

ADJACENT GOVERNMENT

May 2014

Surveying the landscape

Europe's greatest challenges



58 | Sustainable Glasgow

Glasgow City Council highlights how it aims to become one of the most sustainable cities in Europe



73 | Better knowledge for better seas

Janez Potočnik details the ever growing pressures being put on the marine environment



86 | Rail infrastructure: a lasting legacy

Minister for rail, Stephen Hammond discusses the growing investment in rail

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Reinventing the City Building on Creativity

Creativity, innovation and a strong focus on social and cultural aspects of sustainability are at the very heart of developing the City of Varberg to become the Swedish West Coast's Creative Hot Spot by 2025.

In our vision for the future, the City of Varberg has unique opportunities. Our goal is clear, and we are acting on it. We are building a community 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 500,000m² 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. Places of residency, places for eating and meeting, places to shop and work, etc. – comes as a bonus.

Come to Varberg. Share our vision.

Read more on pages 16 and 17.



The City of
Varberg

www.varberg.se



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Introduction

Welcome to the 2nd edition of Adjacent Government. In this spring publication we give thought to a number of topics that remain at the forefront of the government agenda.

Throughout Europe there is consistent agreement from country to country about the importance of sustainability in our cities. Ensuring that each nation becomes greener by reducing their carbon emissions is a key commitment of the European Commission. Each country has their own policies in how this will be established, and we highlight a number of cities that are progressing with their campaigns.

An article by Kirsten Brosbel, The Danish Minister for Environment highlights how Denmark is focusing on creating a more sustainable city. Glasgow City Council also gives an overview on how they are reducing their carbon emissions to become one of the most sustainable cities in Europe.

We also give thought to the incredible work that stem cell research is doing in order to help understand and prevent major health challenges across Europe, such as cancer. The health section includes a number of articles focusing on this, including a piece from the European Cancer Stem Cell Research Institute which discuss in depth the cancer stem cell.

We also highlight Blood and Patient Safety with a special focus in this edition. Included are articles from the NHS Blood and Transplant group in the UK,

and from Diana Agacy from Southampton University Hospital – NHS, which gives an overview of the importance of patient safety during blood transfusions.

Throughout the publication we aim to bring you the topics that are currently on the agenda. One of these topics is investment in rail and rail infrastructure. There are a number of major projects currently underway throughout Europe and the UK. In the transport section we highlight a couple of these projects including HS2, and SHIFT²Rail. Each article sheds light on how these projects will benefit communities, and the economy.

HS2 has been a much debated topic over the last couple of years, with many critics believing it is a waste of money and do not agree that it will close the north and south divide. We also examine the environmental aspects of the project and what impact it will have on Britain's landscape.

We hope that you find the articles in this spring edition of interest and thought provoking. As always we welcome comment from the readers, and should you wish to come forward with future feature ideas, please do get in touch.

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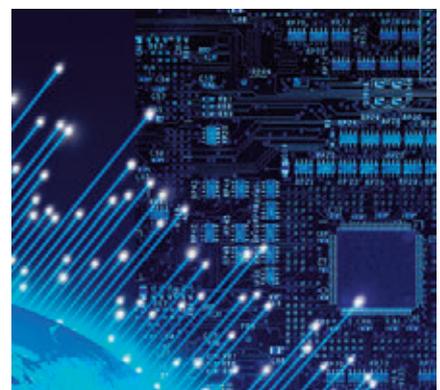
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Denmark: A sustainable urban future

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The world is changing and we have to change along with it. Cities need to be sustainable and adapted to a future with scarce resources. We have to change the way we live, the way we produce goods, and the way we consume.

We live in a global society – a society facing massive challenges in the years to come. Climate change, scarcity of resources, and a growing pressure on the environment constitute the reality that we all will be affected by.

I believe it is essential that we develop and adapt our society to the conditions and the reality of tomorrow. And to me sustainability is the way forward.

I do not expect the transition to be easy, but I believe it is possible. We cannot create a sustainable world without creating more sustainable cities. Our cities are growing – and they are growing fast. In 2050, 3 out of 4 Danes will be living in the major cities. That is an enormous challenge. But if we design our cities in a sustainable and energy efficient manner, we can achieve both environmental and economic efficiency, and at the same time create cities with a high degree of livability for future generations.

The changes we create and the investments we make in our cities now will set the course for generations to come. I believe we have to start making changes today.

The need for sustainable urban development

The UN predicts that 70 % of the world population will be living in cities in 2050. The urbanisation and the growing global population and consumption will inevitably lead to a strong pressure on the planet's

resources, the climate and the environment, and that will create huge problems due to overexploitation of the ecosystems. Therefore, the cities represent our biggest challenges, but also many of the possible solutions to our future challenges.

We need to focus on creating cities, which are adapted to climate change, but still remain attractive and healthy cities that support economic growth, prosperity and employment.

“I believe it is essential that we develop and adapt our society to the conditions and the reality of tomorrow. And to me sustainability is the way forward.”

The World Bank wrote in its urban and local government strategy: Cities can be efficient, but are not always designed that way. That is precisely, why we have to start changing the way we think today, not tomorrow.

The Danish way

Cities consist of complex environmental, social and economic networks that are developed and operated in collaboration between the authorities, the private actors and the citizens.

In Denmark we have a long tradition for involving the public and private actors in city planning. I believe that the inclusion of citizens and business in this process is crucial in order to plan for better and greener solutions and to bring the changes into life.

We must focus on everyday life and on how to make it easy and more attractive for both the public and private sector to become more sustainable. The best examples on urban sustainable solutions are the ones



that are well-balanced between the interests of the common goods and of the markets. To me that is an absolutely necessary focus to have when creating sustainable cities.

Many cities worldwide are affected by more and more rain. In the Danish city of Roskilde, the local water company and municipality have taken a new approach on handling the climate adaption. As extremely heavy rainfalls only occur quite rarely, the municipality has built a skating and activity park, which holds the water in case of heavy rain, thus avoiding flooding by diverting excess water from the streets into the activity park's many channels. When it is not raining, the park contributes to a vibrant urban environment.

“We need to focus on creating cities, which are adapted to climate change, but still remain attractive and healthy cities that support economic growth, prosperity and employment.”

Another worldwide problem is resource scarcity. “The Kalundborg Symbiosis I Denmark” is a unique project between private companies and the local municipality. The principle of the collaboration is the sharing of resource and waste streams. In this case, one company's waste or byproduct becomes another company's resource. Through this cooperation, companies' competitiveness is strengthened, the production becomes greener, the amount of waste and residuals is limited, and the need of new resources is reduced.

Copenhagen CO₂ neutral by 2025

Copenhagen aims to be the first CO₂ neutral capital in the world by 2025, and our capital has won the European Green Capital Award for combining sustainable solutions with economic growth and quality of life.

In Copenhagen, the bicycle is the favourite form of transport for many people. This is extremely good for the environment and the public health as more calories are being burned and less fossil fuel emitted. But when asked why people prefer their bicycle to a car, the answer is often related to neither health nor the environment. It is because it is by far the easiest and cheapest way to travel in Copenhagen.

In many ways, that very comment from the people of Copenhagen is what the whole discussion of sustainability is all about: If we want to succeed in creating a sustainable world, we need to make the sustainable way of living the most attractive alternative. ■

.....
Kirsten Brosbøl

Minister for the Environment

Danish Ministry of the Environment

www.mim.dk

Municipal cooperation

Leading the way to a sustainable society

The Green Cities Partnership is a close and binding partnership between the Danish municipalities of Albertslund, Allerød, Ballerup, Herring, Kolding and Copenhagen. The initiative was founded in 2000. We aim to use this partnership as a platform on which to build a sustainable future for the benefit of our citizens. We are committed to working towards achieving shared and ambitious goals, and we do so by pooling our expertise and engaging in common projects. One such project is the Carbon 20 project described later in this article.

A political platform

The member municipalities are representative of Denmark with respect to geography, urbanization, size and political representation. The work of Green Cities is founded on the member municipalities' pooled experience and know-how. Our political ambition is to create better framework conditions for the municipalities' work with climate and environmental issues. When we meet walls of regulations and economic barriers, which effectively prevent the individual local authority from realising ambitious goals, we initiate debate in the public arena and in direct dialogue with the relevant ministers. More than any other player the municipalities are expected to deliver the climate and environment policy results that government and citizens expect.

Six common themes

The Green Cities Partnership is built on six common themes and a series of exacting goals, towards the achievement of which member municipalities are obliged to work. The six common themes are: Climate, Groundwater, Organic food, Natural environment, Traffic and Waste. The Green Cities' results are collated in a joint annual report. The annual report provides overarching, thorough and documented insight into the municipalities' progress towards reaching each of the goals. The report also accounts for how the municipalities individually are working to achieve these goals. Within three years, we are committed to moving all our goals in a positive direction in every member municipality.

Further information in English is available on our site www.greencities.dk/UK and on our State of Green-profile.

Carbon 20 – Climate partnerships between local government and companies

Green Cities' largest project so far is Carbon 20. Carbon 20 was carried out in the period 2011-2013 with funding from EU Life+. The project has been developed by the Green Cities partners with Næstved municipality, Local Government Denmark, Aalborg University, The Technical University

of Denmark, Business Kolding and Gate 21. The objectives of the project were to develop models for collaboration between local government and private companies with a view to reducing CO₂ emissions, to develop competences and tools municipal authorities and companies can use to achieve CO₂ savings and to reduce CO₂ emissions by at least 20% in at least 100 companies in the seven municipalities involved.

Breaking with tradition

The project focuses on achieving CO₂ reductions in private companies in the municipalities. In 2011, the private sector produced 38% of total CO₂ emissions in Denmark. Until now, partnerships between the public sector and private companies in Denmark in relation to CO₂ reductions mainly targeted large companies and have been managed at the national level. The Danish municipal authorities' contact with the companies primarily targeted approvals and supervision in accordance with the Danish environmental legislation. In the past, this work did not include collaboration with companies on saving energy and reducing CO₂ emissions. Carbon 20 breaks with tradition by developing and testing local partnerships between local government and private companies in relation to CO₂ savings.

CARBON 20'S PARTNERSHIP MODEL



Energy savings drive green growth

Energy screening of the companies which took part in the project resulted in proposals to achieve energy savings at the cost of investing a total of DKK 62 million (EUR 8.3 million). The average payback time is 3.5 years. During the project, interventions costing approximately DKK 24 million (EUR 3.2 million) have been implemented. More investments will probably be made after the end of the project. During the project period, approximately 24 full-time jobs (or the equivalent) have been created. Job creation is expected to continue as more interventions are implemented after the project has ended. From a socio-economic point of view, it pays to allow local government to collaborate with companies on energy savings.

Energy savings - mighty oaks from little acorns grow

The method used in this project resulted in energy savings for very

small and big companies alike. Even very small companies have succeeded in saving energy, which is surprising as they encounter many barriers in connection with identifying and implementing energy efficiency measures. In Denmark, small companies with less than 50 employees constitute approximately 95% of all companies. There is therefore substantial potential to save energy in small companies. All that is needed is to extend the method to every municipality in the country. The project has shown that small and medium-sized companies have a great interest in reducing CO₂ emissions and ultimately in improving their bottom line results. The project results also indicate that local government can play an important role as a catalyst in Denmark's transition to a green economy. The municipal authorities can get the ball rolling, push for change and motivate people to act. Several other companies said that they had never achieved energy savings if they had not got involved in

this project. The point is that we in the municipal authorities can make a difference if we make a determined effort to encourage private companies to reduce CO₂ emissions.

How can the project be replicated?

Carbon 20 has developed methods and tools for developing companies' climate work which can easily be applied to local government collaboration with companies. The method includes establishing a PPP (Public-Private Partnership) agreement between a local authority and a company, and also includes partnership with its suppliers and clients, utility companies, energy advisers and/or other relevant and/or other relevant partners. The methods applied and lessons learned from the project are available on the project website www.carbon20.dk/carbon20InEnglish/. We suggest that the principles and tools developed could also be adapted and applied in other countries.

For further details, please [click here](#) to read the Layman's report for the project.



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Green means a better planet – and better business

Busting the myths of green construction

Green buildings are good for the climate and for a number of business reasons. Green buildings use fewer resources and boost health, productivity and, ultimately, the value of properties. Skanska has a long track record of developing and constructing green buildings. In this article, Staffan Haglind, Skanska's Green Business Officer, summarizes the value of going green and busts a few urban myths.

Urban myth #1 "Green buildings are more expensive than conventional buildings."

According to Skanska's own experience and the World Green Building Council's global report "The Business Case for Green Building", going green doesn't necessarily have to be more expensive. The key to cost-effective green building is to put green on the agenda and set clear green targets from day one, cooperate with skilled green partners and avoid fancy green add-on features late in the process.

Urban myth #2 "None of my clients ask for green buildings."

An increasing number of clients are looking to go green. The green market has doubled every three years and is expected to continue to do so. Clients who don't ask for green buildings today,

probably will tomorrow. Lagging behind can ultimately hurt your business, your bottom line and your brand.

Urban myth #3 "Green is not interesting for civil sector clients."

So far, the building construction sector has been ahead of the civil sector when it comes to going green. However, we now also foresee huge potential and excellent opportunities for green business in the civil sector. Experiences from the UK market indicate a strong correlation between carbon reduction and cost savings, green business and profitability go hand in hand.

Urban myth #4 "Green is only about kilowatts."

Going green is not only about energy. It also includes carbon, waste, material selection and water consumption. Green features can also de-risk property assets, increase property value and attractiveness, and strengthen brands. On top of that, research overwhelmingly shows a strong correlation between green building features and health, well-being and productivity, faster learning in schools, faster recovery in hospitals and higher sales in retail businesses. To make correct business decisions, other effects of green buildings must be taken into consideration in addition to energy savings.



Powerhouse Kjørbo, Oslo, Norway

Powerhouse Kjørbo, near Oslo, generates twice as much energy as its operation uses. The office building has been transformed into a supplier of renewable energy. This has been achieved through solar panels, geothermal heating and cooling, and a well-sealed and insulated building structure combined with integrated control systems. The building is probably the world's first refurbished building to be energy-plus and Norway's first certified BREEAM-NOR Outstanding building.



New Karolinska Solna, Stockholm, Sweden

The new university hospital Nya Karolinska Solna (NKS) in Stockholm is

Skanska's largest project to date. The 330,000-square-meter hospital will be one of the first hospitals in Europe to meet the requirements for LEED Gold certification. The hospital also aims to achieve the Swedish third-party certification Miljöbyggnad Gold.

The hospital's geothermal facility alone will satisfy 65 percent of the hospital's heating and cooling demands. NKS will use 100-percent renewable electricity and climate neutral district heating and district cooling from biofuel.



The Väla Gård office building, Helsingborg, Sweden

Upon completion, Väla Gård achieved more LEED credits than any other project in Europe. It is LEED Platinum certified and became Sweden's first Deep Green building by achieving net zero energy and being constructed

with zero hazardous materials and with zero waste sent to landfill. It sources energy from a solar power system and geothermal heating and cooling. The building's expected and monitored energy usage is only 16kWh/square meter for heating, cooling, ventilation and property related installations.



VT8 Highway, Sepänkylä Bypass, Mustasaari, Finland

The USD 55 million design/build contract comprises an eight-kilometer, four-lane highway project and 13km of secondary roads.

The green approach to design and execution of this project proves that significant environmental and financial savings can coexist. Skanska's cost-effective design decreased material usage, saving USD 8.2 million for the client, the Finnish Transport Agency. In addition, the alternative design reduced the carbon footprint. This was achieved through reducing excavation and the use of cement and other materials substantially.



Puuvilla Shopping Centre, Pori, Finland

Puuvilla Shopping Centre in Pori will be one of the biggest shopping centers in Finland. The aim is to provide energy with low emissions, and geoenergy is used for heating and cooling the building. The shopping center's energy use is expected to be 45 percent below the national standard. Close co-operation between the owner and Skanska from the early phases of the project is key to the success. The 100,000-square-meter building aims to achieve LEED Gold certification.

SKANSKA

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Stockholm: going green

Stockholm is on a journey to become a world-class sustainable city, here Juan Copovi Mena, Executive Director at the City of Stockholm Real Estate Administration explains how...

Together with other major property owners we are working to reduce existing buildings' environmental impact. Now more so than ever, it is important that the environment is taken into consideration when new buildings are constructed and they are certified according to one of the established systems.

The majority of buildings in our towns and cities were built some time ago, and many have considerably lower energy, and environmental standards than new builds. Existing properties account for almost 40% of energy consumption in Sweden, which is where the major challenge lies, as well as the potential to reduce the property industry's ecological footprint.

Four years ago Stockholm City Council commenced a long-term scheme to reduce the environmental impact of our properties. Stockholm City's Real Estate Office owns and manages 800 properties totalling an area of 1 million square metres. Around half of these account for the bulk of the environmental impact.

Our property portfolio includes the beautiful and well-known Stockholm City Hall, several covered markets, libraries, museums, offices and cottages – everything from palaces to cabins. These range from very old and culturally valuable buildings to ultramodern office properties.

Energy efficiencies have been implemented in 74 of our most energy intensive buildings, which has been highly profitable, and with a good outcome for the environment. The target is to reduce energy consumption by 30% – equivalent to heating about 1,000 normally-sized detached houses. As many of the initiatives were

implemented during 2013, a complete follow-up of the target cannot be performed until 2015.

The project has cost 200 million Swedish Krona (SEK) to implement, and will result in savings of SEK 12 million per annum (in 2013 the figure was SEK 5.2 million) in reduced energy costs. This means that on average we will recoup the investment in 16 years, and in some properties the investment will pay for itself in just a few years.

We are also working to reduce our carbon dioxide emissions by 10%, which is equivalent to travelling around the Earth 395 times by car.

The project comprises both efficiencies and conversion to energy sources which have less impact. 33 buildings which were previously heated with oil or gas now use the district heating grid or geothermal heating, and all our larger properties are now fossil-free.

We have made other buildings more energy efficient through:

- Replacing fans and pumps with energy-efficient models;
- Improving control of technical systems;
- Improving ventilation and installing heat recovery;
- Changing to more energy-efficient lighting (LED) and adapting operating times;
- Optimising indoor temperatures;
- Working on energy optimisation.

Continued on page 18...



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

Continued from page 15...

This entails constantly fine tuning systems and finding opportunities for improvement. Energy specialists are contracted to review and optimise each building; all the engineers with operational responsibility in the buildings are trained to rapidly detect negative deviations, and measurements and follow-ups are conducted on a regular basis.

In addition, we have participated in the pilot project "Open District Heating" in conjunction with the energy company Fortum. Two properties which house businesses in the food sector are supplying surplus heat from refrigerating machines to Fortum and the city's district heating grid.

"The greatest environmental improvements can be made in existing properties"

We have also initiated a project to environmentally classify all our larger existing buildings according to In-Use. Thirty-one buildings have been certified, making us the European city with the most buildings certified under BREEAM In-Use. This year at least 20 additional buildings will be certified, and the target is to have 100 certified buildings by the end of 2015.

The BREEAM In-Use certification system is ideal as it has a clear focus on existing buildings and the certifications can be implemented in several different stages. We are working together with the tenants to reduce their energy consumption and overall environmental impact.

Stockholm City Hall is one of our signature buildings and discussions are being held about how to reduce the building's overall ecological footprint through measures including reduced energy consumption and more efficient rubbish separation. More green rental contracts plan to be introduced, where the landlord and tenant agree to work together to reduce the building's environmental impact. Plans to install measuring equipment so that tenants can clearly follow the improvements have also been put in place.

After the successful outcome of the energy project and environmental classification, we have also recently started collaborating with representatives for a number of property companies to reduce the industry's environmental impact. We are formulating targets and criteria through a joint undertaking which will lead to Stockholm becoming a world-class sustainable city by 2030. The work is being performed through the City of Stockholm's forum for sustainable properties.

One of the cornerstones in our joint work is an organised exchange of knowledge and information. We are collecting facts and good examples on a joint website. We are also establishing a prize in conjunction with Swedish Green Building Council to reward successful sustainability measures in collaboration between landlords and tenants.

We are hoping that this initiative will create even greater involvement and motivate each other and our tenants to significant new achievements. The tenants are very keen to be involved. The scheme is also arousing a great deal of pride among our employees. ■



**Stockholms
stad**

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Creating smarter and greener cities

Amy Caddick, Journalist at Adjacent Government sheds light on how the European Commission has grown their regional policy over the last few years...

In a large political area like the EU, regional policy is imperative to ensure all member states are working towards a common goal. Under the auspices of the Commissioner for Regional and Urban Policy Johannes Hahn, the European Commission has grown its regional policy considerably over the last few years.

The urban landscape undoubtedly has a role to play in developing regional policy. The scope and style of a city determines the health and wellbeing of its

citizenship. The urban landscape can also have a significant impact on the environment. Creating smarter and greener cities has been at the forefront of Hahn's agenda for Europe.

"Cities should be central to our thinking," said Hahn, speaking in February at the CiTIEs Forum. "This is not just because so many Europeans are city-dwellers. Cities have a very particular quality. They are a concentration of all the interactions that make up our civilisation – our culture, our society, our genius for

invention, as well as some of our darker tendencies. That is why they are a laboratory in which much of our future will be designed. We should not forget that cities are drivers of development, providing services and amenities for communities beyond their own boundaries. When we support urban development it helps the surrounding rural areas too.”¹

Well established cities impact the towns and villages in the surrounding area, enabling economic growth, increasing employment opportunity, and creating a sense of community. Improving and developing cities is important for the future of Europe.

“It is becoming increasingly clear that economic growth in the EU will come primarily from Europe’s towns and cities. The reality is therefore that these days neither Member States nor the EU can achieve their economic or social policy objectives without engaging with cities,” said Hahn. “Since cities are places where challenges are raised and where solutions can be most effectively delivered, they are in the driving seat to implement many EU or national policies at local level.”²

Another area that is vital to regional development is small, medium enterprises (SMEs). These businesses are the key to economic recovery across Europe. Stimulating the growth of SMEs is something the Commission, and individual European member states, has worked hard to achieve. Hahn recognised the importance of supporting SMEs and nurturing the competitiveness of these businesses.

“It is therefore important to get the programming right and design a policy mix that not only addresses concrete SME needs and opportunities but has the transformative potential to steer SMEs towards higher competitiveness levels, new and improved products and services, and new markets. The best programmes are based on a thorough analysis and understandings of what are the needs, opportunities and bottlenecks of SMEs in a given territory, not only at a general level

but in terms of the whole lifecycle of these companies and the different sectors they are active in.”³

Creating economic and social cohesion across the European Union will reduce inequality between member states and bring all regions to the same standard. The European Regional Development Fund has played a significant role in helping cities across Europe to regenerate and become more efficient, greener places to live.

Focusing on improving innovation and research, pushing forward the digital agenda, supporting SMEs, and creating low-carbon economies, the ERDF has helped many regions to develop and grow. Investing in cities is vital for the future progression of the EU.

“Experience tells us that nearly half of our future funding will be spent in urban areas in one way or another. Our philosophy is that effective investments in urban areas should follow an integrated strategy, based on synergies across sectors. We need to bring together the necessary actions in a holistic view of the development of our urban centres,” said Hahn.⁴ ■

¹ http://europa.eu/rapid/press-release_SPEECH-14-134_en.htm

² <http://www.adjacentgovernment.co.uk/lg-edition-001/driving-smart-sustainable-growth/>

³ http://europa.eu/rapid/press-release_SPEECH-14-335_en.htm

⁴ <http://www.adjacentgovernment.co.uk/lg-edition-001/driving-smart-sustainable-growth/>

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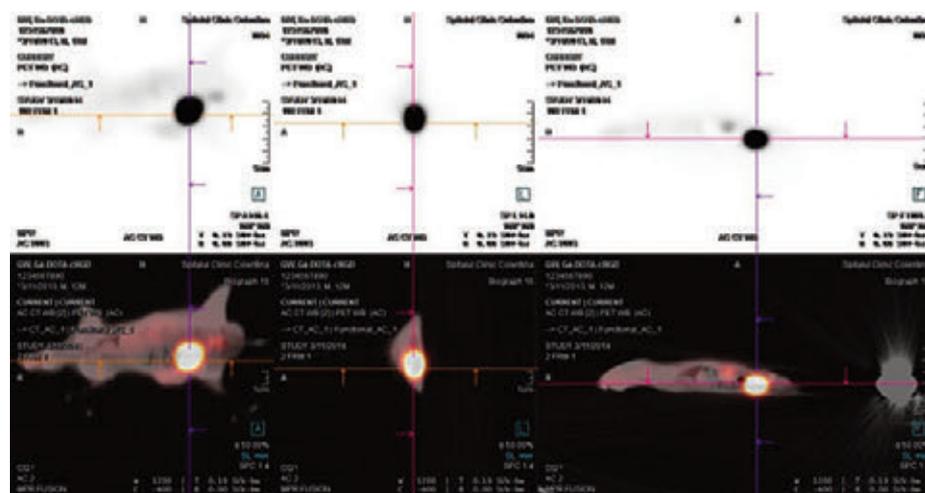
Early diagnosis – a (better) chance to cure

Development of new radiopharmaceuticals for molecular imaging and systemic radiotherapy

For over 35 years, research in the field of medical use of radioisotopes is among one of the top priorities of the Horia Hulubei National Institute for Physics and Nuclear Engineering, the largest Romanian R&D institution in terms of assets, personnel and scientific output.

To turn its strength to the best account, the institute has concentrated resources to steadily develop a sound in-house capability to get, and stay in the forefront of the current nuclear science and technology. In early 2000, by adopting the European Regulations in pharmaceutical preparation for human use, the existing infrastructure had to be redesigned; thus, important investments, quality assurance programs and professional qualifications were successfully pursued for conforming to safety regulations, both pharmaceutical and radiological.

As a consequence of these measures, the newly developed Radiopharmaceuticals Research Centre (CCR) is a state of the art facility, based on a cyclotron and radiochemistry laboratories, dedicated to medical radioisotopes studies and radiopharmaceuticals preparations for clinical use. Its characteristics and performances open new perspectives for significant future achievements in multidisciplinary areas. Researchers aim to obtain emerging radioisotopes for nuclear imaging and therapeutic applications, more convenient production routes in the nuclear reactor



PET (up) and PET/CT (bottom) image of tumor induced angiogenesis (newly formed vessels) in a growing tumor in animal model using 68Ga-cRGD peptide

and accelerators, and to bind them to biological molecules of interest, resulting in radiopharmaceuticals, thus underpinning a more effective and efficient use of nuclear medicine techniques when appropriate and in a cost-effective manner.

Modern medicine asks for better performing methods for diagnosis and therapy, to better understand and treat diseases that have major impacts. The recent statistics say one person in three will have cancer, 50% die after their 1st heart attack, and 20% aged 75-84 suffer from Alzheimer's disease. While the non-nuclear diagnostic methods, such as X-rays and ultrasounds, show the size and shape of an organ and reveal if a tumor or other abnormality is present, nuclear medicine allows seeing how an organ is functioning, using radiopharmaceuticals.

Molecular imaging probes are a special class of pharmaceuticals that target specific biochemical signatures associated with a certain disease and allow for non-invasive imaging at molecular level. Because changes in biochemistry occur well before diseases reach an advanced stage, molecular imaging probes make it possible to locate and stage a disease, track the effectiveness of a drug, treat the disease, monitor the response and select the patients to allow for more personalized diagnosis and treatment. Molecular targets such as hypoxia, angiogenesis, receptor expression on tumor cell surface or in the brain, metabolism, blood flow and cardiac functions are just a few of the biochemical pathways that are of interest to evaluate.

Surgery and external radiation therapy are the major treatment modalities for



Radiopharmacy laboratory at newly established Radiopharmaceuticals Research Centre at NIPNE

primary tumors and large metastases, but other, complementary methods are needed to achieve improvements in the treatment of disseminated malignant diseases. Radionuclide therapy is based on the same biochemical processes, aiming to locally induce severe DNA-damage and to eradicate disseminated tumor cells and small metastases.

The anticipated success of personalised medicine will in part depend on a molecular-targeted drug having a linked diagnostic test designed to plan or to monitor therapy in real time as a way to determine its ongoing efficacy. Molecular probes carrying a radionuclide (a positron emitter for Positron Emission Tomography (PET), a gamma emitter for Single Photon Emission Computed Tomography (SPECT) or beta emitter for systemic radiotherapy) is an essential tool in oncology, both for diagnosis and therapy but also in

cardiology and neurology giving functional imaging and predicting the success of therapeutic drugs. The amount of radiation a patient is subjected to is about the same as a normal X-ray, but the information gathered is significantly different.

The use of radiopharmaceuticals is expected to increase rapidly as new diagnostic methods are developed. According to a new market research report from RnRMarketResearch.com. "The new innovations in nuclear medicine to target coronary heart disease, Alzheimer's disease, breast cancer, and bone metastasis would be the major drivers of the diagnostic radiopharmaceuticals market in the future".

At IFIN-HH, radiopharmaceuticals for both molecular imaging and systemic therapy are under different stages of development, from radiochemistry to preclinical testing. Many others were

successfully translated to clinical practice addressing bone pain palliation, sentinel lymph node detection and cancer seeking or targeted radiotherapy agents.

The strategy of IFIN-HH is to become a key player in the radiopharmaceuticals market, the main medical radioisotopes producer, and to redefine the applicability of research in this field by putting in clinical use a new class of modern agents for molecular imaging and systemic radiotherapy. Because of the limited self-life of these products, they could not be produced at distant sites and imported; this backdraws the use of PET/SPECT radiotracers and targeted therapy in Romania for the last decade.



Cyclotron installed at Radiopharmaceuticals Research Centre, NIPNE, producing medical radioisotopes

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Intelligence in the city

Alain Chiaradia and Louie Sieh of Cardiff University explain the importance of data management for towns and cities...

In the film *Her*, a man who is in a romantic relationship with his computer's intelligent operating system (Samantha, voiced by Scarlett Johansson) is appalled to discover that 'Samantha' has been chatting up other people – 8,316 of them to be precise. To maintain 8,316 parallel meaningful conversations is impossible for humans because we just do not have the capacity necessary to collect relevant data, the adequate knowledge to convert that data into information, nor the necessary disposition to converse in specific, meaningful and particular ways at 8,316 convenient times.

We are faced with this problem of more data than we can deal with in everyday life; just think of your inbox when you get back from holiday. In the parlance of knowledge management, this problem can be described as an inability to turn data that is located in the world

into actionable knowledge which is located in agents, via the deployment of information. Intelligence is the process of making information work for decision making through data identification, collection and analysis, and deployable knowledge itself.

Local authorities hold large amounts of data which simply remain data and does not become intelligence nor inform action. This data-knowledge gap is a major problem in the effective use of information in the public sector. Management decisions in pursuit of efficiency or economy may exacerbate data-knowledge gaps, even as ever more data is generated. Public administrators need to be alert to the potential of data, to analyse and thus transform data into information, producing intelligence, and to grasp opportunities for acting on that intelligence. Importantly, they need techniques to be able to do this effectively.

In managing knowledge for the administration of towns and cities, leaders would do well to pay attention to the following ways of reimagining of the human-machine interface to produce 'intelligence':

First, standard data could be 'street-based' rather than 'area-based'. The way that standard data are formatted can facilitate the automated production of intelligence. With a number of exceptions (e.g. crime data, Ordnance Survey Mastermap and land use, which are street-based), currently, most datasets are 'point data' or 'pre-set area data' (output area, lower super output area, wards, local authority areas). A street-based, rather than pre-set area data format is more versatile for addressing user-defined and bottom up issues. The anonymised street-based formatting of census and related data would have a massive benefit for open data application take up. Street level data formats for all urban management data would dramatically reduce uncertainty about data aggregation into information and thus facilitate the automation of analysis, which in turn produces intelligence. One example is Cardiff University's spatial Design Network Analysis (sDNA). This tool extracts information from the street network, and the network shape itself becomes the common glue between datasets to establish place rank. This built on Google's innovation page rank which was to analyse the network itself, and not only the website content.

Second, explore automatic means of transforming data into information. Such means already exist. In the finance sector, this has until recently been the kind of work done by junior analysts, who pull data from terminals, fill in spreadsheets and crunch numbers. This can now be done by machines (e.g. Warren a "virtual market assistant" – like Apple's Siri, but for investors) that draw inferences, answer questions and recommends action too¹. Machines are taking a bigger role in not just dealing with data, but in the creation and deployment of intelligence. Indeed, 'agents', in which knowledge is located, do not have to be human. The agent could be a machine or an organisation combining both human and machine. This rethinking of the human-machine interface could make standard public sector data more available. See for example the Greater Manchester Data Synchronisation Programme.

Third and finally, incorporate 'imagineering'. The means of converting information into intelligence requires independent thought. If data mining, machine learning and artificial intelligence are extracting patterns and generating information more efficiently and in a more timely manner, human beings' independent thoughts and imagination should be freed up for imagining what is possible. In an information society, 'imagineering' – the explicit evidence-based visioning of "what if" scenarios – will be as necessary to towns and cities as engineering – the explicit mechanics-based imagining of technical possibilities – has been to sophisticated machines. At Cardiff University, students of the MA Urban Design do a community involvement-led urban design project in their second semester. In the past 2 years, they have worked together with local community stakeholders to re-imagine Swansea's historic High Street.

The great challenge is to enable machine intelligence and human imagination to beneficially inform one another. Successful 'imagineering' should enable powerful generalisations of data driven intelligence and specificities of human knowledge to interact fruitfully. In towns and cities, this should be in an arena that admits the voices of diverse urban stakeholders. Decision-makers must not succumb to 'managerialism' and be frightened of framing their use of data-driven intelligence in the specific knowledge of place. Neither should local stakeholders shy away from framing local issues in the broader context. Data-driven intelligence should not be a prison that inhibits decisions. It should be wielded to set imagination free in pursuit of an optimistic future. ■

¹ FT Technology: rise of the replicants by Richard Waters 03/03/2014



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Smart standards for smart cities

Dr Scott Steedman Director of Standards, and Dan Palmer Head of Market Development for Manufacturing & Services at BSI discuss how the UK is setting the global pace for Smart Cities...

The notion of the 'smart city' means different things to different people. For some it means better services, for others it means 'green' cities or more jobs and improved transportation. Essentially the concept is underpinned by a multitude of radical, new and exciting ideas on how to combine previously unshared sources of data and information to improve the quality of life in cities, towns and communities worldwide.

The Smart City challenge

As with all ideas that are open to interpretation, how to achieve them can be difficult, especially when dealing with the engineering and data management challenges inherent in major city development projects. The first problem is to agree a common understanding of what a smart city is, for which we need a common language to explain smart cities and a shared vision of the future that a smart city will make possible. People will then know what is on offer, innovators can explain the benefits of their solutions and city authorities can spend public funds with confidence in the outcomes.

The solution

To do this effectively, standards are needed. They provide a formal process to agree not only technical specifications but also best practice in issues such as public procurement of smart services, or community involvement so that everyone involved can gain confidence in the outcome.

To address the smart city challenge, the Department for Business, Innovation and Skills (BIS) commissioned BSI, in its role as the UK's national standards body, to lead work on standards to support and deliver the smart city vision. During this process, it became clear that the challenge is not confined to technical questions around the exchange of data and the interoperability of systems. There is a wide range of issues surrounding how cities plan, procure and implement smart technologies.

The Smart City standards and data protocols

This year, the UK will be the first country to publish a suite of standards that starts to address the full

breadth of the smart city challenge. Developed by working groups representing all interests, the standards will provide an overview of the concept, a common vocabulary, and a framework¹ to guide decisions on how to create smart cities, guidelines on planning and a concept model to enable data-sharing between agencies.

Supporting these good practice standards, we also need agreed standards for the data protocols, for the use and publication of the data, and for the overall systems architecture. An obvious source of data will be from sensors attached to buildings and infrastructure across the city.

The data standards will need to be compatible with the new national standards on building information modelling (BIM), which government will mandate on publicly funded construction projects from 2016. Cities are also asking for guidance on new business models. The pioneering nature of smart city products and services, which cut across city systems and benefit different agencies, makes them hard to assess using conventional cost-benefit models. New approaches are needed to drawing up business cases and, particularly, on best practice procurement for smart city projects.

The UK projects

Demonstrator projects, funded by the Technology Strategy Board, are underway in Bristol, Glasgow, London and Peterborough. Many other cities are working on their own initiatives. BSI's aim is both to capture good practice from these projects to feed into the standards programme, and to create standards that can help deliver these projects successfully.

The global view

The global smart cities market is emerging rapidly and analysts talk of a global market of around \$40 billion a year within the next few years. If we act quickly, there is a real opportunity to create a 'UK brand' for future cities.

The UK leads the world in shaping business standards. To make the most of the global opportunities from smart cities, experts representing all stakeholders must play their parts in structuring this new knowledge. We have every chance of shaping the way that countries around the world deliver their smart city projects.

In December 2013, BSI signed a new agreement with China's national standards body, the Standardisation Administration of China (SAC) that allows China to adopt UK standards, the first such agreement made by China with any other country. By promoting our new standards for smart city projects to China, and to the world, we can help to bring real competitive advantage to the UK in this rapidly growing world market. ■

Biography

Dr Scott Steedman CBE FREng is Director of Standards at BSI where he is responsible for the UK National Standards Body. He is a non-executive member of the Board of the Port of London Authority (PLA) and a former Vice President of the Royal Academy of Engineering. Dan Palmer is Head of Market Development at BSI, where he leads on standards for manufacturing and service industries, with a particular interest in emerging technologies. As part of this, he is responsible for the development of BSI's smart city standards programme.

¹ PAS 180 Smart cities - Vocabulary and PAS 181 Smart city framework – Guide to establishing strategies for smart cities and communities were published in February 2014.

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The new green buildings

Philip Clayden Director and Co-founder of Green Unit Limited discusses the possibility of pre-fabricated buildings becoming the new sustainable option...

It makes perfect sense to do away with the mess, bother and lead times of traditional building methods and embrace the emerging world of off-site manufacture, but is it a safe option? For prefabricated buildings to make a significant impact on our built environment, the concept must first be proven to present reliable solutions.

After all, many of us grew up with the view that prefabs were sub-standard buildings. We knew of damp community halls, musty classrooms and cold prefab houses that had outlived their original design life and were literally rotting from the ground up.

Over 150,000 prefab buildings were put up at a cost of £2m in the difficult years following the war, when urgent need for housing dictated the need for speed. Surprisingly however, prefabs were not necessarily cheaper than traditional buildings, with many types embodying the latest technology including electricity and central heating, contemporary fitted kitchens and modern bathrooms. In fact, the average cost of a prefab was twice that of a terraced house - but at the time such spending was necessary for the authorities to meet their needs.

It is apparent to us now that the key weakness of prefabs was down to damp, which caused unhealthy mould growth and rot. These failings can mostly be traced to failed damp-proofing and insufficient insulation. However flaws in the design cannot usually be held responsible, as generally the design life of a prefab was only 10-20 years.

Fast-forward to today, and we again find ourselves with a serious housing shortage, and as before, the government is encouraging the uptake of buildings constructed off-site or using off-site manufactured components to guarantee quality and decrease lead

times and cost. The new industry government expert Off Site Construction Group announced recently by Housing Minister, Max Prisk, will seek to use off site construction to “revolutionise the way we deliver our housing, providing a swift, high quality solution to creating cost effective, zero carbon homes”.¹

Their reasoning is that using quality controlled processes in a factory; high standards can be achieved alongside more efficient use of materials. Also, technology is able to augment individual productivity and reduce labour costs per unit of production. We should be clear however; that the cost efficiencies obtained in this way will not necessarily undercut the latest mass site-build systems employed by established developers. In such situations, the entire building site effectively becomes a factory with the implicit efficiency of repetition and scale.

Nevertheless it is undeniable however, that off-site manufactured, engineered systems can produce higher quality buildings with far quicker site-assembly times, and whilst mass developers are often aiming to meet building regulations at the minimum level, some modern prefab systems are striving for true sustainability and ‘eco’ status.

Thus, modern prefab buildings come into their own for small scale developments, where lead times must be short, and costly site disruption minimised. Here also, eco-credentials and excellent building performance are likely to be highly valued.

Today’s prefab market provides plenty of options to meet customer budgets and design aspirations by essentially providing three categories of product: fully-fitted turn-key solutions, site-finished solutions and self-build kits. Prices range from around £500/sqm at the bottom end, for self-build kits, up to around

The Built Environment

£1,800/sqm at the top end, for turn-key solutions.

The UK market is unusual in that our heritage of vernacular homes creates an aspiration for something unique or personally tailored, a fact that has had to be reflected by modern prefab designers. For example, the Suffolk based offshoot of a Swedish prefab manufacturer, Svenskhomes, has developed a range of styles which its Swedish market simply didn't require, as Swedes were often happy to live in essentially identical homes.

German design has famously given us the Huf house, which arrives on a lorry and is assembled by employees from the company's single factory. The high cost of this prefab with its trademark look, makes it attractive to an aspirational market that might otherwise employ architect design. This is not typical of German prefabs however: Hans Haus and Weberhaus have made inroads into the UK in a similar way to the Swedes by providing a range of styles and kit-build options.

The UK itself has struggled to enter the prefab market at an aspirational level, with suppliers such as Portacabin focussing on practical buildings, and the long-established static caravan market offering low-cost solutions under the Caravan Act, which exempts the units from the need for building regulations approval.

However, a number of recent entries to the market are showing that British ingenuity does have something to offer to meet the challenge taken up by the Germans and Swedes. Perhaps most exciting and unique examples being Dwelle, who produce clever micro-homes that can be built together in modular fashion, and Green Unit, which has developed a barrel-vaulted modular system that can be configured for many uses, including homes, classrooms and cafes.

Both companies have re-thought building design from the ground up, Green Unit, for example carried out a prototyping and development cycle lasting over three years, then scientifically tested their prototypes to achieve grade A/A under SAP testing and above code 5 of the Code for Sustainable Homes.

Prefab design is particularly exciting in providing the opportunity to redefine buildings in accordance with the goals of sustainability and energy efficiency. Materials and process can be selected on the basis

of carbon-neutrality, and energy-saving systems can be used in manufacture. The building itself can bring together a number of innovative sustainable technologies and concepts from renewable energy to water efficiency.

And yet the key areas of focus must always remain insulation levels and air-tightness: Insulation prevents cold-bridging through the building envelope, which not only allows heat to escape, but causes condensation, mould growth, and overheating in the summer. Whilst airtight buildings, in combination with a heat recovering ventilation unit (HRV or MVHR) prevents air movement through the building envelope, traditionally a major cause of heat loss.

Insulation comes in many forms, with sheep's wool proving to be among the best performing of sustainable products, but cold bridging through structural elements is always a challenge. For example wool must be used in an overall wall thickness of around 280mm to prevent cold-bridging through structural elements of the timber frame.

Similarly, glazing and external doors can severely impact building performance, and it goes without saying that triple glazing is essential for long term best performance.

Ground-up rethinking and modern technology have made it possible to produce these new attractive prefabs with a design life well in excess of the 40-50 years expected of many traditional new-build homes.

In offering this degree of designed-in sustainability, the new prefabs are certainly the current front runners in green building design. ■

¹ <https://www.gov.uk/government/news/new-action-group-to-help-maximise-house-building-potential-of-off-site-construction>

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Competency: to train, or not to train?

Graham Warren, Manager at ACAD discusses the focus that is now placed on employers to ensure employees are competent to work with asbestos...

With the publication of the latest Asbestos Code of Practice (ACoP) Managing and Working with Asbestos (L143), a great debate has arisen over the impact of competency.

Although supporting legislation remains relatively unchanged, significant prominence has now been given to the matter of employee competence. The focus is now on employers to illustrate that employees are competent to work with asbestos.

Prior to publication of the latest ACoP, most of the asbestos industry was locked into a cycle of 3 day new operative/supervisor/manager training for new recruits followed by a full day's annual refresher training.

Refresher training should have been based on a Training Needs' Analysis (TNA) – but this was not always the case.

All training courses were certificated, which meant anyone undertaking an audit of a licensed contractor, from client organisation to the Health and Safety Executive (HSE), could simply check the expiry date of an individual's training certificate.

Companies had to go to great lengths to ensure certificates were always available on site, particularly if they were managing lots of jobs at the same time with a flow of operatives between sites depending on workload.

Senior management were also required to validate individual training certificates to help stamp out fraudulent copies.

Do asbestos workers still need annual refresher training with the advent of the new ACoP?

Yes – but the length and method of delivery is now a lot more varied. Length of training depends on the results of the individual's TNA. It is possible the individual may only require a short toolbox talk. As a minimum, this needs to include reviewing where things have gone wrong and sharing good practice.

On the other hand, a particularly poorly performing employee may need re-training on multiple issues almost requiring a repeat of the initial 3 day new operative training.

The key message is to maintain an up-to-date TNA on all employees coupled with a minimum standard of annual refresher training. Where work methods, equipment or the type of work change, training is required to address these more immediately than routine annual training.

Companies can conduct this process in house. The possible drawback comes in demonstrating the impartiality in assessments of employees.

ACAD can help by using our A1 assessors to conduct assessments live on site by themselves, or as part of our industry leading site audits.

Another potential drawback is that a company does not assess its employee's competency to a sufficient level.

Fortunately, ACAD and other recognised industry bodies are developing a template for the competency



scheme, which will be applicable to organisations of all sizes.

What should a good audit be looking for on site?

In the short term, it should look for nothing too different to the routine, annual refresher certificates as a transition period is required for the changes.

However, good things to start looking for would be evidence that companies are conducting TNA's of employees and addressing any gaps identified.

Such assessments should also include an assessment of behaviour, as highlighted by RR877 - 'A Commentary on routes to Competence in the Construction Sector'.

Eventually, when an industry-wide approach has been refined, all organisations will go down this route, but any already on the road are doing well. ■

.....
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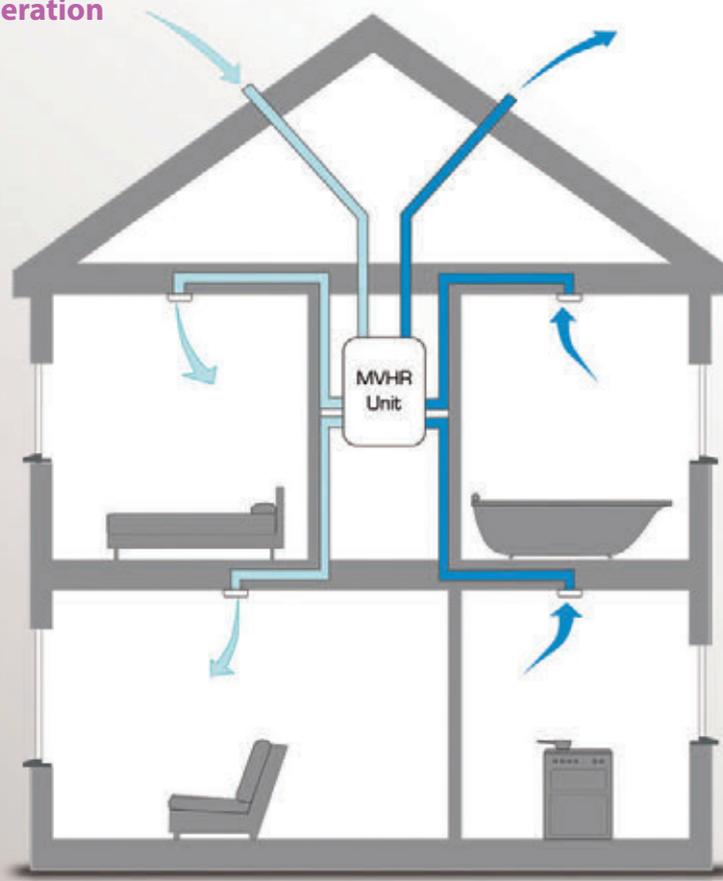
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MVHR: new Standard and guidance

Paul Cribbens, Standards Manager at NHBC outlines the development of new standards and guidance for MVHR systems following research that suggests installations and design are underperforming...

