of senior executives, make the exercise more fulfilling for those engaged in it and speed up the process of documentation and review?

A fault in the interpretation of observations, seen everywhere, is to suppose that every event (defect, mistake, accident) is attributable to someone (usually the one closest at hand), or is related to some special event. The fact is that most troubles with service and production lie in the system and not the people.
Dr. W. Edwards Deming

Why and what is Modelling?

So why should business managers be interested in process modelling? 'Surely this is only relevant for certifying our operations?' It is fact that most errors and inefficiencies are due to the way work is performed rather than due to the person performing it. By mapping and documenting the business process it is possible to analyse where improvements can be made, identify the correct balance of work and where to apply controls. It is

also a fact that the longer the time it has been since businesses have been reviewed, the less streamlined and poor performing they are.

Service companies go from an EBITDA of 1.3% to 37% as they become process-driven.*
SPI Services Maturity Model 2013

The statistics are that after 18 months there is 25% waste introduced into a process and within 5 years this has grown to 70%.

So how would each management level within a business use a process map? They all need different views of the business and a flat single level flow chart of the end to end business process will not provide this. For example the C band executives will require a very high level overview of the entire business showing how the Core business processes deliver the business and how they contribute to the strategy. If the Balanced Scorecard is used to articulate the strategy, then this will require targets to be set for the key business processes.

Middle management will require a more detailed drill down showing handovers between functions and how the cross-functional needs of business delivery to customers can be in conflict with departmental objectives or how poor handovers can



This diagram shows how the process knowledge repository feeds all these initiatives.

affect downstream performance. They also need to understand how business policy as applied to their processes impacts performance.

Front Line staff require a fully detailed step-by-step, model of the process, showing the tasks, who does the work and how it should be done and how to get to work instructions, particularly for more periodic processes that are not day to day activities.

Making the Business Process Model the Centre of Day-to-Day Business

Once the business model is complete, it should be deployed for access by the entire business. By deploying the model to all staff a number of objectives can be achieved including knowledge transfer, continuous process improvement and increased business agility. The key to success will be the reuse of that work. There are many opportunities to do this namely:

- Organisational design, such as introducing new departments.
- Due diligence over mergers and acquisitions.

- Setting realistic process performance measures
- Identifying role requirements, supporting competency definition and resource planning.
- Supporting business improvement initiatives and the application of technology.
- Supporting internal audits for security and segregation of duties, and quality certification such as ISO.
- Training of staff who are new hires or promotions.

This represents a significant benefit to the business and therefore should not be missed. The key to ensuring this, is gaining ownership of the model within the senior executive and functional departmental management and demonstrating immediate benefit.

Gaining ownership will only be achieved by proving the benefit of the approach to those asked to own both processes and outcomes. For process owners to effectively use the business process model on a day-to-day basis, they will need demonstrable benefits of its effectiveness. By designing processes within the model business managers

can apply time and cost so that the cost of delivery can be assessed; this might be related to rework loops and the benefit of avoiding them or skill of the person undertaking the activity. If the model is aligned to business KPI's realistic targets can be set to drive improvements and the removal of 'waste'; providing the source for 'lean' initiatives.

Managers must be trained in how to use the model to successfully facilitate process review and internal organisational redesign, i.e. such as moving jobs between incumbents and removing jobs through the application of technology.

Making the model central to training and induction is much easier; by using the model as a 'how to' guide for each business role, enabling access through the companies intranet leading to more in depth materials such as written work instructions or SOP's, or videos of the same. Rapid analysis of roles and job scope is aided by the 'where used' report applied to the business role.



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Understanding continual improvement

David Armstrong, Head of Profession at The Chartered Quality Institute (CQI) sheds light on what lies at the heart of continual improvement for organisations...

“It is not the strongest or the most intelligent who will survive but those who can best manage change.” This famous quote by Darwin is true not only of living organisms but also of organisations – just ask Kodak or Woolworths.

At the most fundamental level, the purpose of continual improvement is the drive to meet or exceed stakeholders' requirements.

At The Chartered Quality Institute (CQI) we understand that quality professionals are at the heart of continual improvement for organisations. It is their responsibility to ensure an effective system of governance is in place and that processes and outputs are subject to independent, effective process and product assurance. This results in decision-making based on objective evidence.

In most organisations the capability and performance of a particular function, for example engineering, design, HR, finance and IT are the responsibility of the most senior function manager. This is the group that primarily defines capability and performance within the business, not only as a result of the people they recruit, the policies and processes they establish and the investments they decide to make in tools and technologies – but also by the culture and values they establish in how people approach their work.

Driving change

To enable continual improvement in your organisation, it is essential for everyone to understand that change is a very simple process, achieved by acting on no more than 4 variables:

- People;
- Policies and processes;



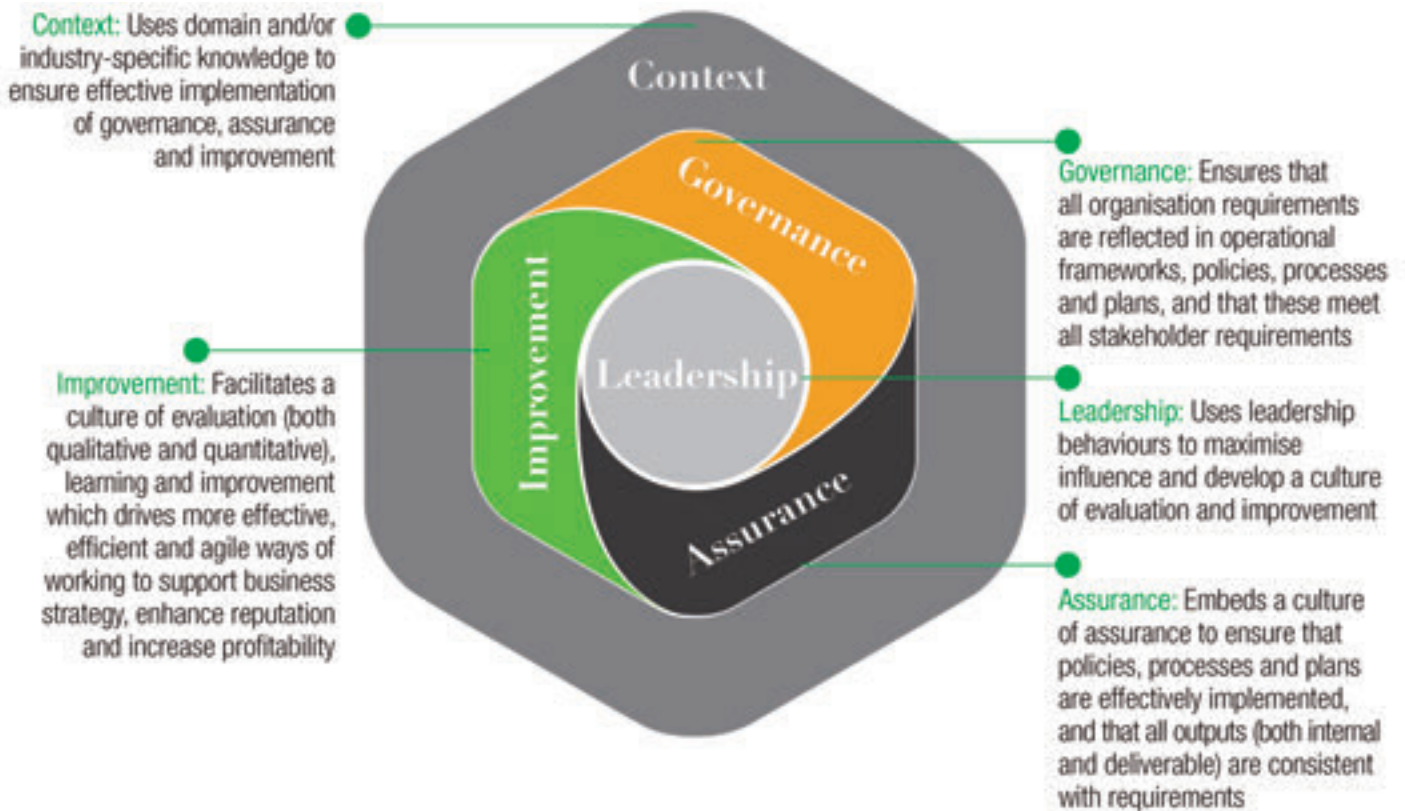
David Armstrong, Head of Profession, The Chartered Quality Institute

- Tools and technologies;
- Culture and values.

However, too often we fail to understand the dynamics of change and focus our attention on the wrong variables. Generally speaking, it is easier to change how things are done than it is to change the capability of the people doing them and even harder to change the level of commitment, desire and passion for achieving success.

For example, if the strategy for a football club is to win the Premier League then we can improve performance by:

- Buying new players;
- Changing process – i.e. the tactics used;



- Investing in tools and technologies – training grounds, statistical analysis;
- Improving the culture – establish mechanisms to motivate and reward good performance.