The move towards higher levels of energy efficiency in new homes and improved airtightness has led to around a quarter of new homes built being fitted with Mechanical Ventilation with Heat Recovery (MVHR) systems, according to NHBC analysis.

The changes to Building Regulations have introduced a practical and regulatory need to ensure that the indoor air quality and ventilation provision in new homes are appropriate, as well as designing the home in such a way that reduces the amount of energy used for space heating. MVHR systems work by providing fresh air ventilation, while at the same time recovering heat from exhaust air that would have otherwise been lost.

With most people in developed countries spending an estimated 80% of the time indoors, good indoor air quality is vital for the comfort, health and wellbeing of

occupants. Poor indoor air quality can be connected to a wide range of serious health effects, including allergic and asthma symptoms, lung cancer, chronic obstructive pulmonary disease and cardiovascular disease.

An increasing number of house-builders are using MVHR as a practical and cost effective way of meeting ventilation and energy efficiency requirements. It appears likely that the trend to install MVHR will continue, and could well become the dominant form of ventilation for new homes.

Designed and installed correctly, MVHR can offer a number of benefits. But there is a growing body of evidence, based on academic study and practical observations that indicate MVHR systems are all too often designed, installed or commissioned in such a way that the design performance is greatly reduced.



Research from the NHBC Foundation in 2009 Indoor air quality in highly energy efficient new homes – a review, followed by the publication this year of the Zero Carbon hub-led VIAQ Task Group report Mechanical Ventilation with Heat Recovery in new homes, both revealed a number of issues with MVHR systems.

However, with only limited evidence available that is based on monitoring the use of MVHR in practice, the NHBC Foundation has this month released primary research that studies 10 homes in Slough, built to level 6 of the Code for Sustainable Homes. As well as examining the design, commissioning, and installation of the systems, over the course of the 18 month monitoring, the occupants were also interviewed on 3 occasions to provide in-use feedback.

The earlier VIAQ Task Group final report did identify that when done correctly, MVHR systems can deliver good performance, but it is clear from this new research - 'Assessment of MVHR systems and air quality in new homes'- that a number of lessons still need to be learned. Nine of the units had to be re-commissioned, and the remaining 1 completely replaced after approximately 1 year of occupation.

As a result of this body of research, and at the request of NHBC's Standards Committee, it was agreed that new

NHBC Standards for MVHR needed to be developed. Following the proven method of engaging with stakeholders, a group of experts from the ventilation and house-building industries was assembled, including representatives from several manufacturers of MVHR systems, a range of house builders, academic and, industry bodies. This group assessed the use of MVHR in house building, identifying common problems and produced a set of technical standards to address them.

The outcome from this group is the new Chapter 3.2 Mechanical ventilation with heat recovery, which will be included in the 2014 edition of the NHBC Standards. It documents new technical guidance that will not only set the standard for MVHR, but significantly raise it, to the benefit of homeowners and the industry in general.

The NHBC Foundation research main findings in connection with the MVHR systems monitored in Slough are:

- It is critical that the overall ventilation strategy is taken into consideration during the design stage when intending to use MVHR systems in home;
- During the procurement process it is important to seek technical input from the supplier and installer of MVHR systems;
- MVHR systems should be installed by trained and experienced ventilation system installers;
- Commissioning of MVHR systems must be carried out with care and attention;
- Factors likely to adversely affect the power consumption and thermal performance by MVHR fan units during operation must be considered, such as the size and location of the fan unit, the level of insulation provided and the commissioning.

Key technical issues covered by the new chapter include:

System design

Satisfactory performance is dependent on the design taking into account issues such as the location of the fan unit, the type and position of air valves and terminals, and the control of condensation, as even relatively minor variations from the design can result in underperformance.

Ductwork

The type of duct and its airflow resistance needs to be integral to the design. The main types of duct used in domestic ventilation systems are; rigid duct, semi-rigid duct with short, straight lengths of flexible duct acceptable only for final connections. Compatibility between the duct and other components such as bends, connectors and fixing brackets is essential. To achieve the correct ventilation rate, airflow has to be balanced against the resistance of the ductwork system and its constituent components.

Location of fan unit

MVHR systems require regular interaction from the occupants, which will involve ensuring that the system is maintained, such as regular cleaning/replacement of the filters, around twice a year. Filters are usually incorporated into the fan unit, which can be fairly large and difficult to locate. Because of the need to optimise space within the home, the fan unit is often located outside of the insulated envelope, typically in the roof void. While this may represent a good use of space, it does mean that additional measures need to be taken to ensure that the system performs as intended. Suitable access for maintenance should also be provided.

Prevention of condensation

Ductwork may be carrying air that is at a different temperature to the surrounding atmosphere and this can create favourable conditions for condensation to form either on, or in the ductwork. The new Chapter



contains guidance for insulating ductwork that takes into account different types and functions of ducts, their location, and where condensation might occur.

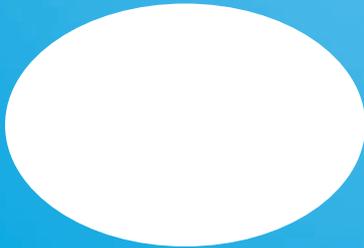
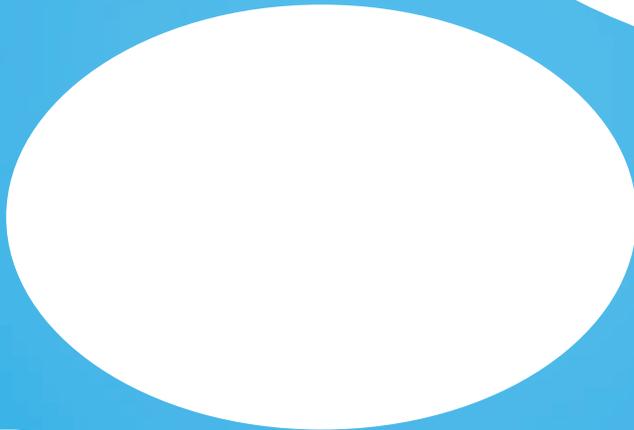
It is critical that when considering MVHR as a ventilation system for new homes, that these new benchmark standards are complied with. A well considered strategy during the design stage – before procurement and commissioning – is essential, as is ensuring that the design is followed through to the installation. ■

For more information on the NHBC Foundation research, please visit www.nhbcfoundation.org/MVHRsystems, and for more information on NHBC Standards please visit www.nhbc.co.uk/Builders/Product-andServices/TechnicalStandards

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Third Party Certification unravelling

Graham Ellicott, CEO of the Fire Industry Association (FIA) explains why buying fit for purpose fire safety products are a must...

If you purchase goods or services you want to be confident that they are fit for purpose. Not just that, it is a legal requirement for the purchaser of fire safety services to ensure that the person or organisation carrying out the work is 'competent'. As most people commissioning this work are unlikely to be experts in fire safety, how can they be sure that the individual or organisation they are hiring is competent to do the job?

Third Party Certification (TPC) is evidence that a service or product adheres to certain standards. An independent expert, the third party, has assessed the service or product and certified that it complies with those standards. TPC can cover the technical qualities of what is being provided, but it can also relate to environmental, ethical or other qualities. This allows purchasers to be confident that what they are purchasing is fit for purpose, or that the supplier is capable doing the job.

What is Third Party Certification then?

TPC is when a Third Party Certification Body (CB) assesses the qualities of a supplier by comparing them with the requirements of a particular scheme. If the organisation meets these standards then it is issued with a certificate detailing the scope of its certification.

The supplier (now a Certificated Organisation) is permitted to claim compliance with the scheme, display copies of their certificate and, in most cases, display the logos of the scheme and the CB. Depending on the scheme, then they will also issue certificates of conformity for the product/service they provide, such as a complete fire alarm system or extinguisher service.

There is a wide range of TPC schemes covering such diverse areas as the installation and maintenance of fire alarms, extinguishers, sprinklers, emergency lighting,

fire risk assessments, fire doors and passive fire protection, so you need to make sure you use a supplier with certification to the relevant scheme for your needs.

How do I do that?

First you need to identify the right scheme owner or CB for the product/service you are looking to commission. Once you've identified this you can visit that scheme owner or CB's website and draw down a list of potential suppliers.

You can also go to the FIA website and draw up a shortlist of members in the relevant product and geographical area. TPC is a requirement of membership to the FIA as we strongly believe that TPC is the only effective way of ensuring the quality of products and services provided for fire safety.

Ensuring you use competent suppliers is both a legal requirement and a practical necessity. With such a range of schemes available, you can make sure your specific needs are met. Getting it wrong can be very costly through fines, legal costs, loss of property and loss of business. By seeking out suppliers with TPC, the risk is substantially reduced and your peace of mind is greatly increased.

For more information on Third party Certification and for a list of schemes download the FIA's whitepaper at www.fia.uk.com/en/third-party-certification. ■

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No risks allowed

Stephen Adams, Chief Executive of BAFE explains 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. 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.

Thousands of companies are now registered to various schemes and as DCLG (Department for Communities and Local Government) say in their Guidance notes: "Third-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-certified 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 has 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.

There are no national standards for the competence of a fire risk assessor, although there are a number of organisations that have their own schemes setting 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.

There is also the UKAS accredited scheme from BAFE (SP205) which offers third party certification of organisations that provide fire risk assessments, ensuring both the competence of the assessors and the capability of the organisation to support them. There are 3 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. ■

.....
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Don't gamble with your fire risk assessment!...

If you are responsible for a business premises, the law requires that you have a fire risk assessment. To find competent providers, you need BAFE.

Under the provisions of the Regulatory Reform (Fire Safety) Order 2005, the Duty Holder or Responsible Person for a building is required to make a Fire Risk assessment to clarify the fire precautions necessary to ensure the safety of staff, customers and property.

At present there are no adequate means to ensure the competence and reliability of a company commissioned to carry this out.

BAFE scheme SP205 has been developed specifically to address this situation, and will provide reassurance to the Responsible Person that they are doing everything possible to meet their obligations.

So don't leave everything to chance. Make sure that your suppliers are registered with BAFE.



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Promoting Quality in Fire Safety



Concrete action on sustainable development

Concrete's role in delivering a sustainable built environment through industry initiatives and performance benefits is increasingly recognised and utilised by design teams, here Concrete Centre explains more...

The UK concrete industry launched the Concrete Industry Sustainable Construction Strategy back in 2008, and has published its sixth annual performance report, presenting performance data across a holistic set of indicators including materials, carbon, waste and material efficiency, biodiversity and water, and wellbeing.

Carbon is the dominant metric for many in evaluating sustainability performance and the industry target is to reduce carbon dioxide emissions from the manufacture of concrete and constituent materials e.g. cement and meet the targets set in sector Climate Change Agreements. Through investment in innovation and efficient production technologies, the industry has reduced the embodied carbon of concrete, with a 23% reduction in CO₂ from 1990.

The sourcing and chain of custody of the goods and products we use in our built environment is of increasing importance. The concrete industry has taken a leadership position in this area and has adopted the BES 6001 framework for responsible sourcing. In 2012, 89% of concrete produced in the UK was accredited to this standard and 99% of this concrete achieved a 'Very Good' or 'Excellent' rating.

The industry has launched its 2020 commitments, which extends the breadth and depth of its aspirations including development of initiatives for low carbon freight and the measurement and management of water usage. One 2020 commitment is to develop a Material and Resource Efficiency Programme to inform best practice across the life cycle of concrete in the built environment.



For example: In 2012, the concrete industry used 62 times more recovered and waste material than the waste it sent to landfill, making the industry a net consumer of waste. In 2020, our target is to reduce waste to landfill to less than 0.5kg per tonne of concrete produced. This represents a 90% reduction from the 2008 baseline.

Concrete Performance Benefits

The performance benefits of concrete: durability, robustness, fire resistance, thermal mass, acoustic performance and flood resilience, all contribute to the performance of our built environment. Concrete is a versatile and natural material and is increasingly being exposed in buildings for aesthetic and performance benefits.

Concrete’s inherent thermal mass can save energy during the lifetime of a building, due to the reduced need for heating and cooling. For example, a typical masonry home has a slightly higher level of embodied CO₂ than an equivalent timber frame home. A study by the NHBC foundation¹ in 2012 found a maximum difference of 4%.

The study found that the operational emissions of concrete and masonry homes were lower over the 60 and 120 years periods used in the study. Similar results were also reached in an earlier 2007 study²

undertaken by Arup, which also considered the effect of climate change on dwelling performance.

This research found that the potential for lower operational emissions in masonry homes enabled them to offset their additional embodied CO₂ in as little as 12 years; a fraction of the dwelling’s life.

In whole life performance terms, the benefit of thermal mass is likely to become increasingly important as the climate continues to warm.

Information on the industry initiative is available from www.sustainableconcrete.org.uk. A range of resources for designers are available at www.concretecentre.com ■

¹ Operational and embodied carbon in new build housing – a reappraisal (NF34), NHBC Foundation, April 2012.

² Embodied and Operational Carbon Dioxide Emissions from Housing: A Case Study on the Effects of Thermal Mass and Climate Change, J. Hacker (Arup) et al, Energy and Buildings 40 (2008), pp375-384.

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Infrastructure: reducing the costs of corrosion

A new climbing robot for the inspection of reinforced concrete structures that detects early signs of damage allowing timely and cost-effective repairs

Chloride induced reinforcement corrosion is the main cause of damage and premature failure of reinforced and post-tensioned concrete structures. It adversely affects the durability and safety of our infrastructure (bridges, power plants, tunnels or buildings). Corrosion is mainly due to the ingress of chloride ions from sea-water or de-icing salts. Chloride ions destroy the protective oxide films on the reinforcement and in presence of humidity and oxygen localised corrosion attacks develop, leading to a dangerous loss of cross-section and very high costs for corrosion.

The cost of corrosion

A detailed study on the cost of corrosion has been conducted by NACE in 1998 for the USA¹. It was stated that the aging infrastructure is one of the most serious problems faced by society today. In past decades, corrosion professionals focused primarily on new construction – specifying materials and designing corrosion prevention and control systems for buildings bridges, roads, plants, pipelines, tanks, and other key elements of the infrastructure. Infrastructure in the NACE study was divided into the following sectors: highway bridges, gas and liquid transmission pipelines, waterways and ports, hazardous materials storage, airports, and railroads. The total annual direct cost in this category was estimated to be \$22.6 billion.

From the approximately 583,000 highway bridges in the U.S. about 15% are structurally deficient because of corroded steel and steel reinforcement. Annual direct cost estimates total \$8.3 billion, including \$3.8 billion to replace deficient bridges over the next 10 years, \$2 billion for maintenance and capital costs for concrete bridge decks and \$2 billion for their concrete substructures, and \$0.5 billion for maintenance painting of steel bridges. Indirect costs to the user, such as traffic delays and lost productivity, were estimated to be as high as 10 times that of direct corrosion costs. Today, it is estimated that the numbers in the NACE corro-

sion study in 1998 approximately can be doubled². Similar costs of corrosion were reported from the Netherlands and from Switzerland³.

The importance of inspection – new climbing robot

Existing concrete infrastructure is aging, while being exposed to aggressive influences, which increases the occurrence of corrosion and damage over time. Today, as much of the aging infrastructure reaches the end of its designed lifetime, the emphasis is on maintaining and extending the life of these valuable assets, becoming the main tasks of bridge management operation.

COST OF CORROSION IN INDUSTRY CATEGORIES (\$137.9 BILLION)

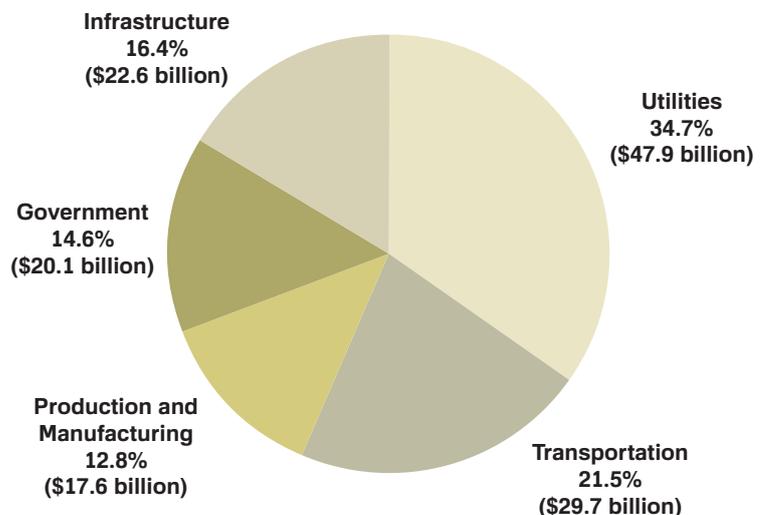


Figure 1: Cost of Corrosion for industry categories in US dollars (1998) and in percent.¹ Source NACE <http://corrosionda.com/summary.htm>



Figure 2: Some reinforced concrete structures are not easily accessible

Inspections are part of the (bridge) management operations, assuming that signs of deterioration will be detected and proper follow-up can be taken before damage is too large. Regular inspections today are relying solely on visual inspection with the risk that damage, especially chloride induced localised corrosion, will be detected only at a very late stage when maintenance already has become very expensive. In comparison carrying out full surface corrosion surveys by half-cell potential mapping^(4, 5) may be considerably more economic because this technique detects corrosion in a very early stage.

The main problem in practice is that most of the reinforced concrete surfaces are not or only with costly scaffolding accessible for this type of inspection. The climbing corrosion detection robot (figure 2) developed by ETH Zurich^(6, 7, 8) can overcome this difficulty. With its Vortex system it can adhere on virtually any concrete surface in any inclination and with the half-cell potential sensor the corrosion state of the reinforcement can be mapped. Corroding areas can be located precisely long before becoming visible at the concrete surface.

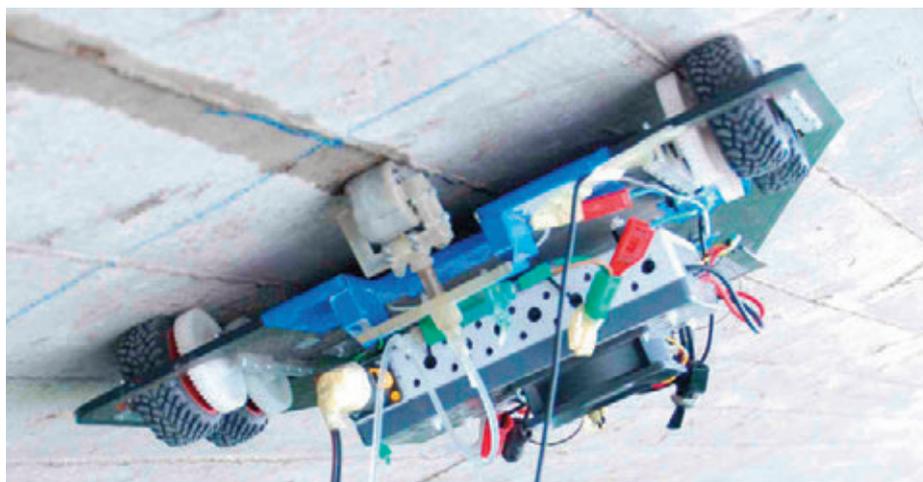


Figure 2: Climbing corrosion detection robot with half-cell potential wheel can be used efficiently for regular inspection of reinforced concrete structures^(6, 7, 8)

The main advantage is that corrosion of the reinforcement can be detected at an early stage, best during regular inspections of the structures that have to be performed. Maintenance and repair of the infrastructure can be planned timely and executed at much lower costs.

Fields of application of the robot are:

- Transportation: Regular inspections of reinforced concrete structures (bridges, tunnels, etc.)
- Energy: inspections and condition assessment of atomic power plants, cooling towers
- Inspections, NDT surveys, condition assessment
- Equipped with additional sensors the climbing robot can be operated also for other purposes (detection of humidity, surface temperature, surface color etc.)
- Locate defects on electrically isolated post-tensioning tendons by magnetic flux measurements

² web site <http://www.g2mlabs.com/cost-of-corrosion/>

³ B. Elsener, "Corrosion of Steel in Concrete – Mechanism, Monitoring, Management", Structural, (2014)

⁴ B. Elsener, C. Andrade, J. Gulikers, R. Polder, M. Raupach, Half-cell potential measurements – potential mapping on reinforced concrete structures. RILEM TC 154 EMC. Materials and Structures 36 (2003) 461 - 471

⁵ L. Bertolini, B. Elsener, E. Redaelli, P. Pedferri, R. Polder, Corrosion of Steel in Concrete, WILEY VCH 2013 (second edition) chapter 16

⁶ A. Leibbrand, G. Caprari, U. Angst, R. Siegwart, R. Flatt, B. Elsener, Climbing Robot for Corrosion Monitoring of Reinforced Concrete Structures, 2nd Int. Conference on Applied Robotics for the Power Industry (CARPI), ETH Zurich September 11-13, 2012.

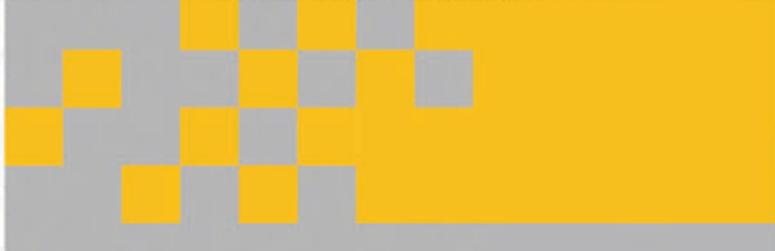
⁷ B. Elsener, R.J. Flatt, R. Siegwart, C. Hürzler, A. Leibbrandt, G. Caprari, "Climbing robot for corrosion monitoring and sensor for potential mapping" (Patent pending)

⁸ B. Elsener, A. Leibbrandt, O. Glauser, U. Angst, Robert J. Flatt, G. Caprari, R.Y. Siegwart, "Climbing robot for Corrosion Inspection and Monitoring of Reinforced and Post-Tensioned Structures", CIC 2014 Concrete Innovation Conference, Oslo 11. – 13. June 2014

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¹ "Corrosion Costs and Preventive Strategies in the United States" PUBLICATION NO. FHWA-RD-01-156, US Department of Transportation, <http://corrosiondata.com/summary.htm>



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Delivering on empty promises

Councillor Janine Bridges, Cabinet Member for Housing at Stoke-on-Trent City Council gives an overview of the £1 house project gathering pace in the city...

Within a matter of weeks, the first buyers will move into 33 newly-renovated terraced houses close to the centre of Stoke-on-Trent. The properties, which will have been bought for the nominal fee of £1, represent an innovative approach that Stoke-on-Trent City Council is taking to the long-standing problem of empty homes. Our £1 houses have already caused quite a stir, and not just here in the property-obsessed UK. Audiences as far afield as Russia and China have been equally intrigued by the unfolding story of how these derelict homes have been brought back into productive use. But the £1 houses are just one element of a much broader programme of housing renewal which will continue long after the last £1 house has been snapped up.

Of the 113,000 properties in Stoke-on-Trent, 86,000 are privately owned – a significant proportion of them by private landlords. Of these, about 4,400 are likely to be empty at any one time, and almost 2,500 will

have been empty for more than 6 months. These long-term empty homes represent a pernicious problem for local authorities. A single untended house can blight an entire neighbourhood, promoting anti-social behaviour, fly-tipping and other social problems which just need an unsupervised enclave to take hold and flourish. Empty homes sap precious resources and threaten to undermine our policy and service delivery objectives. We cannot afford to let homes slide unchecked into decline in a city where more than 2,500 households are in need of social housing, but government cuts mean that we also can't afford to tackle this problem decisively and at scale. Success therefore requires smarter working, finding paths of least resistance and punching well above our financial weight.

The city council's modest-sized empty homes team has waged a relentless David and Goliath battle which saw 574 properties brought back into use over the last 7 years. Buoyed by these successes, the council



has invested additional resources in the team, which has set its sights on between 450 and 600 additional properties by April 2016 and is already ahead of target. The team employs a highly effective combination of encouragement and enforcement tactics and is building strong partnerships within the rental sector and with both outside agencies and inter-departmental teams to ensure that we can take prompt action where voluntary compliance is not forthcoming.

When the coalition government prematurely scrapped our housing renewal pathfinder programme in 2010, the council was left with more than 100 dilapidated terraced homes that it had compulsorily purchased, but could no longer afford to either renovate or clear. With some financial help from the Homes and Communities Agency, we devised a regeneration scheme to dispose of 33 of these homes on a non-profit basis,



Councillor Janine Bridges
Cabinet Member for Housing,
Neighbourhoods and
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Stoke-on-Trent City Council

while ensuring that the properties did not fall straight back into the hands of buy-to-let landlords, fuelling the cycle of under-investment, decline and redevelopment. We undertook to do all of the renovation work on the houses at no initial cost to the buyers, who will then repay £30,000 towards the cost of the work over 10 years. Stringent conditions attached to the purchase agreement require all the buyers to already either live or work in the city, and to live in their £1 home for at least 5 years following completion. The fact that the initial 33 homes are all located around the Portland Street area of the city offered the opportunity to not only bring an entire cluster of derelict homes back into use in one fell swoop, but also to effectively fashion a brand new community in the process. Through careful selection of the £1 house buyers, along with comprehensive support and guidance from the Clusters of Empty Homes team and partner agencies, we have been able to hand-pick a group of residents who have the resources, the vision and the enthusiasm to revitalise the area and help create a sustainable, thriving neighbourhood.

“Within a matter of weeks, the first buyers will move into 33 newly-renovated terraced houses close to the centre of Stoke-on-Trent. The properties, which will have been bought for the nominal fee of £1, represent an innovative approach that Stoke-on-Trent City Council is taking to the long-standing problem of empty homes.”

We are also setting aside around £300,000 of the £3m Clusters of Empty Homes programme budget to carry out improvement projects chosen by the residents. Emerging plans for a community garden and a



revamped play area have bolstered hopes that this neighbourhood will once again enjoy prosperity and social stability. Better still, the area's regeneration will have been delivered at a fraction of what a full-scale intervention would have cost the taxpayer. To support the new residents in realising their community aspirations, as well as insuring against any future regression into property decline, we have consulted on proposals for a selective licensing scheme in the area – a policy which we piloted several years ago in the north of the city. Conscious of the corrosive potential of under-investment, the high density of rented housing in the pilot areas and the lack of landlord accountability for anti-social tenants, we had set out to strengthen our traditional approach of encouragement and support with additional powers of enforcement. Such has been the impact of the scheme that we have only had to use these powers on a handful of occasions.

Our empty homes strategy has become one of the central tenets to our commitment to making Stoke-on-Trent a great city to live in and one of our principal policy areas. Tackling empty homes is by no means a cheap or easy option, but weighed against the cumulative cost of doing nothing, it is more than cost-effective, and the financial benefits are not insignificant. We have calculated that the 574 homes brought back into use to date have injected about

£9m into the local economy just in rent, council tax, land charges and repair work. In addition, we can potentially save the authority approximately £270,000 in relation to works carried out on the owners' behalf to clear rubbish and vermin from property. And when intangible benefits such as increased community pride and sustainability, lower crime and anti-social behaviour rates and higher living standards are taken into account, it becomes clear this is one policy avenue that we cannot afford not to pursue. ■



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Bringing economic growth to your doorstep

Lynne Livsey, Health Partnership Project Coordinator at the National Housing Federation sheds light on the crucial role housing associations play in local communities...

Housing associations are not-for-profit landlords with an important social purpose. They have a crucial role in boosting the supply of high quality, affordable housing – as well as having wider social and economic impact through investing in safe, sustainable and healthy communities.

As the main providers of new affordable housing throughout England, housing associations provide 2.5 million homes for more than 5 million people, catering for 1 in 10 people across the country. They pull in private investment, matching every £1 of public finance with nearly £6 of their own money. Their overall contribution to the nation's economy is valued at around £13.9bn a year.

England is extremely short of housing and needs around 240,000 new homes a year, just to meet demand. Building more homes in areas that need them gives the local economy a major boost, with every £1 spent on housing generating a further £2.41 in the wider economy and creating 2.3 jobs.

Housing associations' offer to local communities reaches far beyond bricks and mortar. They operate in a range of communities, including the most deprived neighbourhoods where there are very few job opportunities and high levels of benefit dependency. As businesses in their own right, they are often major local employers, and across the country the sector employs more than 155,000 people.

As well as delivering new homes, housing associations also run a wide range of successful schemes that, amongst other things, help their tenants find work and training; reduce anti-social behaviour; promote healthy environments and healthy behaviour, and help tenants with care and support needs live independently. As a result, they are key strategic partners for Local Enterprise Partnerships, local councils, the NHS, Police and other agencies.

Strong local knowledge and close connections to the people who need help with getting work and training means they're well placed to deliver employment and



“Housing associations’ offer to local communities reaches far beyond bricks and mortar. They operate in a range of communities, including the most deprived neighbourhoods where there are very few job opportunities and high levels of benefit dependency.”

Access to training and employment also has a significant and positive impact on health and wellbeing, bringing wide-reaching benefits for individual residents and their communities. Housing associations are committed to improving health and wellbeing in their neighbourhoods, reflecting the Marmot review findings that good housing and healthy neighbourhoods have a fundamental impact on health and life-expectancy.

The housing association sector tackles homelessness, supports vulnerable families and individuals with complex health and care needs, and provides state of the art extra-care housing for older and vulnerable adults.

Many associations are at the forefront of work to reduce health inequalities, and are actively supporting their council and health partners in reducing the burden on health and social care budgets, finding integrated and cost-effective solutions of care.

Working with health agencies, Local Enterprise Partnerships, local authorities and other partners, housing associations are committed to investing in strong vibrant neighbourhoods throughout England. They are in it for the long term, and with more support they can be real catalysts for change for local communities. ■

skills schemes. With a good understanding of the personal circumstances and needs of local residents, they are able to design training and advice services to meet their needs.

The National Housing Federation’s Neighbourhood Audit shows that in 2010/11 England’s housing associations invested over £80m helping people into work and over £73m in learning and skills. During this period they ran 1,000 projects to tackle worklessness, helped more than 200,000 people into training, and invested heavily in volunteering.

Housing associations remain committed to tackling unemployment, and are working with the Apprenticeship Service, the Skills Funding Agency and a range of local employment support and training providers to create new apprenticeships. In the last 2 years apprenticeships in England have doubled with 7,500 new apprentices employed directly by housing associations – already meeting 75% of the sector’s pledge for 10,000 apprentices by 2015.

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Closing the Performance Gap

Rob Pannell, MD of the Zero Carbon Hub presents the initial findings of an industry-wide project that is investigating the causes of the energy Performance Gap in new homes, and developing potential solutions to close it...

There is now clear evidence of a 'Performance Gap' between the as-designed and as-built energy performance of new homes. This gap occurs when a constructed home requires more energy than was predicted based on its design – even without taking into account the behaviour of occupants. The Performance Gap can arise due to issues at various stages of the house-building process – from planning and concept design through detailed design, energy modelling, procurement, construction and commissioning, to testing and verification.

Why is the Performance Gap important and what is being done?

The Performance Gap creates a number of potential risks affecting government, residents and industry:

- Impacting on national carbon budget targets and meaning that future Zero Carbon homes targets may not be met in practice;
- Leading to higher than expected energy bills; and
- Undermining buyer confidence in new (low carbon) homes and the reputations of those involved in their development, potentially including planners, designers and building control as well as manufacturers, house-builders and others.

Investigation into the Performance Gap is therefore a priority for government and for the house-building industry. Back in 2011, a Zero Carbon Hub task group advised government that future Building Regulation requirements for Zero Carbon homes should be linked to 'as-built' performance, and set the following '2020 ambition':

'From 2020, to be able to demonstrate that at least 90% of all new homes will meet or perform better than the designed energy/carbon performance.'

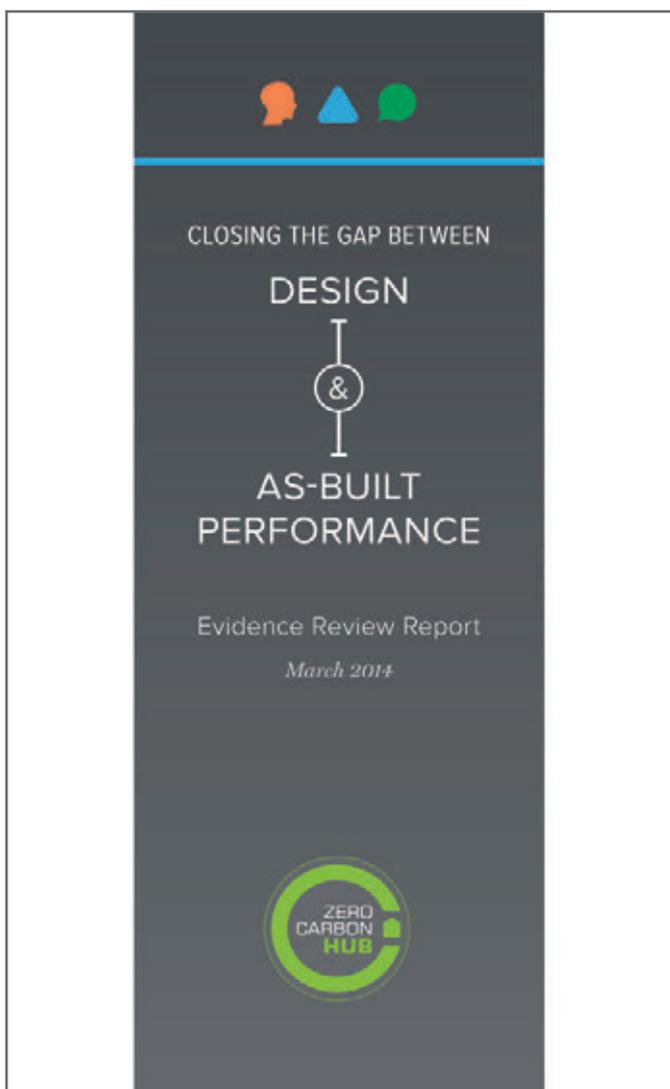
Since the start of 2013, over 140 professionals from across the industry have been working with the Zero Carbon Hub on a government-funded project to explore the potential causes of the Performance Gap and to develop cost-effective and realistic proposals to help close it.

What has the project found, and why should planners and Building Control be interested?

So far, the project has focused on collecting evidence to identify the most significant issues which are contributing to the Performance Gap. This will allow industry, including planners and building control bodies, to concentrate on developing ways to tackle these priority issues.

A large body of published research has been reviewed, and detailed investigations of nearly 100 plots from across 9 current housing developments have been undertaken, including interviews, site visits and audits of SAP assessments. Based on this evidence, 15 issues have been identified as priorities for action, as well as 17 others which may have a significant impact but require further research, and 23 more which are believed to have a lower impact.

The high priority issues appear across the entire house-building process and are not the responsibility of a single discipline. They share common themes of a need for improved knowledge and skills, responsibility for energy performance, and communication. Several



- Inconsistent evidence is being requested by, and provided to building control bodies. This results in uncertainty around the actual constructed specification and performance.

More information on each of the issues can be found in the recently published 'Closing the Gap Between Design and As-Built Performance: Evidence Review Report', shown in the image opposite, which can be downloaded from www.zerocarbonhub.org.

What is happening next?

The next stage of the project will gather further evidence, in particular from additional site investigations, and will identify research strategies for issues which are less well-evidenced. However, the main focus is on developing solutions for the priority issues. This will include proposals for mechanisms to ensure that the 2020 ambition for closing the Performance Gap will be met, which are likely to be of particular interest to building control and planning professionals.

The current project concludes in summer 2014, when its findings, proposed solutions and recommendations will be presented in a final report – please watch out for this on the Zero Carbon Hub’s website. However, efforts to tackle the Performance Gap will require action from all parts of industry over the longer term, as part of the journey to zero carbon homes in 2016 and to meet the 2020 goal. ■

The Zero Carbon Hub is an independent non-profit organisation. Its primary aim is to support the mainstream delivery of low and Zero Carbon homes in England. To keep updated on progress from the project assessing the Performance Gap sign up to our newsletter through their website – www.zerocarbonhub.org.

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relate specifically to the planning and verification stages of the development process:

- Planning and concept design teams are not sufficiently aware of the impacts of early stage design decisions on the energy performance of completed dwellings. This might include aesthetically-driven choices such as form, roof shapes, orientation, layout and materials or variations to standard housetypes;
- Verification procedures are not sufficiently prioritising energy performance. This may be due to reliance on third-party information or lack of time, knowledge and incentives;

Securing our energy future

European Commissioner for Energy, Gunther H. Oettinger discusses the new Energy Strategy and how it will help to tackle Europe's energy challenges...

Energy is the lifeblood of our society. Our way of life is inconceivable without reliable and affordable supplies of energy: electricity, heat and fuel. Never before has the world needed so much energy: we use almost twice as much as in 1980. If this trend continues, it will be difficult to avoid a major energy crisis, with electricity cuts, petrol or gas shortages.

We cannot afford to wait

The energy challenges are among the greatest tests which Europe has to face: We have to act to prevent global warming. At the same time, we need affordable energy prices as our economic competitiveness depends very much on competitive energy prices and a reliable energy supply. Growing EU dependence on imports from third countries is also a matter of great concern, in particular for oil (85 %) and gas (65 %). All these challenges must be addressed and require strong action.

A new strategy for the next decade

National policies are not sufficient anymore to allow a strong economic recovery and maintain our welfare. Any decision taken by one Member State has an impact on the others. Fragmented markets undermine the security of supply and limit the benefits of a fair competition while our investments for the future will only be profitable and efficient within a continental market. We must promote a common energy policy serving our joint policy objectives: competitiveness, sustainability and security of supply.

An example of the need to think internationally is gas supply. Many Member States are reliant on gas imported from Russia. We all agreed that diversifying our gas supply will benefit citizens and businesses across the EU and we are looking to bring new, additional gas from the Caspian region to the EU. In the past few years, the EU Commission has held continuous talks with governments and companies

alike to convince them to deliver gas from this region to Europe. And in June, this European effort will finally bear fruits. In Azerbaijan, the final decision will be taken on how much gas will be delivered to Europe and which pipeline project will be chosen for the first ever direct supply of Azeri gas to the EU.

In very general terms, I see 5 pillars for action to the benefit of all Member States and citizens.

Focus on energy savings

First, there is a vast amount of untapped potential to save energy, which would save money for individuals and businesses alike. Faced with commitments to drastically reduce our emissions and achieve the objective to increase energy efficiency by 20% by 2020, action on energy demand has the most potential with immediate impact for saving energy, reducing waste and maintaining our competitiveness. To this end, the EU has adopted a new energy efficiency directive which obliges Member States to implement binding measures such as an obligation scheme for energy companies to cut down energy consumption at customer level and an obligation for Member States to annually renovate 3% of the central government's building. It also encourages energy audits for SMEs and an obligation for large companies to assess their energy saving possibilities.

A strongly integrated European Energy Single Market

We should no longer tolerate barriers which impede energy flow within the EU. National borders can threaten the benefits of the Single Market, the competitiveness of our industry and the supply of basic needs to all our citizens. Fair competition, quality of service and free access must be guaranteed. The full and proper application of EU legislation is a must. But the existence of the adequate infrastructure is a condition sine qua non. It is time energy is given

comparable pan-European infrastructure, as other sectors of public interest such as telecommunication and transport have enjoyed for a long time: by 2015, no Member State should be isolated from the European internal market in energy supply. This means that we have to concentrate our efforts on concrete projects necessary to achieve our goals: solidarity, an inter-connected market, new power capacities, an “intelligent grid” and large scale production of renewable energies available to all at competitive prices. A single European Energy Market will also increase the competitiveness of renewables, allowing excess energy generated in the sunny South to power homes in Northern Europe during times of light wind or vice-versa on blustery days in the North for cloudier days in the South.

Citizens first

These efforts should always focus on the impact on citizens. Consumers should benefit from wider choice and take advantage of new opportunities. Energy policies have to be more consumer-friendly and this will require further transparency and information: I would like all tools, like the Consumer Check List, to be improved and applied more widely. This also implies that all consumers enjoy their right to basic energy needs at all times, including in a supply crisis.

EU energy policy also aims to achieve more transparency, access to better and more information, better functioning of the retail market, development of adequate infrastructure and safety nets for vulnerable consumers. This is in addition to constant efforts for more safety and security in energy production and processing. Today, the EU represents a decisive added-value for all citizens by ensuring that the highest standards are applied in all Member States for nuclear safety and security, offshore oil and gas extraction or the development of new energy technologies. We must keep on track and continue to be vigilant.

Towards a technological shift

In energy technology, we must consolidate and extend Europe’s lead. I would like to develop a European reference framework in which Member States and regions can maximise their efforts to accelerate market uptake of technologies. Europe has some of the world’s best renewable energy companies and research institutions: we need to keep this leadership. Beyond the implementation of the Strategic Energy

Technology Plan, we have already launched a few large scale projects with strong European added-value:

- Smart grids to link the whole electricity grid system to individual households and give better access to renewable sources of energy;
- The ‘smart cities’ innovation partnership to promote throughout Europe integrated energy systems at local level and facilitate energy savings.

Strengthening the EU leadership in the world

The EU should be a favoured partner in international negotiations. The present situation, where external partners can “divide and rule”, is untenable. The EU has the world’s largest regional energy market – 500 million people. It accounts for one fifth of the world’s energy use. We import on average around 3 million tonnes of oil equivalent every day. The EU is also the world’s biggest economic trading block. We must exploit our geopolitical weight in the world and enjoy the benefits of the Single Market. Every time that the EU has spoken with one voice, for instance in the nuclear international cooperation, it led to results. The integration of energy markets with our neighbours is a must which contributes to both our, and their security. But our international relations must go further and should aim at establishing strategic partnerships with key partners. A common European policy is a strong leverage to strengthen our position in difficult negotiations, and secure our international leadership.

Time for action

This year we will discuss our energy and climate goals for 2030. We will decide whether we choose three targets as we did for 2020 – CO2 reduction, increase of renewables, and energy efficiency – or just one or two, and whether they should be binding or not. We must decide it this year to allow Member States to prepare and to give certainty to investors in industry. As Jean Monnet said: “Where there is no vision, people perish”. Our generation must take the opportunity to make this strategic vision a reality. ■

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Removing the barriers

Progression in the Development of Competitive Market Framework for Electrical Connections.

It was noted with interest that in The World Bank Report of the "Ease of Doing Business" in the United Kingdom ranked the UK's position in getting electricity as 74th of 189 economies in 2014, which were actually 10 positions worse than in the same poll conducted in 2013.

The frontier economies adopted streamlined processes removing duplication and unnecessary approval requirements which in turn reduced connection times and costs to the customer.

Clearly the UK has a challenge to improve the situation.

One of the key drivers for change within the UK will be the delivery of a fully open and competitive market place for making of electrical connections to distribution networks owned and operated by the incumbent Distribution Network Owners (DNO).

The DNO's were given four years until the end of 2013 to demonstrate they had removed the barriers to competition in the nine market segments, as at to date not one of the companies have achieved all nine. In total, through the four year competition test process, Ofgem received applications for price regulation to be lifted in 113 of the 126 relevant market segments (RMSs). In 42 RMSs they were satisfied that effective competition exists. Whilst it is accepted some progress has been achieved, there is still a long way to go, with all the issues, such as streamlined processes targeting at

minimising times not maximum durations, access to records systems, self service and approval processes. These arrangements would provide an open competitive marketplace aimed at meeting the end customers' needs in a time frame they want.

From Power On's position there is a need to swiftly manage transition of the ability to service our customers' needs with the minimum of DNO engagement.

This would be delivered through the immediate adoption of the current process below being undertaken by our business subject to external accreditation demonstrating our technical competency and delivery capability to undertake the following:

- a) Self determination of points of connection
- b) Self certification of Design Approval
- c) Self connection and Inspection Regimes
- d) Access to all records associated with the network in order to undertake required network analysis.
- e) A national standard framework of common standards that should apply.

As the UK No 1 Independent Connections Provider, we have the recognised capabilities and competencies as required by the DNO through independent audit by NERS, however we

are still subject to DNO Approval, Audit and Review as well as seemingly endless trials.

Every Power On employee is faced on a daily basis with interfacing with the bureaucratic processes which have evolved from the DNO's processes from enquiry through to adoption. Fortunately through the past ten years of engagement we have developed the knowledge and capability to successfully get through these barriers, but are still at times disadvantaged by the draconian application of maximum times for responses and endless gates of approval and double checking.

Naturally we are the leading advocates of change and we have leadership roles on all the national debating platforms for the Competition In Connections. We continue to drive this requirement forward which we believe will deliver improved customer service, shorter delivery times and a more cost effective solution for electrical connections.

Power On Connections has had cause for celebration as it has not only marked the company's 10th anniversary, connected over 5000 projects, 1GW of capacity and successfully built and commissioned three primary substations. Importantly we have also successfully delivered this activity safely without a single loss time injury for the past two years. This is an excellent outcome considering we are operating within the Construction

Industry. With increased training, reassessment and an increase management auditing procedures we aim to maintain our hard won excellent performance.

For a company that is so customer and quality-focused, one of the biggest challenges confronting Power On Connections has involved finding staff of the calibre needed to expand the business without compromising the standards of service. To meet the growing challenge in a shrinking competency market place, we have developed a graduate development programme to support our technical and management capabilities and craft apprenticeship scheme to meet the needs of our service and onsite delivery capabilities. This is a significant investment for our business and our people to provide the platform for a growing and sustainable business into the future.

We recognise that as competition expands our well trained, highly competent and committed staff are and will continue to be targeted by others including the incumbent DNO's as they are very valuable and prized commodities.

Power On Connections is in no mood to lessen its rate of expansion, as its investment in recruitment and infrastructure development underlines, particularly as there continues to be ample opportunities going forward with changing regulations and the subsequent opening up of the market. Hopefully during 2014/15 there will be a further releasing of accessibility to the DNO network as the regulator enforces the marketplace to be an open and fair playing field. We are prepared for this eventuality and will

continue to lobby for open and effective competition. In the meantime we will continue to invest in training and employee development to ensure that this remains to be the case, in addition to recruiting additional staff of the calibre and with the relevant skills set that we are looking for.

With the marketplace increasingly opening up, leading to a growing number of opportunities to capitalise on, Power On Connections is looking to utilise the wider strengths of its parent group to move forward. We are an important delivery company for Brookfield Infrastructure Partners, the Canadian-based asset management company, and they are requiring both Power On Connections and GTC to drive the business forward. In October 2013 through acquisitions they became the biggest independent Distribution Network Operator in the UK. In addition their now expanded electricity and gas operations, Metropolitan, Exoteric and Fibre developed a full range of utilities including water, foul water, fibre and district heating schemes into the fold.

Our primary driver for our business is to build customer loyalty, so we that become their choice of service provider. This in turn will support our second objective which is provide asset ownership into our Group and finally expanding the range of assets and in our case fibre connections into the customer's properties. Fibre and electricity products very similar in many ways, physical construction, skills required for design and build as well as the arrangements for future asset management.

The reason for building customer loyalty is obvious but it does mean every

daily transaction must be carefully managed. The benefit for the Group in asset ownership is that long term revenues streams will be secured through Distribution Use of System Charges levied against the electricity supplier of user connected to the assets. As a result the more connections the greater the revenue is generated on an annual basis. The primary drive of the business is to continue to win work whilst giving those assets to our sister company to run and operate as an independent Distribution Network Operator.

The increase of our service offerings to include fibre is an easy bolt on. Through our sister company "See the Light" we have developed a relationship with Sky to offer their services across our 300Mb fibre optic network providing our customers with unrivalled quality service. With the tremendous momentum it has already built up with its bread and butter work, the additional opportunities within fibre installation and the other activities it is concentrating on is sure to help Power On Connections continue on its upward trajectory in 2014 and beyond.

POWER ON
connections

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Investing in energy efficiency

Gregor Paterson-Jones, Managing Director for energy efficiency at the UK Green Investment Bank explains why energy efficiency is key to reducing costs for public services...

With budgets under continuous pressure and demand for savings across the public sector constantly at the forefront of the news agenda, it can be hard to see the wood from the trees.

However, sometimes the answer can be so close it is overlooked. This is where the case for energy efficiency begins. Energy efficiency is the best kept secret of the green revolution. We should be doing much more to realise the savings that come from using much less energy.

Reducing energy bills for organisations as vast as the NHS and local authorities is a huge priority. It's a win-win-win, reducing energy use and sourcing energy from renewable technologies will lower the NHS's and local authorities' carbon footprint, save

money, and can even become a source of revenue.

Both the NHS and local authorities are full-time, highly specialised and energy intensive. Creating energy efficiencies in these sectors is not an easy task and this is where the UK government backed Green Investment Bank (GIB) can help. We can help finance the modernisation of energy infrastructure, leading to significant overall savings from reduced energy demand, protection against rising energy prices, and lower maintenance costs.

In the NHS alone, GIB estimates that energy efficiency measures could cut this bill by up to 20%, saving £150m each year.

For local authorities, simply switching to LED streetlights could bring energy savings of between 50 to



Gregor Paterson-Jones
Managing Director,
Energy Efficiency
 UK Green Investment Bank

80%. The UK has an old and inefficient street lighting estate. More than £300m is spent annually on energy for streetlights and the costs are rapidly increasing for non-energy efficient lighting. The savings can be huge.

The Green Investment Bank has been created by the UK government and capitalised with £3.8bn of public money, our mission is to help the UK transition to a greener economy by supporting projects that are both green and commercial. One of GIB's priority areas for investment is public sector energy efficiency, especially in the NHS and local authorities where we have established a track record of activity.

We have developed an innovative offering. The GIB Health Sector Energy Efficiency Programme and Green Loan allows us to use the full spectrum of financing across debt and equity with the ability to fund long-term projects. We have a dedicated team of energy efficiency project and finance experts established to work with private and public sector organisations and co-investors.

In both areas there is a huge opportunity for cost savings through energy efficiency. The time is right, the technology is mature and well proven, we have some very positive case studies showing what's possible and all public bodies have to face the risks of rising energy costs and on-going budget pressures.

In the NHS, funding examples include the UK's largest health sector energy efficiency project, the energy innovation centre with Cambridge University Hospitals NHS Foundation Trust. Serving Addenbrooke's and Rosie hospitals, the £36m funding package led by GIB and Aviva Investors is a 25-year contract. Housing a

combined heat and power unit, biomass boiler, dual fuel boilers and heat recovery from medical incineration, the centre will reduce costs by £6m a year.

With local authorities, retrofitting of streetlights with LEDs can be financed from savings and can involve no upfront outlay by the authorities.

At GIB, we know there is a funding gap and we are actively working with private finance partner providers to create solutions. We accept there is no 'one size fits all' financing solution for NHS and local authority energy efficiency projects.

We focus on 7 key technology clusters. CHP and district heating, outdoor lighting, renewable heat, building retrofit, efficient transport and industrial processes and smart meters, will all be considered.

Each of our finance options are based on consistent principles: Spend to save: finance repayments are lower than, and repaid, from cost savings which means the GIB can fund the upfront expenditure; attractive rates: finance is priced competitively; long-term: we can lend for up to 25 years, and flexible: we can be flexible to meet the project requirements.

Procurement framework consultants can advise the financing solution that best works with the set of measures required. We can then provide a detailed energy efficiency solution and the evaluation and selection of delivery partners.

We will partner with utilities, public authorities, commercial and industrial companies to achieve our aims. Talk to us. We are ready to help. ■

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Sustainable Glasgow

Glasgow City Council highlight how it aims to cut carbon emissions and become one of the most sustainable cities in Europe...

Glasgow is nothing if not ambitious – it has set itself a challenge to become one of the most sustainable cities in Europe.

The city council aims to achieve this by cutting carbon emissions by 30% in the next 10 years.

Integral to this goal are the dual objectives of curbing climate change and increasing access to affordable energy for city residents.

The Rockefeller Foundation recently named Glasgow as one of its 100 Resilient Cities and, last year, the UK Government's Technology Strategy Board awarded the city £24m to fund the Future City | Glasgow programme. This wide ranging project will demonstrate how technology could be used to make life in the city smarter, safer and more sustainable.

A third driver in the city's journey towards a more resilient future is Sustainable Glasgow. This is a public/private partnership led by Glasgow City Council.

Already a wide range of projects are underway with more in the pipeline. They range from trialling intelligent street lights in the city centre and on off-road cycle paths to increase public safety and encourage more active travel to replacing 10,000 outdated and inefficient sodium street lamps with new energy efficient LED bulbs. The council is working closely with the Green Investment Bank (GIB) to be the first recipient of a Green Loan, supporting the city in its plans to convert its 70,000 streetlights to low energy. Renewal of Glasgow's lights will be paid for by the savings generated.

The council also aims to create its own "green" energy company which could be set up in partnership with the private sector to oversee a range of renewable energy initiatives across the city. Its contacts, expertise and financial clout could also be used to help attract funding for new community-based energy projects – assisting in the city's future economic growth and skills development.

Councillor Gordon Matheson, Leader of Glasgow



unsustainable landfill, is set to create 250 jobs and deliver affordable warmth for homes. Work is underway on the clean waste treatment complex which will replace the former waste transfer station at Polmadie. Using technology already successful in Europe, the plant will harvest tens of thousands of tonnes of recyclable material every year – saving the city around £254m. The facility will produce enough energy to power the equivalent of 22,000 households and heat the equivalent of 8000 homes, saving Glasgow 90,000 tonnes of CO₂ every year.

District heating schemes – where a number of properties are heated from a centralised energy source, such as a combined heat and power (CHP) engine – are becoming increasingly important in the city. Several are already in operation in Glasgow, including at Glasgow Caledonian University, Ibroxholm Oval, the Wyndford housing estate, New Gorbals Housing Association and Glasgow School of Art. Another has been incorporated into the athlete’s village for the upcoming Commonwealth Games. It will provide heat for the Emirates Arena and around 700 homes (which will be occupied by athletes during the Games and become a new eco village when the sport ends.) Two new district heating networks are also being planned, which will include parts of the city centre north and the University of Strathclyde, as well as incorporating areas around the new Glasgow Recycling and Renewable Energy Centre in Polmadie. ■

City Council and Chair of Sustainable Glasgow, said: “This council has adopted a holistic approach to sustainability by working with diverse partners to address issues such as rising energy prices which affect the council and city residents alike.

“We are fortunate to be able to draw on the skills and support of partners including the Rockefeller Foundation and the Technology Strategy Board. This puts the city at a distinct advantage as we endeavour to build a joined up, forward thinking city network to safeguard our economy, citizens and businesses against the effects of climate change and diminishing fossil fuels.”

Glasgow already benefits from a 3MW wind turbine, run by SSE (Scottish Hydro) in partnership with the council at Cathkin Braes, on the city’s southern border.

The local authority is also exploring the possibility of erecting turbines on another 9 sites and is conducting a mapping exercise to assess the suitability of council-owned vacant and derelict sites for use as “solar farms”.

The council and waste giants Viridor have also signed a deal to create a new £150m Recycling and Renewable Energy Centre in the city. The 25-year partnership, which will end the city’s reliance on expensive and



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Meeting the street lighting challenge

Delivering real savings in time, energy and cost

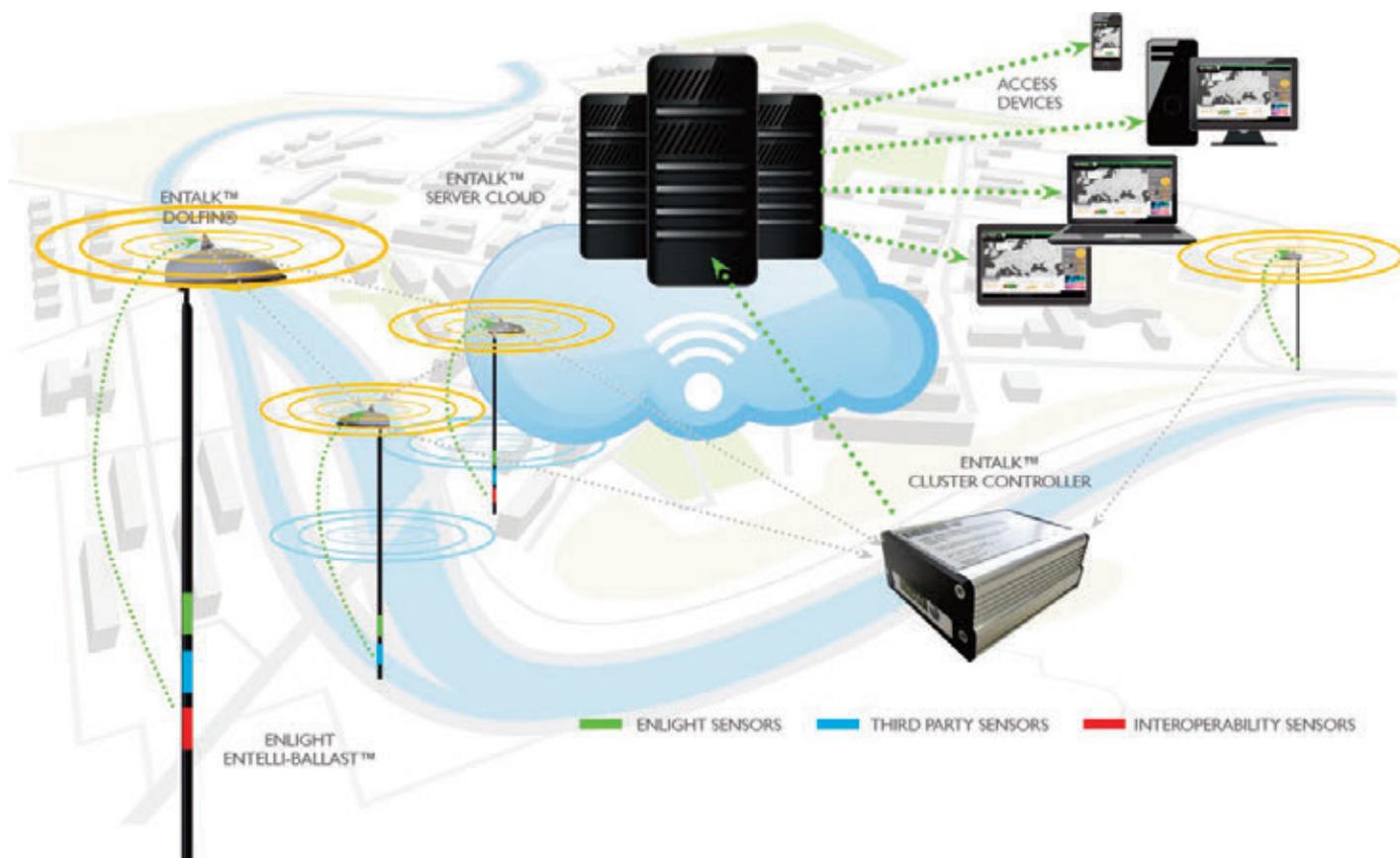
With rising electricity costs, carbon reduction taxes and shrinking budgets, it is no surprise that local authorities see street lighting as an opportunity for saving energy, CO₂ and costs. After all, 30% of the average Council's electricity bill is spent on powering streetlights. For many the answer seems to be either switch lights off at midnight or seek finance for capital-intensive LED street light replacement programmes. Plunging cities into darkness is never going to be popular so switching to LED might seem to be the only option, especially for authorities like Glasgow who have an interest in using the street lighting network for other 'smart city' applications.

There is another alternative. One UK company has pushed the boundaries of lighting control and developed a way of upgrading any existing High Intensity Discharge (HID) lamp so that it becomes highly energy efficient, can be centrally managed and controlled and also serves as the backbone of an intelligent communications network. Their award winning solutions enable Councils to keep their lights on and reap the same benefits they would expect from converting to LED but at a fraction of the cost. What's more the technology is LED compatible meaning that the light source could be changed in the future as and when funding became available.

EnLight is a fully retrofittable system compatible with all makes and models of HID lamps. Existing lanterns are fitted with an EnLight ballast that operates at 96% efficiency, and a DolFin light sensor, which enables accurate light level sensing and the use of more sophisticated dimming profiles. The EnLight DolFin also has communications built-in so that local authorities or their contractors can monitor and control their lighting stock remotely using EnTalk, the company's Central Management System (CMS).

Energy savings of up to 50% have been proven in deployments in both





street lighting and commercial lighting. Along with increased efficiency, the technology delivers improved light output and better dimming capability meaning that energy savings can be further optimised. Maintenance costs are reduced through intelligent fault diagnosis, predictive maintenance and extended lamp life. And with no need to change existing lighting infrastructure there is no environmental cost associated with disposing of lighting stock that could otherwise remain in use. All of this adds up to a return on investment of between 3 and 5 years.

And it doesn't stop at lighting. To enable use of the EnTalk CMS, a robust and highly reliable wireless network is deployed. Once this is in place a multitude of other devices can be connected to the network, enabling other smart city applications

to be rolled out with minimal additional investment in ICT infrastructure. Each EnLight Cluster Controller can handle up to 65,000 devices of any one type and is ideally suited to sensor deployment across urban or rural environments. Applications for this type of low bandwidth network are broad, for instance sensors that monitor air quality, weather, noise, parking space availability and many more.

The company has been working with global technology business ARM Holdings Plc on an Internet of Things project to ensure that the system is both scalable and secure. ARM have deployed EnLight in car park lighting at their Cambridge based headquarters where they are benefiting from energy savings of 50% and they are now looking to pilot other applications

for the EnTalk network. Piloted initially in Norfolk street lighting, EnLight's connected lighting is also being trialed by BT at Adastral Park, with a view to deploying in street lighting as part of MK: Smart. MK: Smart is a £16 million project to accelerate Milton Keynes' Smart City Programme, in which BT is a major partner.



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The low carbon Manhattan Project

We must overcome short-termism, inconvenient truths, cuts to R&D, and find the Brunels of low carbon technology. Here, Tom Delay CEO of the Carbon Trust explains...

Here's a thought. If necessity is the motherhood of invention, how come we are so far away from the wholesale deployment of low carbon energy technologies that can redeem humanity from the worst impacts of climate change?

With carbon dioxide concentrations in the atmosphere rising steeply since the industrial revolution and extreme weather events now occurring with greater frequency around the world, and closer to home, one would be forgiven for thinking that the race for low and carbon free alternatives to powering our lives would be at full throttle and on its last lap. Think again.

Back in 1939 and faced with a different kind of necessity for invention, a German military threat no less, it took Oppenheimer and the other 130,000 scientists working on the Manhattan Project 6 years and \$26bn (in today's money) to uncover the secrets of nuclear fission that so fundamentally changed the war and redefined the geopolitics for the past 70 years.

Yet in the case of climate change, which is set to transform our very existence, there have been no high security secret locations as with the Manhattan Project. In fact, the truth is quite the opposite. For the past quarter of a century the world's leading climate scientists have been openly publishing their findings on climate change – for all of us to read – whether we agree with them or not.

Perhaps that's where we made a mistake. If we kept it top secret, corralled the world's leading scientist and engineers to a series of hidden labs around the globe we might by now, beyond the scrutiny of short term political and business interests, have developed affordable low carbon technologies ready to deploy at

scale. But we didn't. We have as a nation dithered and argued, failing to engage market forces to bring essential technologies like carbon capture and storage (CCS), and offshore wind to commercial reality.

“We must as societies change the short-termism that besieges politicians like the fog of war. And we must do it with facts and argument. The most compelling of which is to see action today as an investment and not a cost.”

Each year the International Energy Agency examines the world's energy ministries' government spending on the commercialisation of key low carbon technologies. Their findings make depressing reading. We are spending little more each year on R&D on these critical technologies than we were when the IPCC published their famous first report¹ on climate science in 1990. And, despite its importance, the energy sector only accounts for about 4% of total government R&D spending which is down from 11% in 1980. Furthermore, when we look at what we need to spend to stay within 2 degrees of average warming we discover that a massive funding gap has opened up which represents some \$30-70bn a year.

Why are we not responding to the greatest engineering challenge that man has ever faced with the purpose and focus on a modern day Manhattan Project? There are many reasons – but here are 3.

Action has been stymied by the generational dilemma, where the threat is long-term but the action required is short-term. Unlike the threat of war which was imminent and to which President Roosevelt, when convinced, responded with decisiveness in 1939,

climate change represents a long-term threat to politicians all too often short-term minded.

Secondly, as Al Gore famously phrased, climate change raises inconvenient truths for all of us – not least those that have based past and future economic prosperity and well-being on the burning of fossil fuels. Not surprisingly, calls to leave coal and other fossil fuels in the ground have been resisted by investors and industries that struggle to respond to the challenges of climate change.

And, most recently, the severe economic downturn has forced economic and finance ministries around the world to re-assess research and innovation budgets as they weigh up short-term priorities against longer term ‘nice to haves’. R&D in these critical technologies has all too often been seen as an optional extra and funding has fallen off a cliff post 2009 as budgets have been reigned in.

So what to do? Most historians date the industrial revolution as lasting between 1760 and 1830. We have a similar amount of time to turn the world’s energy system on its head. Necessity, that mother of invention, and the world’s leading scientists tell us that we need a low carbon transformation that undoes the environmental side effects of the last industrial revolution.

We must find our Brunels, our Edisons and the Stephensons of our low carbon time. Innovators that can literally change the world, but we must help them. We need a new urgency around innovation. We must as societies change the short-termism that besieges politicians like the fog of war. And we must do it with facts and argument. The most compelling of which is to see action today as an investment and not a cost. We must build a new consensus forged around the belief that we can deliver technological solutions to climate change and these solutions will deliver economic prosperity in the long-term.

Our recent research across 11 low carbon technology families² from offshore wind to CCS provides strong evidence to policy makers that this is not just positive thinking to rally the animal spirits, but it is also commercial common sense. We have found that if you look at just offshore wind³ then an investment of £500m out to 2020 in key innovations, such as lower cost foundations, will help deliver long-term cost savings of £45bn by 2050. Despite the win-win opportunities that innovation will bring to the UK economy, we have identified a £3bn funding gap that exists for low carbon innovation in the UK alone.

As politicians start to count the cost of the recent flooding and look for ways to respond, we will see a move to policies enabling us to adapt better to the climate change that is already built into our climate system. But the scale of long-term climate impacts tell us we cannot afford to throw in the towel on climate change mitigation.

Innovation is fundamental and we need to explain why. Beyond the environment, it will deliver prosperity and collective enterprise that the best minds of a generation and our hard earned money will put to the most logical and noble use. ■

¹ http://www.ipcc.ch/publications_and_data/publications_ipcc_first_assessment_1990_wg1.shtml

² <http://www.carbontrust.com/resources/reports/technology/tinas-marine-energy,-carbon-capture,-heat,-bioenergy,-electricity-networks-and-storage>

³ <http://www.carbontrust.com/our-clients/o/offshore-wind-tina>

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Energy flexibility equals energy independence

Karlheinz König from Solarfocus GmbH explains the benefits of using biomass energy...

Biomass energy is generally cheap, local, and abundant and usually understood as a wood-based fuel. Woody biomass comes in 3 different types; logs, wood chips and wood pellets. As fuels, the trade-off in each case is between availability, price, quality, and user involvement. Logs are easiest to get a hold of and particularly low cost as it is usually self-supply. Wood chip can be produced on site, needs little manufacturing but does demand some handling. Wood pellets are the nearest thing to a commodity in woody biomass; they are manufactured on industrial scales and conform to quality standards with little or no end user involvement needed.

As a result of the differing benefits of these wood fuels there are now boilers designed to capture the benefits of multiple wood fuels in the same boiler. As such, we now find that there are, 'dual fuel' or, 'combined biomass', boilers available on the market

that burn log fuel or wood pellets, or even wood chip, wood pellet or log fuel. Many customers appreciate the value of being able to choose between locally available, cheap logs, and easy to use and highly-automated wood pellets. In this way the end user is doubly protected against high and volatile market prices. The oil price has consistently risen over the past decade and it is highly exposed to both local and global changes in demand and supply. Wood log fuel is insulated against such large peaks and troughs. This allows the end users who have combined biomass systems to attain a greater level of energy independence, free from the danger of unforeseeable oil price hikes, which can also affect the pellet price.

There are a few issues that need to be considered when deciding on a combined biomass boiler and determining the level of value being offered. Does the boiler automatically refill when burning wood pellets?

When switching from logs to pellets during the same heating cycle, does the boiler allow for manual fuel switchover or automatic switchover? When using logs the filling chamber must be filled manually. However, some boilers allow for the boiler to switch automatically from logs to pellets once the logs have burnt completely. The size of the filling chamber is important as the bigger the filling chamber, the greater amount of energy can be generated and consequently fewer fills are required. All solid fuel appliances tend to have a larger footprint than the oil or gas alternative, by the very nature of the fuel- it is bulky. However, small boiler footprints exist, to ensure that all key components of the heating system will fit in to most plant rooms.

An additional criterion is what the boiler is able to control. Does the boiler provide complete heat management for the building (including back up boiler control, multiple heating zone control) or does it require an additional controls device? Does the heating control system allow for remote access via the internet, viewable across all platforms e.g. tablet, smartphone and laptop? This leads to the question as to whether the boiler has other control features that ensures ease of use and low levels of maintenance, such as automatic ignition for every fuel source and automatic heat exchanger cleaning. All these points should be considered when comparing prices for different appliances in the biomass boiler range.

The next step after choosing a combined biomass boiler is to evaluate what further benefits can be derived from integrating solar thermal energy into the system. Integration is typically achieved by installing a buffer store with 1 or 2 solar coils. The buffer thereby collects and stores the heat generated by the biomass boiler as well as the energy deposited from the solar thermal collector array. The latest development for these systems is to include a weather forecasting function for the combined biomass boiler. Via an online connection to a weather forecasting service, the boiler receives live weather data. The boiler's controller interprets the data and, in conjunction with the user's own setting, determines if the boiler should produce more heat. For instance, if the weather forecast is predicting a sunny day then the boiler will

only heat a minimum of the buffer with the solar thermal array delivering the remaining energy. With a weather-forecast system in place, the solar fraction will increase and the annual heating cost related to the system will drop. The benefits include:

- Greater system efficiency as wood fuel is not wasted in spring and summer months when solar energy is relatively abundant
- Reduced fuel expenditure by replacing costly wood pellets with free solar thermal energy
- Even less exposure to variability in the availability of quality wood fuel

Furthermore, the domestic renewable heat incentive (RHI) will provide a subsidy to biomass and solar thermal heating systems over a 7 year period. The aim of the RHI is to provide enough payment to ensure that the initial cost of the system to the end user is covered in less than the 7 year period. There is a further benefit for biomass and solar thermal integrated systems as they will receive both the biomass and solar thermal tariffs on the domestic hot water portion of the annual heating demand, as stated in the Green Deal Assessment.

By combining a number of energy sources within one heating system end users are buffered against fuel scarcity and fuel expense. With the latest government incentive, the RHI, the end user will perceive a high financial return in the short-run. Over the long-term the customer's energy independence is secured and carbon emissions are reduced. ■

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An 'enlightened' vision

Stephen McPhail researcher at ENEA discusses how a change in political will could pave the way to a sustainable future...

In a globalised world dominated by a liberal market economy, it is hard to imagine what national governments can undertake in terms of visionary policies without clashing with the irresistible momentum of planet-wide growth. Though this is clear for the European states, who, singly dwarfed by the magnitude of the world economies, strive to gain a say on the international platform by uniting to a culturally and historically challenging unique body, it is certainly equally pertinent to the big players: USA, China, Russia, India, Brazil. The stakes have become so high that it is unthinkable that major deviations from the "business as usual" model should be implemented single-handedly by any important partaker, with no certain returns except a slowing down in the common race around an endless track trying to escape recession. Driven by the diktat of economic growth and bridled by popular consensus, the margins of operation of national politics are indeed restricted to smart talking and lubrication of the production machine.

On the one hand, this concerted advancement creates a kind of insurance against extremes, a mutual monitoring and protection service against radical outshoots in any direction, harming the dissident as well as the group, and as such preserves the entire system from collapse or dispersion much like a herd finds its strength in numbers, acting as one. As any highly organised society, the collective state of health is paramount and as such beneficial to the individual's. According to certain doctrines, the more complex these aggregations, the more the way ahead, the evolution of the society is an emerging quality that will automatically find the best configurations for its survival and prosperity. Wikipedia is a good example of a system that develops and ascertains itself through emergence, relying on the resultant of a vast amount of interactions.

Though this is on the whole a fascinating, and to a certain degree flattering conception of how things

behave in the modern world, on the other hand we are saddled with a finite playing field, and a given amount of resources from which to feed this process of evolution. The Earth is a globe and as such has a non-negotiable volume and surface area in and on which to act. With the technological prowess and thirst for exponential increase that characterises contemporary society (and much facilitated by the virtual environment through which these are commanded), the risk is that this “blind” force of self-regulation may run out of time and space before it reaches effect.

The question is, therefore, whether an “enlightened” vision is required, coupled with certain corresponding coercion, to resist the current overpowering global momentum and timely direct the progress of events towards a truly sustainable state. This does not necessarily imply utopian scenarios of benevolent dictatorship: much can be achieved within the frame of consensus government by reasonableness alone, though a firm wrist in the face of powerful lobbies and opportunism will in any case be required. Examples of where this has been achieved can be cited: in California and South Korea there has been a strong and decided political commitment towards solving environmental concerns and creating energy autonomy, resulting in great opportunities for new technologies, increasing productivity and related profits as well as stimulating a greener and more sustainable society. This has been achieved simply through the setting of unbiased, impartial standards of performance/efficiency/environmental impact for all products and technological solutions (conventional, incumbent or innovative) to have to comply with. It’s like setting an overarching system of basic human rights or working conditions within which all players are expected to move, without exception, but extended to areas less ethically charged and more related to economic and societal development: freedom of competition is safeguarded but bounded by precepts that serve to give a long-term direction to productivity.

Take the case of fuel cells for power generation: a technology undoubtedly more efficient and cleaner than combustion-based generators, but necessarily more difficult and costly, especially given the inexperience as compared to conventional power trains. Enormous

progress has been achieved in the performance and durability of fuel cell products in the past decade, thanks also to a clear strategy of financial support enacted by the EU for example. But though necessary for innovation, subsidies are not a sustainable way of maintaining a wishful situation, nor a very creative or structural means for that matter. A more intelligent and durable approach is to establish solid perspectives within which creativity and a free market may operate: a purely political measure, at practically zero expenditure. Directives taking into account primary energy saving, greenhouse gas emissions, local pollution, small-scale enterprise etc., are clearly of political and social importance. Incorporating external costs such as material recovery and waste disposal, energy independence, pollution and associated healthcare, clearly changes the price tag on any given product or technology, not only in the energy and transport sectors. Establishing binding parameters in these crucial fields and a roadmap for their updates and development will change the game. The resulting playing field can be left completely technology neutral and open to any solution proposed, in view of the overarching objectives that need to be met by society at large. In terms of the all-important domestic product, this scenario provides confidence to investors, who can rely on a fixed set of rules within which their enterprise can be speculated to grow.

The ultimate success of these examples is still up for proof, but vision coupled with decision – preferably backed by a strong confidence in the resilience and fertility of the local economy – is the hallmark of good government, and California and South Korea, amongst others who have spearheaded innovative legislation, have proved this to be possible even in the globalised world of today. ■

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Decarbonising UK energy and industry

Dr Ward Goldthorpe, Programme Manager for Carbon Capture and Storage (CCS) and Gas Storage at The Crown Estate discusses how to help make CCS a viable option for the UK...

As the world continues to burn fossil fuels it is moving closer to using up the internationally agreed carbon budget that will restrict global warming to 2°C. In the UK, the government has recognised that a proportion of our power generation and industry will have to be fitted with Carbon Capture and Storage (CCS) in order to achieve the UK's own carbon budget limits.

CCS is an infrastructure chain comprising technologies that remove carbon dioxide (CO₂) from the exhaust gases of power stations and industrial plants (such as steelworks and cement plants), transport it to a storage site, and then pump it more than a kilometre underground into stable geological formations that will keep it there permanently like the oil and natural gas accumulations of the North Sea.

The UK government is taking steps, through its competitive CCS commercialisation programme, to help CCS equipped power generation become a viable option in the UK's energy mix by the 2020s. By February 2014 the government had concluded £100m of funding arrangements for engineering and design of 2 CCS projects with offshore geological storage beneath the North Sea. One of these projects will remove CO₂ from the gas fired power station at Peterhead in Scotland and the other from a new coal-fired power station in the Humber Valley in England.

The significance of this commitment should not be underestimated, and is an exciting step in the journey for CCS in the UK. But it only gets us to the starting line. We need to understand the cost drivers and overcome a number of barriers and market failures in order to create a pathway forward beyond the first 2 projects. If we can achieve this through collaboration

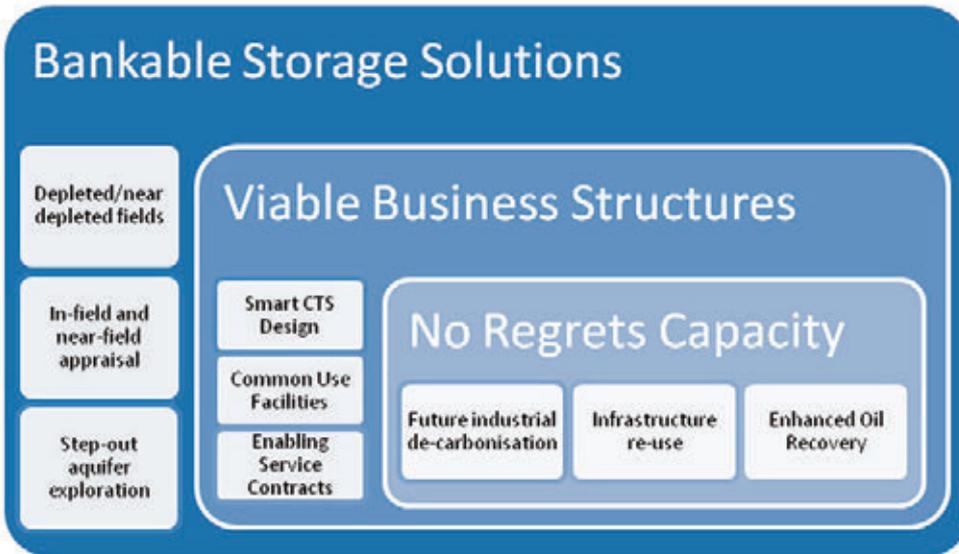
between industry and government, the prize for the UK economy is a saving in the cost of providing low carbon energy of £13bn per year in 2030 rising to £30bn per year by 2050 (Energy Technologies Institute). That doesn't include the upside benefit of earning income from providing a service to continental Europe as it decarbonises its industries in the 2030s and 2040s.

Creating the Future Today

Because carbon (dioxide) pollution and the cost of effects of climate change are not yet priced into all the activities and products of our economy, we have what economists call an "externality" with the effect that free markets do not drive us towards decarbonisation, including low carbon energy. The UK government is taking a global lead with its policies to address this externality. In particular, its Electricity Market Reform framework is designed to create the transitional conditions that will result in a properly functioning market for low carbon electricity in the future.

Similar thinking is now required to create the pathway for deployment of CO₂ transport and storage (CTS) infrastructure that can be used across both the power generation and industrial sectors.

Developers, investors and financial institutions all need a degree of certainty to take forward new projects to a Final Investment Decision (FID). To turn conceptual power or industrial capture projects into reality, storage sites have to be "characterised" and ready to be developed – in other words financeable or "bankable" – and vice versa. If government policies are left to focus solely on electricity generation than the all-important development of CTS infrastructure at scale may not be forthcoming.



storage infrastructure needing a development pathway in parallel to policies that support low carbon power generation or industrial processes. Furthermore, a distinction needs to be made with renewable power generation

There is a risk that the virtuous cycle of CTS infrastructure development, lowering of CCS cost, and construction of capture plants on power and industry will not materialise in the required timeframe. This outcome also runs the risk that industrial decarbonisation in the future will be more expensive and the projected savings to the economy of including CCS in the energy system will not be achieved.

The process of characterisation of storage sites has been well defined by oil and gas industry experts. The length of time and cost to characterise a storage site depends on the type of site and whether data has already been collected from oil and gas exploration or production. The important thing to recognise is that storage characterisation and development is an entirely different activity to power generation or industrial processing, undertaken by different companies working with different investment options and criteria. Ensuring we characterise enough storage over the next 10 years will be one of the most important foundations for decarbonisation of the whole energy system at lowest cost in the future.

De-risking CCS as a viable low carbon option in the energy market of the future would therefore benefit from additional government interventions that address the structural problem of CO₂ transport and

projects when formulating policy because, unlike power transmission infrastructure, there is no existing CO₂ pipeline network for carbon capture projects to connect to.

The figure shows a strategic framework within which policy, interventions and actions could be formulated to ensure an optimal future pathway for CCS based on smart no regrets early deployment of appropriately sized CTS infrastructure for use with some power stations that can then be expanded to industrial CCS in the future. The UK is well placed to pursue such a strategy, and at the same time capitalise on the potential for enhanced oil recovery from some of its North Sea oil fields as well as create new economic activity through use of its skills and supply chain capability in the major industrial regions around the country. ■

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Better knowledge for better seas

With the ever growing pressures that are being put on the marine environment, Janez Potočnik Commissioner for Environment at the European Commission discusses the proposed solutions...

Europe's growth potential – and countless European livelihoods – are heavily dependent on the proper functioning of marine ecosystems. We have every interest in using these resources carefully and efficiently, in ways that safeguard them for future generations. But we can't do that effectively until we recognise and address the growing pressures that we are exerting on the marine environment today.

EU lawmakers have adopted new legislation on Maritime Spatial Planning. Competition for maritime space – for renewable energy equipment, aquaculture and other growth areas – has highlighted the need for more efficient management of such areas, to avoid potential conflict and create a stable environment attractive to investors. What we have proposed will make it easier for Member States to coordinate such activities and better manage environmental pressures from sea-based activities.

Maritime Spatial Planning is a cornerstone of the Commission's Blue Growth strategy and of Integrated Maritime Policy. Clearer rules would boost sustainable

maritime growth, while also contributing to a more efficient implementation of EU environmental legislation in marine and coastal waters. It should also help establish coherent networks of Marine Protected Areas, for which cooperation on planning across borders is essential, and ensure the participation of all stakeholders in planning processes.

The EU's marine areas exceed our total land mass. In fact, almost half of the EU's population lives within 50 km of the sea, regularly using its resources. This number increases during holiday season. The seas are one of the planet's common resources, so it makes sense to have shared legislation in this area. We already do, of course, in the form of the Marine Strategy Framework Directive, the EU's flagship policy for marine protection. This ambitious legislation sets a target of "Good Environmental Status" for all of our marine waters, a target to be reached in just 6 years' time. To achieve good status, we must ensure our waters are clean, healthy and productive, and that the way we use them today does not jeopardise their use by the generations to come.

There is much to be done. It is no secret that Europe's seas are some way from good environmental status, and the latest reports from Member States make troubling reading.

Marine pollution has decreased in some places, but levels of nutrients and hazardous substances such as mercury still remain above safe levels. Damage to the sea-bed, from activities like bottom trawling, is extensive, particularly in the North Sea.

In the Mediterranean and the Black Sea, nearly 9 in every 10 species are still being overfished. Urgent action is required. If we wait too long, the greater the cost will be to our industry and we will endanger the livelihoods of the people who depend on fishing to put food on their table. Member States must deliver on their commitment in the reformed Common Fisheries Policy not to fish beyond the Maximum Sustainable Yield and to bring our fish stocks back within safe biological limits.

To tackle the eutrophication of our seas, we need to adopt a more integrated approach to the way we manage the fertilisers and other nutrients that are at the heart of the problem.

To combat marine litter, we must go to the source of the problem, and ensure that the materials that today end up as litter are instead pumped back into our economy as the raw materials for our products. That is why I am recommending to the Commission a headline target for marine litter reduction in the circular economy and waste package to be delivered this summer.

Closer European integration is a delicate subject, but when dealing with the common resource that is our seas, there is no doubt that Europe has everything to gain from a coherent, transnational approach. It has been said that we know more about the surface of Mars than we do about the deep sea. As Member States move into the next phase of the implementation of the Marine Directive, we must develop joint monitoring programmes and improve the comparability of the data Member States invest so much in generating.

That way we can also work towards a shared picture, an index of the state of our marine environment, which can tell us at a glance how far we are from genuinely healthy seas.

To date, EU Member States have set fragmented, and at times contradictory, ambitions for the marine environment. We need to align our aims if we are to achieve coordinated and adequate actions to address the key marine issues we are facing today: whether overfishing, eutrophication or marine litter.

There are global aspects too that cannot be neglected. At the United Nations' Rio+20 Conference in 2012, the EU played an important role in stepping up international marine cooperation, as outlined in the ambitious oceans chapter in the conference conclusions. A range of commitments was agreed, from reducing marine litter, curbing overfishing, mitigating sea-level rise and coastal erosion and combating ocean acidification. We are now working through the UN processes to turn these commitments into action, and to ensure that marine protection has a prominent place in the Sustainable Development Goals – the key headline targets which the international community is developing for beyond 2015.

Solving these problems is ultimately a question of political will. In March this year, marine stakeholders from all over Europe put out a declaration¹ urging policymakers to address these maritime questions as a matter of urgency, and to turn words into actions to preserve our seas. I hope they pick up that challenge. ■

¹ <http://ec.europa.eu/environment/marine/hope-conference/pdf/HOPE%20Conference%20Declaration.pdf>

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Protecting Britain's star feature

Green belt is increasingly coming under pressure from development, and here, The National Trust outline their concerns...

Although historically the Green Belt has been some of Britain's most protected rural space, concerns have recently been expressed that it is coming under increasing pressure from development. As the government's National Planning Policy Framework (NPPF) approaches its second anniversary, at the National Trust we want to make sure that the government's planning policies are doing their job by adequately protecting the Green Belt and delivering sustainable development.

Why is Green Belt important to the National Trust?

If you asked people to picture Green Belt in their minds, many would have a vision of beautiful countryside. Whilst some Green Belt land is beautiful, this is not the main reason why it has a special status. Green Belt benefits from special protections in planning policy to stop the incursion of urban areas into the countryside, and prevent the merging of towns. As our chairman, Simon Jenkins puts it, the Green Belt

has "protected a vision of rural England and retained access to green spaces for urban dwellers." In this way Green Belts play a key role in keeping our landscape special and are described by some as 'green lungs' for our cities.

Research by the Campaign to Protect Rural England (CPRE), shows there are already a significant number of Green Belt development sites that have been given the green light by councils, often against the wishes of local communities. On 24th March, CPRE stated that over 190,000 houses are scheduled to be developed on protected land. This is over double those planned in 2012, and that this would equate to a loss of more than 21.62 square miles of Green Belt land. These figures don't take into account the potential impact of the growingly controversial HS2 line which will require further sacrifices.

Both before and since the new planning rules were adopted, government ministers reassured us that the

Green Belt would continue to be protected. When the NPPF was drawn up in September 2011, the Prime Minister wrote to the Trust stating that “we must ensure the appropriate protections for our magnificent countryside. This is why our reforms will maintain protections for the Green Belt”. This mismatch between the government’s clear intention and reports of what is happening on the ground prompted us to look into the matter further.

Last summer we commissioned the Local Government Information Unit (LGIU) to carry out a survey of local councils, which the survey revealed that over 50% of councils that had Green Belt in their local authority area are currently likely to allocate some of this for development. It’s hard to argue with Jonathan Carr-West’s (CEO of the LGIU) analysis that “targets around housing supply are putting significant strain on councils’ ability to protect Green Belt.” What is more, the Green Belt could be being developed despite widespread availability of brownfield land, with more than half of the 147 councils that responded claiming that their local authority had brownfield sites available, but that had been considered unviable for development.

So it would seem that although the coalition government has repeatedly stressed its attachment to protecting Green Belt, the new planning rules are nevertheless leading councils to consider allocating land in the Green Belt for development. We were also concerned by the draft versions of new planning policies, published in September and the subject of a recent consultation. Expert advice given to the Trust suggested this new set of policies could be a missed opportunity to underscore the government’s ‘brownfield first’ policy, and might result in local authorities releasing more land in the countryside and the Green Belt for development.

That’s why in December we decided to publish our research on Green Belts, and we wrote to the Communities Secretary Eric Pickles asking the

government to reaffirm its commitment to Green Belt protection, and to ensure the new planning guidance reinforced this protection, and did more to deliver a truly brownfield first approach to development. On 6th March the government published the new guidance in its final form. Although it’s too early to assess the impact of this, our initial reaction is positive as the government has underlined the importance of the Green Belt, and taken some practical steps to encourage more utilisation of brownfield sites.

Though all this feels like a step in the right direction, we will continue to keep a watch on how the new guidance plays out on the ground. The government has a difficult task to ensure we get the new housing we need built in the right places, and at the Trust we are committed to working with them to ensure that we see truly sustainable development that impacts on the countryside as little as possible. To do this, we should continue to protect our Green Belt, which has, as Simon Jenkins says, ‘been the star feature of British town and country planning for half a century’, and has been admired worldwide for helping to preserve our unique English landscape. ■



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Consciously 'decoupling' waste

Roy Hathaway, Consultant at the Environmental Services Association (ESA) provides insight into the aims of waste prevention programmes...

As we all know, the easiest way to deal with waste is to avoid creating it in the first place. People and businesses that use resources wisely not only save money, but also have much less impact on the environment. That is why waste prevention rightly occupies the top spot in the "Waste Hierarchy" set out in EU and national waste legislation.

Waste prevention is about the way the products and services we all rely on are designed, made, bought and sold, used, consumed and disposed of. For example:

- Making products that are more durable, repairable, reusable and recyclable helps to cut the amount of waste being created;
- Encouraging people and businesses to reuse goods, via charity shops or other reuse networks, helps to boost markets for second hand items and decreases waste;

- Reducing the amounts of hazardous, harmful, or difficult to recycle substances in products or materials will help to protect the environment, as well as improve the efficiency with which resources are used.

All EU member states, including the UK, have had to produce national 'Waste Prevention Programmes'. In the past there has been a link between economic growth and increases in the amount of waste being produced – more growth has meant more waste. The aim of the waste prevention programmes is to break this link – sometimes referred to as "decoupling".

In developed economies such as the UK, making progress in reducing and preventing waste will require profound changes in production processes, consumption patterns, and business and consumer behaviour. Given today's propensity towards a "throwaway society", these changes cannot be achieved overnight, and in any case it would be unrealistic to expect waste to be eliminated altogether.



Roy Hathaway
Consultant
Environmental Services
Association (ESA)

Nevertheless, ESA and its members are playing an active part in efforts to improve the way in which we use resources in the economy, not only here in the UK, but also in the EU and more widely. For example, in 2011 ESA agreed a 'Responsibility Deal' with the government. This included a commitment by our members to promote the waste hierarchy, and to place greater emphasis on waste prevention and resource efficiency in their dealings with their waste producer customers.

ESA played an active part in developing the national Waste Prevention Programme, which was published by Defra in 2013. ESA's priorities for action on waste prevention – materials including electrical and electronic equipment, construction materials, food waste, clothing and textiles, and plastics – are very similar to the list of priorities set out in the government's published programme.

Waste Prevention – the future?

Going forward, ESA and its members are looking to work with reuse networks and local authorities to maximise the reuse of articles deposited at household waste recycling centres (HWRCs), and to support reuse, repair, and leasing business models more generally.

A number of ESA member companies are actively engaged in reuse initiatives involving partnerships with charities and local authorities. For example, the Doncaster Reuse Partnership and the Buckinghamshire Reuse Forum. These initiatives help to promote the reuse of a range of products and materials which would otherwise be sent for recycling or disposal, including electricals, textiles, furniture, and paint.

ESA is also pressing for action at European level. In a single market, changing product design is not something that an individual country can achieve on its own. European product legislation should aim to design out waste and encourage the more efficient use of materials, particularly recycled materials.

ESA believes products should be designed to be more durable, repairable and recyclable. They should be capable of being easily dismantled at end of use, so that raw materials (such as platinum), and rare earth metals (such as those alloys used in magnets and fibre-optics) can be recovered. Consumers should be better informed about the recyclability, and the recycled content of products, by clearer labelling so that they can make informed choices. Additionally, those in the public and private sectors responsible for major procurement decisions should set an example by demanding low-waste creation and use of recyclable products in developments.

Above all, ESA believes that the waste and resource management industry should work closer with the designers and manufacturers of products and services, so that in future, products are designed with proper regard for what happens to them when people and businesses have finished using them.

After all, prevention is better than cure. ■

The Environmental Services Association (ESA) is the trade association for the UK's waste and resource management sector. ESA member companies collect, treat, recycle, recover, and where necessary, safely dispose of a wide range of wastes, including hazardous material. They use the best available technologies to protect human health and the environment, while providing jobs and growth for the UK economy.



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Reaping e-waste rewards

Ruediger Kuehr, Executive Secretary of the StEP Initiative at the United Nations University explains the importance of disposing of e-waste correctly...

In the same way as electrical and electronic equipment (EEE) has revolutionised our daily lives in communication, transport, medicine, entertainment etc., their production, usage and disposal have brought along substantial challenges. The number of household or business items with circuitry or electrical components with power or battery supply has exploded over the past years. The United Nations University (UNU) documents that volumes placed annually on the market since 1990 has grown from 19.5 million tonnes to 57.4 million tonnes in 2010, and is set to more than triple to approximately 75 million tonnes by 2015.

E-Waste is a term used to cover items of all types of EEE that have been discarded without the intention of re-use. Because of the increased amounts put on the market and the decreased first life-time of many EEE, the e-waste amounts have increased annually from 15.7 in 1990 to 44.1 million tonnes in 2010, and is expected to reach 57.5 million tonnes in 2016 already.

E-waste contains hazardous substances that if treated inappropriately at end of life can damage human health and the environment. It also contains scarce and

valuable materials, due to the complexity of its design, such as precious metals and rare earth minerals which need to be treated properly to effectively recover them with minimal environmental impact. Therefore, the rather low collection rates for a number of e-waste fractions such as small appliances, which are too often disposed of through the normal household-bin, the long residence time of unused EEE in cabinets, drawers and cellars, together with the illegal export of e-waste to developing and transition countries, usually resulting in primitive and therefore very inefficient recycling, pose rather extensive problems. This comes together with shortening life-times of many products, which increases the environmental rucksack from the resource-intensive production. In consequence, if a second or third-life for EEE through reuse after repair and refurbishment is impossible, also due to too little demand; appropriate and timely material recycling is advisable. This should take place at safe sites, because the open burning or acid baths applied in informal recycling practices are not only harming the workers and polluting the environment, but are also resulting in low return rates of the valuable elements contained in e-waste.

Though, on a meta level, a sustainable solution of the e-waste problem is obvious, the devil is in the detail. This is because of the complexity of the products, the global dimension of the reverse supply chain and the multitude of actors involved which should also take up certain responsibilities. Last but not least, the differing societal context from country to country has to be highlighted. Hence, work towards a sustainable solution must take a holistic approach, considering policy, design, reuse, recycle and capacity building aspects.