Often it is the culture within the club and creating a team spirit that will produce the fastest results.

Continual improvement allows an organisation to address the changes in their products and services, while also providing the opportunity to analyse their efficiency and effectiveness against their key objectives.

They must work with the rest of the organisation to ensure measures are appropriately reviewed and that actions are continuously taken to improve performance.

However, as outlined in the example above, for change to be effective a culture of objective evaluation and improvement is essential at all levels within an organisation – at product/service delivery level, within each function, and at the organisation level.

At the CQI we have developed a new Competency Framework for quality professionals. It is designed

to develop their skills and benefit organisations, by highlighting the importance of good governance, assurance and improvement to business leaders across all industries.

A company that fails to adapt meaningful key performance indicators is unable to improve continually and will ultimately fail its customers, shareholders and employees. ■

To find out how the CQI can help develop your quality staff, visit: <http://www.thecqi.org/Competency-Framework/>



David Armstrong
Head of Profession

The Chartered Quality Institute
www.thecqi.org



Healthy workforce, happy customers, healthy bank

Employee health and well-being can make a significant difference to an organisation's productivity and costs. Dr Jill Miller, Research Adviser at CIPD explains further...

Investing in employee well-being isn't just nice to have – studies consistently show that having a well thought-out well-being strategy reaps dividends for both the employee and employers.

If we look at the significant cost of absence to an organisation, taking action to increase employee health and well-being and build workforce resilience seems an obvious choice. Our recent absence management survey estimated absence costs an employer around £600 per employee per year. This is just the financial expenses of sick pay, employing temporary staff, overtime costs and lost production figures. There are the additional intangible costs, for example the strain on the absent employee's colleagues who pick up extra work, or the impact on customer service. All of these factors ultimately impact productivity.

Investing in health promotion can help people stay in work, which is good for the employer if they can retain a talented employee rather than having a staff member go onto long-term sick leave. There are also obvious benefits for employees, but what's significant is the potential for people to be able to stay in work rather than be signed off. Research has shown work is good for us, in particular our mental health and self-esteem by providing another facet of our identity and a purpose. And the longer we're off work, the more difficult it can be to re-enter the workforce.

And employers themselves are telling us that investing in well-being is worthwhile. Those who told us in our absence management survey that they evaluate the impact of their well-being benefits are more likely to also say they have increased their spend next year.



in the last 5 years we have seen a dramatic rise in the number of reported mental health problems. In 2009 21% of employers said they had seen an increase in the number of reported mental health problems in the previous 12 months. In 2014 this figure increased to 42%.

How do you maximise the impact of your well-being approach?

As well as ensuring your offering aligns with employee needs, it's important to include a clear communication plan in your well-being approach. Do employees know what services and support is on offer and how to access them?

“Investing in health promotion can help people stay in work, which is good for the employer if they can retain a talented employee rather than having a staff member go onto long-term sick leave.”

Some organisations choose to roll out some of their initiatives to their supply chain, reaping the benefits in terms of relationship building and ultimately promoting the health of those they depend on to deliver a great quality service, being a customer or supplier of choice.

Overall, having a genuinely supportive culture in which employees feel they are cared for and valued depends on having a great people management approach. Investing in line manager capability is essential. Line managers are ideally placed to spot early warning signs of issues but need to feel confident to have a good quality conversation with members of their team. Extra tailored support from HR may be needed to deal with sensitive or complex issues.

Managers need to be knowledgeable about the organisation's well-being offering to be able to signpost staff in the right direction for support and to also consider adjustments to work, working hours or the environment where necessary. ■

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Dr Jill Miller
Research Adviser
 CIPD
www.cipd.co.uk

They are reaping the benefits of lower absence levels and increased staff engagement, being viewed as a good place to work.

What well-being approach is right for your organisation?

There are a set of standard components of a well-being offering that most organisations choose to provide, but decisions will depend on your particular workforce needs. It's important to regularly review your offering to examine the uptake of its different elements and ask employees for feedback about their effectiveness.

Our survey found that the most common well-being benefits offered are employee support programmes, for example access to counselling services and employee assistance programmes. 70% of organisations offer some sort of health promotion programme. The most common initiatives, offered by 3 in 10 organisations, include advice on healthy eating, stop smoking support, subsidised gym membership, health screening and healthy canteen options. Nearly two-thirds of organisations overall offer some sort of insurance or protection initiatives, at least to some groups of staff.

It's important to also anticipate and respond to the wider issues we are seeing across the UK. For example,



CASE STUDY: TEAM EFFICIENCY REVIEW

IMPROVING CUSTOMER EXPERIENCE

Much emphasis is placed these days on improving **Customer Experience** – and rightly so. Happy customers cost less to care for and the department performs more efficiently as queries and problems are handled in a shorter time.

And how is this improvement most commonly sought? Often it is set in motion with the allocation of stringent targets, checks and balances and ever more rigorous monitoring of service delivery. But we would like to suggest that there is an even faster way of guaranteeing an improvement in customer experience, and that is by creating a transformational shift in **Staff Experience**.

WHY IS STAFF EXPERIENCE IMPORTANT?

When staff are able to perform their role with ease and feel they are a valued and valuable member of a motivated, supportive team they are transported to the high performance zone. Productivity goes up, as does levels of accuracy, but something else happens too: loyalty to the team and a sense of belonging fosters a paradigm shift in ethos.

Instead of wondering what the team and the organisation can do for them, the focus shifts to:

- How can I add value and support the goals of the team?
- What can I **Contribute** to the team?

CREATING THE SHIFT

We were approached by a large organisation to build an application to complement the work they were doing with the end desire of improving customer experience.

What they wanted was a suite of tools that would link staff contribution to the goals of the business. It had to allow clarity of purpose, build competence, ensure ownership and offer individual, manager, team and customer perspective to the ultimate aim of enhancing customer experience by reviewing staff experience. The tool also needed to enable managers

to identify the learning needs that would support staff in delivering their current and future roles.

Managers having the right conversations can make all the difference and we decided to focus on a suite of tools that would allow staff and managers the time to discuss the competencies and behaviours expected as an employee of the organisation. But we also added a unique feature!

Traditionally, feedback is top down with managers appraising their staff, senior managers appraising the managers who report to them etc. But we decided to turn this on its head by asking ourselves the question – how can we best measure the experience and the contribution of team members and managers? As a result we developed the Team Efficiency suite of tools; the first of which was Manager Review followed by Peer Review.

The ultimate goal was to improve Staff Experience and the first step was to review current levels of staff experience and manager contribution against five selected KPI's that were directly related to the experience of their direct reports. This was done by having Team Managers reviewed by all members of their team.

MANAGER REVIEW PROCESS

The carefully crafted multiple choice questions delivered illuminating information both in the choices team members made and also the free text comments in response to the question: What's making it go so well? or What would improve things for you? – the relevant question being delivered in response to the previous choice made. They are forward looking, positive questions.

The first two questions have three smiley face responses: *How are you currently feeling about work?* and *As a Team, how well do we demonstrate corporate values?* This second question elicited extremely useful information as to consistency of approach and behaviour exhibited within the team.

While those questions alone garner fantastic information about staff experience, the next five are in statement form and the responses alert managers instantly to areas they can usefully work on. With five choices ranging from Strongly Agree to Strongly Disagree we allocated one statement per chosen KPI. The usefulness of the feedback on manager performance exceeded all expectation.

COACHING OPPORTUNITY

Reports are delivered electronically with easy-to-understand graphics and free text comments and it is possible to see instantly which areas to focus on first leading to rapid improvement coaching opportunities. [This is where managers having the right conversations plays an important part and we can train executives and managers to have those conversations.]

STRAIGHT FROM THE HORSES MOUTH

The application allows individuals at all levels to express their thoughts and respond to the feedback they receive. This builds into a picture from the ground up of what teams really think about their manager, corporate vision and culture, and it gives rapid insight into areas that can be improved.

At all levels, the suite offers each individual a unique understanding of how their level of contribution is perceived from their own perspective and that of their peers and, where appropriate, those who report to them.

KEY LEARNINGS

1. With all projects, clear specification for what is to be achieved is of paramount importance. This includes:

- specify desired outcome – which can also include a high-level problem to address – i.e. communication
- adapt branded online survey
- run the survey
- analyse the results
- put in place coaching, leadership or management training to equip manager to deliver improved performance and results

2. In our experience, not all managers are truly monitored on how well they are managing their teams and having the appropriate KPI's is crucial. We can help you put in place the KPI's that will target manager performance in the most useful areas.

3. We worked closely with our client to make the look and feel of the survey inviting and this included input from the Unions who were receptive to the project. We also spent a good amount of time on what to do with the results. This included:

- coaching the manager to work through the feedback and determine what can he/she can do to become a better manager
- as a result of the feedback what is the manager going to do differently with their team
- how to introduce a contribution and coaching culture into their team

4. As a result of the groundwork put in by the client and ourselves, staff were really excited to take part in the feedback opportunity and were even asking when their team would be done!

Of all the tools we have delivered, managers and staff delivered the fastest turnaround response to the survey being opened.

DEMONSTRATION

The best way to evaluate a new tool is to try it out for yourself. To see Team Efficiency Review or experience it with one of your teams, please [click here](#) and we will be delighted to set up your free trial.



Behavioural Safety Readiness

A key part of any business's journey towards ensuring safety excellence, behavioural safety is a proactive method for preventing hazards from escalating into incidents and injuries. If implemented well, it is known to produce a return on investment of around €1.5m, per 100 employees, per year.

Successful behavioural safety processes use targeted behavioural checklists and trained observers to monitor ongoing safety behaviour to reduce incidents, and identify hazards and system faults. A good process also focuses on the underlying contributors that trigger unsafe behaviour: these can be addressed to help streamline existing business processes to reduce incident potentials.

If you are thinking of implementing a behavioural safety process in your company, the over-riding question is: Will it work for you? Although the promise of injury reductions and significant cost savings through behavioural safety is not an empty one, your company has to be ready to roll it out, as well as support and sustain it over a long period of time. This will take time and effort from all those involved, as well as having the right foundations in place.

Being ready for behavioural safety means being ready and willing to do whatever it takes to make it work in the face of obstacles and setbacks. To ensure that your company has the necessary building blocks and 'appetite'

for behavioural safety, it is a good idea to conduct a formal readiness assessment to identify strengths that will facilitate the process, and identify any areas of opportunity to help build a solid foundation for the introduction of your behavioural safety process.

In broad brushstrokes, the basic foundations for a successful behavioural safety process include:

Proactive Safety Leadership

The entire company leadership must actively want to prevent injuries. It's helpful if top executives have articulated a clear and inspiring vision that 'safe production' is the only acceptable goal, and line-managers pro-actively enact and reinforce this vision on a daily basis.

Workforce Involvement

Employees must want to prevent injuries. They must also want to be involved in the behavioural safety process by participating in the design, development, and execution of the process, and be motivated to do whatever it takes to make the process work.

Time

Time is one of the most precious commodities in any company. Companies ready for behavioural safety recognise that spending time on behavioural safety is a sound investment, and are willing to cater for people's time to make it work. The time spent includes training project teams, safety leaders, and observers,

as well as putting time aside for developing the process, daily observations, and half-hour weekly feedback meetings.

Resource Availability

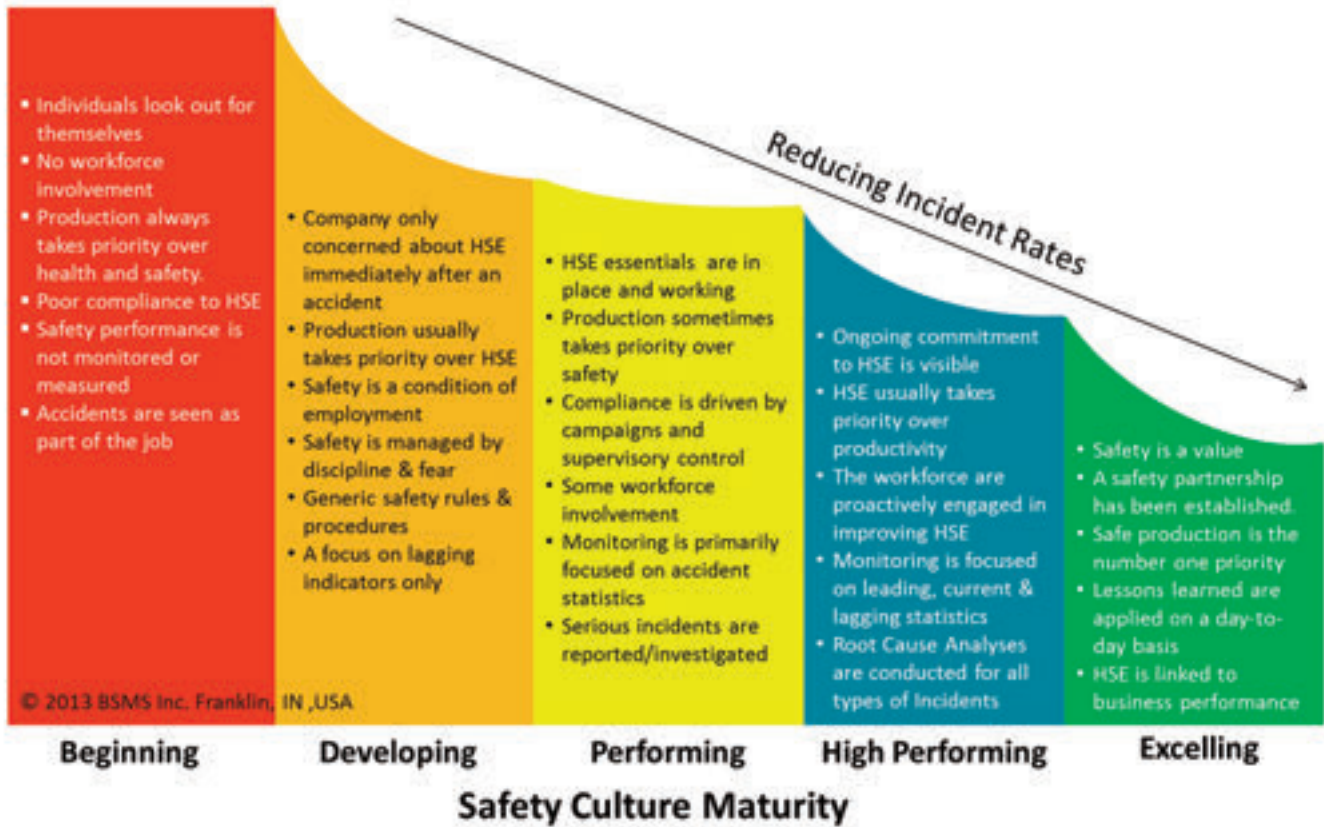
Every behavioural safety process identifies various corrective and preventative actions (CAPA) that need attention. The company must be willing to address these in a timely manner to reduce the number of physical hazards and management system faults. This will take dedicated budgetary and system resources.

Assessment Processes

There are a number of ways that a company can assess whether or not it is ready for a behavioural safety process, such as data-mining and safety culture assessments.

Data-mining

The start point for an assessment should be data-mining to extract hidden patterns from incident databases. The vast majority of safety professionals look at the frequency of particular incident types, but not all try to look beneath the surface of their entire data set. Data-mining is a method to make better use of existing data by sorting through to identify patterns and establish relationships. In this way the data can be used to predict future behaviour. It is useful to identify whether or not the company actually has a 'behavioural' problem; this is usually determined by examining incident databases to identify if the majority of incidents are being triggered



by people’s unsafe behaviour. If so, the questions are asked about how frequently particular types of behaviour are involved, what is triggering these behaviours, under what conditions are they exhibited, and how many are potential Serious Injuries or Fatalities (SIF’s). An in-depth examination leads to identification of the root causes, which can then be fixed through corrective or preventative actions. Sometimes, such behaviours are purely down to the choices made by people to make their work easier in some way, and as such highlights a motivational issue which signals that a behavioural safety approach is warranted.

Seeking Peoples Views

It is important to seek people’s views about safety to help ensure the behavioural safety process is optimally designed and will be well received. Employee input from a wide

range of staff allows you to identify strengths and weaknesses in the way safety is currently being managed in many business units, and develop specific ways forward for each which will support implementation.

Focus-Group Exercises

Because we know that people’s safety behaviour is driven by the current safety culture, it is often useful to determine how mature a facility’s safety culture actually is, and the impact it is having on people’s safety behaviour. Systematically brainstorming the issues leading to unsafe behaviour is also a useful way to proceed. This usually involves the use of structured tools such as the Cultural Web to facilitate discussions. Working in groups of five or so, delegates use the Cultural Web to highlight the current status of the company’s safety systems, processes, and behaviours in terms of:

- What is done routinely in safety to keep people safe?
- What rituals are in place to emphasize the importance of safety?
- What is the reputation of the current approach to safety?
- What symbols are used to publicise and reinforce safety?
- How are decisions made about safety issues?
- What structures are in place to support safety?
- What controls/Key Performance Indicators (KPIs) are in place to sustain safety?

The Cultural Web exercise initially examines what HSE processes and systems are working well, and what

is not working. This is followed by identifying the changes personnel would like to see to improve performance. Ultimately, delegates use the results of their deliberations to produce a concrete action plan that has the broad consensus of all stakeholders.

Laying a solid foundation for change, these focus-group exercises provide a structured, interactive method for discovering the status of the current safety systems, processes, and people's safety-related behaviours. This allows the company to discover 'what is' and 'what could be' so as to develop the way forward. Because many of the subsequent action plans are developed and owned by company personnel, the likelihood of successful safety culture change is that much greater, as people are more willing to follow through on a process they have helped to create.