This equals the approach taken by the “Solving the E-Waste Problem (StEP)” Initiative coordinated by the UN’s think tank, the United Nations University (UNU). StEP is an initiative launched in 2007 proposing necessary changes, uniquely leading global thinking, knowledge, awareness and innovation in the management and development of environmentally, economically and ethically-sound e-waste resource recovery, re-use and prevention. StEP fosters inclusive solutions-oriented

member dialogue, cooperation and consensus by providing a global platform for sharing information, knowledge and recommendations founded on expert scientific research and multi-stakeholder sectoral experience. Towards this aim, StEP works internationally with receptive external partners to develop fair and objective policies to stimulate and demonstrate practical, measured, and effective responses to e-waste prevention, management and processes. StEP is regarded as one of the leaders in e-waste management discussion worldwide by providing a scientific basis from which to inform and actively change the awareness, knowledge, attitudes and behaviour of the international business and consumer public.

In Europe, the latest UNU estimates indicate a growth from 9.4 million tonnes of e-waste in 2008, towards 10.1 million tonnes in 2013 and 11.2 million tonnes in 2018, with a much faster growth in the number of pieces than in weight due to miniaturisation. Many studies proved low collection and recycling rates in the European Union. Therefore EU’s new WEEE Directive changes the collection target for Member States from a ‘flat-rate’ 4 kg per inhabitant to a percentage based approach related to EEE put on market or alternatively e-waste generated. Separate collection of e-waste represents a fundamental step to ensure a proper and effective downstream recycling chain. Environmental, economic and social benefits can only be achieved if separate collection of e-waste is ensured, monitored and tracked. But this requires new approaches for collection in which many initiatives, including StEP, are concentrating efforts. ■

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eVOLVing e-waste

Finally: A scalable, green solution for handling electronic waste

There are several things we are adept at as human beings. Chief among them is the ability to creatively utilise natural resources by selectively targeting their components and combining them in new ways to provide desirable personal benefits. Common examples that we all take for granted are housing (trees), transportation (the forging of metals), office buildings and monuments (manufacturing of bricks, the use of stone) and electronic devices (valuable metals and elements). It's all quite remarkable. But now, more than ever, we must also carefully consider how to properly disassemble these creations when we're done with them. We must learn to re-claim and re-use what we borrowed from nature in the first place because the consequences are piling up.

The proliferation of electronic devices over the last generation has been rapid and extensive. Made from plastics, precious metals, base metals, synthetic materials, chemistries and gases, electronic devices are put together in such a fashion today that, one small single device can integrate the capabilities of previous multiple (and larger) systems and technologies. Advanced Technology Materials, Inc. (ATMI) is proud to have been a major contributor to this amazing high-tech revolution.

But now what? What of the electronic items these new devices have replaced?

And what becomes of these new devices when they themselves become obsolete and get replaced? We've recently become very aware of that answer and it's not appealing, to say the least. I am proud to work for a technology company that understood this several years ago and invested in how we can help solve what has become a serious global issue.

The World's Largest Growing Waste Stream

One of the ugliest, most dangerous and rapidly growing side effects of technology innovation and advancement is something called electronic waste, or e-waste. With tougher regulation and restrictions over the use of smelters and landfills that can be polluting to the environment, mountains of e-waste has, for years, been exported to underdeveloped countries where scrap ends up dumped in the poor regions of Africa, India, China and other developing nations. There, adults and children conduct open burning and use dangerous chemicals such as cyanide and aqua-regia in attempts to extract metals from cables, printed wiring boards and other components to sell or trade.

A United Nations report released last December says that e-waste will grow by one-third by the year 2017 to total about 65.5 million metric tons. According to the report, the U.S. produced 9.4 million metric tons of e-waste in 2012 – the most of any



The eVOLV™ process tool contains a series of non-toxic chemistries that extract precious metals and solder metals safely and efficiently from printed wiring boards of all types.



The eVOLV™ Board Clearing Machine (BCM) is used to depopulate components and heat shields from mobile phones.



The eVOLV™ Solids Processing Technology (SPT) uses an all chemical, non-grinding, non-shredding process step used to extract precious metals and base metals from integrated circuits.

country. In all, e-waste is the fastest growing municipal waste stream in the world, yet we are told that less than 20% of that total is actually recycled – and mostly through old, dirty, hazardous and unsound practices.

What is needed is a safer, cleaner, more responsible way for both developed and developing countries to handle and recycle electronic waste at home. Our eVOLV™ technology platform was specifically designed to meet this global demand.

Evolving to a Safer, More Sustainable Approach

ATMI is a global supplier of specialty materials and systems to the micro-electronics industry, or, more specifically, to the companies that make computer chips that go into electronic devices. In our work, we have had to create chemistries that do very singular and specific things when in contact with certain surfaces and other materials. Because of this, we are experts in interfacial science, such as liquid/solid interactions.

Over the last several years, our technical team has been focused on a unique method to extract and subsequently recover precious and base metals from electronic waste using sustainable methods. Utilising such a focused design approach we have successfully achieved our initial task, and are now able to recycle large amounts of printed circuit or wiring boards (PWBs), integrated circuits (ICs) and cell phones with a 98% metal recovery rate. And we do it employing non-toxic chemicals in a cradle-to-cradle process which yields zero

waste. The process uses a series of chemical baths to chemically depopulate components from printed wire boards and subsequently extract the precious and base metals from the surface of the board and the integrated circuits. The process uses very little energy, operates near-room temperature and is the first process in the world that does not burn or shred the e-waste, thus yielding zero losses in precious metal recovery. We call it the eVOLV™ process.

The eVOLV chemistries that we use were designed according to the 12 principles of Green Chemistry, an approach developed and advocated by the Warner Babcock Institute of Green Chemistry. And it worked. In fact, these chemistries, along with the process water, are infinitely recyclable and therefore generate no waste. The whole process is environmentally benign and yields raw materials that can be re-inserted into multiple manufacturing processes.

The eVOLV technology was designed to be modular and thus easily scalable to any capacity needs. The initial eVOLV pilot program, which we ran from September 2012 through May, 2013, effectively recycled over 100,000lbs. of waste PWBs of various types. Commercially, the eVOLV system can be scaled to specific amounts (many tons per hour) given waste stream volume at a given location site.

While environmentally impactful, the commercial potential of our eVOLV solution is also very compelling. Since this novel process does not shred or burn the printed wire boards or com-

ponents, we can recover significantly more precious metal value than incumbent technologies such as smelting.

Because of this and the environmental and safety benefits it provides, I have been working with global waste management companies, regional enterprises, non-government organisations such as the Basel Action Network (BAN) and governments of large nations to design eVOLV programs that can be installed in various locations in the world. This is a large effort, but one that will one day soon see safer, cleaner and greener solutions for handling, dismantling and processing certain elements of electronic waste.

For more information or inquiries regarding the eVOLV process, visit www.atmi-evolv.com.

By Michael B. Korzenski, Ph.D., ATMI, Inc.

Author's Note: Entegris, Inc. has agreed to acquire ATMI, Inc. The deal is expected to close in the second quarter of this year. At the time of submitting these materials for publication, the deal had not yet closed.

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Averting a storm?

Dr Peter Stott, Head of Climate Monitoring and Attribution at the Met Office Hadley Centre details how climate change has affected extreme weather worldwide...

There has been no shortage of extreme weather in recent years. For example, last year Australia recorded its hottest year on record. Early this year, many parts of the Eastern US endured weeks of extreme cold, while in the UK we had the wettest winter in England and Wales since records began in 1766. How has climate change affected extreme weather and is it still possible to avoid the worst effects of climate change in future?

The recent report from the Intergovernmental Panel on Climate Change, *Climate Change 2013: The Physical Science Basis* (www.climatechange2013.org) provides a comprehensive assessment of the physical science basis of climate change. It concludes that warming of the climate system is unequivocal and, since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and oceans have warmed, snow and ice have diminished, the sea level has risen, and the concentrations of

greenhouse gases have increased. Climate extremes have also changed. There is robust evidence that the frequency of heat waves has increased in large parts of Europe, Asia and Australia and that the frequency of heavy precipitation events has increased in North America and Europe.

What has caused these changes? The atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. These increases, resulting from human emissions, enhance the natural greenhouse effect and cause additional warming of the climate system. Observed patterns of warming of the atmosphere and the ocean are consistent with those expected from this additional greenhouse effect and are not consistent with the patterns of temperature expected from natural causes. The IPCC report concluded that human influence on the climate system is clear.

What can we say about individual weather events? Unusual extremes have always happened in our variable climate and it can be tempting to put the entire blame of a particular heat wave or cold snap on either human-caused climate change or natural climate variability. But the reality is usually that both played a role. It is helpful therefore to consider how anthropogenic factors have changed the risk of such events. This is done by conducting climate model experiments in which simulations are made of the world as it would have been had greenhouse gas concentrations and other human factors on climate not changed. Such attribution studies have shown that human-caused climate change increased the risk of the extreme temperatures seen in Europe in 2003, which brought many thousands of heat-related deaths. Human influence also substantially increased the risk of the record Australian temperatures seen in 2013 which brought devastating forest fires and the destruction of many homes. The risk of such catastrophic heat waves is set to increase with continued emissions. Climate model simulations indicate that by the 2040s half of summers in Europe could be warmer than 2003. With continued greenhouse gas emissions, such summers would be classed as unusually cool relative to the new climate of the end of this century.

“Observed patterns of warming of the atmosphere and the ocean are consistent with those expected from this additional greenhouse effect and are not consistent with the patterns of temperature expected from natural causes.”

It is more challenging to determine how much human-induced climate change might have affected the risk of the extreme rainfall and floods seen in the UK this winter. British rainfall varies hugely because our weather patterns are constantly changing. While there may be more moisture feeding storms when they form, the North Atlantic jet stream, the high level ribbon of air that steers our weather systems, could be varying. Further research is needed to better

understand these processes and better characterise our changing risk to such wet winters. At the Met Office we are leading a new European project called EUCLEIA (www.eucleia.eu) which aims to develop an attribution system to deliver reliable and user-relevant attribution assessments of recent extreme weather events. Such information will be useful in planning for and adapting to future extreme weather.

While we need to plan for further increases in the risk of extreme weather, the science shows it is still not too late to avoid the worst consequences of human-induced climate change. The latest IPCC report states that aggressive reductions in emissions can make a large difference to changes in climate expected during the latter part of this century and beyond. Such reductions could limit the extent to which hitherto rare extremes such as severe heat waves, floods and droughts become increasingly common. Limiting future emissions will also reduce the risk of large releases of greenhouse gasses from melting permafrost and reduce the risk of very rapid rises in sea level from accelerated melting of the ice sheets in Greenland and Antarctica. However, limiting climate change will require substantial and sustained reductions of greenhouse gas emissions. ■

Dr Peter Stott is the Coordinating Lead Author of one of the chapters of the IPCC Working Group I report on “Climate Change 2013: The Physical Science Basis”. For ease of reference the chapter is 10 on “Detection and Attribution of Climate Change : from Global to Regional”

(http://www.climatechange2013.org/images/report/WG1AR5_Chapter10_FINAL.pdf)

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The mathematics of extreme events

Predicting and understanding extreme weather events

Extrême weather events cause severe damage. Examples are hurricane Sandy, windstorm Xynthia, and, more recently, the floods in southern England. Insurance companies need to reserve sufficient capital to cover claims following an extreme weather event. Estimates of expected losses crucially depend on the tail width of the probability distribution, which determines the likelihood of extremes. Therefore, computing accurate estimates of the tail width is a pressing challenge for insurance companies and forecasting agencies.

The Johann Bernoulli Institute for Mathematics and Computer Science, based at the University of Groningen in the Netherlands, actively participates in current mathematical research on extremes. Our research involves a unique combination of theories and methodologies from different fields like climate modelling, nonlinear dynamical systems, ergodic theory, and extreme value statistics.

Mathematical modelling offers a fruitful approach towards an understanding of climate 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 deterministic dynamical systems in which the present state of the system completely determines the future evolution. Time series

generated by these models can be studied using extreme value theory.

Classical extreme value theory is concerned with the distribution of large values in time series of independent random variables. In the last decade this theory has been extended to the setting of deterministic systems, which also includes climate models. In this setting the so-called Generalised Extreme Value (GEV) distributions can be used to compute the probability of occurrence of future large values of a quantity given a sample of past measurements. To that purpose one must estimate the tail width, which determines the frequency and intensity of extreme events.

“Accurate estimates of the tail width are useful for forecasting agencies, such as the UK MetOffice, the Royal Netherlands Meteorological Institute, and also the insurance industry.”

Estimates for the tail width are traditionally computed by the so-called block maximum method. In this method one divides a time series in sufficiently long blocks. Under the assumption that the block maxima form a random sample drawn from a GEV distribution the parameters can be estimated using standard statistical methods. Recently, we discovered that the tail width is related to geometrical characteristics of the evolutions of the underlying

dynamical system. This discovery also explains why probability distributions for extremes obtained by numerical simulations do not always give accurate results.

Accurate estimates of the tail width are useful for forecasting agencies, such as the UK MetOffice, the Royal Netherlands Meteorological Institute, and also the insurance industry. Our research leads to a better understanding of the typical tail behaviour of time series generated by deterministic systems, such as climate models.

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Rail infrastructure – a lasting legacy

Stephen Hammond, Minister for Rail at the Department for Transport details how investment in rail is growing and its positive impact on the nation’s economy...

Rail travel in Britain is soaring. Over the past 20 years, passenger demand has doubled, and on intercity routes it has grown even faster. Although the network today is roughly the same size, we are running 4,000 extra services a day. But historic underinvestment over decades has left the ageing infrastructure in urgent need of modernisation – both to keep the country moving and to generate economic growth. This government has embarked on the biggest programme of improvements to the railway for generations to address this infrastructure deficit.

The investments are as diverse as they are ambitious. We are electrifying 850 miles of track, and spending £5.7bn on the Intercity Express Programme. We are building Crossrail and upgrading Thameslink, and we’re completing the Northern Hub connecting major cities in the north. And by 2017, we will be building

HS2 to give us the capacity we need for long-term growth. All these investments will give Britain a world class railway – one that will create jobs and deliver a lasting skills legacy, providing the capacity and connectivity we need to secure the UK’s long-term economic growth, as well as allowing for a higher quality travel experience for passengers.

Crossrail is the largest infrastructure scheme in Europe. This £14.5bn scheme will create a 100km east-west rail route across London and beyond, from Reading in the west to Shenfield and Abbey Wood in the east, with 13 miles of new tunnels currently being built under central London.

More than 10,000 people are currently working on the new line, including more than 800 previously unemployed workers and nearly 300 new apprentices.

Crossrail's industry-leading Tunnelling and Underground Construction Academy (TUCA) has trained more than 5,000 people. The skills legacy of the programme will boost our construction and engineering industries for decades to come.

Crossrail will also deliver a lasting economic legacy. When the project is complete in 2018, it will bring an additional 1.5 million people within 45 minutes of London's business centres, helping to create an extra 30,000 jobs in Central London by 2026. But the benefits will be felt far beyond the capital. Bombardier in Derby – Britain's oldest surviving train manufacturer – will build the rolling stock in a deal with a capital value of around £1bn, but at least a quarter of the contract value will be channelled through small and medium sized suppliers – over 60% from outside London and the South East.

The £6.5bn Thameslink upgrade is another major initiative that will deliver big benefits. As well as improvements to stations, track and signalling, the rolling stock will be new, significantly increasing capacity and connectivity on the north-south rail route through London.

Thirty two previously unemployed residents of Southwark in London have found work on Thameslink, with many going on to gain construction qualifications that will help them find lasting employment. A further 38 people have secured apprenticeships across a range of roles, with many more planned over the next four years. Overall, the programme will generate more than 6,000 jobs while, outside London, the contract to build and maintain the new trains will create up to 2,000 jobs.

Other important projects include a massive electrification programme, the completion of the Northern Hub, which will allow an extra 700 trains to run each day, and the East-West Rail project, which will connect the South to the East Midlands and generate up to 12,000 new jobs across the region.

In a further boost to manufacturing in this country, the Intercity Express Programme will provide a new fleet of state-of-the-art trains and infrastructure improvements on the Great Western Main Line, and on the East Coast Main Line between London and

Edinburgh. As well as improving connections between major cities, businesses from Gateshead to Cornwall have won contracts to make everything from safety switches to brake systems. The trains themselves will be assembled in a purpose-built factory in Newton Aycliffe, Co Durham, creating more than 700 local jobs.

Our expanding rail sector has also helped to attract international investment to the UK, creating new jobs and generating further growth. Earlier this year, Hitachi – the company building the new Intercity Express trains – announced it would be moving its global rail headquarters from Tokyo to London and expanding its workforce to 4,000 from the current 2,500 – a real vote of confidence in the industry.

On a more local level, improvements to individual stations are also having a major impact on local economies. In the West Midlands, the redevelopment of Birmingham New Street Station will have generated more than 1,000 jobs during construction, while a new John Lewis store being built as part of the project will produce many hundreds more.

Elsewhere, more than 1,300 stations across the country have benefited from a range of accessibility improvements. They include step-free access at more than 160 stations, with a further 42 on the way. These improvements not only create jobs during construction, but also open up opportunities for more passengers to access local work and leisure.

Rail is an engine for growth. Between 2014 and 2019, infrastructure operator Network Rail is planning to spend £38bn to run and expand the railway, and to give us the capacity we need to prosper. This massive commitment will help us overcome the infrastructure problems we inherited, and which have held Britain back for too long. ■

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Stephen Hammond

Rail Minister

Department for Transport

www.gov.uk/government/organisations/department-for-transport

The changing face of public engagement

Richard Edwards of Quatreus speaks to Zoë Lenkiewicz about an innovative approach to consultation

Picture the scene: your department has a new project that you need to consult the public on. You've booked the village hall, placed adverts in the local paper, created some exhibition boards and printed your feedback forms. But is your communication approach going to produce an informed response from your stakeholders?

Particularly for larger organisations and projects, the need to deliver on-target messaging is becoming ever-more important. Take HS2 for example – the consultation is a mammoth undertaking and whichever way you sway, the outputs really matter.

People attend these types of exhibitions with questions and concerns, and the quality of their feedback will largely be determined by their experience on the day.

Richard Edwards of Quatreus, a company that specialises in the design and delivery of engagement programmes, spoke with me about the changing expectations of the public in the age of technology-driven information.

Edwards' view is clear: "People have increasing expectations to be informed about decision-making processes, particularly when it comes to publicly-funded projects. The government is investing in critical schemes that carry sizeable price tags, and communicating the value of these projects is



Demonstrating how technology can benefit the public

fundamental if the public are going to support them."

Too often though, organisations are spending money on consultations but missing a trick. "Times are changing and the public can be swiftly turned off by a static, tired-looking exhibition stand. Protest groups are at times gaining the upper hand simply because they use more exciting tactics."

What Edwards is talking about is neatly summed up by the Chinese proverb:

Tell me, I'll forget.

Show me, I may remember.

Involve me and I'll understand.

"We all know this approach works in the classroom, but we seem to forget

the value of experience when communicating messages to diverse adult audiences," explains Edwards, "Interaction with your audience is critical if you want them to be receptive to your message."

He makes a good point. The marketing industry is continually developing new ways to get our attention, and Edwards argues we can learn a lot from the way technology is being used by these messaging experts.

The future, says Edwards, is experiential.

"Delivering information about the needs and benefits of a project in a way that people will resonate with is part science, part art. By involving your audience in a story, you are giving them the opportunity to engage with the subject in a new way."



Immersing visitors in the benefits of technology throughout the health service

"If all this sounds too airy-fairy, then think of a shop that really engaged you and helped you understand the value of its products," Edwards suggests. Of course, I immediately think of Apple stores.

Richard doesn't own an Apple product, but his 86 year old mother does, and he's impressed by their approach.

"Apple stores are all about engaging customers in the experience. They don't just have a load of kit – they immerse you in what the products can do for you. It's all about the hands-on experience."

Apple stores are a far cry from most public sector information campaigns, and I've been involved in a few. Fortunately we don't all need to don "Genius" t-shirts (no matter how well they fit), but Edwards' point about communicating through experience certainly has merit.

"You can't do that on Facebook or Twitter," argues Edwards, "Face-to-face

engagement is so important – building relationships with your stakeholders, especially when you're spending public funds – that's what changes perception."

As well as designing innovative engagement programmes and experience centres, Quatreus can also provide a swat-team of professionals to do the communicating for you.

They appear to have thought of everything, pioneering reusable equipment and logistical support for public information campaigns, reducing waste and allowing clients to focus on their message. "If you've got hundreds of venues to visit, the logistical side of things can be a headache. We make sure everything is set up and ready to go, enabling different departments to share equipment and reduce their consultation budgets."

Edwards is passionate about using appropriate tools to enhance the public engagement experience. "Technology and personal interaction aren't mutu-

ally exclusive: adopting both can give stakeholders an experience that will help them understand your project."

"The future holds exciting opportunities for public engagement. With technology, creativity and a clear idea of what you want to achieve, you can save money and reach your audience in ways that just wouldn't have been possible even five years ago."

Edwards' final words of advice... "Don't just get a Twitter account for the sake of it. Think laterally about the right tools to enhance your public engagement campaigns."

By working with a specialist partner and adopting a smarter approach, the public sector can deliver face-to-face experiences that inspire and engage audiences – and produce results.



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Missing the connection: the environmental cost of HS2

Sian Atkinson, Senior Conservation Advisor at The Woodland Trust gives an overview of the environmental impacts of the proposed High Speed 2 railway...

The environmental impact of the proposed High Speed 2 (HS2) railway will be considerable. While proponents argue the economic benefits will outweigh the environmental costs, pitching nature against the economy in this way misses the point that healthy functioning ecosystems are vital to human well-being and fundamental to a sustainable social and economic future.

Wildlife habitats like ancient woodland are the key building blocks of these ecosystems, a point that was recognised in the Lawton review, which set out principles for building a coherent and resilient network of habitats across England, and was followed through in the government's Natural Environment White Paper.

The Woodland Trust does not oppose high speed rail per se. It supports the principle of sustainable green transport, but the proposed HS2 does not fit this description. It flies in the face of Lawton while paying lip service to it.

As a woodland conservation charity, the Woodland Trust's response to the proposed HS2 is focused on its impacts on ancient woods and trees. But the wider principles can be applied to other important habitats.

Along the whole of the High Speed 2 route from London to Manchester and Leeds, 83 ancient woods will be affected, with 41 suffering some loss and a further 42 likely to suffer damage due to noise, vibration, changes to lighting and dust. The Trust's research indicates that Phase 1 of the proposed scheme will directly affect 27 ancient woodlands and indirectly affect 21, and at least 32 hectare (ha) of ancient woodland will be lost in this phase of construction.

"Our ancient woodlands are quintessential features of England's much-loved landscapes – irreplaceable, living historic monuments which inspire us and provide us with a sense of place and history in an increasingly frenetic world". These are not The Trust's words, but taken from the government's own Keepers of Time,

written in 2005 as a statement of policy to better protect and value ancient woodland.

Ancient woodland (wooded since at least 1600) covers only around 2% of the UK’s land area, and is generally richer in wildlife than woodland of more recent origin, because of its continuity and relative lack of disturbance. In fact, ancient woodland is our richest land-based habitat, and many of the species found in ancient woods are rare and vulnerable, and depend on the particular conditions found there.

Ancient woodland cannot be moved, nor can it be replaced by planting new woodland elsewhere. The ecological features that make each site so special are the unique product of its location, geology, soils, climate, history and management.

In the Chilterns Area of Outstanding Natural Beauty, it is proposed to build a tunnel portal in the middle of Mantle’s Wood, representing the single biggest loss of ancient woodland along Phase 1 (6.2ha). Other areas of loss may be smaller, but all contribute to further fragmentation of a precious resource. Yet protecting and maintaining such habitats – the reservoirs from which we hope biodiversity will spread – has to be the first step in building more resilient habitat networks.

All mitigation and compensation measures set out in the Environmental Statement (ES) for HS2 are confined to the area within the construction boundaries, which limits potential for them to be meaningful at a landscape scale.

The ES recognises the irreplaceable nature of ancient woodland, but then claims there will be no net loss in biodiversity. It proposes use of the draft Defra methodology for biodiversity offsetting to achieve this, but with considerable modifications and no evidence of the calculations used. The Woodland Trust’s view is that biodiversity offsetting is not appropriate where irreplaceable habitats such as ancient woodland are involved – reflected in Defra’s guidance.

The ES does not propose buffering (another Lawton principle) of ancient woods against the impacts of the development, even though many ancient woods have construction boundaries running directly along the



edge of them. It proposes translocation of ancient woodland soils where the woods are lost, a method which is unproven, and in any case can never equate to rescuing the whole habitat.

The ES assumes that mitigation measures proposed will succeed, with no fallback if they do not, and in many cases state that they will happen “as far as is reasonably practicable” – which gives no guarantee they will happen at all, given financial limitations. Even if they are carried out, a time lag of years between destruction of a habitat and development of compensatory habitat means even those species that are able to move may not survive long enough to benefit.

The Environmental Audit Committee upheld some of these concerns following its recent inquiry into HS2. In particular, it stated that ancient woods should not be subordinated to crude economic cost/benefit calculations, that adequate funding should be ring fenced for environmental safeguards and compensation, and that ancient woodland should not be included in the offsetting calculations. ■

This article was written before the second reading of The Hybrid Bill on HS2.

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The European rail revolution

John Harcus, Head of Communications at UNIFE explains SHIFT²RAIL, the proposed major European public private partnership for rail research and its importance for the rail sector...

SHIFT²RAIL, the European public-private Joint Undertaking for rail research amounting to no less than €920m in funding is expected to be formally approved by the European Council of Ministers in June. This initiative, whose preparatory work is organised by UNIFE, the European rail industry association and its members (along with the broader sector), will improve the state of the art of rail technology and revolutionise rail as a mode of transport for both passengers and freight. The European rail industry currently accounts for 50% of the world market for rail products; SHIFT²RAIL is central to helping the industry maintain this leadership position while at the same time boosting the capacity and reliability of rail transport – resulting in better transport for all that is both attractive and environmentally friendly.

In 2011, the European Commission published their White Paper on Transport that sought to address the main transport challenges in the EU for the foreseeable future. One of the key phrases that is repeatedly mentioned throughout the document is “modal shift” – the need to move the percentage of passengers and freight using Europe’s over taxed road infrastructure to rail and maritime transport – in fact, it stipulates a target of 30% of passenger and freight transport to shift from road to rail and inland waterways by 2050.

For the rail industry, this document represented a massive opportunity and paralleled some investigatory work into a large scale EU-industry research initiative at that time being carried out by several major rail manufacturers and their European trade association, UNIFE. Having witnessed considerable success in similar EU PPP initiatives such as Clean Sky and SESAR in the air transport sector, the rail industry sought a massive, system-wide innovation initiative that

would make rail transport more attractive to end users by delivering a step change in rail technology – dubbed SHIFT²RAIL after the modal “shift” it endeavours to promote.

In order to boost the demand for rail, SHIFT²RAIL has 3 main targets: increasing the capacity, boosting the reliability, and reducing the lifecycle cost of the rail system. The research will be organised into 5 research areas called “Innovation Programmes” (or IPs):

- IP1: Cost-Efficient and Reliable High Capacity Trains, including High Capacity Trains and High Speed Trains;
- IP2: Advanced Traffic Management and Control Systems;
- IP3: Cost Efficient and Reliable High Capacity Infrastructure;
- IP4: IT Solutions for Attractive Railway Services;
- IP5: Technologies for Sustainable & Attractive European Freight.

These 5 IPs, and their component Integrated Technology Demonstrators (ITDs), constitute the system-focused approach that encompasses all of the subsystems across all platforms of rail transport (high-speed/mainline, regional, urban/suburban, and freight). Moreover, the research is designed to deliver outcomes that are “closer to market” through vigorous testing and demonstration that boosts confidence in early adopters and investors. This solves a common challenge in rail innovation – the fact that many new products are developed and tested in labs but the research programme lacks the resources to bring it close

enough to market for future implementation; making the first customer the first tester, if the results even go to market. In SHIFT²RAIL, 4 System Platform Demonstrations (1 for each segment of rail transport) are foreseen that will integrate the outcomes of all ITDs and IPs to be validated – ensuring high market uptake.

“The potential societal impact of SHIFT²RAIL is massive. In fact, the European Commission pointed out in its impact assessment on the initiative that “more effective and efficient rail R&I results in economic (competitiveness and operational efficiency of the sector, induced macroeconomic impacts for wider economy), social (employment, safety, security, service quality) and environmental (reduced pollution, noise, congestion) impacts”.”

The critical mass of support necessary to prepare and launch such a public-private undertaking has been possible not only because of the apparent societal challenges mentioned above, but because this type of undertaking is the only tool capable of delivering the step change that is widely viewed as necessary for rail. Furthermore, European PPPs in other sectors such as CleanSky (air transport), SESAR (air traffic management), and FCH (Fuel Cells and Hydrogen) have been great successes. These initiatives provided the necessary resources and the framework for collaboration that is necessary to take large strides forward which otherwise would not have been taken. This is especially true for the rail sector which is quite fragmented and large scale collaboration between the industry, operators, and infrastructure managers would be impossible without the incentive of EU investment which allows them to mitigate the risks associated with such large scale R&D.

The potential societal impact of SHIFT²RAIL is massive. In fact, the European Commission pointed out in its impact assessment on the initiative that “more effective

and efficient rail R&I results in economic (competitiveness and operational efficiency of the sector, induced macroeconomic impacts for wider economy), social (employment, safety, security, service quality) and environmental (reduced pollution, noise, congestion) impacts”. Additionally, a study carried out in 2013 by Seureco-Erasme Institute supports this assertion pointing out that SHIFT²RAIL will “enhance growth, competitiveness and employment in Europe” and foresees that the initiative will help to create more than 140,000 jobs in Europe between 2015 and 2030.

At present, SHIFT²RAIL has rallied monumental support within the EU institutions: including the full endorsement of the Commission through its proposal for a Council regulation to provide €450m in EU funds to create SHIFT²RAIL (to be matched by €470m from the private sector), and positive opinions on the Regulation from the European Parliament, the European Economic and Social Committee, and the Council of Ministers. Moreover, a significant portion of the European rail sector has participated in the preparatory work of the initiative, counting more than 125 organisations including: rail manufacturers, operators, infrastructure managers, universities, research institutes, and SMEs. The full Regulation for the Joint Undertaking is expected to be formally approved and adopted by the Council of Ministers in June, meaning that the Joint Undertaking will be officially established over the summer with operations expected to begin in January 2015. ■

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Managing transport emissions

Andrea Balluchi of Pure Power Control highlights the importance of the integration of traffic management systems and vehicle control for the reduction of CO₂ emissions...

Electronic control was first introduced in the 1980s to meet engine tailpipe emission requirements, which were established by the Clean Air Act. It proved to be the breakthrough technology for the development of cleaner and more efficient vehicles. Since then, engine control developed significantly and electronic control extended to cover all vehicle functions including transmission, braking, steering, and chassis dynamics. Today more than 90% of innovation in the automotive sector is represented by automotive control and infotainment electronics.

The automotive industry is facing the challenge of significantly improving car fuel economy to meet the CAFE standard targets for 2017-2025 (54.5mpg fuel efficiency) and the EU targets for 2020 (95g/km CO₂ emission).

However, since actual behaviour of cars in real driving is also a concern for authorities (and the customers), homologation driving-cycle oriented solutions will not be enough. A complementary direction for achieving important CO₂ emission mitigation and fuel economy improvements is related to augmented level of integration of the vehicle in its environment.

Many cities in Europe are equipped with centralised traffic management systems that monitor in real-time traffic flow and control it by properly optimising traffic light sequencing. Often, optimal cruise speed is suggested to drivers on displays so to catch the traffic light green wave. Modern cars are equipped with stop-start systems that prevent fuel consumption at engine idle speed; however, stops cause loss of vehicle kinetic energy. In hybrid electric vehicles, the latter can be partially recovered to battery and be available for the next vehicle acceleration. Nevertheless, due to losses in energy cycle, avoiding vehicle stops in urban

traffic would be definitely more beneficial in terms of fuel saving and CO₂ emission reduction.

The forthcoming innovation is the interconnection and mutual interaction between vehicles and traffic management systems for: mitigation of transport environmental impact (e.g. CO₂ emission), further reduction of fuel consumption, and optimisation of road efficiency on urban areas, extra-urban roads and motorways.

Traffic management strategies could be significantly improved if real-time data was available from each vehicle on the road, resulting in: more accurate traffic prediction, better management of unexpected events, and minimisation of environmental impact indexes, such as global CO₂ emissions.

In on-board vehicle electronic controls for engine, gearbox, hybrid powertrain and longitudinal dynamics, advanced algorithms can be used to accurately manage a vehicle's powertrain in order to achieve maximum fuel economy and minimise CO₂ emissions by exploiting real-time data from infrastructures (route to destination, traffic state along the route, traffic light timing, etc.).

The time is now for moving forward and implementing this technology, but this will require active involvement of all stakeholders from European, National and Local Governments to automotive and ICT industries. ■

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Managing the key assets

Adjacent Government outlines the importance of good asset management within rail organisations...

An increase in traffic and rising congestion are 2 of the major challenges Europe is facing in terms of transport. The increased demand on our road networks call for the need to build sustainable transport connections to help fuel economic growth.

Railways are seen as one of the most sustainable modes of transport, and funding for rail infrastructure projects across Europe has grown. Major projects such as HS2, Crossrail and SHIFT²Rail are helping the rail industry to develop to meet the demands of the 21st Century.

In January, the European Commission tripled the funding for rail innovation in order to get more passengers and freight onto Europe's railways.

Vice President of the European Commission Siim Kallas is responsible for Transport, and said in January: "If we want to get more passengers and freight on Europe's railways, then rail needs to provide better services and offer an attractive choice to more customers.

"For that to happen, rail needs to innovate. This public private partnership is a major breakthrough, it will drive innovation to reduce the costs of all rail services, increase capacity and provide more reliable, frequent rail services for customers." ¹

Infrastructure managers and railway projects have had to adapt a more business-like approach towards cost and performance, in order to ensure their projects are effective and efficient to meet the ongoing challenges.



Effective asset management is important to support the delivery of infrastructure that supports the current timetable safely, efficiently and sustainably.

Asset management for railway infrastructure is fundamentally about delivering the outputs valued by customers, funders and other key stakeholders, in a sustainable way – for the lowest cost.

Implementing an asset management strategy can be key to ensuring organisations long-term approach defines how the infrastructure is required to perform. The strategy should also set out how the asset management system will be implemented, and how organisational design will support the implementation of asset management.

With a diverse portfolio of assets, Network Rail are one of the largest asset management organisations in Britain. Their portfolio includes over 30,000 bridges and tunnels, around 2,500 stations and over 20,000 miles of track.

In regards to rail, they have one of the oldest systems in the world and one of the busiest networks in Europe, with 20% more train services than France and 60% more than Italy.

In their Asset Management Policy in February 2011, Network Rail says: “Our aim is to meet our asset management obligations in a manner that is demonstrably world class, with asset management capabilities appropriately matched with the needs of ourselves and our industry partners.

“The effective management of these assets requires a robust understanding of their behaviour and the most appropriate actions to mitigate asset degradation or failure. This understanding must be supported by reliable information, effective processes and delivered by competent people.”²

Railways throughout Europe are a success, and to build on this success and continue to deliver efficient and effective services, asset management plays a vital role. ■

¹ http://ec.europa.eu/transport/modes/rail/news/shift-to-rail_en.htm

² <http://www.networkrail.co.uk/asp/12210.aspx>

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Asset management in the rail industry

Benefits of adopting the new ISO 55000 standard

For many years the Rail Industry has been relatively stable with progressive evolution and development, however more recently significant changes have been seen. The recent development and technological advancements have resulted in numerous efficiencies with more transportation being undertaken on the rail network. Passenger traffic and freight movement is increasing due to convenience, comfort and value for money, thus making Rail an attractive means of transportation. If this progress is to be sustained focus must be on the Rail Assets.

The Rail Industry is not directly comparable to any other industry regarding Asset Management. One primary factor being, that we have two very different Asset Classes, Infrastructure Assets (Infra Assets) and Rolling Stock; each with their own specific requirements regarding Asset Management.

“It is absolutely imperative that Evolution and Developments of all interrelating/interacting assets are co-ordinated, harmonised, integrated, optimised, maintained and appropriately managed. As you can see, we are now beyond the world of Excel Spreadsheets.”

Asset Management activities enable Assets to deliver planned/expected results against planned/expected costs. Results not only from a financial



perspective but also from other perspectives, like availability, safety, etc.

Now let us look at the infrastructure (termed as Linear Asset). The tracks must cope with the various types of loads transmitted by freight traffic, normal passenger trains and high speed trains. However Rolling Stock is being developed to carry more and heavier freight and more passengers at higher speeds. As a consequence wheel, axle and bogie maintenance/management are critical. However the bottom line is that a train can still only operate within the limitations of the infrastructure.

The new ISO 55.000 standard, which was launched in January, professionally lays out the principles of Asset Management. Essentially this standard has been accepted within the Utility Industry, primarily by Power Generation and Transmission and Distribution, the expectations is that ISO 55000 will be adopted by the majority of industries. The Rail Industry will no doubt benefit by adopting this standard.

What is the basic principle of PAS55 & ISO 55000?

Asset Management is systematic and coordinated activities and practices through which an organisation opti-

mally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its Organisational Strategic Plan.

What are the comparisons between the Utility industry, especially T&D and the Rail industry?

Both industries are heavily regulated, often owned by the government, both industries having to deliver in accordance with their contractual requirements, unlike much of the “Commercial/Private Sector” who can basically decide to cease to produce/deliver a certain product overnight.

From a cost and risk management perspective both T&D and the Rail industries have aging Assets that are now displaying new failure modes. Knowledge of these failures is limited, let alone the experience re. detection/prevention. Another aspect is the ageing workforce. Limited funding available for Asset Maintenance is another problem. This lack of funding is in effect building up a huge debt over the asset base, decreasing asset efficiency and increasing the risk of assets failure.

How can we implement and comply with the Management part of ISO 55000?

There are three main systems that deal with Asset Management. The most well known is the Enterprise Asset Management system. IBM’s MAXIMO and SAP’s EAM are the leading systems in the market. Basically the func-

tion of these systems is to register all the Assets, their individual relationship to each other and the activities to be performed to maintain the assets, either by corrective, preventive or predictive maintenance. The second system is Asset Performance Management, the system that defines the Asset Strategy for the maintenance activities and the Asset Condition. Many types of Condition Monitoring can be applied along with new technologies allowing us to learn more about our Assets Health, these being at affordable costs due to their ability to reduce maintenance costs.

Last but not least is Asset Investment Planning & Management, e.g. Copperleaf’s C55. This system identifies all the investments needed to:

- Align the Asset Strategy with the Business Strategy,
- Manage the lifetime costs and revenue of the Assets and the individual investments made regarding Assets,
- And manage the risk portfolio of the Assets.

It is the combined support that these three systems give that supports the ISO 55000 concept and give organisations unparalleled capability to optimise their Asset Management.

“Asset Management investment Reduces Costs and Raises Efficiency of Assets.”

Many Rail companies struggle in defend-

ing their Asset Management Policy/Budget to the Regulators and therefore do not get the required or appropriate budget. This has resulted in budget reductions over the years, resulting in minimal maintenance being performed.

Therefore early replacements of aging parts or condition monitoring to detect potential failures are not possible.

ISO 55000 will assist Rail Companies in getting better visibility of the realistic requirements for Asset Maintenance and to subsequently justify the budget requirements to the regulators. It will support achieving the highest result with the given resources/funds and will identify the potential risks and related costs with insufficient maintenance. Note: Not performing the required maintenance will only increase costs and the Risks of Failure in the future.

Marcel van Velthoven is the managing director of ZNAPZ (www.znapz.com) an IBM partner that sells and supports Asset Management systems for Rail and other industries.



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Maintaining maritime giants

Tony Hall, Journalist outlines the problems corrosion can cause for ballast tank ships...

The safe operation of ships at sea depends on the strength and the integrity of the steel of which they are built. But in their strength and integrity is inherent weakness. Steel exposed to water and oxygen and insufficiently protected by an impermeable coating quickly oxidises into rust, and this corrosion can degenerate into a potential source of catastrophic structural failure of a ship's hull.

Until the late 1990s corrosion protection of hull steel was regarded within the shipping industry as private business between owners and shipyards. However, a series of environmental disasters involving single hulled oil tankers opened the subject to debate and scrutiny. Notable among these the loss of the 37,000 ton Erika in December 1999, which broke in 2 and sank in heavy seas as a direct result of structural failure, spilling 20,000 tons of fuel oil onto the Brittany coast.

Steel corrosion was identified as a major contributor to that disaster. As a result the structural integrity of ships, particularly tankers and bulk carriers, became the focus of a concerted effort by maritime safety organisations and classification societies to impose internationally agreed specifications for corrosion protection, together with regimes for inspection and verification. This work was inspired not least by the fact that a recognised standards classification society, RINA (Foundation Registro Italiano Navale ed Aeronautica) had issued a 5-year safety construction certificate to the Erika 12 months before she sank.

Among the bodies taking a lead in this intervention were the International Maritime Organisation (IMO), the administrators of the International Convention for Safety of Life at Sea (SOLAS), the International Organization for Standardization (ISO) and the

International Association of Classification Societies (IACS) a leading member of which – Det Norske Veritas AS (DNV) based in Norway – was instrumental in publicising the need for classification societies to become actively engaged in corrosion protection.¹

Imposing a new regulatory framework involved reaching agreement with the shipping industry, for whom the preparation and application of protective coatings was an issue primarily of economics, accounting as it did for up to 10% of the cost of a new build, according to DNV figures.²

From the early 1990s internal seawater ballast tanks had been identified as one of the primary areas of corrosion, and the areas of a ship that required more frequent and accurate surveys.³ Pumping seawater into a vessel to provide ballast has been an accepted procedure since the 19th century. It has the benefit of stabilising the ship, particularly if it is sailing at a lighter weight because of an unloaded cargo, while the added weight reduces stress on the hull. There is also the benefit that seawater is free and can be pumped in and out whenever, and wherever, the ship requires it.

While ballast sea water solves problems of operational efficiency internal corrosion was an inevitable result. From the mid-1970s additional risks were introduced when vessels, particularly tankers, began to be built from high tensile steel, which reduced weight, reduced cost, allowing for bigger vessels but popularised the building of single hulled ships using reduced thicknesses of steel. Unfortunately less was not better and not only did this reduce the resilience of the hull to corrosion, it also opened tankers to the danger of oil tanks and hull splitting at the same time because it

was common practice for empty oil tanks to double as containers for sea water ballast.

The Erika disaster and US anti-pollution legislation in the 1990s heralded the introduction of double-hulled vessels, built with separate ballast tanks. This change in design while solving one set of safety issues exacerbated the danger from corrosion. Segregated ballast tanks offered more area for rust to gain purchase, with designs that made accessibility, inspection and coating procedures more difficult, and time consuming.

While ship designs were evolving the technology of marine anti-corrosion coatings was lagging behind the need for their use. DNV admitted in 1999 that general knowledge of coating technology was lacking.⁴ To drive technological advances and build a sustainable global market for protective coatings performance standards needed to be applied.

During the 1990s international standards and maritime organisations had published safety regulations on corrosion prevention in sea water ballast tanks including IACS UR Z8, and SOLAS Amendment Ch. II Reg 3-2 which made protective systems mandatory. But it was not until 2006 after 2 years of talks that IMO could bring industry and classification bodies together to adopt international performance specifications and survey procedures for protective coatings on the ballast tanks of all new ships.⁵

After what a published overview of the proceedings referred to as “extremely difficult and controversial discussions” the agreed specifications addressing issues of the design of the coating system, surface preparation, inspection, and verification were introduced.⁶ They also laid down reporting procedures on a dedicated the Coating Technical File (CTF) for each vessel which, “documents the specification of the coating system applied to the seawater ballast tanks and double-side skin spaces, record of the shipyard’s and ship owner’s coating work, detailed criteria for coating selection, job specifications, inspection, maintenance and repair.” The requirements cover all ship

types of not less than 500 gross tonnes and apply to newly built vessels that have been delivered on or after 1 July 2012.⁷

In applying these standards, classification organisations, the shipping industry, and coating manufacturers together are ensuring that catastrophes such as the sinking of the Erika can be safely regarded as events of the past. ■

¹ ‘How and Why Corrosion Protection of Ballast Tanks Has Become the Business of Classification Societies’, Askeim, Nakkon, Haugland. DNV, 1999
www.paintsquare.com/library/articles/Corrosion_Potection_of_Ballast_Tanks_Has_Become_the_Business_of_Classification_Societies.pdf

² Ibid

³ [www.imo.org/OurWork/Safety/SafetyTopics/Documents/215\(82\).pd3/See](http://www.imo.org/OurWork/Safety/SafetyTopics/Documents/215(82).pd3/See) IACS Unified Requirement UR Z10.2 ‘Enhanced survey of water ballast tanks introduced for ships in service,’ 1993. Coatings classed as being in a good, fair or poor condition.

⁴ ‘How and Why Corrosion Protection of Ballast Tanks Has Become the Business of Classification Societies’, Askeim, Nakkon, Haugland. DNV, 1999

⁵ Reference IMO Resolution MSC. 215(82)
[www.imo.org/OurWork/Safety/SafetyTopics/Documents/215\(82\).pdf](http://www.imo.org/OurWork/Safety/SafetyTopics/Documents/215(82).pdf)

⁶ Development of Mandatory IMO Performance Standards for Protective Coatings on Ships, an Overview, Heike Hoppe, Senior Technical Officer, Maritime Safety Division, International Maritime Organization.

⁷ Ibid

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CSR by Trustper

A most economical way to descale and protect water ballast tanks

Our Company has over 40 years of technical knowledge and experience in the renovation, preservation and maintenance of seawater ballast tanks for ocean going vessels. We have a network of sales and distribution agents located across Europe and Asia, and have a close business relationship with Wilhelmsen Chemicals A/S.

Our rust removal and protection program is based around the application of a choice of 2 rust and scale removing agents: either CSR or CSRII.

Coatscale Remover (CSR) a blend of vegetable oils, driers, wetting agents and corrosion inhibitors, is a rust & scale removing agent and corrosion inhibitor, developed specifically for the treatment and protection of ballast tanks, including the life extension of epoxy coated tanks where coating breakdown is beginning to occur.

CSR is environmentally green, easy to apply by the crew without any kind of surface preparation or fresh water rinse and quick curing, thus not affecting ballasting/deballasting operations or tank inspections.

The CSR product is manufactured by Wilhelmsen Chemicals A/S exclusively for Trustper in Norway and provides an economical solution for ballast tanks treatment, without loss of hire.



CSR Primary function: Rust and scale remover. Penetrates the substrate, expands during curing and separates the scale layers. Achieves pre-cleaning equivalent to ISO 8501-1, D Sa 2, or better.

CSR Secondary function: Temporary corrosion inhibitor, providing protection between 14 to 18 months or longer, depending on application area prior to touch up requirement.

CSR is a transparent product, semi-hard once cured, and unlike soft/gel type alternatives does not lift up on shoes, therefore making the tanks fully inspectable at all times and not preventing 'hot work'. CSR can be applied by crew members using a low pres-

sure spray, which means no loss of hire and no external workmen costs. As well as rust removal, this product also protects existing paint schemes and improves the general appearance of the tanks.

TRUSTPER AS

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TRUSTPER AIS



Extending the life of your vessels

With over 40 years technical knowledge and experience preserving and maintaining ships, TRUSTPER AS has distribution agents across Europe and Asia. Our core business is steel preservation and basic maintenance of seawater ballast tanks for ocean going vessels.