Safety Culture Surveys

Useful diagnostic tools, safety culture surveys help companies develop highly focused, cost-effective safety improvement initiatives, and are one of the quickest ways to gain the most information about employees' perceptions of the current culture. Typically, the survey questions will inquire about the main characteristics of a strong safety culture such as:

- The visibility of safety leadership
- Safety being a clearly recognised value
- Whether a safety partnership has been established
- People's accountability for safety being clear



Dr Dominic Cooper CFIOASH CPsychol, CEO

- Safety being fully integrated into all business activities
- Safety being driven by lessons learned

Providing an indicator of the overall maturity of a company's safety culture, these surveys are used to measure the effectiveness of current safety improvement initiatives, and their impact on people's behaviour. Usually distributed to personnel online, the responses are analysed to identify strengths and areas of opportunity to develop the way forward. The results are also used to benchmark the results against other companies making use of safety culture maturity models such as that shown in the chart on the previous page.

Conclusion

It is not always easy to introduce a behavioural safety process into a company, as many issues that could delay progress may not have been

identified and addressed. The advantage of doing a Readiness Assessment is that it helps you to examine whether people's behaviour really is a problem, and if so, how people view your current safety efforts. This allows any issues that may block the introduction of a successful process to be identified and addressed before starting, which increases the likelihood of success.



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Managing wellbeing in the workplace

Louise Aston, Workwell Director, Business in the Community, gives her views on why a positive culture of wellbeing is vital for all organisations...

Supporting employees to be happy and healthy at work is one of the most important ways that an organisation can ensure sustainable high-level performance, and there is an inextricable link between the two.

When we talk about ‘wellbeing’ we’re referring to the mutually supportive relationship between a person’s physical, mental and social health. Business in the Community’s Workwell model¹ provides a framework for organisations to embed a strategic, proactive and integrated approach to support employee engagement and wellbeing. A positive culture of wellbeing in the workplace doesn’t just benefit people on an individual level; it’s good for business too. Benefits include better engagement, better attendance, better retention and recruitment, better brand image and higher productivity. Engage for Success² has recently shown that engaged employees are 35% more attached to their companies³ than those with lower wellbeing.

Right now, mental ill-health is one of the biggest threats to the wellbeing of business and society and it has been a core focus for Business in the Community’s efforts over the past year. Employees are working longer and harder and are under more pressure than ever before, and 1 in 4 people experience a mental health condition⁴ such as stress, depression and anxiety each year. Yet there remains a culture of silence around mental health, both on an individual and organisational level. People are afraid to speak out for fear of discrimination and this is resulting in suffering and inequality for thousands of employees across the country.

This culture of silence contributes to the estimated £70bn UK cost of mental ill-health each year, equating to £1,035 per employee, per year. This is an issue that all organisations need to take very seriously and we need to see a greater effort to help normalise the issue and make transparency around mental health



business as usual. It's not possible to manage what you can't talk about.

There are lots of ways in which organisations can take simple steps to promote a positive culture of wellbeing amongst their employees. These could range from social activities for employees to coincide with events such as World Mental Health Day, to offering written guidance and tips on building emotional resilience to help employees manage everyday pressures more effectively.

“Employees are working longer and harder and are under more pressure than ever before and one in four people experience a mental health condition⁴ such as stress, depression and anxiety each year.”

Line managers also play an important role in helping to monitor and support the performance of their team, and as such are often best placed to spot the warning signs of employee stress or anxiety, signposting to the right support accordingly. This isn't about expecting line managers to be experts on mental health, but equipping them with the key skills to feel confident making proactive interventions and become more attuned to the mental wellbeing of their staff.

However, it is vital to understand that fostering a positive and sustainable culture of engagement

and wellbeing is a collective responsibility in which everyone has a role to play.

Business in the Community's (BITC's) Workwell programme⁵ is a collaborative business-led movement which has been developed by international business leaders with the core purpose of creating happier, healthier and more productive workforces. Last year, this group produced a landmark report on the need for business-led transparency around mental wellbeing at work, called 'Mental Health: We're Ready to Talk' (6). We will be presenting a second report charting the progress of these organisations 1 year on, during our annual Responsible Business Week in April.

To coincide with this, we will also be unveiling a new Workwell membership offer, which will provide businesses with unique insight and best practice from organisations who have implemented wellbeing strategies successfully. ■

¹ <http://www.bitc.org.uk/programmes/workwell/workwell-model>

² <http://www.engageforsuccess.org/>

³ <http://www.engageforsuccess.org/wp-content/uploads/2012/09/The-Evidence.pdf>

⁴ <http://www.mind.org.uk/information-support/types-of-mental-health-problems/statistics-and-facts-about-mental-health/how-common-are-mental-health-problems/>

⁵ <http://www.bitc.org.uk/programmes/workwell>

⁶ <http://www.bitc.org.uk/programmes/workwell/mental-health-were-ready-talk>

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Talent recruitment – the Bucks way

Jenny O’Neill, Workforce Management Manager at Buckinghamshire County Council, tells Adjacent Government how her Council is focusing across the age spectrum in the search for talent...

There is a common myth that older people are no longer valued and no longer needed in the workplace. But I can assure you that is simply miles from the truth here at Buckinghamshire County Council.

While we are rightly thrilled at the success of our recent graduate training programme, the search continues unabated for experienced staff to join us.

Nowhere is this more relevant than in the world of social work where there remains a shortage of skilled practitioners. Many fantastic workers who have left us and other authorities would be welcomed back with open arms.

Of course, we want fresh new talent and we need to ‘grow our own’ experts of the future, but there is no substitute for an older, wiser head which has seen and done it all before.

Hiring older employees will also allow us to give the younger ones valuable support in the shape of official or unofficial mentors as they develop their careers.

And don’t forget, the more mature staff were once young bloods too and went through years of training, which will all be left neglected on the shelf if we don’t do more to encourage them back into the market-place.

One such example is our Return to Social Work Programme aimed at experienced professionals who have taken a career break. We are well aware that there are likely to be a number of people out there with skills to match our needs, who may need just a bit of encouragement or support in raising their confidence to return to the workplace.

Our ideal candidate would be a social worker who has had a minimum of 3 years’ experience within Children and Families services. We are hoping to recruit locally as we have found these are the people more likely to stay, and are offering refresher training and shadowing days.

The purpose is to give the returning workers what they need with regards to CPD requirements for registering/re-registering with the Health & Care Professionals Council, which they must do in order to practice as a social worker in England. At the end of the programme, we will offer them a guaranteed place on one of our recruitment days, hopefully leading to a position.

We are not alone in our views. I was interested to read a story at the end of January on this very subject on the website of the CIPD – the professional body for HR and people development. This told how research by the Recruitment and Employment Confederation showed businesses need to adjust the way they advertise jobs and provide training opportunities or miss the best candidates in the over 55-age group.

However, as I stressed at the start, we are interested in talent across all age ranges, and believe that a flexible, innovative approach to resourcing is key to attracting and developing our own stars of tomorrow.

When we re-introduced our graduate management development programme in early 2013 we weren’t sure what response we would get. We were out of synch with the normal milk round and we wondered whether a local government scheme would attract the quality of applicants we hoped for. We needn’t have worried. Our results delighted us.

Candidates repeatedly said they were interested in us because they were looking for a career that offered more than just a pay cheque. They were excited by the challenge and variety local government offered. They appreciated the opportunity to work alongside Cabinet Members and the Chief Officer’s Management team at such an early stage in their career and recognised they wouldn’t get that sort of contact in many other organisations.

“Hiring older employees will also allow us to give the younger ones valuable support in the shape of official or unofficial mentors as they develop their careers.”

But not only that, the feedback we received about our recruitment process also told us that what we did really encouraged talented young people to want to work for us.

What we did wasn’t complicated. We told a story about what it was like to work for the Council; and in the main, did it through the voices and video clips of talented young people already working with us – helping to present a candid, friendly face of the organisation.

Once we had pre-screened applicants, we moved on to telephone interviews giving us an early opportunity to engage directly. We started a conversation and made the process personal. By the time applicants were invited to assessment centres, we were already getting to know them and starting to share a story.

By the time we offered jobs, we had an established trainee group with their own closed Facebook group, who were supporting each other before they even started work.

So how do we learn the lessons from that success, with something else such as experienced social worker recruitment?

The challenge for social worker recruitment is well-documented and there is no magic wand to wave at

this – but the lessons around candidate engagement and employment proposition are just as important for experienced professionals.

We need to ask ourselves whether we really tell the employment story as clearly, engage with candidates as effectively, on-board them as sensitively. The approaches may need to be a bit different – online, telephone or face to face – but it’s the personal contact that’s important.

Making people feel valued and connected is a critical part of resourcing for talent. Being clear that we welcome diversity and that we want to encourage those with relevant skills and experience back into the workplace. Letting people know that we provide great training and development. People want to work for organisations they respect, with people they like, doing a job they will enjoy and which they believe will make a difference.

People will perform better when they are supported and valued. And people will join organisations where they believe these things happen.

Lots of people come to work for reasons other than money, such as a sense of job satisfaction, working for a great team and performing a role that is making a difference. And I’m happy to add that this is why people right through the age spectrum choose to work for Buckinghamshire County Council. ■

If you want to find out more about opportunities at our Council, contact Diane Murphy at: dmurphy@buckscc.gov.uk or on 01296 383047

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A new green growth model for SMEs in the EU

Antonello Pezzini, Member of the European Economic and Social Committee (EESC) explains the importance of European companies creating sustainability strategies...

European companies are progressively building sustainability into their strategies, together with a new culture of innovation, with a view to securing competitive advantages. It is widely believed, from top management down to customer contacts, that these changes will produce the expected results, rapidly creating a win-win situation. Both business organisations and trade unions emphasise the importance of skills, calling for more information and guidance on developing green skills for efficient use of resources by SMEs. It is clear that European SMEs are increasingly efficient in seizing opportunities, and are contributing to the shift towards a low-carbon economy. This trend also emerges from the latest Eurobarometer survey on SMEs, resource efficiency and green markets¹. What then might be the best ways to help SMEs to turn environmental challenges into business opportunities?

There is a need for a well-defined, consistent and long-term EU framework that should be discussed with all the stakeholders and steer clear of excessive regulation, fostering links between R&D, innovation and energy, climate policy and efficient energy infrastructure, with new storage capacities. The policy package “Towards a circular economy: a zero waste programme for Europe” put forward by the European Commission in July 2014 is a step in to the right direction towards creating the enabling framework conditions.²

The Green Action Plan, included in the Commission policy package, proposes a green growth model for SMEs, requiring not only a wholesale culture shift, with a powerful boost to innovation and research, but also substantial investment in technology, education, organisation and training for new job

profiles, financial engineering and appropriate tax policies.

In practice, the shift to a circular economy obliges producers, workers, consumers and people in general to make real changes to their attitudes towards the use of resources and raw materials. Products must be eco-designed; proper market and business opportunity must be identified and – most importantly – new methods for processing waste and resources must be sought.

On 10 December 2014 the European Economic and Social Committee (EESC) adopted 2 opinions addressing the Commission proposals on the circular economy, the Green Action Plan for SMEs and the Green Employment Initiative³ As the representation of civil society organisations within the frame of the institutions of the European Unions⁴, the EESC argues strongly that in order to make this new green growth model effective, backing must be given to a consensus-based, participatory transition to a circular economy in Europe. This could open up a wide range of opportunities for micro-, small and medium-sized enterprises and for the social economy. The circular economy could become the main driver force for growth on both the international and internal markets.

To this end, the EESC believes that priority should be given to:

- Devising and promoting broader application of the voluntary green audit mechanism by companies;
- Boosting access to credit, especially with guarantee systems;
- Financing eco-innovation for micro- and small enterprises, particularly in a number of demonstrator regions, that can show-case systemic eco-innovations;
- Consolidating in-company training and tutoring measures;
- Supporting a circular EU market for materials, parts and intermediate products, especially for by-products of building renovation;
- Promoting education and training for positive development of skills, particularly in technical and professional training systems that involve social interest groups;
- Launching a “circular eBay” based on European and international technical standards.

An integrated policy approach is crucial to harnessing the job-creation potential, based on proper access to new occupations and to meet the challenges inherent in the transition to a non-linear circular economy. Special attention should be given to enhancing communication, in order to address the range of major challenges represented by new training, jobs and organisational models.

This new green growth model is particularly important in order to stabilise primary and secondary resources in Europe, and could serve as a valuable factor for security of supply and for the EU’s trade balance. It is also the ideal solution for small businesses, entrepreneurs and start-ups, as they would be able to react faster to the changing demands of the market and of occupations, enhancing their models from the outset in order to tap into these trends. ■

EESC rapporteur on the opinion “The circular economy: job creation and the Green Action Plan for SMEs”, adopted on 10 December 2014.

¹ Eurobarometer survey: How green are European SMEs? http://ec.europa.eu/enterprise/newsroom/cf/itemdetail.cfm?item_type=251&lang=en&item_id=7191

² <http://ec.europa.eu/environment/circular-economy/>

³ <http://www.eesc.europa.eu/?i=portal.en.nat-opinions.33629> ; <http://www.eesc.europa.eu/?i=portal.en.nat-opinions.33631>

⁴ Further information about the EESC <http://www.eesc.europa.eu/?i=portal.en.home>

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Innovating growth in Ireland

Deirdre Glenn, Manufacturing, Engineering and Energy Research Commercialisation Manager at Enterprise Ireland speaks to Adjacent Government about how the organisation is supporting innovation throughout the country...

Ireland is one of, if not the, leading Research, Development and Innovation (RDI) countries in Europe, offering key commercial environments for companies to develop their research and innovation activities. RDI has a significant impact on economic growth and jobs throughout the country, and is a crucial part of government strategy.

Along with government departments, Enterprise Ireland plays a key role in supporting innovation by companies, and helping them to engage in the research and innovation ecosystem. The organisation shares the ambition of the Irish government, which is to put innovation at the core of their policies and strategies for the future – in order for Ireland to become a leader in research and innovation.

Enterprise Ireland's Manufacturing, Engineering and Energy Research Commercialisation Manager Deirdre Glenn explains to Adjacent Government the role of her organisation in making Ireland an 'innovation nation'.

"Research and development is hugely important, as is investment in innovation," she says. "This government has very much committed itself to driving forward a knowledge based economy, and the delivery of that is very heavily supported by Enterprise Ireland."

Glenn says around 80,000 new jobs have been created over the last 3 years through the Irish government's Action Plan for Jobs which has a strong focus on promoting and supporting innovative research and technology.

"The Department for Jobs, Enterprise and Innovation (DJEI) Action Plan for Jobs is very much about increasing the levels of research and innovation within companies and by helping them to gain competitive advantage in international markets. Ultimately our aim along with the government is to create jobs within our domestic economy."

In their end of year statement, Enterprise Ireland reported that client companies had created 19,705

new jobs in 2014. This reinforces their strategy of driving innovation, as well as their leadership positions in international markets and new sectors. In order to make this happen funding is crucial.

“Investment has been critical for our economic recovery, and investment by the government is still somewhere between €6-700m, which shows they have continued to invest significantly in building research capability and skills to support the development of new innovative products, processes and services,” explains Glenn.

“Of that €650m plus investment from the government, Enterprise Ireland’s investment is about €120m.”

This is spent on the following activities; Funding R&D in companies; commercialising State funded research into market-ready products and services, funding collaborative research and innovation projects between companies and teams in research providing organisations; developing entrepreneurs and supporting new high-potential start-up companies.

Collaboration and partnerships play an integral role in developing new innovations, and Enterprise Ireland supports companies and helps them to engage with that sector. Ultimately enabling them to develop partnerships, and unlock skills and expertise in order to improve competitive advantage.

“Collaboration is a huge priority for Enterprise Ireland, and particularly for my department to effectively and efficiently leverage the wealth of innovative knowledge and skills available in the education system.

“One of the most successful programmes that we run to help achieve this, is the Innovation Partnership programme,” says Glenn. “The company articulates its specifications and we identify an academic to do the work on behalf of that company. It’s about organisations coming together around a specific need.

“A really good example of this is one we funded recently, which was around 3D printing. An Innovation Partnership was created between a research institute, a tool manufacturing company, and an engineering company. All 3 worked together to deliver a new innovative 3D research programme.”

Glenn explains that Enterprise Ireland works very

closely alongside government departments, in order to coordinate and maximise the return in state investment on public research – essentially getting more bang for their buck.

“Within the Department of Jobs, Innovation and Enterprise (DJEI) there are 3 agencies in particular – Enterprise Ireland, IDA and Science Foundation Ireland (SFI), which work very much in close co-operation,” she notes.

“Enterprise Ireland and IDA are very much about trying to understand what enterprise needs are and ensuring then that the required knowledge and skills are available to them and they can get access to it.”

One of the main programmes Enterprise Ireland use to deliver on these needs is a joint venture with the IDA – the Technology Centre Programme.

Enterprise Ireland and IDA jointly support 15 Technology Centres which are delivering market-focused, industry-led research for companies across national priority areas:

- **Manufacturing and Materials:**
 - Applied Nanotechnology – CCAN
 - Manufacturing research – ICMR
 - Pharmaceuticals Manufacturing – PMTC
- **Health & Medical Technologies:**
 - Connected Health – ARCH
- **Innovation in Business Processes & Services**
 - Innovation Value Institute – IVI
 - Learning technologies – Learnovate
 - Financial Services – governance, risk and compliance – GRCTC
- **ICT:**
 - Applied Data Analytics – CeADAR
 - Microelectronics Circuits – MCCI
- **Energy:**
 - Bioenergy & Biorefinery – TCBB
 - International Energy Research – IERC
- **Sustainable Food:**
 - Dairy Processing – DPTC
 - Food for Health Ireland – FHI

A great example highlighting of all 3 agencies working together recently was an event held in Ireland called the National Innovation Showcase. It brought together enterprise companies, research communities, and education institutes to help industry engage with the third sector.