Our Coatscale Remover (CSR and CSRII) products are a blend of vegetable oils, driers, wetting agents and corrosion inhibitors. These remove rust and scale and extend the life of the vessel.



www.trustper.com

Modernising our youth

European Commissioner for Education, Culture, Multilingualism and Youth, Androulla Vassiliou gives an overview of the Erasmus+ programme and how it will enable young people to develop skills for life...

Erasmus+ is the new European Union programme for education, training, youth and sport. Across Europe, it will provide grants for more than 4 million people to study, train, and work or volunteer abroad, in a new culture, in a new language, and with new friends. With a budget of more than £12bn over the next 7 years – 40% higher than before – Erasmus+ will enable young people to develop skills that will make them more employable and serve them for the rest of their life, to stand on their own 2 feet and to open their minds to new possibilities.

Across Europe, 2 million higher education students will receive Erasmus+ grants, as well as 650,000 vocational training students and apprentices, and 800,000 school teachers, lecturers, trainers, education staff and youth workers. More than 500,000 will also receive support for youth exchanges or volunteering abroad. In the UK alone, nearly 250,000 people could benefit from Erasmus+ grants between now and 2020.

“Together with our Member States we have agreed that early school leaving is an urgent priority; therefore Erasmus+ will share the best solutions from across Europe.”

Erasmus+ builds on the success of the Erasmus student exchange programme and similar initiatives. Since 2007, the UK has received nearly £500m in EU funding for students and others keen to increase their skills through opportunities to study or work abroad. This funding, managed by the British Council in partnership with Ecorys UK, has provided grants for more than 160,000 students, teachers, youth workers and volunteers.

The individual benefits gained from opportunities to study or train abroad are well known. By spending time abroad, young people improve their language proficiency, adaptability and self confidence. They learn how to live and work alongside people with different traditions and backgrounds. The skills gained through this international experience boost their employability and also have an impact on the EU economy as a whole.

As well as offering grants for individuals, Erasmus+ will support all levels of education, from virtual platforms for teachers to the unique needs of adult learners.

Together with our Member States we have agreed that early school leaving is an urgent priority; therefore Erasmus+ will share the best solutions from across Europe. We have identified poor reading skills as a serious problem; Erasmus+ will fund new cross-border projects to tackle it.

We know that our foreign language skills are falling behind; Erasmus+ will support initiatives to boost them. We need to open up education to new technologies; Erasmus+ will support better use of ICT for learners and teachers.

Our vocational training systems are too often failing our young people; Erasmus+ will help to modernise them. Students wanting to study for a full Master’s degree abroad find it difficult to secure loans; Erasmus+ will provide a new loan guarantee. Our universities do not work closely enough with businesses; Erasmus+ will bring them together to create new alliances fostering innovation.



Several UK universities and businesses have already shown a keen interest in taking part in these new 'Knowledge Alliances'. We will also support 'Sector Skills Alliances' to develop stronger cooperation between vocational education providers and enterprise.

By strengthening the European Voluntary Service and international youth exchanges, Erasmus+ will also promote active citizenship and the participation of young people in democratic life.

At a time when populist and extreme views are attracting increasing support in parts of Europe, Erasmus+ is a reminder of the positive democratic values that bind us together.

It is for the UK to decide on its future relationship with the EU, but I hope that the many other practical opportunities which the European Union has to offer to the British people are not underestimated.

I personally believe EU membership brings major benefits to all British people – but especially to the young whose lives in a globalised world lie ahead of them.

Those benefits include not only the kind of personal opportunities I have set out in this article. But also the

economic benefits that come from living in a single market where unprecedented trading opportunities help to create and safeguard millions of jobs in Britain.

So, as well as encouraging all young Britons to make the most of the opportunities offered by the EU, I would urge you to get involved in the debate on what kind of Europe you want for the future, starting – for those old enough – by casting your vote in the European elections.

Europe faces tremendous economic and social challenges. The level of youth unemployment is unacceptably high in many countries.

I am convinced that Erasmus+ has a vital role to play in helping to meet these challenges and giving millions of young Europeans hope for a better future. ■

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Androulla Vassiliou
European Commissioner for Education, Culture,
Multilingualism and Youth
 European Commission
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Strengthening Europe through youth partnerships

Keen to bring Eastern Europe closer to the EU, The Eastern Partnership Youth Window encourages young people to help strengthen partnerships, here Amy Caddick at Adjacent Government explains...

In 2009, the Eastern Partnership was launched by the European Union. The relationship brought together the European Commission with six Eastern European countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine) to promote political and economic reforms whilst bringing these nations closer to the EU.

Relations with Eastern Europe have undoubtedly been a focus for the Commission, and strengthening these partnerships has been vital to ensure this. In May 2012, the Eastern Partnership Roadmap – a joint working document – laid out how to achieve a multilateral dimension to the partnership.

Part of the Roadmap included supporting electoral regulations, and establishing more efficient civil services in the Eastern regions. The Roadmap also discussed how this could be achieved, and described the support the EU would give the Eastern European nations.

One area that the Eastern nations have worked hard to improve is the outcomes for young people. All governments in the partnership recognise youth engagement and progression as a priority area, accepting that it requires significant input and support from the leadership of each nation.

This is also an area that Europe has worked to improve. The Commission for Education, Culture, Multilingualism and Youth over the last few years has put in place a number of initiatives to ensure that young people across Europe receive the best assistance possible to flourish as competent adults.

The EU Youth in Action Programme was one such initiative. It ran between 2007 and 2013 to ‘inspire a sense of active European citizenship, solidarity and tolerance among young Europeans and to involve them in shaping the Union’s future’.¹

The Eastern Partnership Youth Window (EPYW) programme is a reworking of the EU Youth in Action Programme, and is ‘designed to reflect the national and regional priorities within the Eastern partnership region’.² Improving the employability of young people through skills development and lifelong learning is one of the main priorities of the EPYW.

Discussing the value of the EPYW programme, Commissioner for Enlargement and the European Neighbourhood Policy, Stefan Füle said: “Young people are crucial for the harmonious development of inclusive societies and for successful future collaboration with our neighbours. For this reason we have approved this programme, to support young people – particularly those with fewer opportunities – and their active participation in society³.”

The programme, it is hoped, will finance over 1,400 projects for over 21,000 young people and youth workers. The main aim is to promote opportunities for young people in the Eastern Partnership nations.

The EPYW programme recognised a number of areas that were key challenges that needed to be addressed and how to tackle these issues. These included:

- Creating an integrated cross-sectoral approach to policy responses to deal with the complex needs of the youth population;
- Broadening the remit of youth policy and affairs to ensure the wide range of issues facing young people can be addressed;

- Facilitating the greater involvement of young people in identifying the needs of the youth population, and ensuring this is built into policy;
- Addressing the significant inequality facing disadvantaged groups within the youth population;
- Developing a more comprehensive system of youth work, and assisting youth workers to improve their skills;
- Ensuring lifelong learning and non-formal education is made a priority and reflects the needs of young people, as well as the economies in the Eastern Partnership region.⁴

Guaranteeing cooperation between policy-makers, youth organisations and workers, and the youth population is very much the focus of the programme.

Young people need much support if they are to grow into responsible, healthy, active members of their local communities. Schemes such as the EPYW programme support and assist young people to do so, giving them a voice in their own future. With the support of the European Commission, and lessons learnt from earlier youth programmes enacted across Europe, the EPYW has the potential to help many young people in the Eastern Partnership nations. ■

¹ http://eacea.ec.europa.eu/youth/programme/about_youth_en.php

² http://ec.europa.eu/europeaid/documents/aap/2012/af_aap_2012_enpi-e_p3.pdf

³ http://europa.eu/rapid/press-release_IP-12-1284_en.htm

⁴ http://ec.europa.eu/europeaid/documents/aap/2012/af_aap_2012_enpi-e_p3.pdf

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Faculty of Medicine in Hradec Králové

The oldest institution of higher education and rapidly developing scientific organization in East Bohemia Region

Faculty of Medicine in Hradec Králové was established as the first of the new medical faculties immediately after the end of World War II and became a part of Charles University in Prague.

We provide a high standard of quality teaching in undergraduate and post-graduate studies. Students are taught both in Czech and English and the achieved level of education is internationally recognised. Undergraduate education includes two master's degree programs: general medicine and dentistry.

The innovative curriculum of the faculty emphasises modern teaching methods, a solid grounding in the sciences and regular clinical experience. Students become part of scientific research teams, involved in organising and conducting their own research, presenting their results at international meetings and in internationally recognised scientific journals.

The research focuses on 3 main areas in which the Faculty have a long and successful tradition:

- Research in the field of lifestyle diseases affecting the two main systems: cardiovascular and gastrointestinal system. The research is focused mainly on the issue of coronary heart disease, heart failure, valvular diseases, arrhythmias, sudden cardiac death and identification of the risk markers, pharmacological and non-pharma-



logical treatment of the cardiovascular diseases including the invasive procedures and cardiosurgery. The second area is of the diseases affecting the digestive system. This area includes study of functional GI disorders, Helicobacter pylori infection, small intestine imaging, inflammatory bowel disorders, colorectal cancer screening, bio-degradable stents, electrogastrography, portal hypertension studies etc.

- Research in oncology and hemato-oncology. This area of the multidisciplinary research covers broad spectrum of the research activities, which include prediction study of the effect and toxicity of treatment, the importance of individual treatment dose regimen of drugs and prediction

of response to these treatments. Considerable attention is paid to the study of the gastrointestinal cancer.

- Research of aging and related health problems including studies of regeneration at different levels. Research focusses on basic metabolic and molecular effects of aging and reparative and regenerative processes. This includes studying damage and repair at the DNA level, at the cellular and organ level, at the level of body (liver regeneration), including the possibility of influencing these processes (stem cells, iPS cells, the use of nanomaterials, etc.).

Currently, our preparations are underway for the involvement of Faculty of Medicine in Hradec Kralove to participate in new projects for Horizon 2020.

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Combating skills shortages in the UK

Douglas McCormick, Commissioner for the UKCES, and Managing Director of Atkins' UK rail business discusses skills shortages and how they affect the rail industry...

It is encouraging to see the UK economy recovering, employers are once again recruiting, and within the transport industry, we are seeing record levels of investment in major projects such as Thameslink and Crossrail. However, one challenging element of this growth is the fierce competition for skilled workers, with many businesses struggling to source candidates with relevant qualifications and experience. A report released earlier this year by the UK Commission for Employment and Skills (UKCES)¹ found that skills shortage vacancies nearly doubled in 2009 to 2013, increasing from 63,100 to 124,800.

Certain industries are more affected than others, for example, within the professional services and skilled trade occupations there are large pockets of skills deficiency, particularly in the manufacturing, transport

and communications industries. What these findings highlight is that businesses need to consider planning their talent pipeline now – rather than delay and risk the inability to fulfil contracts because of the lack of skilled staff available to deploy.

There are a number of ways that employers can attract and retain skilled employees. Atkins has adopted a range of options, from employing more apprentices and graduates, to improving the professional development for each of its people.

The rail industry in which I work is addressing the challenges associated with an ageing workforce, for example, actively encouraging young people to consider a career in engineering. To foster this, Atkins has developed a Science, Technology, Engineering



and Mathematics Network (STEMNET). STEMNET Ambassadors volunteer their time, visiting schools and inspiring students in the field of engineering, for instance by designing and making a bridge or even a railway out of cardboard, bringing into play practical activities to engage young people who can have fun while learning about engineering.

Providing high school students with meaningful work experience is also important. Research published by the UKCES in February 2014² shows that young people who get early experience of the world of work are significantly less likely to end up unemployed, get better jobs and earn more money. Likewise, employers who offer work experience also enjoy major benefits such as brand loyalty and having fresh ideas injected into their businesses. With 29% of employers saying that experience is critical when recruiting young people, it is clear that work experience should not just be about having a young person make tea for a couple of weeks in the summer. Instead, employers should be looking at running activities like mock interviews or giving work experience students a discrete project to work on over their placement so that both parties get the most out of it.

Another strategy is to create alternative routes for young people to enter the industry. Apprenticeships have an increasingly important role to play in that they give young people the opportunity to work on real, exciting projects, learning from the current generation's expertise whilst achieving their qualifications. During 2013, Atkins took on over 400 apprentices and graduates, one of our largest intakes ever, and further opportunities are available this year.

Of equal importance is staff retention. One way of addressing this issue is maintaining motivation and utilising talent and skills effectively. Worryingly, the UKCES Employer Skills Survey shows that some employers might be attempting to solve their skills issues by choosing to recruit highly-skilled, qualified staff in very basic roles. Under-use a person's skills and you risk an uninterested and de-motivated workforce. One way to combat this is to offer high-quality and job-specific training. Atkins' rail business has recently introduced a new professional development review system, putting staff in the driving seat of their own career. The review system encourages staff and managers to have worthwhile discussions and explore development and, through an online portal, individuals create objectives and can track their progress during the year. From this portal, staff can also enrol on in-house training courses and request appropriate external training. Not surprisingly, Atkins has found that the best way to attract and retain highly skilled staff in our sectors is to win world class, complex and challenging work, work that staff want to have on their CV so that they are proud to say "I was part of that".

Whilst attracting highly skilled workers to an organisation is a challenge, it is just as important for organisations to retain these employees. As the UK economy continues to recover, the time is now for businesses to start planning for future delivery by encouraging new blood into their industries and motivating those who are already there to stay. ■

¹ 2013 Employer Skills Survey – Skills for Sustainable Recovery, <http://www.ukces.org.uk/publications/er81-ukces-ess-13>

² Not just making tea: Reinventing work experience, <http://www.ukces.org.uk/ourwork/youthemployment/notjustmakingtea>

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Local skills – fit for purpose

Sarah Fenton Head of Local Sector Strategy at CITB describes how their new Joint Investment Strategy aims to tackle skills shortages at a local level...

Last autumn, the CITB announced a new £10m Joint Investment Strategy (JIS) targeted on the development of construction skills across the 8 core city Local Enterprise Partnership (LEP) areas and Greater London. £5m of CITB levy funding is being matched by £5m from Local Government funding sources.

To deliver this sector based approach to local skills needs, CITB is working closely with the LEPs and local authorities in London, Sheffield, Birmingham, Manchester, Bristol, Nottingham, Leeds, Liverpool and Newcastle, to firstly secure investment and then work with employers to determine the best use of the funding for each locality.

The strategy reflects the fact that construction is a key contributor to the economy. Working together, the industry and local government can help drive growth

through skills and employment and in doing so reinforce the wider economy.

JIS gives employers and industry more direct ownership of skills. Currently, industry feedback suggests that employers skills needs are not being met as quickly and effectively as they'd like. At local levels there are considerable variations in skills needs, influenced by a variety of factors such as the local skills legacy, existing and planned construction workloads and educational course offerings. The JIS model provides the perfect opportunity to address employers' skills needs as well as filling local skills gaps.

The strategy will use industry research and intelligence such as CITB's Construction Skills Network to tailor the training and skills offering to best suit the needs of the locality.



Sarah Fenton
Head of Local Sector Strategy
CITB

On the ground, the JIS will target 3 thematic areas of Growth through Business; People and Local Enablers and Drivers.

Industry objectives include:

- Business growth for construction SMEs;
- Reskilling unemployed construction workers;
- Engagement with NEETs;
- Supporting more clients to use the National Skills Academy for Construction's client based approach, to set and achieve targets for skills, employment and apprenticeships.

“At local levels there are considerable variations in skills needs, influenced by a variety of factors such as the local skills legacy, existing and planned construction workloads and educational course offerings.”

The priority given to each of the thematic areas will vary according to the local need and availability of pre-existing programmes on offer. In some localities for example, there may already be a lot of programmes in place to reskill unemployed people for work. In that instance, the JIS might concentrate instead on SME growth. The idea is to avoid any duplication in terms of existing initiatives and offerings, and identify the gaps to focus on.

As the first programme of its kind, the Joint Investment Strategy sees construction employers taking greater ownership and leadership of their skills agenda at a local level. Through co-design, co-funding and co-delivery, employers, local government and CITB are coming together to provide real skills solutions.

A system for sharing best practice across the cities will be set up and there will also be an independent impact evaluation on each locality to inform future working. The first schemes will become operational in London and Sheffield this spring with other areas coming on board later in the year.

To date, there has been a great deal of enthusiasm and optimism from all of the nine localities who are keen to engage in the strategy. The biggest hurdle thus far for local governments has been sourcing the match funding. There are numerous funding pots available to local government however, accessing these and the criteria that come with them, is part of the difficulty. It's often a case of square peg, round hole. There will always be challenges in breaking new ground and moving to new ways of working. It is encouraging that local government are being enabled to respond to this as they wish, and are eager to do so. Working with existing systems and funding schemes can be challenging and frustrating for all involved.

With willingness on both sides, the JIS model can benefit both industry and local government. It will supply employers with the skilled employees they need and help local economies by getting people back into employment and building a strong skills base that's fit for purpose. ■

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Apprenticeships go from strength to strength

Debbie Shandley, Chief Executive of The Real Apprenticeship Company gives an overview of why there is no better time to invest in apprenticeships...

National Apprenticeship Week held from March 3rd-7th 2014, once again provided employers and apprentices with the opportunities to showcase the impact of apprenticeship training on organisational performance. 82% of employers use the apprenticeship training model to build up skills in their workplace. Every week, the average fully trained apprentice boosts business productivity by £214 per week.

Figures from the National Apprenticeship Service show that apprenticeships have grown at a record rate: since 2010, more than 1.5 million people have started an apprenticeship. They now cover more than 170 industries and 1,500 job roles, including those not traditionally associated with apprenticeships, such as IT, software and professional services.

There has never been a better time to invest in apprenticeships in the public sector. Plymouth City Council won Large Employer of the Year at the South West National Apprenticeship Awards in 2013. The apprenticeship programme helped the Council tackle its youth unemployment through the offer of 70 apprenticeships across a wide range of occupational areas. The figure is due to grow to 100 in the next 12 months.

The role of the employer is central in the development and delivery of an apprenticeship training programme. This has been recognised by the Richards Review. The Richards Review puts the employer at the heart of the apprenticeship. Employers will increasingly have the opportunity to shape apprenticeship programmes that truly add value. The recommendations of the Review are being implemented with the creation of trailblazers across the various occupational sectors.

At last we will see training standards truly driven and developed by the employer with a simplified and aligned funding model to enable employers to offer the revised training programmes.

The public sector has the opportunity to shape the new standards and to use the apprenticeship model to up-skill its existing workforce and invest in the managers and leaders of tomorrow. Young people bring a new dimension to an organisation and quickly add value to the workplace. Their IT and social networking skills enable organisations to refresh their communications policies and practices. At The Real Apprenticeship, apprentices recruited for the public and private sector have added value from translation of materials into minority languages, communicating in a language appropriate to the target market through Facebook, harnessing IT to inform customers of special offers, and leading inclusive sales practices to support the deaf community in a local area. Research clearly indicates the wealth creation an apprentice can make to a business. Apprentices provide real opportunities to add value and support succession planning, up-skilling and transformational management within the organisation. ■

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Debbie Shandley
Chief Executive

The Real Apprenticeship Company
www.therealapprenticeship.com

Kingspan Insulation's OPTIM-R Roofing System was installed as part of the new "play-deck" at Caldmore Community Primary School, delivering optimum thermal performance without compromising accessibility.

Insulating the classroom

Tony Millichap, Technical Manager at Kingspan Insulation Ltd discusses the significance of insulating school buildings in line with building regulations...

With pupil numbers on the rise, many schools are left with the difficult choice of remaining in overcrowded buildings, or expanding over what limited playground or playing fields are available. One increasingly common solution is to construct multi-storey extensions where the top floor classrooms are off-set, allowing rooftop 'play-decks' to be created. Whilst the space saving benefits of these areas are clear, the challenge when designing them is to ensure the rooms below are well insulated, whilst also avoiding a step-up between the interior and exterior which may affect access for disabled pupils or staff, and presents a trip hazard, particularly for primary age children.

Staying Accessible

With features such as rooftop 'play-decks' or terraces, the options are to insulate either above or below the deck. Insulating above could create a significant step up from the room inside, and could be in contravention

of Part M of the Building Regulations governing access to and use of buildings. Approved Document M (ADM) states that:

"People, regardless of disability, age or gender, should be able to...

...gain access to buildings and to gain access within buildings and use their facilities, both as visitors and as people who live or work in them"¹

This could present a problem, and could lead to poor insulation being installed in order to meet the requirements of ADM, but at the same time failing to meet the requirements of Approved Documents L (ADL).

Looking Good

Quite apart from the question of ease of access, having a significant difference in level between a room and the terrace area could spoil the aesthetics

of the design, with a clumsy step instead of an unobtrusive, low threshold to keep the lines clean and uncluttered.

The alternative route, of insulating underneath the roof or balcony deck, could have a similar effect on the internal appearance of the construction, resulting in a lower ceiling in the room below, with subsequent loss of headroom and feeling of space, as well as unsightly discrepancies in room height.

Insulating below the deck also does not adequately solve the issue as, unless a thicker layer of insulation is also applied above, it can lead to problems of interstitial condensation, which in turn could lead to mould growth, damage to the fabric of the building and an unhealthy environment for the occupants.

U-Values

As the requirement for better U-values has increased, the thickness of insulation needed to meet those requirements has increased too, further exacerbating the issues described. Even using high performance insulation products will have an impact on the levels involved, and worse performing materials far more so.

At the same time, it is absolutely crucial that buildings are built or refurbished to achieve the best thermal performance that they reasonably can, not just in order to comply with the latest Approved Document L, but also because of the pressing need to address both climate change and the effects of rapidly rising energy bills.

VIPs

One very effective solution to the problem is to install Vacuum Insulated Panels (VIPs) above the deck, a solution which has become increasingly popular on the Continent, in particular in Germany, Switzerland and Scandinavia. VIPs are ideal for applications where a lack of construction depth or space is an issue. The minimal thickness of the insulation allows consistency of ceiling height and avoids the necessity of a step between the terrace and the room.

With an aged thermal conductivity as low as 0.007 W/m·K, VIPs can offer optimum thermal performance, at a fraction of the thickness required for other

commonly available insulation materials. This can ensure that thresholds remain manageable from both a design and an accessibility point of view. Installing VIPs with LABC Registered Details can also help to streamline the Building Control checking and approval stage, generating time and cost savings.

Case Study

The construction of a new development within its catchment, led to Caldmore Community Primary School’s intake of new pupils rapidly increasing. To accommodate the pupils, Walsall Council’s architects designed a new two storey extension with the first storey rooms opening out onto a ‘play-deck’ which sits on the roof of the lower level rooms.

To minimise heatloss and ensure a smooth transition from the classrooms to the concrete play-deck, 30mm VIPs were installed above an extruded polystyrene tapered insulation system. This layer of tapered insulation ensures effective drainage of surface water which filters through a porous rubber play surfacing. The build-up delivers outstanding thermal performance with a final U-value of just 0.16 W/m².K.

VIPs Away

Compromise has become an all too familiar part of how problem areas such as rooftop areas are dealt with, whether they be ‘play decks’ or terraces. VIPs offer a solution which ticks all the boxes and can allow the most challenging levels of thermal performance to be achieved with a minimal build-up. ■

¹ Approved Document M: Access to and use of buildings, 2004 edition incorporating 2010 and 2013 amendments, p11.
www.planningportal.gov.uk/uploads/br/BR_PDF_AD_M_2013.pdf

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Changing the face of modern medicine

Amy Caddick, Journalist at Adjacent Government details how RNA has vast potential as a therapeutic intervention in the future...

There is little doubt that as a field biomedical research has had a major impact upon society. Drug therapies are more efficient, and diagnostics are more accurate than ever before. Economically, biomedical research is also significant, bringing great returns on investment.

The European Commissioner for Research, Innovation and Science, Máire Geoghegan-Quinn has always been an advocate of cutting edge research, and has supported those who are committed to pushing the boundaries of science. In the aim of delivering more pioneering science across Europe, the Commission launched its largest research and innovation programme this year, Horizon 2020. The €80bn research programme will push Europe to the forefront of scientific endeavour during the 7 years it runs.

Speaking in Athens earlier this year, Geoghegan-Quinn said: "With nearly €80bn to invest over the next 7 years, Horizon 2020 is one of the few areas of the EU's new budget that sees a major increase in resources. I am determined that this additional money – which

represents a roughly 30% increase in real terms on the 7th Framework Programme for Research – will be spent as wisely and efficiently as possible. It will fund not just the best fundamental research, but also applied research and innovation, bringing in small and large companies. This is so vital because we know that research and innovation mean growth and jobs."¹

Research across Europe has already come a long way. Over the last few decades, medicine in particular has advanced considerably, and continued to grow at an exponential rate. Support from the EC has seen areas such as genomics, proteomics and stem cell therapy take centre stage, and the Commission has certainly demonstrated its willingness to develop cutting-edge research.

Genomics is particularly important as it is an area that will undoubtedly change the face of modern medicine. Recognising this, the European Commission has shown support for the field. Genetics play a significant role in many disease processes and understanding the inner workings of the human body on a molecular

and cellular level has enabled more precise treatments to be delivered. In the future, it will no longer be a case of 'one size fits all'. Treatments will, and can, be tailored to the individual, taking into account the smallest of genetic changes.

The Human Genome Project, a US-led programme, laid the foundation for researchers to delve deeper than ever before into the complex interactions that take place inside humans. It pushed the boundaries of science further than ever before, with vast implications for the future of medicine. The ability to sequence the human genome has enabled medical scientists to locate many genetic variations that cause specific diseases. From this, interest in other fields such as RNA research and proteomics has increased knowledge considerably.

RNA in particular has become a field that is showing great promise. Previously thought only to be a messenger of genetic information, research has uncovered the role of RNA is far more important. In fact, RNA has been described as a key molecule responsible for the origin of life. RNA has vast potential as a therapeutic intervention in the future.

However, understanding specific areas such as RNA is not enough. The human body is a complex system that is affected by the smallest molecular changes. Therefore research cannot exist in a vacuum. Scientists have understood the impact of RNA changes on all parts of the body. This requires the integration of other fields such as proteomics and metabolic studies to fully gauge the impact of any alterations.

Europe certainly has a history of collaboration across disciplines. In fact, part of Horizon 2020 includes a €2.5bn budget to improve and support research infrastructure. This includes ensuring facilities are in place to share data, streamlining the research process and preventing the duplication of studies.

“Europe’s genius for innovation and invention can be traced all the way back to ancient Greece. But coming back to the present, the innovation challenges that our continent faces are so great that they demand action on a Europe-wide scale. And the size and

complexities of the challenges we face as a society demand that we all look outward. We have to work together with the very best researchers and innovators, wherever they are in the world.

“Research infrastructures make a very clear contribution to the EU’s headline policies to boost growth and jobs and tackle society’s biggest challenges,” said Geoghegan-Quinn. “[They] act as centres of innovation and of knowledge transfer to industry and society at large.”²

As a society, understanding the complex genetic changes within the human body changes the way in which doctors interact with patients. The rise of personalised medicine is an area that has already started to gather momentum, but in the future it will undoubtedly become the norm. The ability to locate specific genetic changes and target treatment there sounds like science fiction, but it is quickly becoming science fact. However, personalising medicine in this way is not without issue. Having to sequence every patient’s genome or study the RNA in depth for any changes will place additional pressure on healthcare systems. In spite of this fact, research has to continue. The more researchers know about the human body the better the health outcomes become in the future.

In order to achieve a quality research base, Europe must focus upon building stronger relationships, ensuring collaboration and supporting pioneering research. While the European Commission remains committed to supporting research into areas such as RNA and genomics, science will continue to flourish across the continent and Europe will remain a key player in biomedical research. ■

¹ http://gr2014.eu/sites/default/files/SPEECH_Maire%20GEOGHEGAN-QUINN%20%5Ben%5D.pdf

² http://europa.eu/rapid/press-release_SPEECH-14-277_en.htm

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RNA in human disease diagnosis and therapy

Dr Michela Alessandra Denti of the Centre for Integrative Biology at the University of Trento, outlines the work of her laboratory on genetic diseases and cancers

The Laboratory of RNA Biology and Biotechnology at the Centre for Integrative Biology (CIBIO) of the University of Trento, Italy, is focusing on RNA to develop better diagnostic tools and therapeutics for a range of genetic diseases and cancers. The research projects developed in the laboratory also aim at unveiling new active roles for RNA molecules in the mechanisms underlying these diseases.

RNA impacts nearly every aspect of gene expression and it is now clear that a large portion of human genetic diseases are caused by mistakes in RNA metabolism. It has become progressively evident that RNA is not just a carrier of genetic information, but also a catalyst and a guide for sequence-specific recognition and processing of other RNA molecules.

The growing body of knowledge concerning RNAs is opening up exciting and unprecedented avenues for research: RNA molecules are today, at the same time, targets of therapeutic intervention, tools for functional studies and novel therapeutic molecules to treat human diseases.

Led by Dr Michela Alessandra Denti, the research in the RNA Biology and Biotechnology laboratory covers various diverse areas, and researchers focus on two main research interests.

Modulating RNA splicing as a cure for inherited diseases

Firstly, the laboratory studies different ways of modulating 'RNA splicing', a process that all messenger RNAs (mRNAs) undergo in the cell. Several gene mutations, which cause different rare inherited diseases, affect the splicing of specific mRNAs. At variance with mainstream gene therapy approaches, which aim at replacing the mutated gene with a functional DNA copy of the gene itself, Denti and coworkers intend to correct the mRNA

transcribed from the mutated gene, through an approach called "exon-skipping". By introducing small RNA molecules, they mask the mRNA to the attack of the splicing machinery, inducing it to jump certain portions of the mRNA, thus restoring the correct message. The team predicts that exon-skipping holds a great deal of promise as a potential cure for genetic diseases, and several clinical trials have supported the notion that the technique could one day become commonplace.

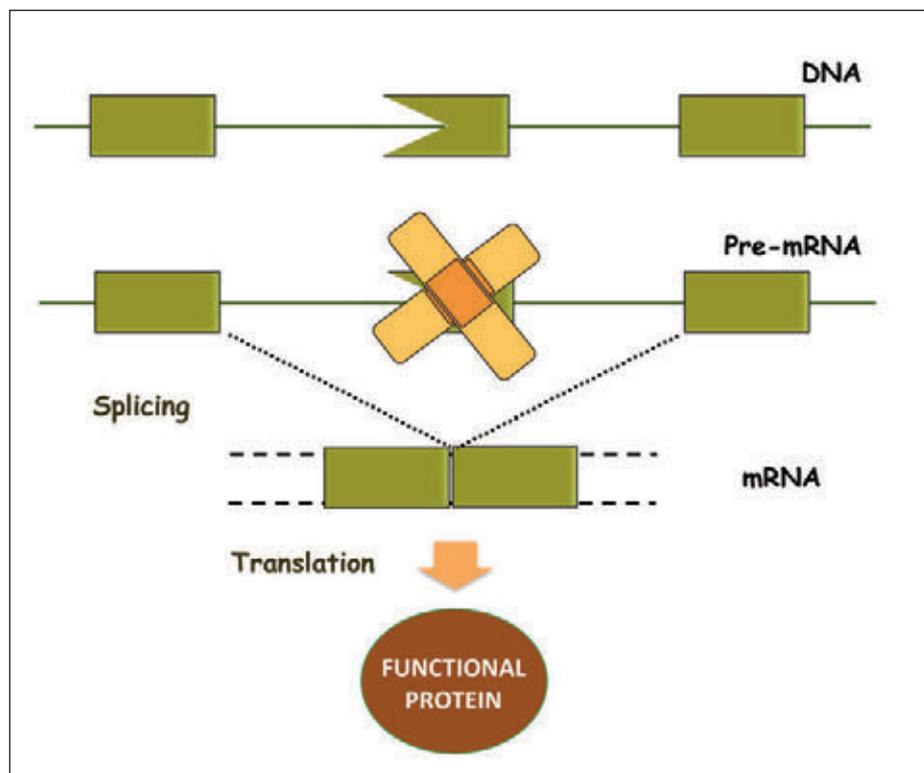


Figure 1. Exon skipping approaches to correct diseased genes: a molecular bandage for inherited diseases

The group is carrying out studies to develop a cure for a rare neurodegenerative disease: FrontoTemporal Dementia with Parkinsonism linked to chromosome 17 (FTDP-17). FTDP-17 patients have single nucleotide mutations in the gene for protein tau, which induce the aberrant inclusion of an exon in tau mRNA, and ultimately cause the accumulation of this protein in neurons and consequently result in neuron's degeneration. Very recently, Denti and colleagues have been successful in inducing exon skipping and the correction of tau mRNA through the use small RNA molecules in cells. They are now working to show the efficacy of the approach in an animal model of the disease.

MicroRNAs as biomarkers of cancer, cardiac and neurodegenerative diseases

A second line of research is aimed at studying some very small RNA molecules called microRNAs (miRNAs) that have only recently been discovered. Due to their size these RNA molecules were overlooked for a long time, but it has become clear in the last decade that thousands of them are encoded in the genomes of all organisms, and play a crucial role in cells, fine-tuning the production of proteins. The deregulation of miRNAs has been implicated in several diseases, and the laboratory is studying the potential for specific miRNA, to be used as a tool in the early and accurate diagnosis of cancers, cardiac diseases and neurodegenerative diseases. The advantage of using miRNAs as biomarkers lies in the ease with which they can be detected, and in their extreme specificity.

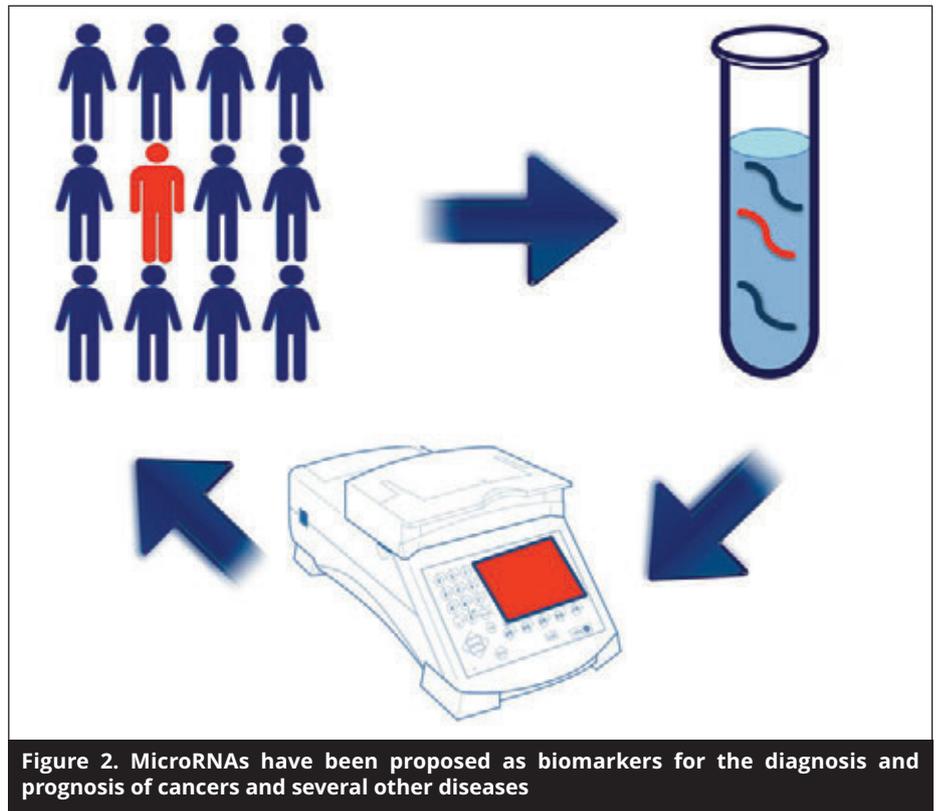


Figure 2. MicroRNAs have been proposed as biomarkers for the diagnosis and prognosis of cancers and several other diseases

In one project, the group focused on lung cancer, the leading cause of cancer mortality worldwide. As it is now possible to design therapies targeted towards specific forms of cancer, Denti and her colleagues were required to distinguish between squamous cell carcinomas (SCCs) and adenocarcinomas (ADCs). To do this, the researchers measured the quantities of miR-205 and miR-21 in cancer biopsies, and found that the results provided a useful marker for differentiating between SCCs and ADCs - an identification which is not always possible via traditional histochemical methods. Recently, the researchers have discovered that measuring other miRNAs could enable the differentiation between neuroendocrine tumours both from the other two lung tumour types, and amongst themselves.

The group is also working towards the identification of molecular mechanisms in which miRNAs play a key role, thus representing optimal targets for a therapeutic approach.



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The science of sugar

Amy Caddick, Journalist explains the progress that has been made in understanding the benefits of glycomics to help tackle major health challenges...

In the twenty-first century, medical research has made impressive strides. Diagnostics are better than ever before, and treatments are for the most part very successful. However, as the rate of diseases such as cancer, heart disease, and diabetes steadily grow, finding new ways to tackle the biggest health burdens facing this generation is becoming increasingly difficult.

Much of the progress made in medical research is due to a greater understanding of the human body. Unravelling the mechanisms and triggers that cause illness has led to the eradication of a number of deadly diseases, and the management of many formally life-threatening ones.

Genomics has been a vital step in biomedical research, as it paved the way for other fields of expertise within structural medicine, such as proteomics (the study of proteins), and glycomics (the study of sugars). Analysing the impact of disturbances to proteins and sugars on the human body – and the consequences of changes to either of these – has far-reaching implications within the biomedical field.

Glycomics – the study of sugars – is a discipline that focuses on the fundamental knowledge of structures, and the interactions of the molecules within that structure. It has enabled researchers to gain a greater insight into the changes that occur within the body and how these changes influence disease onset, and/or progression.

Researchers working in glycomics have already gleaned much about specific changes to the structure and metabolism of glycans – fundamental biopolymers that bear biological information. Glycans are usually bound to proteins or lipids, and are often found in body fluids as secretory proteins. Glycans can also be

found on the cell surface. Changes to the structure of glycans can cause inflammation, arteriosclerosis, immune defects and autoimmunity infections within the body, leading to diseases such as influenza, viral hepatitis, meningitis, HIV, and cancer. Research has also uncovered greater understanding of the mechanisms behind glycosylation, the process of adding glycan chains (or other sugar units) to proteins.

But it is not just medicine that glycomics has, and will continue, to benefit. The cosmetic industry has also utilised the knowledge gained from glycomics research to develop products for the commercial market. L’Oreal, one of the largest cosmetic companies in the world, recently used glycans in some of its anti-ageing products. The glycans encourage the production of collagen, the protein that makes skin supple and smooth, which reduces the signs of ageing.

The ability of glycans to stimulate the production of proteins has extensive implications. If collagen can be produced by glycans, then perhaps in the future other proteins that cause major diseases can also be stimulated to reverse the damage caused.

Glycomics undoubtedly shows astounding promise in breaking down disease and understanding the changes that occur within the body. Much like many aspects of regenerative medicine, glycomics has the potential to recreate many of the building blocks within the body. The ability to stimulate cells to produce specific proteins will certainly be advantageous in modern medicine. ■

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A battlefield in glycomics

Ultrasensitive biosensors vs. biochips



Ultrasensitive biosensors vs. biochips

Use of biochips is behind fundamental discoveries of the role of complex sugars (glycans) in important processes inside the cell. Moreover, biochips together with other sophisticated instrumental techniques helped to discover new prospective disease biomarkers, so important in diagnostics. There are however some limitations of biochips including a need to use special fluorescent markers for signal reading, influencing reliability of assays and the method is not applicable for early stage disease analysis. Contrary biosensors can effectively address biochip limitations working in a sensitive manner without fluorescent markers, thus being a viable alternative to biochips for possible future diagnostics. A competition has started.

Glycomics

There is no doubt that glycans are involved in numerous physiological (i.e. classification of human blood into different blood types) and pathological processes (viral/bacterial infections, development and spreading of various types of cancer) in living organisms. Thus, glycomics, a scientific field studying the role of glycans, is developing at an increased pace. Every day new discoveries are emerging, further underlining essential functional role of glycans for the cell to stay fit and healthy. It is estimated that 70-80% of all proteins within and on the surface of the cell have this “sugary” coat. Attachment of glycans to proteins is quite time- and energy-consuming process with substantial involvement of the cell building machinery. Since evolution only preserves the most effective survival strategies this fact further points out to the importance of glycans for every cell. This “sugary” coat is kind of an identity key, which after being “hacked” makes the cell vulnerable to attack or change of this identity can be behind disease progression. Remarkable discoveries in the field of glycomics have been achieved using various types of sophisticated instrumentation, which had to be in many cases combined, to get information about function of glycans in the living system depending on a precise structure of glycans. These days’ biochips and biosensors can provide useful information applicable for diagnostic/prognostic purposes without any need to apply quite complex instrumental techniques.

Biochips



Glycan and lectin biochips

DNA biochips are effective for high-throughput gene assays and currently two such small biochips contain the whole human genome i.e. 25,000 genes. There are two forms of such devices applicable in glycomics either glycan or lectin biochips developed from DNA biochips. Glycan biochips mimic the human cell surface and can be applied for analysis of proteins or cells (i.e. viruses) infecting our human cells. Lectin biochips utilise lectins, proteins binding to glycans, for specific analysis of changed glycans for example in human blood or tissues signalling presence of some disease including various types of cancer with possible utilisation in diagnostics.

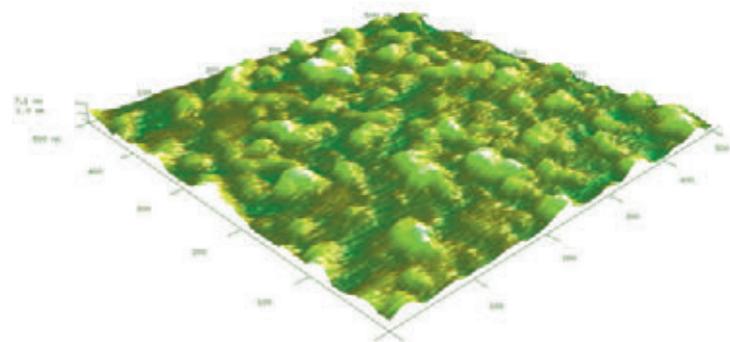
Two Affymetrix DNA biochips are shown. A match for size comparison is depicted, as well. Images were taken from Schutz: <http://en.wikipedia.org/wiki/File:Affymetrix-microarray.jpg>

The main problem of application of biochips is a need to use fluorescent markers, what can negatively influence reliability of detection and low sensitivity of analysis, what is the main drawback in application of this technology in early diagnosis of diseases. Thus, biosensors emerged as an alternative to biochips to address the main drawbacks of biochips.

Biosensors

Biosensors, devices integrated with biological molecules, can selectively detect a wide range of clinically important molecules (glucose, alcohol, but also disease biomarkers). Various different biosensor configurations are available and some of them are much more sensitive compared to biochips. Especially application of nanomaterials helped to provide detection limit of such devices down to detection of single molecules, what is amount much lower than the amount of disease biomarkers present in human blood. Thus, convenient and reliable early stage diagnostics is possible using some biosensor concepts. Moreover, some biosensor detection schemes (electrochemistry) allow detecting ultralow amount of disease biomarkers without a need to use fluorescent markers, enhancing reliability of analysis.

Biosensors with nanoscale controlled architecture



Nanoscale biosensors

There are two ways for nanoscale controlling a biosensor design. The first one is a careful density adjustment of molecules on the surface to achieve high sensitivity, selectivity and reliability of analysis. The second one is utilisation of nanoparticles, nanotubes and a hot material of today's science – graphene to do the same.

Control over protein density on the surface with individual proteins (shown in the figure on the left) is achievable.

There are two students responsible for development of especially electrochemical glycan and lectin biosensors in the group Tomáš Bertók and Jaroslav Filip. The biosensor developed so far were applied in analysis of rheumatoid arthritis and systemic sclerosis, but our current effort is aimed to design biosensors for diagnostics of prostate and colon cancer; and for detection of various forms of viruses.



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<http://www.adjacentgovernment.co.uk/stakeholders/electrochemical-lectin-and-glycan-biochips-integrated-with-nanostructures-elena/>



Effective regulation equals effective drugs

Dr Jordi Llinares Garcia and Dr Paolo Tomasi of the European Medicines Agency speak to Editor Laura Evans about the regulation of paediatric medicines throughout Europe...

The European Medicines Agency (EMA) is responsible for the scientific evaluation of medicines developed by pharmaceutical companies for use in the European Union. It began operating in 1995 and works with international partners, such as the European Commission to ensure the correct information and data is available for any new drugs that are brought onto the market.

When prescribing medicines in children specifically, there can be a number of complications and challenges that arise due to the lack of studies that have been conducted. A new European Union Regulation came into force in 2007 to help encourage more studies into paediatric medicines throughout Europe.

Here, Editor Laura Evans speaks to Dr Jordi Llinares Garcia, Head of Product Development Scientific Support Department, and Dr Paolo Tomasi, Head of Paediatric Medicines, at the European Medicines Agency (EMA) to find out more about the regulation of paediatric medicines and the problems that arise from unregulated drugs.

“Many of the medicines that are used for children were never authorised for them – only in adults – which means, we are using medicines based on assumptions that they will be as safe and effective as in adults,” explained Dr Tomasi.

“Unfortunately, these assumptions have been proven to be quite wrong in a number of cases, and sometimes with tragic consequences.”

When paediatric medicines are not studied adequately, there can be a number of problems that arise which have been reported in the past. Drugs might not have the same effect on children as they do in adults, which could be down to the dosage and even the way they are administered. The EMA believes this to be an important reason to ensure paediatric medicines are studied as closely as adult medicines.

“There are several problems that can happen, and one that is probably the most common is the medicine is not effective because it has been given in the wrong dose. We often have no idea how to adjust the dose in

children, compared to adults, but you can't just use the weight to adjust the dose if it has not been studied, because you are never sure if it is distributed and metabolised in the body in the same way," explained Dr Tomasi.

The lack of adequate research into the development and authorisation of medicinal products for children was first recognised in the USA. In 2007, The European Paediatric Regulation tried to improve outcomes based on the experience acquired in the USA.

The financial return is often judged insufficient for development of drugs for children, and therefore even promising medicines for conditions that do affect children, are not studied effectively. The Paediatric Investigation Plan (PIP) was introduced, which enables pharmaceutical companies looking to study medicines in adults to gain incentives by also studying said medicine in children.

"As part of the incentives they would receive an extension of the supplementary protection certificate (SPC), which is an instrument used to extend a patent life of a drug, normally 20 years. SPCs are granted to provide additional protection, because the development of a drug is often very lengthy. If the pharmaceutical companies do all their development for children as agreed in the plan, an extra 6 months is attached to the existing SPC.

"One of the aims of the regulations is not only to have the indication authorised for children, but to give information to patients and prescribers of the product," said Dr Llinares Garcia. "The incentives are not linked to the fact that the product was successful in paediatric development, but for conducting the studies and providing information for the patients.

"Other incentives include free scientific advice, and a 50% reduction of the fees they pay to the agency."

Since 2007, the EMA and its Paediatric Committee have agreed more than 600 Paediatric Investigation Plans (PIPs) with pharmaceutical companies, to provide data on the efficacy and safety of medicines for diseases in children.

The Paediatric Committee has 3 main aims:

- To promote and encourage high quality research for medicines that will be used in children;
- To make available more information on the use of paediatric medicines, including when they should not be used;
- To increase the number of medicines that are authorised and properly studied for diseases that affect children, with the appropriate form and formulation.

The Committee acts as the scientific body that officially adopts the Opinions agreeing PIPs, or granting exemptions.

The EMA works alongside many partners and organisations in order to carry out their work, which includes Competent Authorities in the EU Member States, and the European Commission.

"Members of the Commission often come to the Paediatric Committee meetings, so the relationship is continuous. The relationship is both with the Directorate General for Health and that for Research; this last one is responsible for the implementation of the programmes for research such as FP7, or Horizon 2020, and we have a fruitful collaboration with them" Dr. Tomasi explains.