“The whole point of that day was to target industry and to have an event that would make it as easy as possible to find the information they wanted in one location on one day.

“We also launched the first National Directory of Research and Technology Centres at the Showcase. The whole purpose of this is to provide a profile and details of the 38 research centres and technology centres of scale that are supported by the State to help companies navigate the system”, says Glenn.

One new resource on offer in Ireland is Knowledge Transfer Ireland (KTI) which is based in Enterprise Ireland and run in partnership with the Irish Universities Association. The aim of KTI is to maximise the benefit of State funded technology, ideas and expertise getting into the hands of companies, allowing them to innovate and grow. The KTI web portal enables businesses and the public sector to leverage the potential of Irish research and innovation by providing an overview of the capabilities and research talent at the country’s research performing organisations. The portal also provides guidance on IP, licensing and commercialisation opportunities as well as practical guides to contracts and sample agreements.

As with many of the Enterprise Ireland resources and programmes, it aims to make the process of engaging in collaborations or sharing knowledge between companies and higher education institutes more accessible and efficient.

Ireland also tests its mettle on an international platform, and has utilised European initiatives such as Horizon 2020. This is one of the largest European funded research programmes, and as the leader of Ireland’s support network for the programme, Enterprise Ireland is keen to ensure they get the most out of it.

“Horizon 2020 is going to be vital to our research growth here in Ireland; it is based on competitive

calls and is open to anyone, be that researchers, organisations or companies.

“As a nation we have adopted a strategy to ensure that we have strong participation, particularly for companies. We have an ambitious national target to win €1.25bn of the funding. For us it is about getting our SME’s to engage in those large projects.

“Framework Programme 7 (FP7) was very industry relevant, and Horizon 2020 is even more so, meaning there is massive opportunities for all our clients in all sectors.”

Enterprise Ireland is leading Ireland's participation in Horizon 2020 and is committed to achieving high success rates for company participation. Add this to the fact that it is also deeply embedded in the knowledge and commercial research transfer infrastructure having funded much of its development over the last decade through the Technology Transfer Strengthening Initiative and the establishment of Knowledge Transfer Ireland and it is clear that Enterprise Ireland can stand over its tagline 'where innovation means business'. ■

For more information visit www.enterprise-ireland.com and Knowledge Transfer Ireland www.knowledgetransferireland.com



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Strengthening Europe's digital economy

Gerard de Graaf, Director – ‘Digital Economy and Coordination’ Communications Networks at the European Commission explains the importance of closing the ICT skills gap...

Digital technology, automation, computing and the Internet have revolutionised our daily lives and transformed the way products and services are designed and offered. This 4th industrial revolution is changing even the most traditional economic sectors. Not only is technology changing the nature of the economy, but it is also opening up opportunities for innovation, sometimes of a disruptive nature.

The digital economy has the potential to unleash additional growth, competition, investment and innovation, while expanding markets and fostering better services at better prices, more choice and creating new sources of employment. It has the potential to contribute to taking Europe out of the crisis by creating opportunities for new start-ups and allowing existing companies to grow, profiting from the scale of a market of over 500 million people, and to transform traditional industries.

This is why the Commission has identified the completion of the Digital Single Market (DSM) as one of its top 10 political priorities and will present concrete proposals before the summer.

Already today, the Digital Economy is an important motor for growth and job creation in the EU. The ICT industry's share of value added is around 4.4% in the EU; increasing to 7% if you include the indirect contribution from ICT in other sectors. Further contributions come from broader "spillover-effects" on the rest of the economy. However, the economic impact of ICT is more than its value in static terms. Through its impact on productivity, ICT is responsible for around a third of overall GDP growth in the EU.

In the US, and some EU countries such as the UK, the gains from ICT for productivity and growth have been higher. Evidence shows those countries that have benefited most from ICT for growth and productivity

either have a strong digital industry or the right framework conditions that allows the gains from the use of ICT to spread in the whole economy. An essential element is the availability of skilled human capital. Currently, the EU is suffering from important digital skills gaps and mismatches. Skills gaps exist at all levels from basic user skills to skilled ICT professionals. As ICT innovations spread throughout the economy, the demand for digital skills is rising. Over the past decade, employment of ICT professionals in Europe has risen on average by around 4% per annum, despite the economic crisis and the general downturn in employment. These new jobs, and the multiplier effects (estimated at up to 5 new jobs for each new ICT job created) they have for employment elsewhere in the economy, are sorely needed.

However, the full employment potential related to ICT jobs is not being fully tapped. Companies are having difficulty getting the skilled people they need. Indeed, 40% of firms trying to employ ICT professionals in the EU say they are having difficulty in doing so. And the problem is growing. It is estimated that, by 2020, there may be as many as 825,000 unfilled vacancies for ICT professionals in the EU if current trends persist. In particular, while demand is growing, the supply of new computer science graduates has flat-lined. Not enough young people, especially women, are choosing an ICT education and career, despite good pay and career prospects.

However, the digital skills gap is larger and broader than this. While more and more jobs throughout the economy require digital skills, so that such skills are becoming essential for the job market, a significant proportion of the EU population lacks even the most basic skills: around 40% of the EU labour force, for example, has low or no digital skills, with around 20% having none at all.

We need to exploit the growth and employment potential of digital technologies. In particular, we need to give young people better digital skills, so they can take advantage of these new emerging jobs. As women are largely underrepresented in the ICT

field more focus needs to be put on attracting young women to ICT. If we do not make use of this valuable resource we will miss out on an important economic opportunity.

Under the European Commission's Digital Agenda for Europe, the Grand Coalition for digital jobs brings stakeholders together to jointly ensure the increased availability of ICT training as well as to create awareness about ICT careers among young people. This coalition has been a great success story, receiving a large number of pledges for action by public and private stakeholders and stimulating many local initiatives, including the setting up of national coalitions in a number of countries. The learning of digital skills such as computer programming or "coding", needs to start at a young age. It is only through radical curricula changes in European education systems, to introduce the learning of digital skills and the integration of digital technologies into teaching and learning that we will be able to close our digital skills gaps and prepare our citizens for the world they will live and work in. Some Member States, such as the UK, have included coding in their school curricula.

The transformation of Europe's economy for the digital age is not a trivial task. No government or company can do this alone. It requires a long-term vision, decisive action and strong collaboration of all actors: Governments, businesses, educators, social partners, and many more. I hope you join us on this journey towards the digital economy in Europe. ■

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From a digital market to a digital society

Constance Krehl, MEP at the European Parliament discusses the importance of building a digital society, and what it could mean for Europe...

The European Commission has announced it will propose a comprehensive strategy for a Digital Agenda for Europe. The Commission wants to achieve ambitious goals in the field of telecommunication and digital policies: fast broadband connections for all citizens and ultra-fast connections for at least half of all European citizens by the end of this decade. The plan to strengthen Europe's efforts within the area of information and communication technologies is grounded on the assumption that this is going to have a significant impact on further developing and diversifying the social and economic potentials of Europe. The development of a digital market is therefore a chance for Europe. However, this chance can only be utilised in the most comprehensive fashion if policy makers simultaneously shape the digital agenda in order to achieve a digital society.

The intention of the European Commission to boost the digital economy is most welcome. Nevertheless, building a digital society implies much more than only building a modern digital infrastructure in Europe. The digital agenda for Europe is instead a cross-cutting issue which stretches upon different policy fields. The Commission would therefore be well-advised to ground its digital strategy not on industrial and economic motivations only. Hence, the Union's Digital Agenda should not be regarded as being a mere economic task: Neither will it bring benefits and recovery for the Union's economy only, nor will it increase the Union's industrial base as such. In fact, it will shape the European society for decades provided that the right instruments and policies are applied and that the Digital Agenda is as much understood as a social strategy as it is an industrial one.



In addition to these, we need to intensify European investments in the digital market. This includes investments in modern infrastructure as well as investments in creative technologies and research. Europe needs to become a forerunner in ICT developments such as the “internet of things”. There are a number of investment programs in Europe which can help to invest in the digital infrastructure and telecommunications technology and research, namely the European Structural and Investment Funds or the research funding program Horizon2020. Highly innovative start-ups with a low financial base could gain further momentum if the strategy accounts to the special needs of this target group. It is essential that we make use of the given funding instruments and bring them in line with our strategies. Furthermore we have to guarantee the protection of the privacy and the freedom of expression in and out of the digital environment. This includes a high level of data protection, the right to informational self-determination and the protection of consumers.