The EMA cooperates with all the Competent Authorities (for medicines) in the EU member states; the members of the Paediatric Committee (PDCO) of the EMA are in fact nominated by the member states (plus additional members from Norway and Iceland).

"Every year, these Competent Authorities together with the national Patent Offices submit a report to the EMA on the incentives received, and the infringements of the Regulation. In addition, the FDA and EMA have created a regular forum for the discussion of paediatric development issues, which has then been expanded to include regulators from Japan, Canada and Australia."

Due to the number of pharmaceutical companies that do not see an adequate return on investments when studying medicines in children, there can be many challenges that arise. Since the regulation came into force in 2007, many achievements have been recorded and without doubt the regulation has been successful.

One of the key developments includes the creation of paediatric research networks, which bring together 18 research networks that meet research quality criteria. As well as the creation of the networks, there have been significant results which include more paediatric clinical trials being done – around 350-400 per year – including children (0-18 years).

Over the past 6 years, the proportion of clinical trials including children has increased to approximately 10%. There is also significantly more information on medicines available, and for the first time ever, results of the paediatric medicines studied are available to the public.

Dr. Tomasi added: “If you make a comparison with the American legislation, you can see that we have been more successful. The numbers in the US may appear higher but the legislation is so much older in the USA, and has had much more time to impact.”

Paediatric development has become an integral part of the overall development of medicinal products in the EU; however, there is always room for improvement. Both Dr Tomasi and Dr Llinares Garcia identify a number of challenges that still exist and could be tackled.

“It took some time but I think now all pharmaceutical companies have accepted that it is an integral part that they have to think about, and not just an after thought,” said Dr Llinares Garcia.

“One of the main difficulties is that development of drugs is still geared for adults, and that has implications for some therapeutic areas, in particular, for paediatric oncology. The pharmaceutical companies can use the legislation to by-pass and avoid the development for children if they declare to develop for conditions that only exist in adults.

“For example, ovarian cancers, lung cancer, gastric cancer, breast cancer, are diseases that exist in adults only. However, even if a product is potentially interesting in paediatric conditions, if a pharmaceutical company declares their intention to limit future use only to diseases that do not exist in children, it is difficult or impossible to impose paediatric development them. This is a pity, because we are losing interesting products due to the mechanics of the legislation. I perceive this as one of the greatest challenges,” he added.

Another challenge for the study of paediatric medicines is the recruitment of children for the medical trials. As suggested by the EMA, the numbers of unhealthy children are low which can make recruitment a much harder task.

Dr Tomasi and Dr Llinares Garcia emphasise the importance of studies needed for paediatric medicines and the work that is being done at the Agency, in regards to regulations it only has one result in mind – improving the health of children.

“I think a lot of experience tells you that there are lots of benefits to working together for the health of the children, but still companies have a lot of market pressure to think about,” concludes Dr Llinares Garcia.

“We are working on a new report on implementation of the regulations to be finished in 2016, and I think that will be quite a milestone where we will reflect on the success and achievements of the regulation and where we can move forward.” ■

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Danish healthcare – leading the way

Amy Caddick, Journalist, gives an overview of the Danish Ministry of Health and the new Minister's plans for the Danish healthcare system...

Like the UK, Denmark's healthcare system offers free and equal access to services, as well as universal coverage for all. In 2011, 9.3% of gross domestic product (GDP) – 1.5% higher than in the UK – was spent on public healthcare expenditure alone¹.

Over the last few years, Denmark has developed a reputation as a leader and a pioneer in health. Under the auspices of the former Minister for Health and Prevention Astrid Krag, Denmark has successfully grown its digital programme, pushing the country to the forefront of healthcare technology in Europe.

One area that was a major focus for the former minister was e-health, a sector that has seen significant growth in most European nations. In April 2012, Krag's ministry published its e-health vision, which aimed to give healthcare providers access to patient information when required. Krag also successfully launched a 2 year telemedicine project in 2012, involving 2,000 patients from across 10 municipalities, to analyse home-based treatments – a scheme that could potentially save money and relieve the pressure on healthcare systems in Denmark.

At the opening of e-Health Week 2012 in Copenhagen Krag said, "New technologies, such as smart phones, are user-friendly and improve our everyday lives continuously. E-Health should do the same: it should be easy to use and focus fully on the needs of patients and employees in the health care sector."²

New minister Nick Hækkerup certainly has some big shoes to fill when it comes to developing innovation in the Danish healthcare system. Despite only being in power since February, the minister has yet to really get his teeth into his agenda. However, recognising the



Nick Hækkerup Danish Minister for Health and Prevention

importance of technology and innovation in developing a first-class healthcare system is hopefully something that he – like his predecessor – will bring to the role.

In his short tenure, one area that Hækkerup has begun to champion is diabetes. As rates of obesity continue to grow, the number of people affected by the disorder has risen dramatically. The disease, Hækkerup recognised, is not limited to Denmark, and currently affects around 32 million people across the EU³.

Speaking during an interview at the 'Today, we change tomorrow' conference on diabetes, the minister said: "...it's a serious challenge, not only for the population in Denmark, but for the population across Europe to be able to fight diabetes better than we have done up until now.

“We see by counting the number of people who suffer from diabetes in Europe, that it is a severe problem due to our way of living and it’s only going to become bigger in the years to come. We have to do something to treat diabetes, but we also have to do something to prevent ourselves from getting diabetes at the speed we are doing now.”

He also acknowledged the social impact of ignoring the disease, stating that: “The most important consequence will of course be that a lot of people throughout Europe will experience a lower quality of life than they would have if we didn’t do anything. That’s one aspect,” he said. “Another aspect is that this is an area where we see a great social inequality. It’s the people from the lower-ranking social groups who tend to represent the largest number.

“On top of that, and very important as well, this also has large economic consequences for a society in terms of money spent on treating diabetes and in terms of people suffering from diabetes who are not able to participate as part of the workforce, to participate in the society as a whole.”

Another area Hækkerup has spoken firmly on is e-Cigarettes. The devices, which are designed to help people stop smoking, contain nicotine. Recently, there has been increased discussion about the regulation of these devices, particularly in regards to safety and age restrictions. In April, Hækkerup called upon parliament to discuss regulations for electronic cigarettes.

“It concerns me that children are using strawberry and liquorice flavoured e-cigarettes,” Hækkerup wrote in a statement to Denmark’s parliamentary committee on health. “It doesn’t matter whether or not they contain nicotine, it is still a concern.”⁴

The minister also seems to be keen on tackling health inequality. Speaking in March, Hækkerup recognised that patients with low-incomes and poorer education were more likely to be affected by chronic diseases.

To combat poor health amongst this demographic, Denmark must ensure real equality in its healthcare system⁵. He also focused upon the fact that health-care should be based upon the individual’s situation, not a one-size fits all mentality, stating that, “The problem is that the principle of equality in fact leads to discrimination.”⁶

Tackling the inequalities that prevent people from accessing healthcare is undoubtedly vital if Denmark is to remain a healthy nation. However, finding new innovative ways to tackle health problems, maintaining adequate funding, and recognising the critical issues that clog up health systems across the country is also imperative to ensure this development continues. What legacy Hækkerup will leave behind remains to be seen, but if he continues to follow in the same direction as his predecessor Denmark’s healthcare system will undoubtedly come out on top. ■

¹ http://www.oecd-ilibrary.org/economics/country-statistical-profile-denmark_20752288-table-dnk
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³ <http://diabetesleadershipforum.eu/>
⁴ <http://cphpost.dk/news/health-minister-no-fan-of-electronic-cigarettes.9290.html>
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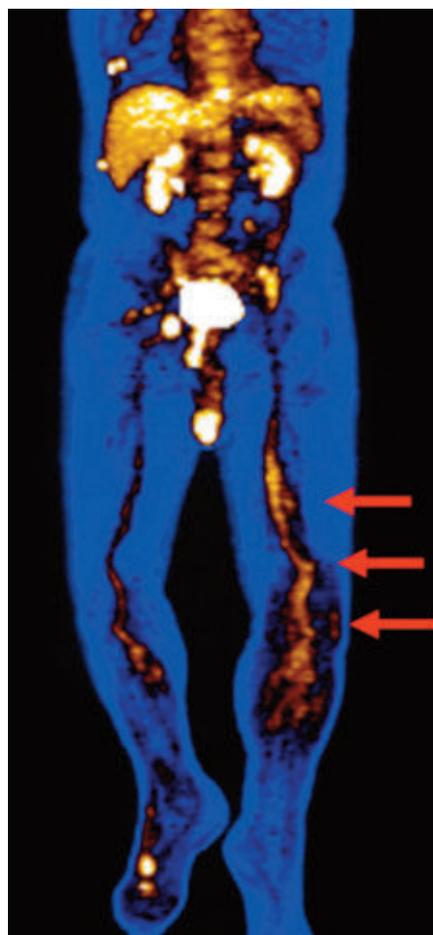
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A new horizon in molecular imaging – inflammation

Correct diagnosis is a must for rational therapy, and nuclear medicine offers a unique instrument. As opposed to conventional diagnostic imaging with x-rays or magnetic resonance imaging (MRI), molecular imaging provides understanding and quantification of molecular processes in the body. By tracking from outside the body the distribution and fate of molecules inside the body and being up to a million times more sensitive, molecular imaging offers early and more correct diagnosis and staging of disease and, in addition, monitoring of treatment response. As such molecular imaging is the prerequisite of 21st Century personalized medicine.

Positron emission tomography (PET) is the heart of molecular medicine. Positrons are cyclotron produced radioisotopes. When attached to a molecule, these become detectable and quantifiable by a PET scanner. Modern PET/CT or PET/MRI hybrid scanners provide molecular and structural information of the entire body. The most common tracer is a modified glucose molecule called FDG, which accumulates in cells with increased metabolism, e.g. cancer cells. By FDG-PET/CT most cancers and their metastases can be accurately detected. The error rate is about 10% as compared to 33% with conventional imaging. This has enormous implications.

Increased glucose metabolism is a hallmark also of inflammation, whether infectious or non-infectious. Inflammation is the major reason for “false”



Deep vein thrombosis in left leg. FDG-PET/CT imaging shows a dilated vein with high metabolic activity (red arrows) consistent with a fresh new clot.

results with FDG-PET/CT. Due to different dynamics, changes caused by cancer and inflammation can often be separated. Inflammation is considered “the mother” of many diseases. PET can detect inflammation at an early stage, when it is still curable. This as opposed to cancer, which is no longer considered a curable but a chronic disease, which, at best, one may die with instead of from.

The major role of inflammation was demonstrated by PET in psoriasis, which

affects 2-3% of all women and men, and also in deep vein thrombosis, which is the fore-runner of pulmonary embolism. In psoriasis, PET surprisingly disclosed that patients, besides inflammation of the skin, may have inflamed major vessels inside the body and abscess-like changes in various organs. In venous thromboembolism, the blood may clot in the leg veins during long-distance flights or prolonged bed rest. This is a serious condition, since fragments of the clot may dislodge and wedge in the lungs as pulmonary emboli. Anticoagulant therapy is effective, but carries a risk of haemorrhage causing stroke or bleeding stomach ulcer. In these patients, PET ensures the correct indication for therapy. Since inflammation is a key factor in diseases like arteriosclerosis, rheumatoid arthritis, inflammatory bowel disease, chronic obstructive pulmonary disorder and maybe even cancer, molecular imaging may cause a paradigm shift in their management.



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Lambeth: building for wellbeing

John Kerridge, Associate Director for Communities at Lambeth Council discusses the project to develop a joint health centre and its benefits to the community...

A project to deliver a brand new community building is no simple thing to realise. When that project involves several different stakeholders and aims to deliver a multi-use facility, it becomes an even more challenging task, but one which can prove all the more effective when complete.

The development of a joint health centre, complete with leisure facilities, GP surgeries and dental suites, has involved a great deal of consultation and cooperation and it is close to completion; on time and in budget.

Lambeth Council, Kings Health Partners and what is now Lambeth Clinical Commissioning Group have collaborated to bring together the £14.2m West Norwood Health & Leisure Centre, which is due to open to the public in a few months.

The plan for a health and leisure centre was not

universally popular within the council – several senior officers wanted a new school on the site – but in consultation with the local community and with strong support from ward councillors and cabinet members, the joint centre proposals were approved.

The building, delivered by contractor Galliford Try, will house a 25 metre swimming pool, a fitness suite with more than 100 work stations, a dance studio, GP consultation rooms, a dental surgery with training facilities for Kings College dental students, community meeting rooms, a council customer service point as well as an outdoor playground for children; it is a truly impressive facility and one of which we are extremely proud.

Considerable work has been done by the partners through an Integration Manager, to engage both with one another and with the local community. This



process has been led through the Joint Project Team and Health Commissioning Group meetings, under the leadership of a Sponsors' Board.

The 'joint partnership' operation involved in delivering the centre has not been restricted to the immediate stakeholders however. At Lambeth, we market ourselves as a 'cooperative council' and this means working with, not just for, the community we serve.

“The development of a joint health centre, complete with leisure facilities, GP surgeries and dental suites, has involved a great deal of consultation and cooperation and it is close to completion; on time and in budget.”

The delivery of West Norwood Health and Leisure Centre encapsulates this, with the partnership engaging with local residents through a number of means; involvement in community group meetings (including with Norwood Forum, Hainthorpe TRA and Norwood Area Housing Forum), Norwood Jobsfair (in partnership with Lambeth Working) and a Community Workshop held in early March, which gave residents the

opportunity to hear more about what services are being planned for the centre and to shape how the centre operates going forward. Even the name of the centre was put to a vote amongst local residents.

Going forward, the centre will be managed by Lambeth Council with leisure centre managers GLL, but the partnership board will continue to monitor how the centre impacts on the health and wellbeing of local residents and the community. They plan to report against this every year to the community as well as Lambeth Council and the NHS.

We know that many residents will come into the centre in order to access specific services; however, we want them to leave the centre with a better understanding of their own wellbeing and what they can do themselves to improve this. To that end, we are focusing the services and our communication around the Five Ways to Wellbeing: Connect, Be Active, Take Notice, Keep Learning and Give.

We have been working with partners to develop clear pathways for patients and other centre users between services to ensure that, as much as is possible, they



experience the centre as a seamless and integrated process, with support to access the activity or service they need.

We are currently in the process of recruiting 2 volunteer teams for the centre – Centre Navigators, whose role will be to welcome visitors to the centre and direct them to the appropriate service and Community Health Champions, who will be trained and supported to signpost people into health related services around West Norwood, including the Health and Leisure Centre.

Moving forward following the handover of the building to the council, the partnership and cooperation work continues. Considerable work is being done on managing the installation of services into the centre and on working with the staff teams who will operate through the centre. New equipment is being delivered and installed, staff need inductions and training, operational systems need to be installed and tested so that, from the very first day of opening, residents who come into the centre experience it as a welcoming

place in which everyone involved is there to support them in improving their own health and wellbeing – and that of the wider community.

We are genuinely excited about having a facility that brings together different health services in one place. The way the facility has been developed – with input from so many different partners – will be of huge benefit when it is up and running and we are hopeful that centres like this one will offer a more holistic and effective way for Lambeth residents to improve their health. ■

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Modern healthcare in the community

Neil McElduff, Executive Director at Community Health Partnerships, looks at the history behind Finchley Memorial Hospital's development and how it is meeting the needs of the local community...

Since opening its doors almost 2 years ago, the purpose-built Finchley Memorial Hospital in Barnet, London has provided a wide range of health services to thousands of patients.

The new Finchley Memorial Hospital, when first conceived by NHS Barnet in 2003, was a central part of a wider strategy focused on the transformation of local health services to meet the future healthcare needs of the community, by providing high quality services closer to home and thus reducing the reliance on acute hospitals in the surrounding area.

The hospital was developed and built under the Local Improvement Finance Trust (LIFT) programme, led by LIFT Company, North London Estate Partnership, uniting public and private sector partners – including Community Health Partnerships, the head tenant and public sector shareholder, Galliford Try Plc, Bilfinger Berger and gbpartnerships.

The Partnership is governed and driven by a Strategic Partnering Board, made up of local public sector organisations including (but not limited to): Barnet CCG, Barnet, Enfield and Haringey Mental Health Trust, North Middlesex University Hospital NHS Trust and Barnet and Chase Farm Hospitals NHS Trust.

The Partnership looked at how the development could provide the local community with the most advanced primary and community health services, housed within a modern and environmentally advanced building, located on a park-like health and fitness campus setting.

The new hospital replaced an old facility that was originally founded in 1908. In the decades that

followed, the former cottage hospital was gradually expanded through a series of ad hoc extensions, however, the estate was outmoded, inadequate, and wholly unsuitable for delivering 21st Century healthcare.

Today, the new £28m building provides the local community with advanced community and primary health care services including: inpatient rehabilitative care, outpatient services, an infusion suite, blood tests, x-ray and other diagnostics, a walk-in centre to treat minor injuries and illnesses, along with a pharmacy and patient information library.

It also has dedicated retail accommodation space for a café and community pharmacy, and the surrounding parkland provides a health and fitness campus which includes a physiotherapy garden and football pitches for local school use.

The development of the hospital could only have happened by involving the local community, staff, patients and various key stakeholders – such as GPs, the Friends of Finchley, Barnet Council and the former Barnet Primary Care Trust.

Due to the project's significance, the Department of Health, NHS London, the GLA and Sport England were also involved in the stakeholder process. A number of public meetings were held prior to the submission of the planning application, with feedback at each meeting carefully reviewed and incorporated wherever possible – for example – with the incorporation of a green acoustic barrier to prevent noise overspill to neighbouring properties.

During the design development of the internal areas, patient representatives formed part of the project



Overview

owned by the London Borough of Camden, which preferred to sell all the land rather than just the part initially wanted for the hospital development. Fortunately, the council agreed to the land sale.

Another challenge faced was to retain as much of the earth that was excavated in order to reduce vehicle movements to and from the site. This was partly due to the site being in a residential area, but also because it needed to meet a BREEAM Excellent rating.

However, the hard work was worth it, and the building has won a host of awards including best designed project at the Health Investor awards and most recently Highly Commended recognition at the 2014 CIBSE Building Performance Awards for the collaborative work on the project.

The success at the CIBSE awards demonstrates how collaborative working on PPP LIFT projects such as Finchley, can help ensure a clear focus in public sector procurement on driving out waste, meeting or beating cost benchmarks and delivering comfortable, sustainable, low carbon, energy efficient buildings that satisfy the needs of the organisations and people who use them.

The co-location of services in the hospital, an approach typical of LIFT buildings, has enabled a more united service for the public, which in turn has facilitated improved joint working, as well as better integration of primary and secondary care and specialist services. It has also helped reduce unnecessary hospital appointments and allowed more efficient referrals, avoiding people getting lost in the system and bringing care closer to patients. ■

team, with the bespoke way-finding strategy and signage developed through a student competition at local and Central London colleges.

Also, as a result of extensive consultation with the local community, League of Friends and the Royal British Legion, the memorial aspect of the existing hospital was retained through the incorporation of a quiet memorial garden with a newly commissioned sculpture.

The scheme faced some difficulties when it was discovered that a playing field near to the site was

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Maximising budgets

For the best possible outcome

Getting a quart out of a pint pot might seem an impossible task, but town halls are faced with the ongoing mission of achieving more for less.

Not only are Local Authorities under great pressure to maintain current services with fewer staff and resources, but there is little prospect of departmental budgets seeing any real gains for years to come. The onus, therefore, is on making savings in other ways in order to help protect frontline services.

In recent years, councils have increasingly looked to public private partnerships (PPP) to deliver capital projects and services, with one or more private companies taking on board much of the financial, operational risk and project management.

gbpartnerships is an established healthcare developer and market leader in the LIFT arena, working closely alongside public and private stakeholders to deliver in excess of £300m worth of new healthcare facilities.

Our approach, skills and experience gained from working in partnership with the NHS can be extended to meet the needs of local councils looking to save money and maximise the efficiency and utilisation of assets.

By focussing on service led estates strategy and the QIPP agenda, gbpartnerships are able to provide value for



Kensington Neighbourhood Health Centre

money solutions in a very challenging environment. We offer a comprehensive range of development, investment and property services; including: strategic estates planning, development and project, asset and estates management.

Councils the length and breadth of the country collectively own thousands of vacant buildings, as well as keeping open substantially under utilised office accommodation. In both scenarios, the ongoing service charges and maintenance bills are a major drain on resources. By selling off surplus land and estate buildings, very substantial cash sums be generated.

One vital 'tool' in achieving this 'goal' is Strategic Infrastructure Planning, which involves collecting and collating accurate estate and service information and determining 'where you are now' and, from this, plan for 'where you want to be.'

PPP is the best way of implementing strategic estate planning as it doesn't remove the decision making process from Councils or the NHS, and we are able to provide the skills and resources to come up with the best possible solution.

The whole process requires detailed planning involving inter-governmental departments working together to share the resources and 'buy' into the integration agenda.

Through mutual cooperation and innovation, change can be introduced to the way the local infrastructure and operations are used and managed.

Through PPP we have delivered a range of first class healthcare facilities including the landmark £28m Finchley Memorial Hospital. This impressive facility was developed and is owned by North London Estates Partnership (NLEP), one of six public private part-



South Liverpool NHS Treatment Centre

nership LIFT companies managed by gbpartnerships.

Part of our involvement with Finchley was helping to develop a very strong business case which met the commissioning requirement of the area, whilst falling within affordability constraints.

Not only did we act as developer under the LIFT process, but we undertook the roles of project manager and employers agent, whilst providing ongoing management of the FM and Life Cycle works for the building.

This scheme has already won numerous accolades – most recently a UK Project Commendation at the Civic Trust Awards 2014 held in Blackpool on March 7. (In 2013 NLEP won the ‘Best Designed Project’ category at the Partnerships Awards 2013 for its role in the development of the scheme).

Changing the way health provision is administered has been one of the priorities within the City of Liverpool. In recent years, tens of millions of pounds have been invested to provide both purpose built modern health facilities, as well as an extensive refurbishment of existing buildings.

Key to the city’s NHS reorganisation has been the relocation of clinical services out of Secondary Care and into Primary Care organisations.

This extensive programme has been rolled out to meet the PCT’s ‘Out of Hospital Strategy’ designed to provide a local network of Neighbourhood Health Centres to ensure no resident would be more than 15 minutes walking distance away.

To date, gbpartnerships has delivered 13 new facilities in the city, representing

a capital investment of over £50m. We have also managed a comprehensive refurbishment programme across the primary care estate with a capital cost of circa £15m.

The reorganisation of facilities has seen the ongoing transfer of the excellent clinical skills of the Royal, and other leading Liverpool hospitals, into a planned network of well-equipped local medical centres. This includes the £18m South Liverpool NHS Treatment Centre in Garston, which occupies 5,800m², and is the largest of four schemes being built on the site of the former Sir Alfred Jones Hospital in Garston.

Another landmark building is the £7.6m Kensington Neighbourhood Health Centre, which opened its doors to the public in March 2013.

gbpartnerships has played a significant role in this scheme through our LIFTco Liverpool & Sefton Health Partnership. Centre Management – run by gbpartnerships – has a remit to commission and operate the city’s Neighbourhood Health Centres on behalf of the local NHS.

The City of Liverpool now has primary care services that will meet the needs of the community for the next 25 years.



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Shedding the obesity problem

Obesity is an issue that many local authorities are trying to tackle. Here, Professor Kate Ardern explains the steps that Wigan Council are taking to reduce the issue...

For years, sweet-toothed Shirley Lloyd and her pie-loving husband Kieran battled the bulge. At her heaviest, Shirley tipped the scales at 16st 3lb while Kieran's weight ballooned to 21st 9lb.

The couple from Leigh struggled to slim down until Shirley signed up for a weight-loss programme offered by Wigan Council.

The 41 year old soon started seeing results and persuaded 33 year old Kieran to sign-up too. By last summer, the couple had lost a combined total of 10 stone and ran their first 10km.

“Since the launch of Lose Weight Feel Great in 2009, over 16,700 people have taken up the community weight management group sessions, losing a combined total of over 72,000kg.”

Kieran has since shed another 3 stone and Shirley is at her target weight of 11 stone. The couple trained and ran in The London Marathon. Their lives – and their health – have been transformed. Shirley said: “I started to actually enjoy running and when we were offered two places for the marathon we snapped them up.”

Kieran said: “I have more energy now and I feel great physically and know I look much better than I did. I'm sharper mentally too. I wish I'd done it years ago. I kept saying I would lose weight soon but never did. If you put the effort in, you get the rewards.”

The couple's story is just one example of the many successes for Lose Weight Feel Great, Wigan Council's pathway for managing excess weight in adults. It



Shirley and Kieran Lloyd after losing a combined 10 stone

launched 5 years ago in response to some pretty shocking statistics for excess weight in the Wigan Borough. We had one of the most overweight populations in the North West.



Professor Kate Ardern
Director for Public Health
Wigan Council

We introduced a range of services tailored to meet people’s needs. In 2012-13 alone, more than 8,000 people took on their weight loss challenge. Services are accessible from a wide range of venues across the Wigan Borough. People can call us to be directed to the service most appropriate for their needs, depending on health, previous weight loss experience and body mass index. They can also be referred by a health care professional.

The pathway includes a range of services including an online programme, one-to-one support from a health trainer, a consultant-led weight management service, and the group-based community weight management programme. All services offer support and advice about healthy eating, physical activity and behaviour change, tailored to meet people’s needs to help them lose weight and keep it off for good.

Since the launch of Lose Weight Feel Great in 2009, over 16,700 people have taken up the community weight management group sessions, losing a combined total of over 72,000kg. Over 60% of people who complete the programme lose at least 5% of their starting weight, which brings significant clinical benefits, and 12 months after finishing the programme, over 25% of these people maintain or lose more weight.

We’ve also developed a really successful scheme exclusively for men, as some seem more comfortable making their weight loss journey in male-only company. Trim Down Shape Up was launched in 2011 to encourage men to take charge of their health, get fit and develop camaraderie in a social and fun environment. The programme has been hugely successful

with 747 men losing 1,967kg between them – the equivalent of 19,670 meat pies, 17,407 burgers or one large elephant.

In February 2014 Public Health England published for the first time excess weight figures for each local authority area in England. I’m delighted to say Wigan Borough’s rate of 65.3% puts us well in the top half of performers in the region. Far too many people in the borough are still carrying too much weight but our figures are heading in the right direction.

With the publication of its report, Public Health England also stated local authorities are well-placed to tackle the rising obesity epidemic. That’s a view our experience supports.

Councils have the local knowledge and the network of partners and resources to tackle this complex problem in the round. We’ve been able to tailor services to meet the needs of residents. Encouraging people to take up physical activity is crucial to tackling excess weight. It’s made easier because our leisure services provider, Wigan Leisure and Culture Trust, who run the council’s leisure centres, swimming pools and other sporting facilities, are part of the Lose Weight Feel Great provider partnership.

We know the health implications of being overweight or obese. It can significantly increase the risk of long term conditions such as heart disease, diabetes and certain cancers. It’s also an increasing burden on the NHS. Here in Wigan, we’re working hard to address this issue and think our results show councils can make a difference. Shirley and Kieran’s marathon efforts prove that. ■

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Counterweight Ltd. offers proven solutions (Counterweight Programme and The Counterweight Plus Programme) for weight loss and weight loss maintenance with published evidence demonstrating successful long term outcomes at 12 months.

The Counterweight Programme

- Lifestyle Programme underpinned by behaviour change for individuals with BMI > 25kg/m².^{1,2}
- Aims for moderate weight loss of 5-10% followed by maintenance for at least 12 months.
- Delivered in 9 sessions over 12 months.^{1,2}
- 1:1 or group delivery supported by comprehensive educational materials.

The Counterweight Programme Evidence

Mean weight loss of 3.0 kg at 12 months.^{3,4}

30% of patients attending follow up at 12 months achieve ≥5% weight loss.^{3,4}

70% of individuals who attend at 12 months weigh less than at baseline.⁴

The Counterweight Plus Programme

- Tier between lifestyle programme and bariatric surgery (and for some can provide alternative to bariatric surgery).

- Non-surgical intervention to manage weight in those with BMI ≥ 30kg/m² with type 2 diabetes or BMI ≥ 35kg/m².
- Aims for a weight loss of at least 15kg/15% (2 stones or more) and then focuses on the skills needed to keep weight at this new lower level for 2 years or more.
- Structured programme with 4 stages: Screening, Total Diet Replacement, Food Reintroduction, Weight Loss Maintenance with comprehensive educational materials for each stage.
- Delivered in 20 one to one consultations over 12 months.
- Total Diet Replacement product used is Pro800, manufactured by Cambridge Weight Plan. Some NHS providers pay for the product as part of contracts and others pass part or all the cost of product to the patients.

The Counterweight Plus Programme Evidence

- Mean weight loss of 14.7 at 12 months in programme compliant patient.⁵
- Mean weight loss of 12.4kg at 12 months in all followed up.⁵
- 33% of those entering the programme achieve ≥15 kg weight loss at 12 months.⁵
- 52% of individuals who complete all

stages of the programme achieve the >15kg at 12months.⁵

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³ Counterweight Project Team. Evaluation of the Counterweight Programme for obesity management in primary care: a starting point for continuous improvement. *Br J Gen Pract* 2008; 58: 548-54.

⁴ Counterweight Project Team. The implementation of the Counterweight Programme in Scotland, UK. *Family Practice* 2012; 29:i139-i144.

⁵ Lean et al. Feasibility and indicative results from a 12-month low-energy liquid diet treatment and maintenance programme for severe obesity. *Br J Gen Pract* 2013; e115-124.



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The future alternative of smoking?

Laura Evans, Editor at Adjacent Government sheds light on how e-cigarettes are becoming a preferred alternative for people giving up smoking...

Health officials in the UK and across Europe are keen to promote the importance of a smoke free life. For years, health experts have been arguing the relevance of giving up smoking to encourage a healthier lifestyle. Smoking is believed to increase the risk of a number of health problems including: lung cancer; stroke; heart attack, and coronary heart disease. Every year around 100,000 people die from smoking-related illnesses.

Since the smoking ban came into place in public spaces back in 2007, the use of e-cigarettes has risen dramatically. Compared with 9 million smokers in the UK, there are an estimated 1.3 million users of e-cigarettes.

Typical e-cigarettes, also known as electronic nicotine delivery systems (ENDS), contain nicotine and are often designed to look like real cigarettes.

There is however a great deal of speculation surrounding the e-cigarette, as to whether it is the best alternative. The Medicines and Healthcare Products Regulatory Agency will regulate e-cigarettes from 2016 due to concern that products currently on the market do not meet appropriate standards of safety and quality.

Are e-cigarettes a better alternative to patches and other products? There seems to be a consensus that they are certainly less harmful than smoking tobacco, but due to the nicotine content, still as addictive. The extent of nicotine uptake and the safety of electronic cigarettes have yet to be fully established, and the NHS do not yet recommend them as an alternative when giving up smoking.

However, there is some evidence that they may help. In 2013 a study at the University of Auckland, New Zealand, which compared the ENDS devices to nicotine

patches showed that 7.3% using e-cigarettes had quit after 6 months, compared with 5.8% using patches.

Furthermore, after 6 months, 57% of e-cigarette users had halved the number of cigarettes smoked each day compared with 41% among those using patches.¹

Health authorities in England are considering a ban on e-cigarettes in public places, such as workplaces, and educational establishments. The proposals were put forward at a Public Health England meeting in February. Plans for a ban in Wales are already underway.

Speaking in April 2014, Professor Kevin Fenton, PHE's national director health and wellbeing said: "We have not called for a ban on e-cigarette use in public spaces. PHE is working with our partners to consider options for supporting safe use of e-cigarettes to reduce harm and support smokers to quit, some of which were discussed by our Board on February."²

It remains to be seen whether e-cigarettes will gain the approval from NHS officials, but there seems to be growing evidence to show they are an acceptable alternative when trying to give up cigarettes. ■

¹ <http://www.bbc.co.uk/news/uk-26852649>

² <http://www.independent.co.uk/life-style/health-and-families/health-news/english-health-officials-consider-ban-on-ecigarettes-in-public-places-9308108.html>

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E-cigarettes: Evidence versus ideology?

Electronic cigarettes (“ecigs”) have arrived very suddenly in a ‘cat-amongst-the-pigeons’ flurry of opinion and debate. An increasing number of public health professionals are recognising that this could be the most significant tool in the arsenal of Tobacco Control. According to Professor West, who produces the Smoking Toolkit Study¹, ecigs represent a “massive opportunity”: “It would be a shame to let it slip away by being overly cautious.”

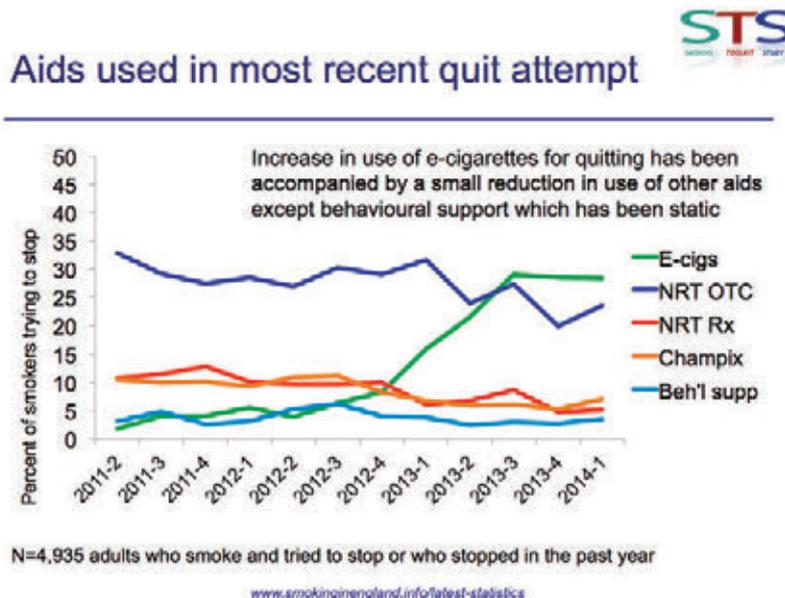
Others seem to remain wilfully ignorant of the ever-growing evidence base, and remain stubbornly diametrically opposed. How are policy-makers to get to the truth, with so much – often ideological and vitriolic – debate?

Harm reduction provides a framework to reduce the harm from particular behaviours without requiring abstinence. Needle exchanges, and the promotion of safer sex have made a tangible difference to public health. Tobacco Harm Reduction could have an even greater impact. Professor Nutt describes ecigs as the “greatest health advance since vaccinations”.²

Some local Stop Smoking Services (SSS) recognise the potential to really help their client bases, by offering advice about ecigs alongside the recommended NRT and behavioural support. Leicestershire SSS Manager, Louise Ross attended the ECig Summit in November 2013.³ She realised “we actually could see a huge drop in smoking

rates”, so she did further research and talked to users. Back at her SSS office, she says: “They wanted to use the e-cigarette and I think, above everything, we should listen to what people are saying and give them what they want.”⁴ Since launching her initiative, others have reached out to their local ‘vaping community’ as a first step.

Surely, it behooves all policy makers – on every issue – to properly inform themselves with evidence, rather than ideological rhetoric. Ecigs are neither medicines, nor tobacco products; as consumer products, appropriately and proportionally regulated with robust enforcement, they offer the greatest opportunity to improve health outcomes related to smoking ever seen – but only if they remain widely available to the smokers who need and want them. As Professor West says: “E-cigarettes are about as safe as you can get.”⁵



¹ <http://www.smokinginengland.info/latest-statistics/>
² <http://www.bbc.co.uk/news/health-26036064>
³ <http://e-cigarette-summit.com/presentations/>
⁴ <https://www.youtube.com/watch?v=hf2WdUeLGU>
⁵ <http://onlinelibrary.wiley.com/doi/10.1111/add.12550/full>



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Breaking the offending cycle

Whitney Iles, CEO of Project 507 Ltd discusses the benefits of a more holistic approach to the treatment of re-offenders...

With over 11 years experience working directly with children and young people, including the last 4 working with 16-25 year olds within Her Majesty's Prison service, I have found myself, like so many other professionals within the sector, searching for solutions to lower our current recidivism rates. My experience leads me to the following question:

Is it beneficial to move away from punishment and towards a more holistic focused treatment process?

James Gilligan wrote in his book Violence: Reflections On Our Deadliest Epidemic that "punishment is a form of violence in its own right – albeit a legally sanctioned form – but it is also a cause of violence".

The word "punishment" derives from poena, the Latin word for pain, which has been well documented by Gilligan and many others that more often than not, it creates feelings of humiliation and shame, which in turn leads to violence.

A day in the life of an inmate consists of being searched to and from education/intervention sessions, living in a cell where the toilet facilities are stationed next to where you eat and sleep, limited access to healthy food, less than minimum wage for jobs within the prison, and minimal access to loved ones. Schedules are dictated, and going against what is expected results in punishment of some kind. This creates, as those whom I work with will communicate; a feeling of being violated and small, and by continuing to add more punishment onto this situation, it can be argued, that these feelings do not go away but increase.

Now let me state that I am not promoting disobedience, nor do I suggest that those who harm or are at risk of harming others be left to do so. My argument is that

due to the complex and diverse nature of offenders, we must become complex and diverse in our thinking of rehabilitation, and remember that the 'Skinner Method' of positive and negative reinforcement is not the only way forward in regards to our prison system. My argument is for a more treatment based prison system, where rehabilitation is holistic.

Freud. S discusses in his paper "Remembering, Repeating and Working Through" that working with patients to highlight their own resistances enables them to develop insight into their behaviour and create change.

So can we not argue that for a person to break the cycle of offending behaviour, they must understand where their negative behaviour originated? Thus empowering and giving them a choice to create the changes necessary within their own thinking patterns to stop the repeating behaviour – a therapeutic approach to rehabilitation.

It can be argued that only once we start looking at the root of the behaviour that the offender can truly change. So how can this be achieved? We would need to create a system that promotes self-reflection in a non-shaming way and provide a safe and containing environment for inmates to "do the work" on themselves and work through their own personal traumas. Thus creating a holistic treatment based prison service. ■

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Next generation healthcare

Kath Mackay and Michael Sullivan, Lead Technologists in Regenerative Medicine at the Technology Strategy Board shed light on how cell therapy and regenerative medicine can revolutionise healthcare...

Innovation is essential in developing the next generation of medical treatments. As the global population grows and ages, healthcare providers will need to contend with an increasing burden of disease, but the way healthcare is currently delivered is becoming unsustainable.

Already in the UK it is estimated that 30% of the population suffers from a chronic disease where there is no cure or where treatment is inadequate, and chronic disease management is thought to account for 70-75% of all UK healthcare costs.

The Technology Strategy Board is the UK's innovation agency. We guide, mentor and fund high growth companies, accelerating economic growth and helping our companies to bring new ideas and technologies to market faster. We focus innovation activity on areas where the UK has strong capability and where we think it can make the biggest difference – one of those areas is regenerative medicine.

Regenerative medicine is a broad definition for innovative medical therapies that aim to replace or regenerate human cells, tissues or organs in order to restore or establish normal function. Regenerative medicine brings together multiple different technologies, including cell therapy which uses live cells to replace damaged tissue or to treat disease. Together, regenerative medicine and cell therapy offer the potential to transform how we treat conditions that lie beyond the reach of classic pharmaceutical approaches.

The UK is at the forefront of developments in this field – underpinned by the history of the safe and successful clinical use of bone marrow transplants to regenerate the blood and immune systems of patients with, say, leukaemia or lymphoma. There have been significant medical advances in skin regeneration for burns patients and the treatment of diabetic foot ulcers. Now, clinical trials are underway testing a second generation of innovative treatments for conditions such as diabetes, liver disease,



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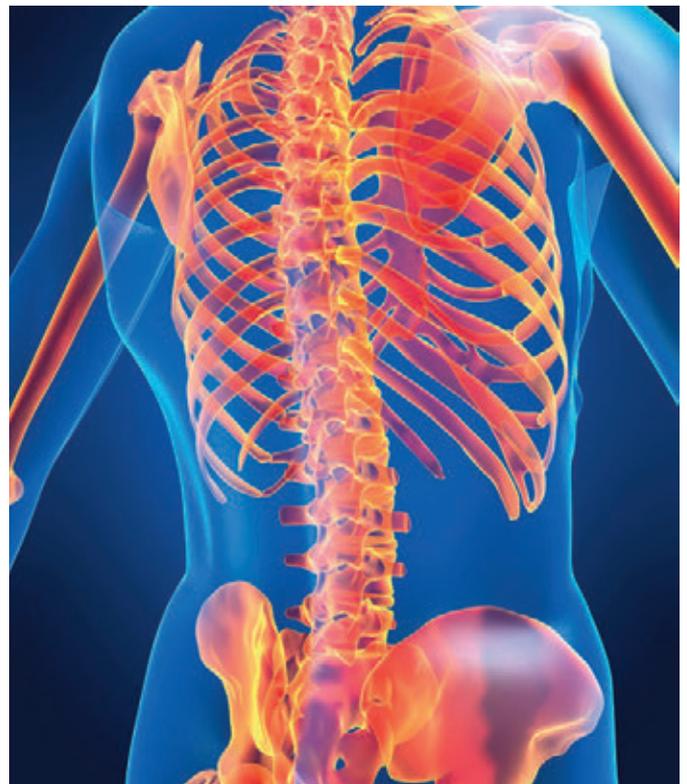
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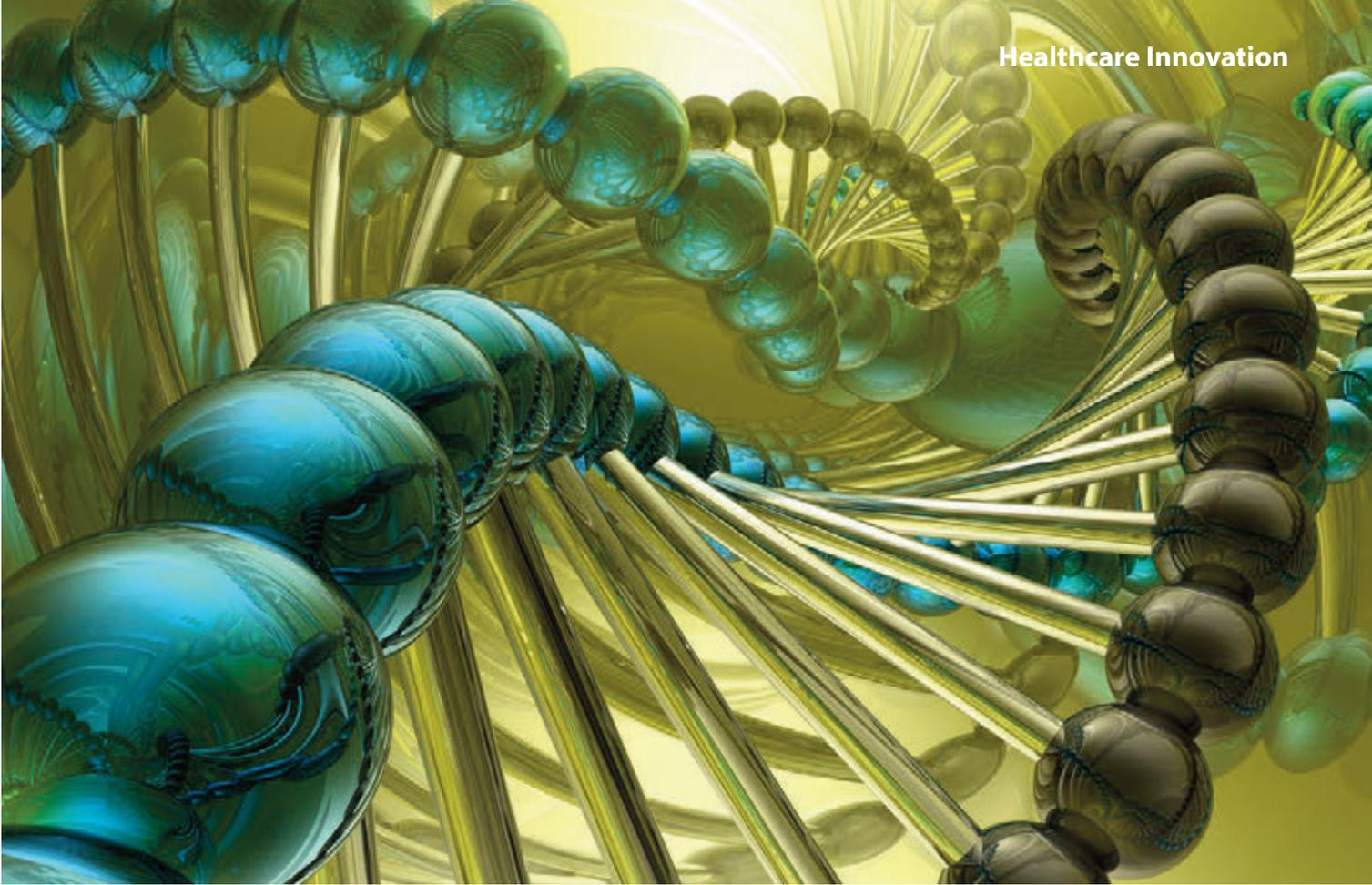
neurodegenerative disorders and spinal cord injuries. A striking example of the application of regenerative medicine was the successful replacement of a portion of a patient's damaged trachea with a tissue-engineered transplant constructed in the lab by growing stem cells and epithelial cells from the patient, on a collagen scaffold prepared from a donor trachea.

Regenerative medicine and cell therapy can revolutionise the way we deliver healthcare and there is clear potential for these treatments to combat rising healthcare costs. The burgeoning UK regenerative medicine industry is in a strong international position, both industrially and scientifically, to generate significant revenues from the increasing demands of our growing population. The Technology Strategy Board is leading in the support for companies working in this emerging field. However, developing these novel products and bringing them to market is particularly challenging; for example, the current clinical and regulatory framework is designed for more conventional therapies, and there are technical challenges associated with designing early stage clinical development programmes and large scale manufacturing methods to work with live cells.

In 2009, we established our Regenerative Medicine and Cell Therapy Programme to enable the best businesses to flourish, providing funding and support for them to address their sector specific challenges. So far, with a £3m contribution from our partners in the research councils and Scottish government, we have committed almost £28m of funding which has allowed UK companies and their collaborators to undertake more than 80 research projects that otherwise would not have been funded.

Our funding has enabled treatments to go into clinical trials for the very first time, in areas such as eye disease, wound healing, cartilage repair and immunotherapy. Several companies that we have supported have leveraged private financial investment as a direct consequence of our funding. We are building upon our successes with the recent announcement of a new competition, Advancing Regenerative Medicines and Cell Therapies which will offer up to an additional £8m of funding, including a contribution from the Welsh government. This will advance the industry by further addressing the clinical development and manufacturing challenges related to preparing these novel treatments for use.





It became clear to us that companies we were working with faced many collective challenges that could be better served by the development of infrastructure and expertise which could be shared amongst the emerging industry in the UK. Working with the community we were able to design a Catapult Centre that would address the needs of this emerging industry sector, supporting its growth and establishing the UK as a global centre. The Cell Therapy Catapult¹ was established in 2012 and is based at Guy's Hospital in London, a pioneering healthcare centre of excellence. The Catapult provides access to technical, regulatory, clinical and financial expertise and infrastructure, enhancing the UK's key strengths in this area, and enabling the UK to be a global leader in the development and rapid commercial exploitation of cell therapies.

The government's budget of March 2014 unveiled exciting plans to establish the UK's first facility dedicated to addressing industrial scale manufacture of cell therapies for Phase 3 clinical trials. Managed by the Cell Therapy Catapult, £55m will be spent to establish this new centre which will draw upon the team's unparalleled expertise and work with existing infrastructure to meet the demands of our expanding industry, bringing trade and investment benefits for the UK as a whole.

As we further support the UK cell regenerative medicine industry to grow and mature, success will see therapies available on the NHS. Work is now underway to ensure that healthcare providers are 'delivery ready'. The Regenerative Medicine Expert Group (RMEG) was established to develop an NHS regenerative medicine strategy, so that the NHS is fully prepared to deliver these innovative treatments, and also assess the effect of regulation on the development of Regenerative Medicines in the UK. The group will report its strategy and action plan to the Secretary of State for Health by December 2014. ■

¹ <https://ct.catapult.org.uk>

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Leading the way on assistive technology

Patricia Birchley, Cabinet Member for Health and Wellbeing at Buckinghamshire County Council, explains how assistive technology is improving the lives of people in her county...

I'm proud to report that the public is already reaping the benefits of a slow but steady technological revolution going on within our health and social care services.

Modern everyday electrical devices, such as smart phones and laptops, are being used in a number of ingenious ways to give people vastly more independence and flexibility.

And I'm delighted that my own authority, Buckinghamshire County Council, is at the forefront of this innovation. I have been thrilled at the successes we have so far seen in the field of assistive technology in Buckinghamshire.

Perhaps the most exciting of these initiatives is a scheme called Advice and Interactive Messaging (AIM), where we have utilised a software system called Simple Telehealth in conjunction with NHS Aylesbury Vale Clinical Commissioning Group and NHS Chiltern Clinical Commissioning Group.

It was only made available last October, but around 400 patients across 40 surgeries have signed up to it.

Simple Telehealth allows patients to take their own health readings at home and texting them to the doctor using their own mobile phones. The system is used to support many different conditions, including monitoring blood pressure readings. So far, 300 monitors have been distributed to surgeries at a cost of around £8,000 in total to the Council.

Patients are shown how to take their own readings and are asked to send in the results by text. These go

into a secure website portal where a clinician can interpret the data and decide what action to take.

This gives people more flexibility because it can save them from having to make an appointment with their GP. It also perhaps removes some of the stress and anxiety some feel when going to the doctor's – so it may even mean the readings are more accurate.

Equally, it also means that GPs can focus their efforts on those who prefer or require face-to-face consultations.

“Patients are shown how to take their own readings and are asked to send in the results by text. These go into a secure website portal where a clinician can interpret the data and decide what action to take.”

Make no mistake though, this project is not trying to remove essential one-to-one care. It is very important to me that people, especially the elderly and vulnerable, do not lead isolated lives and often, a visit to the GP is vital for them. There is no way a smart phone is going to replace this type of essential human interaction.

However, there are many other people who simply do not have the time or perhaps the means to get to the doctor's on a regular basis. For them, Simple Telehealth is a wonderful alternative.

It's also worth stressing that the home readings will only be permitted in safe situations. Only suitable patients, who would already have been assessed by their doctor are given access to the system.



The innovation was first made available in Stoke-on-Trent and is being rolled out nationally, supported by NHS England. So we are not the first, but I am proud of how we are one of the leaders nationally in assistive technology.

Simple Telehealth is one of a number of initiatives being led by the County Council’s Assistive Technology Team. In an earlier issue, it was reported on how we have partnered with the NHS to help adults with learning disabilities learn how to cook by following instructions on smart phones.

Another system being trialled here uses a smart phone and route planning service to enable people to use public transport on their own.

Our innovation hasn’t gone unrecognised. In April, health, social care and industry experts from across the UK descended on Aylesbury for a national conference on telecare.

The event, organised by UK Telehealthcare, was designed to share experiences from across the country and was a notable success.

So we’re proud of what we have achieved through technology and innovation, and in partnership with NHS colleagues. This project is a great example of how the NHS and local authorities are working closely together to improve the health of the local population.

However, I believe this is just the tip of the iceberg as far as assistive technology is concerned and huge advances will continue to be made in the next few years.

I am looking forward to seeing how this all unfolds, but can assure you we will stay focussed on the number one priority which is helping the public secure the best possible health outcomes. Assistive technology is not about saving money or cutting corners; it’s about doing things better and more efficiently with the needs of the patients always at the forefront. More and more of our processes may well become automated, but the emphasis of the outcomes will always be on what’s best for the humans. ■

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Improvements in technology over 35 years

Dave Ridley from Ridley Electronics Ltd gives an overview of how electronics have helped disabled people lead more independent lives...

Having spent the last 35 years in the disability field I have been able to see many changes, especially technologically, and not before time.

So why did I get involved in the disability field? I had been a research and development engineer, and during my college days I had designed a remote thirteen Amp switch, amongst many other designs. Following on from this I started Ridley Electronics Limited, and with 2 other engineers realised how little I knew about both company management, and more to the point, how difficult it can be for people overcome disabilities.

I reasoned that a little bit of electronics could make independence more achievable, and my simple infrared remote 13 Amp switch was a good place to start, which had a 'point and shoot' strategy. This meant that at least the user had the facility to switch on the electric fire, the light, or turn off their 'wireless'.

It soon became apparent that to be able to raise the alarm without pulling the 'red pull cord', and be able to do so from where you had fallen, was a step in the right direction using infrared transmitters.

Things began to roll, and I was beginning to understand what problems were being encountered; door latch release systems enabled visitors not only to knock on the window and mouth are you O.K?, but also let them in, soon to be followed by door openers, curtain pullers, window openers, and many other products.

These days we do consider everyone to have good use of their hands; however, I have difficulty thinking of a part of the body that we have not or can not use to operate many functions, whether it is to simply

raise an alarm or take control of your home or office, mainly using radio frequency technology.

It is important to work with clients and try to illicit how technology can work for them, aiming to enhance their ability to be in charge of their environment. Many products that we consider to be 'one-offs' have become widely used items.

I spend a lot of my time carrying out assessments often with occupational therapists to establish how and what will give the client enhanced control of their environment with a little technology, which most commonly reduces the cost and reliance on the public services and enables personal independence.

Ensuring integration is a must, and this is often done using phones to perform other functions, such as enhancing security, and making sure that controls are as discreet as possible, with an understanding of the clients' prognosis or need at an older age.

I have a motto; 'we like to talk', this being a good starting point to having a comprehension of resolution of the problems. ■

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Plan of Action for mental health

Dr Matt Muijen, Mental Health Programme Manager for WHO Europe explains the affect mental health can have on society across Europe...

It is often underestimated how much mental health problems affect both the lives of people and the productivity of society. About 25% of people have a mental disorder annually. Mostly these are light to moderate depressions and anxiety disorders, but many require help. Some 3-4% of people have severe and chronic mental health problems. In many Western European countries mental disorders already are the main cause of disability, responsible for some 30-40% of chronic sick leave, and the numbers are increasing. It is obvious that mental disorders cause much personal suffering, but it is also a burden to society, according to some calculations costing some 3% of GDP.

Most mental disorders respond well to treatment, either by psycho-therapy, medication or psycho-social support. Early identification and regular follow up is important, since interventions can prevent suffering and deterioration. It is therefore reasonable to expect that mental health services are easily accessible, acceptable and effective.

Unfortunately in many countries services and treatments are inadequate. Even in the most developed countries, up to about 50% of people with major depressions do not receive any form of treatment, and in poorer countries this proportion will be much higher. In many European countries the majority of the mental health budget is still spent on mental hospitals. However, it is not simply a question of ensuring availability of adequate services. Even in countries

with advanced and diverse community based service arrangements, many people do not receive the care they require. The decision to visit a psychiatric service and admitting to a mental health problem is influenced by a complex interaction between the fear of stigma, the confidence about the effectiveness of treatments available, trust in the clinician and the availability and competence of the staff to identify, diagnose and treat adequately.

Each of these points is addressed in the WHO European Mental Health Action Plan, which was endorsed by all the 53 European Member States of the WHO in September 2013. The Action Plan sets 7 strategic objectives, proposing Actions related to wellbeing throughout the lifespan, human rights, services, partnerships and governance.

“However, it is not simply a question of ensuring availability of adequate services. Even in countries with advanced and diverse community based service arrangements, many people do not receive the care they require.”

At the heart of the Plan is the belief that people with mental health problems are citizens whose human rights are fully valued, protected and promoted. This means that it is no longer acceptable that treatment is provided in large mental institutions that are so strongly associated with neglect and sometimes



abuse. It is accepted that they should gradually be closed in the European countries that still use them. Instead, a model of care is proposed that aims to intervene at the earliest stages, preventing the need for hospital admissions, and only using beds as a last resort. It is essential that such mental health services are easily accessible and affordable to everyone, which is not always the case.

Such a model relies on effective primary care, since this is the main access point in European countries. Unless family doctors identify, diagnose and treat people with problems such as depression and anxiety, problems will be ignored and conditions deteriorate. Primary care staff will also need to refer people with more severe conditions to specialist mental health services. Such community based staff will offer intensive and ongoing care for people with severe and often long-term mental health problems including schizophrenia and bipolar disorders. They work in close partnership with general medical services, social services, housing and employment. Modern mental health services are not any longer the exclusive responsibility of psychiatry, but need to draw in and coordinate all expertise and agencies on which vulnerable people and their families rely.

Discussions about mental health services tend to concentrate on the structures of services, such as the debate on hospital versus community care. What tends to be ignored is that for most people settings,

short of isolated gloomy asylums, are of secondary importance as compared to issues such as respect, safety, trust and effectiveness. It is indeed the case that large institutions tend to offer impersonal types of care, poorly set up to address individual needs. However, community settings alone do not guarantee personalised care either. WHO gives much attention to the importance of staff competencies to instil trust to patients and their families, so reducing as much as possible the feeling of stigma so strongly associated with mental health care. Trust is as important as effective treatment, since without trust the high drop-out rate from mental health care will not reduce.

Countries around Europe are attempting to build up acceptable mental health services in the spirit of the WHO European Action Plan. The last few years have been challenging due to restricted public spending, but commitment to mental health care is growing again. This is only fair, since mental disorders affect disproportionately the most vulnerable people in communities, and good mental health care is one of the best ways to offer them hope and opportunities. ■

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Effective support for serving personnel

Colonel Alan Finnegan and Professor Mike Thomas from the Centre for Veteran Wellbeing at the University of Chester discuss the importance of effective mental health support for British Armed Forces personnel and veterans...

The British Armed Forces aim to provide a capable workforce, able to undertake military duties without mental health (MH) problems. This is achieved by maximising the psychological support afforded to soldiers by providing immediate and effective MH care wherever they are serving. The most common MH disorders affecting UK Armed Forces are depression, alcohol misuse and anxiety^(1,2).

Military Mental Health (MMH) provides an occupational MH service that makes recommendations regarding a service person's suitability for service. In a peacetime setting, this is delivered through a clearly defined integrated care pathway between Primary Health Care, military Departments of Community Mental Health (DCMHs) and Secondary Health Care. DCMHs consist of multi-disciplinary clinical staff, providing service personnel with a medium for sharing problems, whilst utilising recognised treatments such as Cognitive Behavioural Therapy (CBT) including Eye Movement Desensitisation and Reprocessing. Hospital care is provided within the NHS through a defined contract. Performance indicators and military satisfaction surveys indicate that the British Armed Forces MH service is of a very high standard³.

Operational Mental Health

The majority of troops reach the battlefield with high levels of physical and mental strength, with well motivated British troops reporting many benefits of military life and serving on deployments^(4,5). However, soldiers have to constantly face advancements in military technology, including potentially witnessing the deaths of friends, colleagues and the local population.

During operational deployments, the objective is to maximise the numbers of fighting troops within the

combat environment to ensure that a soldier maintains their military identity. This can provide self-confidence, more self-belief and result in improved functioning⁶. Psychological support is provided by MMH nurses, who work independently as autonomous practitioners and function within whatever austere environment the troops, are deployed. They face the same operational stressors experienced by front line soldiers including personal threat, extensive working patterns and facing temperature extremes. The role is underpinned by experience and appropriate educational, clinical and military preparation.

Clinical interventions focus on risk assessment, risk management and patient maintenance. There is an extensive MH liaison and psycho-educational remit, and proactive MH policies extend into the operational theatre, where peer support programmes such as Traumatic Risk Management⁷ is available. Reducing work stress and providing health and nutrition advice can also help, whilst on operations the problems associated with alcohol are negated as none is available. Service personnel requiring psychotherapeutic interventions should be evacuated back to their home base, and structures exist to support service-personnel to reintegrate on return from their tour.

Emerging Interventions

Particularly during a period of stress, families and friends may provide care and assistance but this is not available on operations and other support mechanisms must be established. For clinical personnel, there are stressors relating to treating high incidences of severe poly-trauma casualties, a vicarious trauma which has a direct bearing on the mental well-being of deployed personnel. To address this, the services continue to explore new, safe interventions that can improve the

wellbeing of troops. During 2014, Major Tristan Griffin undertook Mindfulness to support clinical staff at Camp Bastion Hospital, and this was reported as beneficial. The project is short listed for the Nursing Standard Defence Nurse of the Year Award 2014.

Other initiatives to provide further MH support to service personnel and veterans include a collaborative education and employment scheme from the Centre for Veterans Wellbeing at the University of Chester that includes staff from the University of Salford. This involves psychological support, cross mapping military experiences to a recognised civilian educational profile, and integration into employment. Another innovative project is the Defence Archaeology Group and Operation Nightingale, which utilises both the technical and social aspects of field archaeology in the recovery and skill development of service-personnel injured in conflict. Both of these interventions will be subject to empirical research studies.

Other interventions include the use of Accelerated Resolution Therapy (ART)⁸. This aims to provide a rapid recovery from depression and post traumatic stress disorder and has proved successful with military Veterans in the USA; resulting in a UK pilot study in Scotland. The effect of this model and all emerging interventions are carefully scrutinised to identify if they can benefit service personnel within the British Armed Forces.

If soldiers are provided with these appropriate interventions, within an environment that values leadership and that tackles stigma, then stress and MH issues related to the battlefield can continue to be effectively managed. ■

Both authors are Directors at the Centre for Veteran Wellbeing at the University of Chester.

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Post Traumatic Stress Disorder and Acute Stress Disorder...

...what is the difference?

Post Traumatic Stress Disorder (PTSD) and Acute Stress Disorder (ASD) are rising in prevalence.

PTSD is a pervasive and devastating anxiety disorder, affecting millions of people, caused by experiencing or witnessing any event that is perceived to be life-threatening to ourselves or others and beyond our control such as rape, physical assault, natural and industrial disasters, being diagnosed with a life-threatening illness, or traffic accidents. It can result from enduring years of domestic violence to a single violent attack that lasts but a few seconds. Military personnel are far more likely to be exposed to traumatic events, and with recent turns in the relationships between East and West together with the high rates of PTSD in returning military from Operation Iraqi Freedom/Operation Enduring Freedom, the urgency of providing timely and effective treatment options for ASD and PTSD is imperative.

What are PTSD and ASD?

How do ASD and PTSD differ from a natural response to a traumatic event? ASD is a natural response to an event that undermines our sense that life is fair, reasonably safe and that we are secure, making us feel grief-stricken, depressed, anxious, guilty and angry. Characteristics that mark out an individual as suffering from ASD or PTSD are emotional numbness, restlessness (the need to be 'on guard' at all times), anxiety, uncharacteristic irritability, problems focusing or concentrating, flashbacks, sleep

disturbance and physical reactions such as irregular heartbeats, feelings of panic and fear, and depression.

There are two important distinctions between ASD and PTSD.

One is that ASD is more associated with dissociative symptoms, which may include extreme emotional disconnection, manifesting as extreme withdrawal and unsociableness, or exhibiting as a mental or emotional 'distance' between the individual and their violent experience. They may seem "spaced out" and appear to refuse to acknowledge their trauma.

The other is that ASD is considered a more immediate, short-term response to trauma that lasts between two days and twelve weeks. When ASD symptoms persist for longer than that or if the symptoms surface much later, then PTSD may be diagnosed.

Individuals with untreated ASD are at a substantially higher risk for developing PTSD.

Why do these responses happen?

There are several possible psychological and physical reasons. Psychologically, the act of 'reliving' the event, including flashbacks, force the individual to decide what to do if the event should happen again; conversely, avoidance and numbing blocks the exhaustion and stress of reliving the trauma; and being 'on guard' means

that the individual can react quickly should another crisis present itself.

From a physical perspective, vivid memories of what happened keep adrenaline levels high creating anxiety and irritability, and these same adrenaline levels may stop the hippocampus in the brain from processing memories, so causing continuing flashbacks and nightmares.

Stigma

Many sufferers remain reluctant to seek help because of the stigma of being diagnosed with a "mental health condition" or "mental illness". It is important to understand that PTSD and ASD are potentially serious conditions that afflict a great number of trauma victims, and that experiencing them in no way reflects a "weakness" or "deficiency" on the part of the survivor.

PTSD in the military – the role of modifiable occupational factors

The mental health of any fighting force influences their occupational effectiveness. It has been shown to be an essential factor in the retention and productivity of military personnel, as well as affecting their chance of social inclusion when they leave the Armed Forces (Iversen et al, 2009). Therefore, understanding the factors which increase the risk of PTSD for military personnel is important.

While unsurprisingly, personal appraisal of threat to life and perceived loss of



control during the trauma have emerged as the strongest predictors of symptoms. Research also suggests that there are some modifiable occupational factors which may influence an individual's risk of PTSD including low morale, poor social support within the unit and non-receipt of a homecoming (Iversen et al, 1999) .

Cognitive Behavioural Therapy is the most effective treatment

Three decades of research have revealed that cognitive behavioural therapy (CBT), particularly exposure-based therapies, are the most effective in the treatment of ASD and PTSD (Bryant et al, 1999).

CBT is an umbrella term that covers a number of different psychological interventions. In essence, CBT helps individuals think differently about their memories to make them less distressing and more manageable. It is intended to be short-term therapy, with most studies on PTSD providing between 9 to 12 sessions, each typically lasting 90 to 120 minutes, which are administered once or twice weekly.

In between sessions, patients are usually assigned homework that involves practicing the specific interventions being used. The interventions most frequently used in the treatment of PTSD are exposure therapy, anxiety management training, and cognitive restructuring. A fourth treatment for PTSD, eye movement desensitisation and reprocessing (EMDR), incorporates elements of all three interventions and adds the use of therapist-directed rapid eye movements.

Our Trauma Management Workshops centre on the use of proven cognitive behavioural techniques to assist participants to manage Acute Stress Disorder, return to 'normal' productive life quickly and prevent the development of PTSD.

Our CBT expertise

We have over 12 years' experience of providing CBT services – including CBT training – to major UK organisations, both within the public and private sectors. Our services include initial assessments, treatment delivery and recommendations, and cover a hugely broad range from PTSD through to

stress, anxiety, depression and obsessive-compulsive disorders.

Our highly skilled and experienced psychologists and CBT psychotherapists are all fully accredited members of the British Association of Behavioural and Cognitive Psychotherapies, many of whom are also employed as CBT Clinical Specialists, Clinical Psychologists and Psychiatrists within the NHS – and who are located throughout the UK. We do not employ CBT therapists who are trainees or newly-trained.

Our dedicated Case Managers manage individual cases, ensuring that treatment plans are running according to schedule, that regular progress reports are provided and that recommendations are clear and tailored not just to the individual's needs but also to those of the employer.

For an informal chat about how we may be able to help your employees regain and maintain mental wellness, or our CBT training services, please call us on 0845 2600 126, e-mail us at talk@arcadiaalive.com or visit us at arcadiaalive.com.



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Effective tools for mental health

Professor Jamie Hacker Hughes, Military Psychologist, and Director at the Veterans and Families Institute, Anglia Ruskin University, highlights the importance of our armed forces being in excellent mental health...

The mental fitness of Britain's Armed Forces is every bit as important as the physical fitness for which they are rightly renowned and it is vitally important that their mental fitness is maintained to a high level. Our sailors, soldiers and aviators (some 150,000 of them with, it is planned, a further 30,000 in the reserves) are in reality every bit as prone to mental health difficulties as everyone else in British society, and in some cases, because of the virtue and nature of the occupation that they are engaged in, more so.

Relatively recent research shows that whereas the mental health of the majority of Britain's servicemen and women is relatively robust, around one fifth of them suffer some kind of common mental health difficulty. This rate is significantly better than in their civilian equivalents, which one would expect. So what are these common health difficulties? Anxiety disorders – generalised anxiety, panic disorder and phobia, obsessional difficulties and depressive disorders – such as depressive episodes and major depression.

These are the most common. Serious mental health problems such as schizophrenia and bipolar disorder (previously better known as manic depression) are very rare indeed and are not considered conducive to continuing military service.

Post-traumatic stress disorder is rare too, despite what the media might have you believe, and is of course related to the amount, frequency and type of exposure to trauma accumulated by an individual during her or his service. Research has found the level of PTSD to be higher in certain groups – combat troops, the reserves, medics, those who have actually been in combat with the enemy – and where 'harmony guidelines' (the recommended maximum number of deployments during any 2 year period) have been exceeded. The current rate of PTSD among British troops is estimated to be somewhere between 4% and 6%.

The other signature problem faced by our armed forces – and this is by no means a new problem but,

rather, has been accepted to be more of a cultural legacy, is alcohol abuse, particularly and surprisingly perhaps in serving young women. Drug abuse is, however, almost negligible as a result of the Armed Forces' zero tolerance and the practice of surprise controlled drug testing entire units at a time. The attitudes of the forces to both of these issues are hardening and compulsory discharge for drug related offences are commonplace.

Military mental healthcare

How then is mental fitness maintained if it is as essential as we said that it was at the beginning of the piece? The answer is that there is a comprehensive mental healthcare system in place for our armed services personnel. This goes all the way through a serviceman or woman's career, from enlistment to discharge, and at every stage in between. The forces have a cadre of over 100 mental health professionals, uniformed and civilian, whose job it is to assess, treat and return to duty (in most cases) or assist with discharge (in the minority) anyone experiencing mental health difficulties. These mental health teams are part of the Defence Primary Healthcare Service and operate from Departments of Community Mental Health located in every major naval base, Army garrison and RAF station in the UK, Germany and Cyprus, and as field mental health teams in operational bases. If intensive or acute mental health treatment is required, then that is provided by a network of NHS units working alongside the Armed Forces.

Cognitive Behavioural Psychotherapy

The most common intervention is cognitive behavioural therapy (CBT). This is a NICE (National Institute of Health and Care Excellence) recommended therapy based on the theoretical work of the US psychiatrist, Professor Aaron Beck. The premise behind CBT is that our moods are affected by what we think, and that we can, therefore, learn to control and improve our moods by noticing, and then challenging and modifying successively, our dysfunctional negative thoughts. These negative cognitions are often based on negative schemas and core beliefs, often deriving from early negative experiences, and these can be uncovered and worked with in a similar way.

Training

Over the years in which CBT has been developing, protocols have been developed for every problem:

anxiety, depression, OCD, PTSD. Therapists learn about CBT in their core training as mental health nurses, clinical or counselling psychologists or psychiatrists but specialise further after initial qualification. The military insist that every newly qualified mental health professional has post qualification training in CBT, but also in EMDR (eye movement desensitisation and reprocessing) - the NICE approved evidence-based treatment for PTSD and adjustment disorder - during their first few years of qualification.

The evidence base

Of all the psychotherapies, CBT, along with EMDR, has been the most intensively researched and has been found to produce significant reduction in symptom scores if delivered according to the protocol together with significant reductions in the rates of risk of relapse. It is a talking therapy, involving sessions where clients learn how to view difficulties in a different way, along with 'behavioural experiments' where the likelihood of certain eventualities occurring or not are evaluated in a scientific way, and home-based assignments which the client must complete over the therapy course.

Multidisciplinary teamwork

In most cases, a CBT intervention on its own can be highly effective without the need for any prescribed medication. In other cases, medication is prescribed by service general practitioners on advice of service consultant psychiatrists. All members of the service, together with military social workers, the welfare agencies and the chain of command work together.

The goal of military mental healthcare services - supplemented by training at several points throughout a serviceman or woman's career - is to restore service personnel to a state of full mental fitness so that they can return to their role and carry out their duties. ■

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Combating mental health

Journalist Tony Hall gives an overview of how the Cognitive Behaviour Treatment (CBT) is used within the armed forces to combat mental health issues...

In recent years the UK government and Ministry of Defence (MoD) have acknowledged that service in the Armed Forces should be publicly recognised and not be a cause of any personal or social disadvantage. The Armed Forces Covenant that is the tangible result of that intent was introduced into law in 2011. It encompasses all levels of welfare support from the transition from service to civilian life to the rehabilitation of the physically injured.¹ The Covenant also broadens the nation's welfare commitments by bringing issues of psychological health to the forefront of policy. In doing so MoD and Government have acknowledged that mental health is an essential contributor to the social stability and individual wellbeing of service personnel, veterans, and their families.

This commitment was first introduced as an integral part of a welfare strategy set out in the UK's first Strategic Defence and Security Review (SDSR) in 2010. The SDSR in seeking to promote a more active engagement in psychological health gave official endorsement to a new mental health programme for the Armed Forces and veterans proposed by Dr Andrew Murrison, MP in his report 'Fighting Fit', published the same year.²

Murrison's report laid out a future for the provision of mental health care based on established models within the NHS, delivered against guidelines and standards set out by National Institute for Health and Clinical Excellence (NICE) guidelines and Care Quality Commission (CQC). It acknowledged that the long term psychological care of serving and former personnel represented special challenges, in that the clinical care pathways had to be established by the MoD's Defence Medical Services (DMS) at the onset of an illness and then referred over to the Department of

Health, NHS and private sector health providers, if these service-related illnesses persisted and led to a medical discharge.

Post Traumatic Stress Disorder (PTSD) was singled out as an example of a chronic service-related illness that would require this new breadth of focus. 'Fighting Fit' recommended that the MoD develop PTSD screening tools and "that a mental health systems enquiry is built into routine Service medical examinations, discharge medicals and the medical examinations conducted prior to invaliding from the Service on the grounds of physical or mental incapacity. This will employ a series of structured questions designed to highlight common mental health problems such as depression and anxiety together with alcohol misuse and PTSD."³

Responding to these recommendations, MoD through DMS has now established 15 military run Departments of Community Mental Health (DCMH) in the UK and 5 at overseas bases. The DCHM's provide both out-patient and in-patient assessment and care. The individual services have also responded. The Army for example now acknowledges that mental illness is both serious and disabling. It has raised awareness within its ranks by establishing a peer-group Trauma Risk Management (TRiM) model that supports personnel following traumatic incidence. It is a method of risk assessment recommended in the 'Fighting Fit' as a means of making mental health interventions acceptable, and reducing the stigma of mental ill-health among service personnel which the report emphasises strongly is "accustomed to viewing itself as mentally and physically robust."

Treatment following diagnoses is now centred on community-based care and is delivered by the MoD in

partnership with the Department of Health, and service charities including Combat Stress. This broadening out of care provision is necessary because there is currently no organised network of military mental health care across the UK, with the Government admitting that the NHS alone no longer has access to the type of specialist care that is required.⁴

This shortfall has at least been acknowledged, and in response Government has begun a Community Veterans Mental Health Pilot project which is now established across six UK sites, while MoD has provided Combat Stress with £2m of new funding in support of its own Treatment Centres. Charities themselves are also collaborating. These efforts include the training of over 6,000 Armed Forces Community Mental Health First Aiders, through the MFHA for the Armed Forces Community project, now being undertaken by MFHA (Mental First Aid England) in conjunction with SSAFA (the Soldiers, Sailors, Airmen, and Families Association), The Royal British Legion and Combat Stress.⁵

MoD is also taking practical steps to improve the skills of those engaged in mental health care and has recently awarded contracts for DMS personnel to train in the treatment of PTSD. According to DCMH figures for serving personnel, the last quarter of 2013 rates of PTSD in serving currently stand at 0.6 per 1,000, “and there was no significant change in the rate of PTSD compared to previous quarters.”⁶ However, this particular anxiety disorder has proven itself to be chronic and capable of revealing psychological and physical problems, such as emotional withdrawal, insomnia, and anger, years after traumatic events took place. Its impact on the long term mental health of veterans has been recognised for that reason.

But while PTSD has proven itself a persistent cause of mental ill health and distress, it is treatable. NICE guidelines recognise the benefit of treatments such as Cognitive Behaviour Therapy (CBT); a ‘talking therapy’ that addresses a patient’s current difficulties through discussions with the therapist, to consciously change state of mind and ways of thinking.

CBT is a therapy that engages the patient to face mental problems, and in understanding them better. It stands as a symbol of the moves being undertaken now on many fronts to help and support personnel, veterans and their families to break the stigma of mental health and change for good our suffering in silence culture. ■

¹ For progress in Covenant pledges 2013/14 see www.gov.uk/government/publications/armed-forces-covenant-annual-report
www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191634.pdf

² www.gov.uk/government/uploads/system/uploads/attachment_data/file/27375/20101006_mental_health_Report.pdf

³ Ibid Page 3

⁴ See www.veterans-uk.info/mental_health/faq.html#vets11

⁵ See <http://mhfaengland.org/instructor-training/instructor-armed-forces/>

⁶ Quarterly UK Armed Forces Mental Health: Presenting complaints at MOD Departments of Community Mental Health October 2012/13 - December 2013/14 www.gov.uk/government/uploads/system/uploads/attachment_data/file/300067/20131224-Mental_Health_Report_Q3_2013-2014_amended-U.pdf

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The life-blood of the NHS

Jon Latham Assistant Director of Donor Services and Marketing at NHS Blood and Transplant, explains how blood is being donated more efficiently within the organisation...

At NHS Blood and Transplant we have always worked hard to ensure blood donated voluntarily is used in the right way. Last year, our donors provided the 1.8 million units of blood hospitals needed. Thanks to better clinical practice such as the rise in less invasive surgical techniques, the amount of blood needed for patients has reduced by 125,000 units in the last 2 years.

The change in the amount of blood needed by hospitals is a global trend and services such as ours must be flexible in the way we respond.

What does this mean for blood donors?

Despite the overall demand for blood being less than it was, blood and donors are always needed. But the reality is that we need less of some blood groups and more of others in order to meet the needs of patients.

With hospitals still in need of blood, but less than before, we need to be careful not to collect too much. If all of our donors, irrespective of blood group, were to continue to donate as they do at the moment, it is likely that we would collect too much, wasting some donors' time and NHS resources.

It's vital that we carefully plan our blood donation sessions and regularly review them to ensure we are always collecting the right type of blood, at the right time, to continue saving thousands of patients' lives every year. With the need for blood decreasing within the NHS, we have been reducing the number of sessions we hold and locations we visit. It's important we explain to donors why we're doing this, especially if they may need to travel a little further to donate, as we still need them to do so. If we can explain clearly that the demand is reducing but that we still need

them, that we don't want to waste their precious donations and that by operating efficiently we can keep the cost of blood low for hospitals, they will understand why we cannot run sessions in every village, town or city.

Demand for rarer blood groups

We will still ask donors with some of the rarer blood groups to donate as frequently as they can. This is particularly true of donors who are B Rh negative. This is because these blood donations are required more often for patients with particular illnesses such as sickle cell anaemia. Similarly, donations from male donors who are AB Rh negative can be used to make other products such as plasma for trauma patients with severe bleeding. We are always in need of new donors with these blood types and would like to encourage them to donate as often as they can. Occasionally we also need blood from donors with very rare blood types as their blood is needed to match the specific blood type of certain patients. This blood may be frozen to keep for special emergencies.

Keeping the donor base stable and looking to the future

We have around 1.3 million active donors who have donated blood within the last 2 years. But every year there are thousands of donors who can no longer donate for reasons such as ill health, pregnancy or foreign travel. We estimate that we need to recruit around 200,000 new blood donors every year to replace these donors, so encouraging more people to donate is essential.

Encouraging younger donors to come forward is particularly important. In total 48% of our active donors are over 45 years old. If we just continue to rely on them to donate, we won't be safeguarding the blood supply for the future.

We creatively use our active Facebook (www.facebook.com/NHSBlood) and Twitter (@GiveBloodNHS) pages to explain why we need donors, answer people's questions and concerns about donation, and to demystify the whole process. We've also been

improving our website, so it's now really easy to register, book and amend appointments in real time, and change personal details. All of these initiatives help us to attract younger people to donate, as well as make it easier for our existing donors to engage with us too.

Positive donor experience

We simply couldn't supply the blood hospitals in England and North Wales need without loyal donors. And we want them to have a positive experience every time they donate.

Almost 70% of donors recently surveyed rate NHS Blood and Transplant as 9 out of 10 or 10 of 10 for customer satisfaction. Nevertheless, we are far from complacent.

We're working hard to improve even further the donation experience. We want our sessions to run smoothly for donors, regardless of whether they have made an appointment in advance or simply walked in to donate. Key to this is sending out the right amount of invitations to donors in advance of sessions, carefully monitoring uptake, and being clear on sessions about waiting times. Listening to donor feedback and using this to improve and constantly offer a quality and caring service is vital.

A final note

Donors are special. Every time they donate, they save or improve people's lives. A lot goes into ensuring that we run one of the world's safest blood supplies and that we operate efficiently. But right at the heart of our work are the donors and the patients, whose lives they save. ■

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VH Bio – Suppliers to the tissue typing community

For over 20 years, VH Bio has provided the National Blood and Transplant Service with products for transplant diagnosis.

In 1992 we provided laboratories with rabbit complement, which was required for complement-mediated cytotoxicity. Following our link-up with One Lambda Inc., the world leader in HLA diagnostics, we supplied One Lambda Monoclonal Typing trays to the UK Transplant Services Special Authority (UKTSSA) who distributed these trays to transplant diagnostic laboratories throughout the UK until it was wound up.

VH Bio continued to supply these trays directly to the HLA laboratories. In addition, as new improved technologies became available, our partnership with One Lambda enabled us to provide typing kits of increasing speed, sophistication and resolution. Firstly, the Micro SSP™ line of DNA sequence specific primer (SSP) typing trays, reagents and equipment was introduced for Class 1 and 11 allele – specific typing.

In 2001 One Lambda revolutionised HLA typing by introducing their RSSO (Reverse sequence specific oligonucleotide) LabType® kits. LabType employs Luminex® fluorescent microbead technology to the reverse SSO DNA technology. First target DNA is PCR-amplified using a group-specific primer. The PCR product is biotinylated, which allows it to be detected using R-phycoerythrin-conjugated streptavidin. The PCR product is denatured and allowed to re-hybridise with complementary DNA probes conjugated to fluorescently coded

microspheres. A flow analyser (LABScan™ 100) identifies the fluorescent intensity of the phycoerythrin on each microsphere. The assignment of the HLA typing is based upon the reaction pattern compared with the patterns associated with published HLA gene sequences. 100 different microsphere sets can be combined in one suspension, and the reaction is carried out in one well of a 96-well microplate. 96 samples can thus be processed simultaneously. This has greatly assisted high-throughput laboratories, such as those screening potential bone marrow donors. Recently, One Lambda have introduced the LABXpress™, which is an instrument which enables complete automation of the typing procedure. This has been followed by the LABScan3D™, an instrument which can analyse 500 microspheres in one tube.

In parallel with the range of HLA Typing products we offer, VH Bio offers a variety of kits for the detection of HLA antibodies. The first antibody detection products were the Lambda Cell Trays™, panels of frozen cells designed to be used for detecting Class I PRA (panel reactive antibody) and HLA Antibody screening using complement-dependent cytotoxicity. In 1994 the FlowPRA® test was introduced. This consisted of panels of beads coated with Class I and Class II antigens. The beads are mixed with the serum under test and stained with a FITC labelled anti human IgG, the anti-HLA positive serum shows a fluorescent channel shift in a flow cytometer as compared with the negative serum.

The revolution in antibody detection



came with the Luminex® microbead technology when One Lambda developed the LABScreen®PRA for use with the LABScan™100. The product consists of fluorescent-coded microbeads coated with purified HLA Class I or Class II antigens. Panels of beads are incubated with test sera. Positive reactions are detected by incubation with PE-labelled anti human IgG followed by analysis in the LABScan™100.

VH Bio technical personnel are highly experienced HLA scientists. We pride ourselves on our technical back-up. If problems cannot be cleared up with a phone call, then they will visit your laboratory to assist you.

VH Bio values our relationship with National Blood and Transplant, and we look forward to a long and mutually beneficial relationship.



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A plan for patient safety

Adjacent Government highlights how the European Commission is supporting patient safety in hospitals during organ and blood transplants...

Patient safety is of key importance for the European Commission, ensuring patients receive a high level of treatment and aftercare during hospital visits whether it is for major operations, which might need organ or blood donations, or just routine checks.

The Director General for Health at the European Commission (EC) is responsible for ensuring patient safety, and Martin Seychell, Deputy Director for Health and Consumers at the EC has expressed a commitment to: "When a patient is treated in a hospital, they expect to get well and receive the best care possible without being exposed to medical errors that could lead to adverse health effects or infection.

"Ensuring the safety of anyone that comes into contact with healthcare services is one of the most pressing challenges to date, which is why in 2009, EU Member States adopted a recommendation where they agreed on a number of actions to increase patient safety."¹

Organ transplants happen regularly within hospitals across Europe, and can often be routine operations. The European Commission has set out an Action Plan to ensure patients and organ donors receive high standards of quality and safety during these operations. The Action Plan on Organ Donation and Transplantation (2009 – 2015) was first launched in 2009 and has recently had a mid-tem review published.²

The Action Plan review confirms an increase in both organ availability and the number of transplantations, from 28,080 in 2007 to 30,274 patients transplanted in 2012. However, despite the increase there are significant differences between certain EU countries, which only highlight further efforts that need to be made.

Despite recent figures showing progress is being made in the number of patients receiving transplants, in 2012 the number of people that died in the EU before receiving a suitable organ was more than 4000.

Worldwide blood donations are also of great importance, and can save a large number of lives. There is always immense need for blood donors throughout Europe as certain blood types are in short supply, and without essential donations patients could be in a life or death situation. In 2011 alone more than 24 million units of blood and blood components were issued, and over 2 million patients received a transfusion.

Due to the high volume of blood donated and transfused every year, a new platform has been launched by the European Commission to help improve the safety of patients who undergo medical treatment involving blood and blood products. A web based Rapid Alert system for Blood and Blood Components (RAB) has been launched, which allows national health authorities to exchange information so that cross-border incidents are prevented or contained.

Both the Action Plan and the Rapid Alert System show how important patient safety is taken throughout the EU, and the European Commission sees organ and blood donations as an integral role in public health. ■

¹ http://ec.europa.eu/health/newsletter/107/focus_newsletter_en.htm

² http://ec.europa.eu/dgs/health_consumer/dyna/enews/enews.cfm?al_id=1475

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Practising in blood safety

Diana Agacy, Blood Transfusion Nurse Practitioner and Phlebotomy Manager at University Hospital Southampton NHS Foundation gives an overview of the importance of patient safety during blood transfusions...

As a transfusion practitioner, the main aspect of my role is to educate healthcare professionals in safe transfusion practice and the first thing that I was taught by my blood bank manager was that “the safest blood transfusion is the one not given”. This, to me, was an oxymoron. I had worked in oncology and critical care and had seen the benefits of blood transfusions.

Within the transfusion community it has been widely recognised that the biggest risk in transfusion practice is the result of human error – the biggest risk being the wrong blood being transfused to the wrong patient. This usually occurs if the final bedside check prior to transfusion is not carried out as per guidelines. Transfusing the wrong blood type is also associated with errors at the pre-transfusion sample taking stage. This happens when the healthcare professional

takes a sample from one patient but then labels it with another patient’s details, wrong blood in tube (WBIT) category in SHOT. This usually occurs because the pre-transfusion sample label is not filled in at the patient’s side, after the patient has been bled. The healthcare professional must always check that the information on the sample label exactly matches the information on the patient’s identification band or has it confirmed verbally by the patient before completing the pre-transfusion sample taking phase of the transfusion process. The general public, however, perceive the greatest risk of a blood transfusion is a blood borne infection.

The quality of the most frequently transfused blood components (red cells, platelets, fresh frozen plasma (FFP) and cryoprecipitate) in England, Wales and Northern Ireland are of the highest standard thanks

to the Blood Safety and Quality Regulations 2005, both in hospitals and at the point of manufacturing. The evidence from the Serious Hazards of Transfusion Haemovigilance Scheme (SHOT) is proof of this. Approximately 3 million components are issued per year. The figures of major morbidity risk per component are as follows:

Hepatitis B (Public Health Data)	1 in 1.3 million
Hepatitis C	1 in 28 million
HIV	1 in 6.7 million

However, patient safety in relation to blood transfusion has to be appropriate use of blood and, unfortunately, traditional liberal transfusion practice is hard to challenge.

A red cell transfusion is considered appropriate when the patient's bone marrow is dysfunctional or when there is a severe life-threatening bleed that jeopardises the oxygenation of the vital organs. Red cell transfusions should never be used to treat chronic anaemia unless there are associated symptoms of acute anaemia. Chronic anaemia is a sign of an underlying pathology, it is not a diagnosis. The underlying disease which is causing the anaemia must be diagnosed and treated.

“Within the transfusion community it has been widely recognised that the biggest risk in transfusion practice is the result of human error – the biggest risk being the wrong blood being transfused to the wrong patient.”

Platelets have their uses but using these outside the recommended guidelines can be detrimental and a waste of a precious resource. The effectiveness of FFP is also being questioned and it is often used incorrectly. These 2 components are used to stop bleeding based on laboratory results done in vitro. The evidence which is emerging implies that these tests do not reflect their true action within the human body and a good bleeding history from a patient is more beneficial to avoid bleeding in elective peri-operative cases. All of the above are addressed in the training and

education of doctors; however, it is very difficult to demystify culture.

This is where patient blood management (PBM) is pivotal and it is the task of the transfusion practitioner, backed by the hospital transfusion committee, to educate healthcare professionals in the acute setting about PBM. In the community setting, the challenge is to educate general practitioners about iron pre-optimisation before referring a patient for elective surgery. Pre-assessment clinics, regardless of speciality, should not accept patients that do not meet the optimal haemoglobin level for elective surgery. Optimal haemoglobin levels and good surgical techniques reduce the need for postoperative transfusions and length of stay in hospital. This is summarised in the 3 Pillars of Patient Blood Management, available here: www.health.wa.gov.au/bloodmanagement/docs/pbm_pillars

Lastly, the 2 simplest but most effective patient safety measures in blood transfusion lie with the patient and their next of kin. To avoid human errors, patients must take ownership of ensuring that their demographics are correct on the hospital patient administrative system by checking that the information on their identification wristband is correct, if not inform a member of staff immediately, and wear it at all times while in hospital. The 'Do you know who I am campaign?', based on 2009 SHOT recommendations, is available here: <http://www.pifonline.org.uk/blood-transfusion-awareness-campaign-do-you-know-who-i-am-launches/> ■



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Kidney transplants – the gold standard treatment

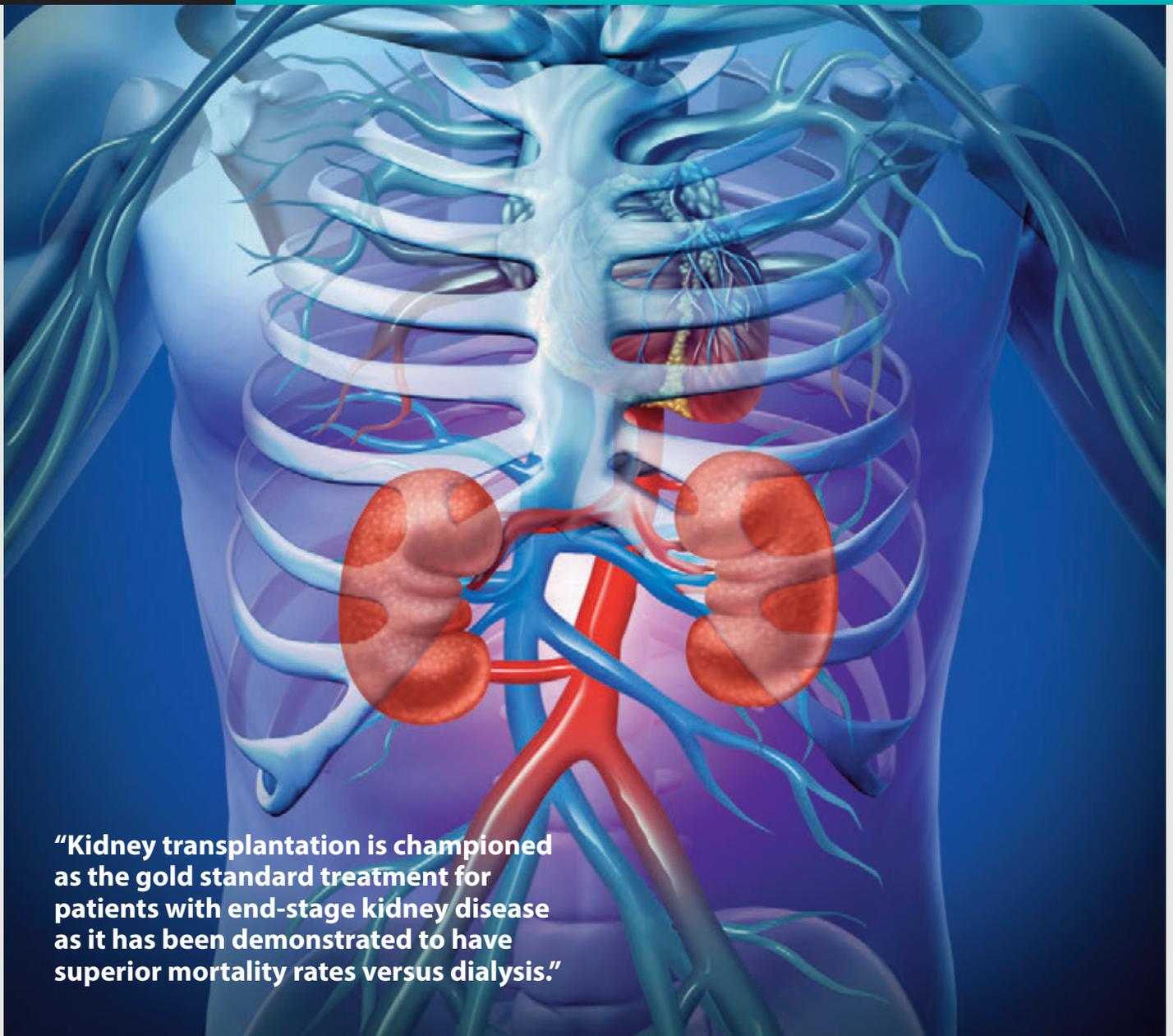
Adnan Sharif, Consultant Nephrologist at University Hospitals Birmingham discusses kidney transplants and the impact it has on the patient and their quality of life...

Chronic kidney disease affects over 10% of the UK population and can progress to end-stage kidney disease, requiring renal replacement therapy in the form of either dialysis treatment or transplantation. As of December 2011, there were more than 53,000 patients in the UK on renal replacement therapy with a 4% annual growth. The cost of dialysis ranges between £20,000 to £40,000 per patient per year (depending upon dialysis modality) and the NHS is estimated to be spending 1.5% of its total annual budget on providing renal replacement therapy, despite this representing only 0.05% of the population. The prevalence of renal replacement therapy is expected to rise with the ageing population and increasing rates of risk factors for chronic kidney disease (e.g. diabetes mellitus, hypertension), as well as increasing the survival of patients already on renal replacement therapy. However, despite this increased survival, over a third of patients on renal replacement therapy (especially dialysis) will die within 5 years of developing end-stage kidney disease.