The creation of a ubiquitous digital society is a task which demands answers to a wide range of questions. It is much to be hoped that the Commission follows this approach as well and takes social, educational and consumer aspects into account in developing the strategy. The Members of the European Parliament are very much awaiting the Commission proposals. There is no doubt that the Parliament will take all necessary action to extend the strategy if the mentioned aspects are missing. ■

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There are a number of issues we need to address if we are willing to build a ubiquitous digital society which reflects the challenges and needs of our times. The major task is, firstly, to prevent a digital split within our society: having on the one hand those who possess unlimited access to a fast and inexpensive internet connection, and on the other hand those being technically cut off due to infrastructural or economic shortcomings. We need affordable internet access for all citizens. Hence, we have to overcome digital handicaps which hinder the further development of a digital market – the further development of fast broadband access points all over Europe is a prerequisite for building a digital society. Secondly, we need to allow for fair and equal access to media and information. Therefore it is our duty to safeguard open and neutral internet access and its use. Thirdly, we have to promote and develop programs for digital awareness and competence. We have to strengthen the digital and media literacy of European citizens by adjusting our education to enable a responsible and confident interaction within existing and future digital facilities. Hence, the Digital Agenda for Europe also requires the inclusion of an educational strategy that outlines how Europe’s intellectual competence will benefit.



Supporting the data agenda

Iain Rolfe, Assistant Director with the Public Data Group (PDG) at the Department for Business, Innovation and Skills gives an overview of how the PDG brings together public sector bodies...

The Public Data Group (PDG) was born out of the government's aim to make real meaningful progress on the open data and transparency agenda. At its heart is the idea that bringing together the organisations responsible for some of the most significant data in the public sector would help them to drive forward the development of the UK digital economy and to encourage innovation across both the public and the private sector.

Created in 2011, PDG brings together 4 organisations – Companies House, Land Registry, Met Office and Ordnance Survey – with world leading expertise in collecting, refining, managing and distributing data on companies, property, weather and geography. It is an Advisory Board with an independent Chair – Claudia Arney – who reports directly to Business Minister Matthew Hancock. Its original remit was to explore synergies between members to deliver efficiencies, new products and enhanced support for the open data agenda.

The challenges PDG has faced in delivering this remit will be similar to many across the public sector:

- Working across diverse organisations – Companies House and Land Registry provide statutory registration functions of the state whereas the Met Office is essentially a scientific organisation and Ordnance Survey is much more commercial in nature.
- Engaging with multiple government policies – Companies House and the Land Registry are at the forefront of the digital transformation agenda and Ordnance Survey recently changed into a government Company.
- An evolving governance landscape – changes following the 2012 Shakespeare Review required PDG to adapt its role.

PDG's early focus was very much on operational opportunities, with working groups exploring IT, HR,

data management, communications and licensing, which resulted in best practice being shared and joint forums being created. One early and significant efficiency identified saw Land Registry move its surveying team to join with the larger Ordnance Survey operation, resulting in savings to government of in excess of £3m over 10 years.

With the disbanding of the Data Strategy Board (DSB) in 2012 the focus shifted more to helping the development and implementation of data policy.

PDG data is made available through a variety of channels and licences and includes both commercial agreements and the provision of open data. The value of the charged-for data to the economy is vast – with Ordnance Survey data widely used in the insurance sector, and the billions of pounds saved by the use of Met Office data and services in the aviation industry as just two examples. Equally, the value of the open data released by PDG is very significant and growing. The most recent estimate placed the value at over £900m annually.

Examples of the open data that PDG has released include:

- Companies House has launched an Accounts Data Product that allows free access to all statutory accounts filed digitally.
- Land Registry has made available more than 18 million definitive records of monthly residential property price data – dating back to 1995.
- The Met Office releases a very large amount of open data particularly through their DataPoint service, which makes available both daily and 3 hourly forecasts, updated hourly, for over 5,000 locations.
- Ordnance Survey has continued to enhance their suite of open data products, which ranges from a generalised street level map to Electoral and administrative boundaries.

PDG is, however, keenly aware that just throwing the data out there is not enough. The Board has encouraged activities to increase awareness of its data and to help people to use it. Examples include:

- Publishing a PDG Summer Statement in 2014, which provided an overview and explanation of the data it makes available and a range of commitments for work going forward.
- A range of engagement and hack events with data users and a diverse range of partners from Mozilla to NASA to the V&A museum.
- Ordnance Survey’s GeoVation challenge programme has involved eight events, supported 28 new ventures (and counting) and awarded almost £640,000 to turn innovative ideas into reality. The most recent challenge on housing has been a joint project with Land Registry.

Looking ahead PDG remains focused on ensuring it is supporting the open data agenda. There will be more data releases to come – not least the move by Companies House to make all its digital data available free of charge, and the recent announcement of new products and increased support for Ordnance Survey. There will also be more activities and events. In the immediate future the focus is on a survey to better understand how businesses are using data to inform improvements to how PDG data is licenced, provided and communicated.

Overall, PDG has made a significant contribution to supporting the UK’s growth into a digital economy and is looking ahead to how it can continue to do more. ■

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An effective resilience community

Resilience Direct is making fantastic strides in the emergency response service arena. Created specifically for “blue light” responders along with their public and private sector response partners. Here, Luana Avagliano, Head of the Resilience Direct team in the Civil Contingencies Secretariat – Cabinet Office, answers the key questions.

Why do we need Resilience Direct?

It's quite simple to make the UK a safer place. ResilienceDirect™ is the UK's secure platform for multi-agency partnerships to share information in both emergency response and in planning. It is essential that the Resilience Community have the best tools and services to support them in effective decision-making at the tactical and strategic levels.

Whose specifications did you use to build this web service?

The resilience community users were vital. ResilienceDirect™ was developed using Agile methodology and open-source methods. It is an adaptable hub, capable of hosting new applications reflecting user demand and future trends in emergency planning and response. Our ethos is “with you” “for you” and “by you”.

How do you get access to Resilience Direct?

It is a private network based across the UK, Local Resilience Forums, and Local Resilience Partnerships. New organisations and users are nominated and

these are submitted to the team. The team then authorise access and create the organisations on the system and give access to additional users.

What benefits have you seen delivered to the resilience community?

A free, intuitive, easy to use service, with no digital certificates. Accessible from any mobile device. It provides real-time information-sharing across organisational and geographical boundaries. By supporting emergency planning and response organisations to do more for less by cutting across organisational silos and multiple communication channels, enabling greater efficiency and increased joint-working. By using agile development techniques the service was delivered within 16 weeks – an absolutely awesome achievement. Also because we do not use proprietary software, we have saved money for the public purse. A win win.

Why include OS mapping?

User feedback and the response to the mapping app has been phenomenal. The first thing that any multi agency response needs is a map which is what we were told when we identified user's needs. There are lots of GIS packages with each organisation using various services and experts; that is still the case. The need has been for an easy to use mapping app that provides a secure multi agency response picture that could be shared across all partners in real time, with the ability to draw cordons, sectorise them for evacuation

and shelter, draw polygons, and use the common symbology as created by the Civil Contingencies Secretariat within the Cabinet Office.

Why did you have to create a new lot of mapping symbols?

When working collaboratively it is important that everyone uses the same terminology, and in this case for mapping the common symbology. A lot of hard work has gone into the delivery of this by the Civil Contingencies Secretariat, and by using this for the ResilienceDirect™ mapping app it will embed this at the heart of multiagency responses.

What does the future look like for Resilience Direct?

It is very exciting, and we are currently scoping our future Technical Roadmap, for new apps to be developed and delivered at pace. We continue to work with our Resilience User Community and there are a number of areas we will focus on; interoperability, system integration, live data feeds for mapping and continuing to enhance ResilienceDirect™.

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ResilienceDirect:

A common information platform
for central and local resilience

OS DATA KEEPS UK CRISIS RESILIENT

Emergency responders need to be ready to deal with crises and disruptive events – ranging from natural disasters to deliberate attacks. Now the emergency response community in the UK have access to a new, fully accredited and secure information-sharing platform called ResilienceDirect™, underpinned by OS location data provided under the Public Sector Mapping Agreement (PSMA).

Smarter Printing for Construction

By Rob Brown, OKI Business Manager for managed document services

The construction industry was hit hard by the recession as housing activity slumped and building projects were cancelled. Recent months have seen a recovery but as construction businesses emerge from the downturn, many are uncertain what approach to take to printing.

Construction companies need accessible printing that is dependable and of high graphical quality. Yet, many such firms remain reluctant to make large investments in new solutions. Instead they often just struggle on, wasting money through inefficient processes and ageing printers.

The construction sector would benefit from a third approach, which involves buying printing as a service which develops with their business. Managed print services is often the ideal solution here.

That is because, instead of requiring them to make an upfront investment in the latest technology, it enables them to buy printers, supplies, maintenance and support in one all-inclusive ongoing contract as operational rather than capital expenditure. And these are exactly the kinds of benefits that OKI can deliver to construction sector businesses through its managed print services and associated managed page solutions.

An OKI managed print services implementation typically begins with an audit of existing practices including

output volumes and printing types. By gaining a transparent view across the print landscape, a business can see where budget is spent and where it is potentially being wasted.

The results will be used to design a long-term print solution tailored to the needs of that organisation, helping ensure that the right printers are being used for the right job.

This approach also establishes best practices such as setting double-sided and mono printing as default options to save costs and drive energy efficiencies. In addition, it means just one contract for all printing and documents needs. This makes it easier to monitor on-going costs, reduce capital investment and control budgets.

For businesses that need more granular control, OKI offers a comprehensive managed page services approach. This involves OKI working with its customer to establish their print and document requirements; recommending the right printing device and delivering a tailored all-inclusive printing plan that covers all consumables and servicing, thereby improving productivity. The right device together with the right printing plan and the implementation of print policies will ensure the company pays a flat monthly fee for what it prints, so it can control its costs.

Of course, in implementing such an approach, vendors need to provide printing solutions that drive added

value for their construction sector clients. The new OKI C931 A3 colour printer is one such solution, delivering the outstanding print quality that construction sector businesses need to print maps, plans and diagrams while pushing the boundaries of media flexibility.

What many construction businesses are looking for today is an approach that allows them to manage and control their spending on printing while enabling them to unleash their creativity with outstanding print quality and superior media flexibility. And that is exactly what OKI's services and solutions for the sector enable them to do.

For further information about OKI's products and services, please visit the OKI website, <http://cleverprinters.co.uk/>



OKI

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 OKI Systems (UK) Ltd
 Tel: 01784 274 300
www.oki.co.uk



ITS ALL IN THE DETAILS

Little things make big things happen

The OKI C931 is your perfect partner ensuring you never miss the finest of details. The C931 can also be used as an office printer for day to day printing, eliminating the need for two separate printers for your office and detail drawing requirements.

Offering true flexibility for office or on site environments with paper handling capability from A6 to SRA3 and banner lengths up to 1.3m for essential signage. The OKI can print on a wide range of media including gloss paper, film, transfer paper, waterproof/ tearproof paper and more!

For more information visit www.cleverprinters.co.uk



Optional

Specification	OKI C931
Description	Four (CMYK) colour
Print speed	A4: 50ppm colour, 50ppm mono; A3: 28ppm colour, 28ppm mono
Print resolution	ProQ2400 Multi-Level technology, 1200 x 1200dpi
Paper capacity	Standard 530 + 300 sheets, additional trays up to 2,950 sheets
Memory RAM	Standard: 2GB; Maximum: 2GB
Hard Disk Drive	Optional: 160GB
Paper sizes/weight	SRA3 to B5; Custom banner up to 1321mm and weights up to 360gsm



Delivering services online

John Chilver, Deputy Cabinet Member for Finance and Resources at Buckinghamshire County Council, explains why it is vital that the fight continues to convince taxpayers and staff to do business with the Council online...

Everyone is on the internet these days, aren't they? Isn't it true that new technology is old hat now for this digital generation who are all online 24 hours a day?

Well actually no, not according to our research which proves there is still a crucial battle to fight to win the hearts and minds of the public.

The reality is that there are large swathes of people who still need to be convinced that conducting their council business online is not only easier, but will also save them and their local authority stacks of money.

That is why Buckinghamshire County Council has embarked on our 'Bucks Online' digital campaign with a view to driving take-up of our council services available online.

But for those of you still unconvinced by the merits of such a campaign, here are some facts unearthed by our research:

- 25% of the calls received by our contact centre in 2014 were for services already offered on our website with 24% of callers being unaware they could have done the same thing online;
- In the year preceding our campaign, only 28% of people contacting our Council had done so digitally, according to a survey carried out on our behalf by Ipsos Mori;
- Nationally, more than 70% of 16-24 year-olds and over 65s did not use the internet at all to interact with local authorities, according to research carried out by the Office of National Statistics in 2013.

These statistics show just why we need to do more to help people transact with us digitally, rather than calling us on the phone, particularly for simple things such as renewing a library book or reporting fly-tipping.

“It really is a ‘win, win’ situation for residents and us; residents will be able to access services online anytime and the savings we achieve will enable us to carry out vital work elsewhere.”

Putting more services online is something we're totally committed to doing.

It's a no-brainer when you consider online contact is the most cost-effective for organisations at 15p per transaction, compared with phone (£2.83) and face-to-face (£8.62) contact. And don't just take my word for this because these statistics are from Socitm, the national professional IT body.

To date, our Council has invested significant funds on overhauling its website, enabling more people to access services and complete transactions online more quickly and easily.

We already have around 64 different services available on our website, from renewing library books or applying for a school place, to reporting a pothole or booking tickets for events. We also collect payments through the site for a number of services.

But we must not rest on our laurels and are working hard to ensure these functions are improved. Meanwhile, we are determined that all of our new online services will be as simple and easy to use as possible.

Among services we've developed are new ways of reporting potholes through a simple to use web page and an interactive mobile app, Report It, which allows people to upload photos and track the status of their reports. I am delighted to reveal that Report It has now been set up for people to also report broken street lights.

This is all revolutionising the way customers interact with us because it is simply so much easier and quicker than ever before to let our Council know when there is a problem. It's also simple for people to then follow-up the issue they've reported – 24 hours a day, 7 days a week.

This is not just about whizzy smartphone apps; it's perhaps even more important that our website is fully mobile-enabled for the easiest and smoothest web access from any device, and this is something we are continually improving on.

Other initiatives we've brought in include the extension of live chat, which is already a feature on our schools and libraries web pages. This will be seen more widely across the website. Later this year, we are also due to unveil a personalised My Account function, which will allow people to see and track their transactions, applications and reports.

Our ambition is to make our online services so good that everyone uses them as their first choice for getting in touch with us.

However, we are aware that some of the public – and indeed some of our staff – still need convincing. We need our employees to act as our advocates on this and champion the digital-first approach; if they are enthused and fired up by our digital offering, then they will spread this enthusiasm to others.

Some of the ways we are encouraging staff to think 'digital first' include drop-in digital surgeries, roadshows and workshops and, for those already digital-savvy employees, we have e-communications and social media forums to help nurture employees' skills and passion for digital revolution.

To help get residents on board with our digital ambitions, we are engaging directly with people at libraries, children's centres, shopping centres, supermarkets and community events such as coffee mornings. Printed promotional material is a key resource to help us reach residents in as many ways as possible, through locations like GP surgeries, community halls and dental practices.

At the same time, we're working with organisations across the county to ensure people have both the skills and access to be able to get online. All of our libraries have access to the internet if not Wi-Fi, and job centres are opening more access points.

We can also offer incentives such as free internet use for library members.

However, let me reassure you, this doesn't mean people won't be able to phone us or visit us in person when they need to, as we know that sometimes personal contact is important.

But what it does mean is that simple transactions, such as reporting a pothole or renewing library items, can be completed day or night.

It really is a 'win, win' situation for residents and us; residents will be able to access services online anytime and the savings we achieve will enable us to carry out vital work elsewhere.

One day, it's possible everybody will be online and will be utterly comfortable in using digital services. But until then, our battle continues to help the public to Do It Online. ■

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Animal Physiology and Nutrition

Areas of Expertise:

The Kielanowski Institute of Animal Physiology and Nutrition conducts fundamental and applied research in the fields of farm and laboratory animal physiology and nutrition. The projects include studies on the endocrinology of growth, development, and reproduction, on neuro-endocrinology, as well as on the metabolism and utilisation of nutrients and biologically active substances from feeds.

The aim of innovative research undertaken in recent years is the improvement of the health-promoting qualities of poultry, pork, and lamb meat by reducing their fat content and improving their fatty acid profiles.

Important topics of research are also the development of digestive tract structure and function in newborn and growing animals, and the symbiotic microorganisms colonising the gastrointestinal tract of herbivorous mammals.

The Institute is authorised to confer the academic degree of PhD in agricultural sciences and publishes the quarterly ***Journal of Animal and Feed Sciences***.



Research Interests:

- Secretory activity of the hypothalamic-pituitary axes
- Molecular regulatory mechanisms within the cells of the pituitary gland
- Brain and gastrointestinal tract histology
- Factors influencing the development of the gastrointestinal tract in neonatal animals
- Food digestibility and nutrient metabolism
- Bioactive substances in animal feed
- Genetically modified plants in animal feed
- Functional food of animal origin
- Rumen microorganisms in domestic and wild animals
- Enzymatic conversions in the rumen
- The use of animals as models for medical research
- Experimental surgery



Pulmonary Ultrasound in Emergency Medicine and Critical Care

Health care providers are challenged daily to rapidly diagnose and treat life threatening respiratory illness. Ultrasound is a non-invasive, rapid bedside tool that enables providers to quickly identify and treat undifferentiated shortness of breath. The BRIPPED project is a rapid, accurate approach to using ultrasound in the evaluation of shortness of breath in the Emergency Department.

[Click to view our video](#)