Kidney transplantation is championed as the gold standard treatment for patients with end-stage kidney disease as it has been demonstrated to have superior mortality rates versus dialysis. It also leads to improvements in the quality of life for the majority of patients and represents significant cost savings for the NHS. However, kidney transplant recipients require lifelong specialist care due to the potent anti-rejection therapy required for the longevity of the transplant, associated with increased risks of cardiovascular disease, infection and cancer, and expert care is essential to achieve a fine balance between the risks and benefits of anti-rejection therapy post kidney transplantation. Kidney specialists who look after patients with end-stage kidney disease make a

careful assessment of kidney transplant candidates to determine their suitability for the rigors of transplantation, with meticulous counselling of the likely expectations and outcomes after receiving a kidney transplant. The transplant professional therefore guides patients with end-stage kidney disease to make an informed decision with regards to whether kidney transplantation is the right choice for them.

Due to the disparity between supply and demand for kidneys, the average national wait for a kidney transplant from the deceased-donor national waiting list is 3 years. Living donor kidney transplantation, where loved ones donate one of their healthy kidneys for transplantation, has been on the increase over the last decade and may soon represent half of all kidney transplants performed in the UK. This represents an excellent opportunity for recipients of such kidneys due to a number of benefits; pre-emptive kidney transplantation can occur in a timely fashion with shorter wait, better patient survival and improved long-term kidney allograft survival. The well-being of the donor takes priority in such transplants, with careful assessment of both short- and long-term medical risks. In such cases, the transplant professional will make a decision as to the suitability of any potential donors in line with national guidelines. Although there is no denying the significant emotional benefit associated with donating a kidney to a loved one, the absence of any personal medical benefit means we must follow a rigorous pathway for willing candidates to donate one of their kidneys that is robust, comprehensive and evidence-based. Post living kidney donation, although long-term risks for hypertension, end-stage kidney disease and death are lower compared to similar aged people in the general population, all donors are encouraged to remain under long-term



“Kidney transplantation is championed as the gold standard treatment for patients with end-stage kidney disease as it has been demonstrated to have superior mortality rates versus dialysis.”

review for surveillance as an additional safety check. This represents the commitment from the NHS to ensure the excellent outcomes associated with living kidney donation are maintained. There are numerous resources available to guide and advise willing donors in the general population, both medical and non-medical based. Groups and charities advocating living kidney donation, especially altruistic kidney donation to a stranger, have proliferated and are leading major campaigns to promote kidney donation and provide information with regards to the safety and risks associated with kidney donation.

Transplantation is a rapidly evolving field with scientific advances propelling the field further than ever before. It is essential that all staff involved with transplantation are kept abreast of the latest advances, and continued

professional development forms an important component of the training and development for all staff involved with transplantation. Organ transplantation is a major medical success story of the last 50 years and the NHS is committed to ensuring every opportunity to offer this life saving treatment to suitable candidates are explored in the context of a safe and equitable framework. ■

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Smart Biobanking

Senior Research Analyst for Frost & Sullivan Divyaa Ravishankar discusses the growing need for innovative products in the realm of bio-storage applications...

The concept of biobanking has triggered massive interest in the area of long-term sample storage conditions but with a key challenge of maintaining sample integrity. In order to combat this, biobanks are adopting new storage methodologies and solutions that will guarantee better sample quality to the research community.

Globally, sample storage is an outsourced activity by many large pharmaceutical companies. Commercialisation of biobanking activity has forced the providers to adopt tools that are more sophisticated and facilitate sample tracking. Laboratory information management systems (LIMS) prove to be an essential component in facilitating various biorepository models and it is important to understand the workflow involved in each biobank set up; this will aid the adoption of automation at certain levels.

Market Insights

Researchers handling small quantities of samples are at the risk of getting contaminated. Further, maintaining consistency becomes a huge factor when large quantities of samples are processed. Therefore, automated protocols are replacing manual ones.

Interest in dry-state storing and eliminating freeze-thaw cycles causing unwanted intervention of sample quality has brought many patented automated biobanking

storage platforms for -20°C and -80°C with a facility to store samples in both microplates and micro-tube format. Continuous monitoring of samples is ensured even during picking.

The cornerstone of every biorepository lies in the efficiency of its freezer inventory software or the LIMS employed. The key objective is to enable researchers to locate and use biospecimens. Besides tracking the location of the vial of a specific sample, it is important to retrieve the associated additional data such as consent information, demographic information and related regulatory data.

Challenges Associated with Clinical Sample Storage

Primitive methods of storing samples in cryotanks have reported instances of loss of samples, with them either being discarded, owing to the fact that they become unidentifiable, or due to 'handling errors'. The sample retrieval process would be laborious if performed by humans, with the loss of an ID label leading to sample mix-up.

Given the fact that no 2 biobanks function in a similar way, it is tough to generalise a technology platform that is common for them. A lot of custom work is required to suit the workflow processes of a biobank, and at the same time, funding and financial

maintenance of the biobanking infrastructure becomes tougher in the long run.

With time, samples demand more sophisticated methods of storage with clinical samples requiring a highly integrated set up that involves continuous monitoring of temperatures, along with the associated sample information.

An exponential increase in the volume of samples is leading to issues with store capacity and duration, with space to accommodate new samples in the given temperature and conditions posing a huge problem.

Today, the lack of high-quality and clinically annotated samples is seen as a major drawback. There is a need for standardising sample handling and storage protocols globally. Owing to very few standardised quality checking protocols for the pre-analytical phase, there arises a difficulty to compare and share samples, especially when specimen volumes are likely to be high. These issues need to be addressed, as they prove to be a barrier for the development of new treatments.

Many issues associated with the scientific use of biobanking samples are ethical in nature, such as consent, personal integrity, privacy protection, safety of samples and access to data and stored samples. The laws and regulations pertaining to ownership, intellectual property rights and commercialisation discourage the use of resource material. There are also issues pertaining to cross-border shipping of samples, which requires consent from donors. With the sole aim of safeguarding the donor information, biobanking acts in Norway and Sweden allow the analysis of samples but discourage their long-term storage.

Technology Innovations for Clinical Sample Storage

Biobanks seek solutions that are easy, efficient and are able to provide cost-effective sample management. Traditional methods of storage include storing samples in laboratory freezers at -20°C, -80°C and liquid nitrogen,

and this process is being largely automated with the help of RFID and the MEMS technology.

On the other hand, the recent trend shows an increasing preference towards room temperature storage. There are firms developing reagents to stabilise the DNA and RNA in order to be able to last long under ambient temperature; this concept has allowed whole blood samples to be shipped and preserved under room temperature for about 3 months. Adapting to room temperature storage can yield benefits such as eliminating the need for freezer units and extra storage space.

Over time, it becomes tough for biobanks and biorepositories to track and retrieve samples when stored at ultra-low temperatures. Traditional methods of storage involve microplates with barcode readers. Retrieval of a single sample from a microplate meant thawing the entire plate, which affects the freeze-thaw cycles of other samples simultaneously. For this purpose, sample storage is being carried out in microtubes and individual vials. Earlier, equipment and robotic arms were designed to handle microplates; now, systems are flexible to cherry pick individual microtubes. Most of the storage systems today provide robotic interfaces inside a chilled atmosphere in order to prevent the disturbance of unused samples.

Conclusions

A totally integrated system of hardware, software and consumable tools would be the way to “smart biobanking”. With many new technologies, biobanks oriented towards the future can retain sample quality/integrity by employing smart and smooth sample handling systems available in the market today. ■

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Biobank Graz

The hub for biobanking in Europe

Biobank Graz at Medical University of Graz, Austria, belongs to the largest repositories of human samples in Europe. It contains nearly six million samples from normal and pathological tissues, including formalin-fixed, paraffin-embedded tissues (FFPE), fresh frozen tissue samples and frozen body fluids such as serum, plasma, urine and liquor.

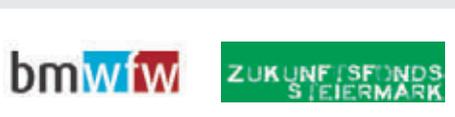
Biobank Graz is characterised by a number of features, unique to be present in a single biobank.

Biobank Graz:

- is based in a university carrying the label "HR Excellence in Research".
- is certified according to ISO 9001:2008.
- runs a QM system with SOPs for all aspects of the biobanking process.
- fully protects personal rights and privacy of sample donors and handles their biological samples accordingly.
- runs powerful logistics to offer highest sample qualities.
- has set up new automated infrastructure for handling and storage of samples at room temperature, -80°C and below -130°C (liquid nitrogen).

- enables prospective collections of samples and data based on the needs of the scientists.

At Medical University of Graz, Biobank Graz is a publicly owned non-profit organisation supported by public funds (BM.WFW, Zukunftsfonds Steiermark).



Biobank Graz has developed into a central research facility and now matures to a biological resource center specifically designed to support scientific projects that foster medical research and personalised medicine. Biobank Graz is directly linked to cutting-edge technologies (all -omics) combined with sustainable high quality research services based at the Center of Medical Research (ZMF) of the Medical University of Graz. Biobank Graz is also directly linked to the highly renowned clinical expertise of the LKH-University Hospital Graz.

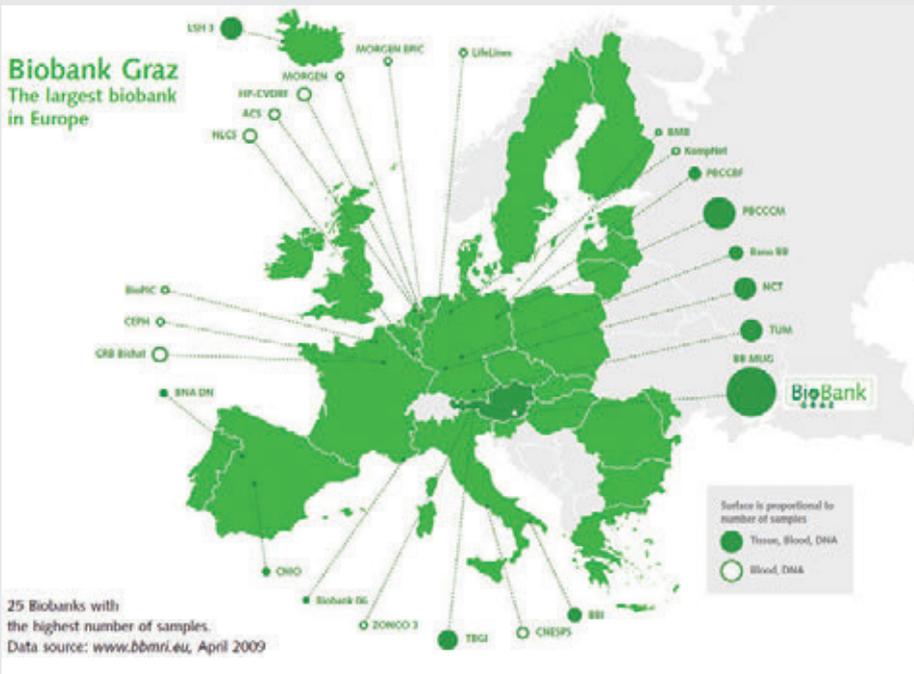
Using this perfect environment, Biobank Graz directly supports academic, industrial as well as cooperative research all over the world. In recent years, a large number of clinical projects and trials have been carried out using samples, data and/or logistic services of Biobank Graz. Thus, Biobank Graz contributes to scientific development and research results building the basis for medical benefits for the public and the health care system.

The collection strategy of Biobank Graz is represented by a double-tracked system. Therefore, Biobank Graz merges two different types of biobanks in one supra-regional biobank:

- **A non-selected, cross sectional biobank**, containing essentially all pathological samples and clinical data from the population of the Austrian state of Styria (1.2 million inhabitants). These samples with their respective clinical data are derived from a non-selected patient group characteristic of central Europe and have been collected and stored over the last 30 years.
- **A disease-focused clinical biobank** containing specific types of human biological samples of the highest quality and with detailed clinical follow-up data during the whole course of diseases. Samples and data include long term observations for specifically selected diseases and targeted disease groups. Such disease focused collections are based on the major research interests of cooperating institutions.

The strategic combination of both types of collections in Biobank Graz provides the ideal basis for epidemiological studies as well as allowing scientists to validate biomarkers for the identification of specific diseases and determine response to treatment. Hence, samples can be used for testing and validating strategies for personalised





network of biobanks BBMRI-ERIC (www.bbmri-eric.eu). Just recently, the headquarters of BBMRI.AT as well as of the European network BBMRI-ERIC have been established in the same building where Biobank Graz is located.

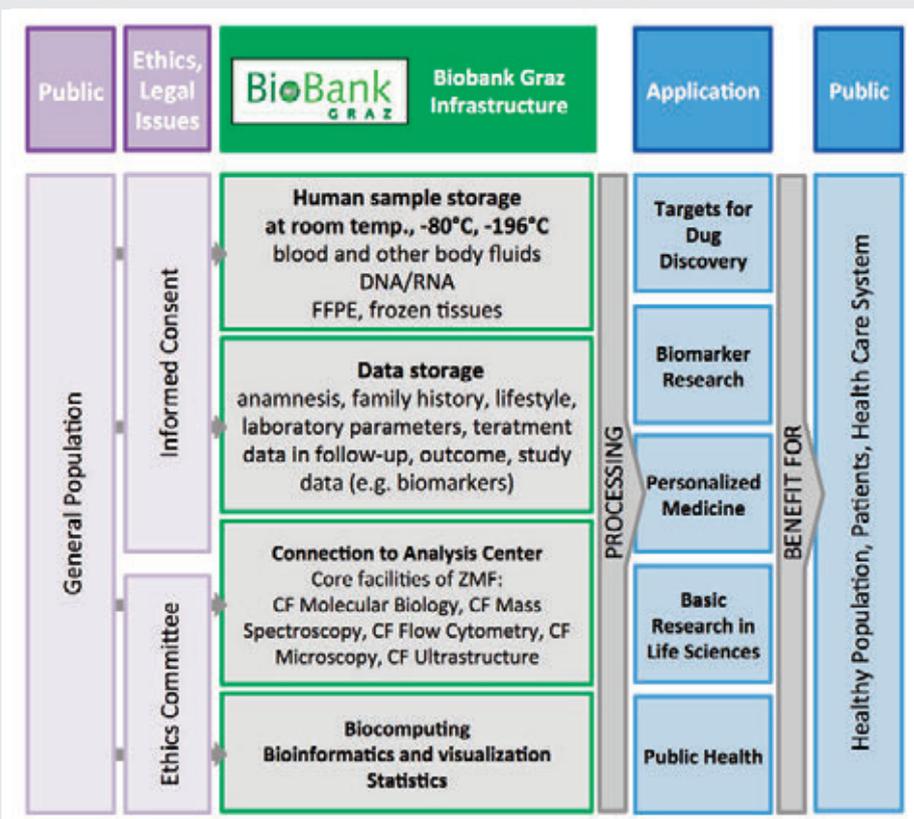
As the largest biobank in Europe, Biobank Graz was one of the leading biobanks fostering the development of the European biobanking network BBMRI-ERIC.

Today, the greatest challenge for national and international biobanking networks is to set up standards and to achieve harmonisation regarding high level sample and data quality combined with an ethical, legally adjusted environment. Biobanks need to explore their economic justification, perform effective reporting and quantify economic and often non-profit performance. Common standards need to be defined on a high rather than low level and hence, only few biobanks may be able to join such high-standard networks. Supra-regional biobanks such as Biobank Graz mostly meet international standards and thus will add innovative implementations to the field of maintaining sample and data quality.

monitoring and treatment or any other research question.

Today, networking and cooperation become more and more important. Therefore, Biobank Graz is an active leading player in (inter) national networks and activities targeting improved

interactions between biobanks and scientists to foster internationally successful research. Biobank Graz is member of the ESBB Biobanking Society (www.esbb.org) and ISBER (www.isber.org), the Austrian node of BBMRI (BBMRI.AT, www.bbmri.at) and thus is member of the European



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Stem cell research excellence on the Horizon

Adjacent Government gives an overview of the work the European Commission, and Horizon 2020 is doing to help fund research in the area of stem cells...

Europe undoubtedly boasts an impressive research base, one that has grown from strength to strength. The support of the European Commission in nurturing and growing Europe's science platform has been significant and has allowed risks to be taken. Pioneering research continues to steam ahead, bringing Europe closer to becoming a leader in many fields.

The European Commission (EC) has done much to increase innovation and support research within the European Union. Bringing together member states, often with different cultural identities and ethical ideologies, has undoubtedly been challenging at times, but the continued presence of the EC has seen a breaking down of barriers and the disappearance of borders for science progression.

This year, the Commission launched its largest research and innovation programme. Replacing the former Seventh Framework Programme, Horizon 2020 will run for 7 years and expects to deliver more discoveries and pioneering science during the period. With a budget of €80bn over the 7 year period, it is hoped that Europe will continue to develop as a research powerhouse.

Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science explained why Horizon 2020 is different from previous programmes and how it will change the European research landscape:

"Horizon 2020 is putting a lot of research money into finding answers to societal challenges. It's challenging all the disciplines to step outside their comfort zones. We don't have neat little boxes [for each scientific area] like we had before, and that's a criticism I suppose in

one way by some of the disciplines. Everybody's being asked to do things differently, and that's always challenging."¹

Pushing the boundaries of research is something the Commissioner is keen to do and she has actively supported cutting edge research during her tenure. One area that gained significant attention from Geoghegan-Quinn is stem cell research.

Stem cells have the ability to rebuild damaged cells and offer a renewable source of cell replacement. Because of this, stem cells have been heralded the future of medicine, offering a very real solution to many diseases and disorders.

Adult and foetal stem cells are only able to develop into specific cells, but embryonic stem cells can become almost any type of cell in the body. For this reason, embryonic stem cells have – and can – play an important role in medicine.

However, the use of human embryonic cells in medicine has been controversial and has raised numerous questions about the ethical implications. Recognising the challenges of this field, the Commission were careful to address the issue of stem cells in the proposal for the regulation of Horizon 2020.

One section of the proposal stated that, "The European Commission does not explicitly solicit the use of human embryonic stem cells. The use of human stem cells, be they adult or embryonic, if any, depends on the judgement of the scientists in view of the objectives they want to achieve and is subject to stringent Ethics Review. No project involving the use of human embryonic stem cells should be funded

that does not obtain the necessary approvals under the law of the Member State concerned. No activity should be funded that is forbidden in all Member States. No activity should be funded in a Member State where such activity is forbidden.”²

“Horizon 2020 is putting a lot of research money into finding answers to societal challenges. It’s challenging all the disciplines to step outside their comfort zones. We don’t have neat little boxes [for each scientific area] like we had before, and that’s a criticism I suppose in one way by some of the disciplines. Everybody’s being asked to do things differently, and that’s always challenging.”¹

Adhering to the laws of each member state is something that the Commission must remain sensitive to when setting up guidelines for new, controversial research such as with stem cells. The regulation also made it clear that research should not be funded through Horizon 2020 that would “create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.”³

Furthermore, the regulation also said that: “The Commission should actively support research aiming at developing alternatives to embryonic stem cells. The recent discovery of induced pluripotent stem cells (iPSCs) has opened up a new avenue for research, over and beyond the opportunities for research on adult and embryonic stem cells that have existed for several years, and has thus offered new hope to patients awaiting treatment. Nevertheless, the Commission should also take due account of the scientific community’s interest in all types of stem cell research and, therefore, not favour any one over another, while considering the ethical problems raised by each category of stem cells.”⁴

Stem cell research is undoubtedly an exciting and promising field, but one that must be approached carefully and sensitively. However, if stem cell research is allowed to flourish, the future may see numerous diseases treated using stem cell therapy. Previously incurable diseases could be treated by replacing the damaged cells or tissue with new cells.

Horizon 2020 certainly offers much in the way of support for cutting edge research, but what legacy it will achieve remains to be seen. What is clear is that Geoghegan-Quinn and her Commission will tackle the controversial areas, if there is a benefit to society.

“Horizon 2020 won’t shy away from policy issues that are at the top of the agenda and that demand a firm evidence base, such as security, migration or climate change. Nor are we ignoring issues concerning the role of science in our society,” said Geoghegan-Quinn. “We are addressing difficult and emotive questions such as the use of stem cells. I think that Horizon 2020’s approach on this issue shows that we can find balanced solutions at European level that satisfy divergent positions.”⁵ ■

¹ <http://news.sciencemag.org/europe/2013/12/geoghegan-quinn-surveys-europes-science-horizon>

² <http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2012-0427&language=EN>

³ <http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2012-0427&language=EN>

⁴ <http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2012-0427&language=EN>

⁵ http://europa.eu/rapid/press-release_SPEECH-14-83_en.htm

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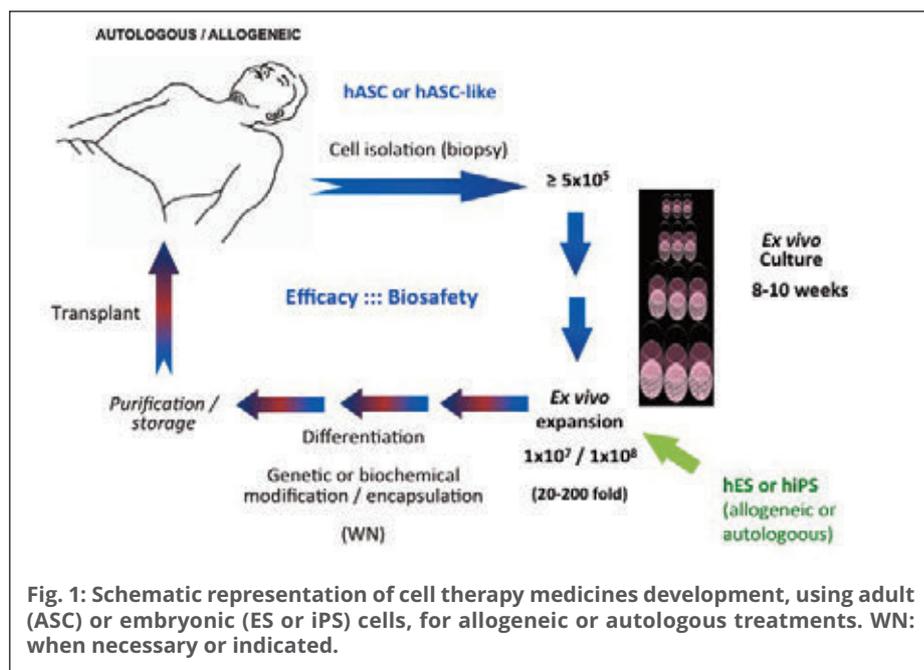
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Stem cells and immunity

From stem cell biology to tissue mending

In the last 25 years, tremendous advances have been made in the identification and generation of stem cells (SC) from diverse organisms, generating a wealth of knowledge in various fields from embryology to development. SC not only have the ability to differentiate into several cell types, but are also capable of prolonged self-renewal in an undifferentiated state. SC can be classified according to the range of cell types into which they can differentiate. This property, termed potency, is dictated by progressive hierarchical differentiation; totipotent SC can differentiate into embryonic and extra-embryonic tissues, pluripotent cells can form embryonic tissues (ectoderm, mesoderm and endoderm), and multipotent SC become only a reduced number of cell types. In addition to potency, SC ontogeny is important. Embryonic SC (ESC) are harvested from the inner cell mass of the blastocyst of 5-day-old preimplantation embryos and are pluripotent. Fetal stem cells (from different tissues) are considered multipotent. Most, if not all, organs and adult functional structures harbor adult stem cells (ASC). Finally, umbilical cord tissue is an important, practical source of multipotent stem cells that can be stored for long periods in tissue banks.

Therapeutic application of stem cells is based on a variety of strategies, of which cell replacement therapy is the best-known. The predominant alternative method relies on paracrine



effects, in which the transplanted stem cells secrete trophic factors that induce or promote self-repair. There is no universal method, and a specific SC source or determined procedures must be prioritised depending on the pathology or the patient's medical condition.

Despite the expectations that stem cell biology generates, current SC research is driven mainly by regenerative/repairative medicine, which tries to identify conditions useful for replacement of malfunctioning organs in the body. To consolidate the efficiency and safety of new SC therapies, however, a sustained effort that encompasses trial and error will be necessary, as was the case for gene therapy¹. SC approaches are also being used to generate interesting models for human disease and are

currently producing a revolution in the understanding of several human diseases and the creation of physiological testing platforms (even personalised) for screening chemical and molecular drugs and for toxicology.

Embryonic stem cells

ESC are obtained from early stage embryos; they have indefinite self-renewal capacity and can differentiate into cell types derivative of all three germ layers. They provide a powerful research tool for developmental biology, drug screening, disease modeling, and potentially in cell replacement therapy. The ESC concept was established in mice in 1987, and translated to humans². Controlled, efficient differentiation protocols will lead to maximal exploitation of these cells. Their use has ethical considerations associated with the

destruction of human embryos to obtain ESC cell lines, and research in the field is controlled in Europe by strict legislation³.

Yamanaka⁴ recently developed revolutionary procedures for obtaining ES-like cells from somatic cells, known as reprogramming. These cells are termed induced pluripotent stem cells (iPS) and show potency comparable to that of ESC. These iPS have immense potential and can be obtained from an adult patient in a reasonable period of time, eliminating most ethical concerns associated with ESC. Procedures to derive specific cell lineages are being developed and show promising results, yielding hematopoietic stem cells (HSC), mesenchymal stem cells (MSC), cardiomyocytes (CS), dendritic cells and dopaminergic neurons. These advances will boost research in replacement therapy, as well as physiological drug screening, toxicology and biosafety studies. Several clinical trials to test the clinical potential of iPS will soon be under way⁵.

Adult stem cells

The cradle of SC therapy was in bone marrow transplant research. This community established and developed central concepts that have since been shown to apply to most ASC systems. These contributions remain relevant more than 40 years after the first descriptions of hematopoietic stem cells (HSC) in the bone marrow, and intense research continues to decipher the laws of HSC regulation and its alteration in hematopoietic pathologies.

Adult stem cells (ASC) are central participants in the repair of most, if not all, host tissues in mature organisms, and the prevention of ASC senescence is critical for tissue homeostasis.

Bmi1 expression is reported to have a crucial role in the self-renewal and maintenance of hematopoietic, neural, intestinal, bronchioalveolar, pancreatic, prostate, lung and epithelial SC, as well as in the tongue and in rodent incisors; Bmi1 thus seems to be a general marker for ASC. Bmi1 is one of the main regulators of *INK4a/ARF*, encoding p16, which in turn is associated with cell senescence and ageing. The effects of p16 activity include not only loss of ASC, but also triggering an unresponsive state.

The plausible involvement of altered stem cells in cancer is another important contribution of the SC field, which suggests the emergence of malignant clones that could evolve and progressively generate a tumor. This is the origin of an SC-centric view of some human diseases. In this line of thought, selective drugs able to cope with cancer stem cells and their metastasis could be a critical step in curing human cancer or rendering it a chronic illness.

Conclusions

The last 25 years have seen impressive advances in the identification and generation of SC from several organisms. Adult stem cells at first, and subsequently embryonic or induced pluripotent stem cells have been evaluated for their therapeutic potential. Although preliminary results are encouraging, especially with MSC, RPE and HSC, several central aspects of the therapeutic procedure must be optimised to improve the therapeutic index. Preserving the genomic stability of ASC and ESC, intrinsically and after the required expansion, seems particularly important. These observations underline the need for more complete understanding of each SC system. Finally, animal models must

undergo critical re-evaluation for each specific intervention, combining previous results with the model's realistic ability to predict SC behavior in man. Despite all these pending technical issues, however, a bright future is envisioned for SC-based therapies. We will see notable improvements and new applications in areas in which no cure is currently available. In addition, the extensive use of ES-derived cells as human disease models will reveal their relevance for drug and toxicology screening, especially in situations where an animal model cannot be substituted. Anti-cancer and immunomodulatory therapies are probably the two areas on which SC-based therapies will have the most direct impact.

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- ⁴ Takahashi et al. (2007) *Cell* 131:861-72.
- ⁵ www.clinicaltrials.gov



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The birth of blood cells

Unraveling the mechanisms leading to the formation of blood progenitor and stem cells

The continuous generation of blood cells throughout life relies on the existence of haematopoietic stem cells (HSC) generated during embryogenesis. They have the ability to self-renew and to generate all types of blood cells. Any pathology affecting these cells could lead to the development of serious diseases such as leukaemia and anaemia. That is why understanding how HSC and haematopoietic progenitors are produced during embryonic life is important.

The cellular origin of blood stem and progenitor cells has been the subject of an intense scientific debate during the last decade. However, in the last few years, several studies, including ours, have allowed to single out one particular cell type as the source of HSC. It is a rare type of endothelial cells, the building block of blood vessels, endowed with haematopoietic potential. They form the haemogenic endothelium and can be only detected during embryonic life. The process of the generation of blood cells from haemogenic endothelium is evolutionary conserved since it takes place in many different organisms including the human, the mouse, and the fish species.

Future projects and goals

Recently, the generation of the Embryonic Stem Cell (ESC)-like induced Pluripotent Stem Cells (iPSC) by reprogramming of fully differentiated cell type such as skin cells, provided a

major breakthrough for the field of regenerative medicine. However, to fulfill the therapeutic potential of iPSC, essential basic research has to be done to find the way to differentiate them efficiently toward blood progenitor and stem cells.

“The process of the generation of blood cells from haemogenic endothelium is evolutionary conserved since it takes place in many different organisms including the human, the mouse, and the fish species.”

Consequently, in order to better understand the development of the haematopoietic system, the focus of our research is to unravel the mechanisms underlying the generation of blood stem and progenitor cells from haemogenic endothelium using mouse embryos and the mouse ESC in vitro differentiation system, an ideal setting to define the key molecules involved in haematopoiesis.

Our group is part of the European Molecular Biology Laboratory (EMBL), one of the highest ranked scientific research organisations in the world. At the EMBL Monterotondo unit (Italy), we have access to a state-of-the-art transgenesis facility allowing us to perform advanced mouse biology experiments. Through the other EMBL units in Germany (Heidelberg and Hamburg), France (Grenoble) and

United Kingdom (Hinxton) we have access to a very strong set of experts in various fields: structural biology, proteomics, bioinformatics, genomics, cell biology, development biology and advanced imaging. This unique environment allows us to combine different methodological and innovative approaches to address key questions about the mechanisms of cell fate decisions leading to the production of the first haematopoietic cells. It will give us the opportunity to develop new strategies to improve methods of blood cells generation from ESC or iPSC for regenerative medicine.



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Challenging the stem cell convention

Professor Alan Clarke, Director of the European Cancer Stem Cell Research Institute gives an overview of how cancer stem cells differ from the conventional stem cell...

Cancer remains one of the major challenges in terms of life expectancy and is recognised as the second largest cause of mortality within the EU, accounting for 28% of all deaths in 2010. Although we are slowly improving 5 year survival rates for many tumour types, we still do not have effective therapies for all tumours and we still do not properly understand the processes that underlie resistance to therapy and tumour relapse. Furthermore, for some tumours (such as those of the pancreas) our understanding of how to treat patients is so woeful that they are currently virtually untreatable. There is therefore a plethora of unmet clinical needs relating to better cancer diagnosis and treatment.

One concept that may aid in tackling these problems is that of the 'cancer stem cell'. Normal stem cells have now been found in many different tissue types and these are responsible for the growth and subsequent maintenance of those tissues, and also for their repair following damage, such as exposure to toxins or irradiation. One way to view this is that the stem cells sit at the top of a hierarchy of cells which are required for correct tissue maintenance and that the stem cells are capable of generating all of that hierarchy. Our understanding of these normal stem cell populations is burgeoning and as it does it opens up radical new prospects for regenerative medicine in diseases such as neurodegeneration and arthritis.

The 'Cancer Stem Cell' notion is that, in a manner parallel to normal tissues, tumorous tissues actually possess a similar hierarchy of cells, with a small proportion of cancer stem cells capable of driving the growth and development of the entire tumour. However, this view clashes with the more conventional notion that all tumours are homogeneous – i.e., that



all cells within a tumour have similar tumorigenic capacity. Evidence from many different laboratories is now challenging this conventional view, with clear examples of cancers that are driven by a small population of 'cancer stem cells' which we can identify by the unique profiles of proteins they express on the surface of these cells. The importance of the cancer stem cell concept may also extend beyond implications for the growth and relapse of the primary tumour, as these cells have also been implicated in the spreading of the tumour around the body – a process termed metastasis which is the stage of disease most closely associated with lethality. If the above is correct, it may be possible to treat cancer more effectively by concentrating on the stem cells alone, rather than all the cells in the tumour, as current treatments do.

The critical distinction between these views (homogeneous versus driving cancer stem cells) means that, if the cancer stem cell concept is correct, current cancer therapies being developed and used may not be being targeted at the correct cell type within the tumour. At the present time, this traditional view could mean an "apparently" successful therapy



Prof Alan Clarke, Director
European Cancer Stem Cell Research Institute

or treatment in a cancer patient that results in reducing tumour 'bulk' is, in fact, a poor or failed treatment because it still allows the driving cancer stem cell population to survive and therefore the tumour is still able to re-grow. It could also mean that potential cancer treatments and therapies which successfully target the cancer stem cell are currently being disregarded. These are the cutting-edge scientific issues that now need to be addressed. If we can now confirm that the cancer stem cells concept is correct, it offers the possibility of transforming our progress in the fight against cancer.

The cancer stem cell concept has always been vigorously debated, with the field split into two camps – those advocating the existence of cancer stem cells and those opposed to this concept. However, there have been significant changes over the last 12-24 months in that a series of high impact scientific papers have been published that are seen to prove the notion of the cancer stem cell, or at least confirmation of the existence of hierarchy within tumours. Furthermore, there has been rapid technological development in our capacity to extract and indefinitely grow cancer stem cells in a laboratory setting which is revolutionising the utility of these cells. For example, this is now opening up possibilities for the development of tailored therapy per patient (known as 'stratified' or 'personalised' medicine) which is predicted to change the landscape of both research and therapy over the coming years.

The study of cancer stem cells remains in its infancy. There are a number of key objectives within the field

that need to be met. The most basic of these is to improve our understanding of cancer stem cells and the roles they play in a range of cancers. For example, we are still unsure if the concept is relevant to all cancers or just to a subset. We also need to identify robust markers of disease that reflect the presence of cancer stem cells; and further we need to use this approach to identify new therapeutic targets. Perhaps most excitingly, it may be possible to repurpose existing drugs against cancer stem cells that have previously not been shown to be effective against bulk cancer cells. This latter approach carries the great twin benefits of reduced cost and reduced time in development. We will also need to develop new platforms based around cancer stem cells which will allow mid-to-high throughput drug screening of both existing and novel agents (including natural agents) to assess their capacity to target the cancer stem cell.

The cancer stem cell concept offers a new approach to the treatment of cancer that has wide ranging implications. From our improved basic knowledge, the aim will be to develop new therapies which can be shown to make a real difference in the clinic. Ultimately, the objective will be to transform the survival rates for patients suffering from a range of cancer types. All of the above of course requires substantial investment from both industrial and academic partners. Currently this is derived from a range of funding streams, none of which is wholly devoted to the cancer stem cell concept. However some institutions do exist, such as the European Cancer Stem Cell Research Institute, based at Cardiff University, which is wholly focussed on this problem. The key challenge must be to coalesce efforts across the EU to truly ascertain the value and usefulness of the cancer stem cell notion. ■

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A focus on Stem Cells and Cancer

Contemporary cancer research

Cancer has an important biological characteristic: it causes cells to divide, or 'proliferate' in an uncontrolled fashion. Most current cancer therapies use drugs that interfere with one or more of the mechanisms of cell proliferation. These treatments are based on the assumption that healthy cells proliferate at a much lower rate than tumour cells. But healthy cells do still proliferate, so current therapies are highly toxic and cause many side effects, especially in tissues or organs where cells are regularly replaced, such as the hair, blood, or lining of the intestine. Most importantly, although these drugs initially manage to reduce the size of tumours, many cancers still remain incurable and relapse occurs in a large number of cases.

Are stem cells the cause of cancer relapse?

The cancer stem cell (CSC) theory explains relapses by suggesting that tumours are maintained by a special sub-population of cancer cells. According to the theory, these cells are the only ones within the tumour that can self-renew (copy themselves) and maintain the tumour. Because of their particular stem cell characteristics, these cells would be largely unaffected by standard therapies. Instead, they would survive and continue to divide, which would lead to the reappearance of the tumour with time. This could be compared with the effects of chemotherapy on other tis-

suess, like the hair: the differentiated cells that form most of the hair are killed during treatment, but the stem cells responsible for hair growth survive. When the therapy is over, hair re-grows normally.

The CSC theory therefore argues that tumours are stem-cell based tissues, very similar in their architecture to other tissues in the body, but with a disease-causing fault. This point of view implies that studying the rapidly dividing differentiated cells which generally make up the bulk of a tumour might not tell us much about the cause of the cancer. Instead, we need to study the less rapidly dividing cancer stem cells, which maintain the tumour.

A theory with a history

Although it was proposed almost 50 years ago, the CSC theory has only begun to gain acceptance in recent years. The existence of CSCs has been demonstrated in many types of human cancers. Still, there are many opponents to the theory, particularly among clinicians. They argue that the theory mainly represents a laboratory artifact due to our technological inability to transplant tumours into experimental animals so that 100% of the cells are always transplanted. In this regard, I would argue that the fundamental concept essential to the CSC hypothesis does not have anything to do with the exact number of cells within the tumour. Instead, the CSC

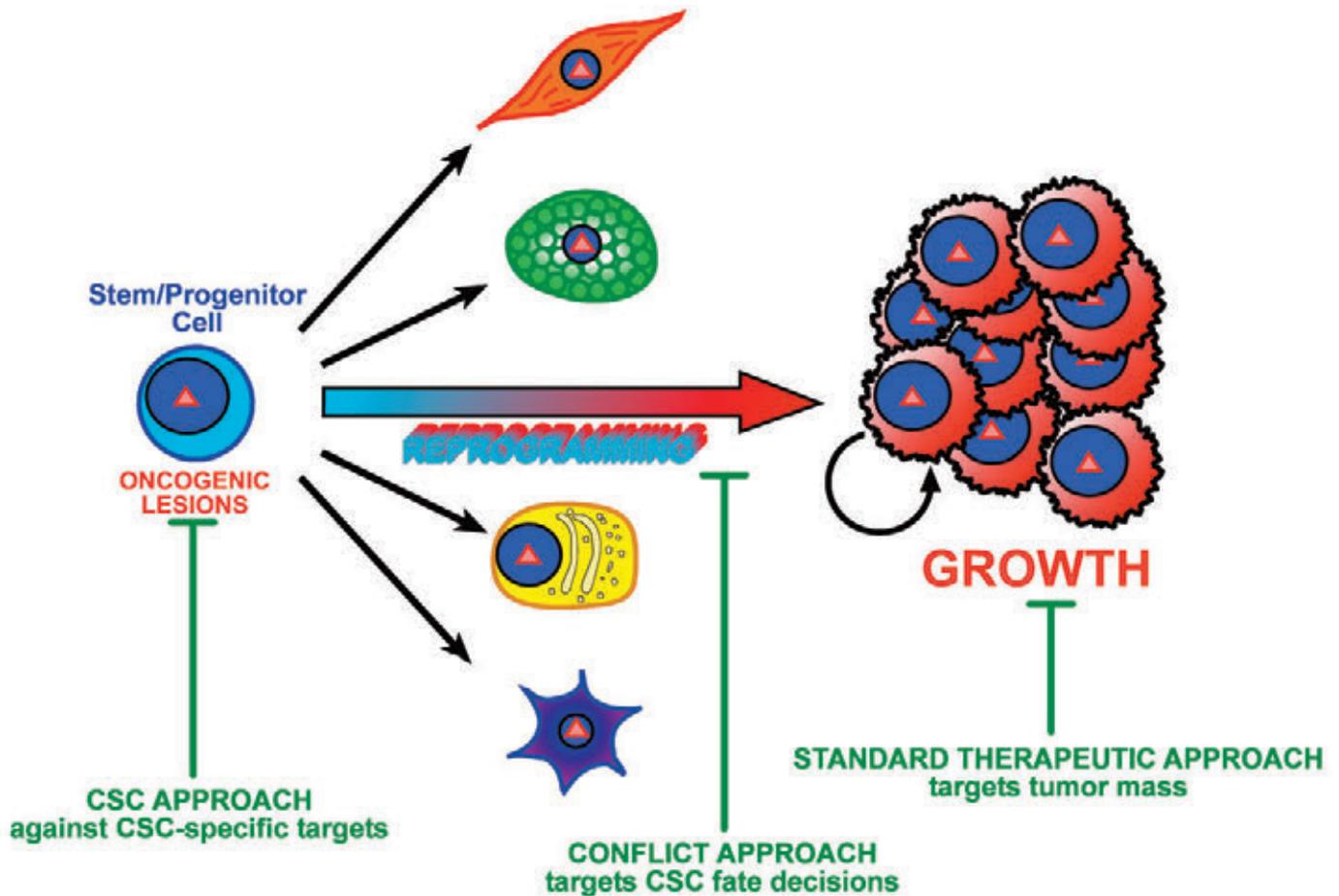


Dr Isidro Sánchez-García is a scientist working in the Institute of Molecular and Cell Biology of Cancer at the CSIC/University of Salamanca, Spain, to debilitate cancer. While his research has focused on different haematological cancers, his work into targeting malignant stem cell populations to eradicate cancerous tumours may have a major impact on the concepts, therapies and methods for assessing treatment efficacy of cancer biology and development across the board.

idea is that a tumour is made up of a mixture of cells with different functions, with only a certain set of cells in the tumour able to initiate and maintain malignant growth in the body. Nevertheless, there are many types of cancer and some do not seem to follow the CSC model.

Significant implications for future therapies and research

The existence of CSCs has a tremendously important therapeutic implication: only by completely eliminating the cancer stem cells can we avoid



relapse and achieve a definitive cure. In order to do this we must be able to target CSCs specifically, discriminating them from the normal stem cells that maintain normal tissues. Therapies that also kill normal stem cells would be lethal to the patient. This remains the biggest challenge for the coming years.

“CSC-based therapies must not replace, but rather complement, current approaches.”

Looking to the future, there is new evidence suggesting that human cancer could be caused by a kind of reprogramming of cells. In other words, particular cancer-causing genes (known as ‘oncogenes’) are turned on in cells and this ‘reprogrammes’ them to behave differently – to turn into cancer stem cells. If the potential

growth of cancer depends on CSCs with such oncogenes turned on, it will be important to know how to turn off the reprogramming process (see Figure 1). In my personal opinion this is an important area on which to focus research efforts. The formation of tumour cells as a result of genetic reprogramming represents a new explanation of how cancer cells are formed and maintained. The practical implications that this new point of view has for cancer therapy are obviously enormous. What is clear is that CSC-based therapies must not replace, but rather complement the current approaches. Elimination of the bulk of the tumour is required in the initial stages of any treatment, whether or not we are also able to target cancer stem cells. The coming years will show whether optimism about new treatments based on the CSC theory is well

founded, or whether the immense complexity of this disease will continue to confound our best endeavours to treat it.



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A stem cell solution for Parkinson's?

Claire Bale, Communications Manager for Parkinson's UK, highlights the latest thinking in stem cell research for the potential treatment of Parkinson's...

Stem cells can develop into almost any cell in the body. They are the original cells from which we are made, and are responsible for repairing our tissues and organs when they get damaged. Since their discovery, researchers have been trying to find ways to use them to treat conditions like Parkinson's, where cells have been lost or damaged beyond repair.

Every hour, someone in the UK is told they have Parkinson's.

Parkinson's is an incredibly complex and individual condition. Most people know that Parkinson's affects movement and causes symptoms such as slowness, stiffness and tremor. But there is also a whole host of other symptoms that can affect people with the condition, including difficulties with sleep, speech, anxiety, constipation and sense of smell, to name just a few.

These symptoms emerge when dopamine-producing nerve cells found in a tiny but vital part of the brain die. Some of the common symptoms of Parkinson's can be managed during the early stages of the condition, but there is no cure and no treatments can replace the cells lost or that can slow or stop its progression.

But many scientists believe stem cell therapies could hold the key to a cure for Parkinson's.

Stem cells are 'unspecialised' cells which can develop into almost any cell in the body. They are found in early embryos, umbilical cords and in tissues like bone marrow. Scientists can now even grow stem cells from adult skin cells.

What makes stem cells so exciting for Parkinson's research is that they have the potential to grow new

cells. Our researchers are investigating stem cells in the hope that they could one day be used to grow healthy new nerve cells to replace those lost in the Parkinson's brain.

How far away are stem cell therapies for Parkinson's?

There are no stem cell treatments available yet for people with Parkinson's. Studies on stem cells are still at an early stage and, as yet, no clinical trials have been carried out.

Stem cells definitely hold huge potential for developing therapies for Parkinson's, but we still have a number of questions to answer and challenges to address before we can begin testing them in people with the condition, including:

- How can we grow large numbers of nerve cells?
- How can we make sure new nerve cells survive?
- How can we get transplanted cells to connect and work normally inside the brain?
- How can we control newly transplanted cells to prevent tumours forming?

How long this will take is unfortunately, impossible to say. We may solve the problems straight away, but then again we may uncover new challenges too. The more we, and other funders can invest in the research, the faster we'll get there.

It's difficult to put a date on when clinical trials of stem cell therapies for Parkinson's may start but we're optimistic that it could be in the next few years.

How can we bring stem cell therapies closer?

As Europe's largest charitable funder of Parkinson's research, we are currently supporting vital research projects that aim to make stem cell treatments a reality for people with Parkinson's.

But we cannot do it alone. It is essential that the whole research community works together to tackle these challenges. This means charities, the pharmaceutical industry, regulators and government bodies all pulling together towards a common goal.

“What makes stem cells so exciting for Parkinson's research is that they have the potential to grow new cells. Our researchers are investigating stem cells in the hope that they could one day be used to grow healthy new nerve cells to replace those lost in the Parkinson's brain.”

The UK government has recently established a new centre, the 'Cell Therapy Catapult', which aims to help the UK become a global leader in the development and commercialisation of cell therapies.

The Catapult aims to speed up the translation of promising discoveries and advances being made by stem cell scientists in the lab, into real treatments in the clinic that are available to people with conditions like Parkinson's.

This is a really promising step in the right direction, and we're excited by the opportunities ahead for developing the next generation of cell therapies which are so urgently needed for Parkinson's. ■

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Demystifying organ regeneration

Christopher L Antos, Group Leader at the DFG-Center for Regenerative Therapies Dresden explains how Zebrafish research is a vital tool to help understand organ and appendage regeneration...

Injuries from trauma, ischemia and amputation can result in the permanent loss of an organ and limb function. The regeneration of many vital organs and appendages is a phenomenon that is limited or absent in humans, and this limitation can result in severe incapacitation or mortality. Such outcomes generate a medical need to find strategies to replace tissue loss. These strategies may come from understanding the cell biology and molecular mechanisms that are used by animals which have a significant capacity to regenerate organs and appendages, and there are vertebrates that have the ability to regenerate with such high fidelity that it is impossible to identify the original loss. While it remains unclear why some animals can regenerate specific structures and others cannot, what current research is finding is that many of the molecular mechanisms involved in regeneration are involved in embryonic development and these basic molecular mechanisms are conserved among the species. Thus, it should be possible to partially or completely restore the human endogenous ability to regenerate appendages and organs by providing the missing signals identified through studies of those animals that regenerate.

The processes governing regeneration are very complex. After injury, as for general wound healing, adjacent tissues need to recognise that there is an injury; however, something else takes place in the cells at the wound site that instructs them to do more than heal. Consequently, some cells in the residual tissues need to be instructed to react, and information must be provided to instruct them how to react in a coordinated manner. They then grow new tissue together in a possessive fashion so that one tissue does not overgrow another and that these cells make the appropriate connections (innervations, vasculari-

sation, tendon attachment to bone, muscle attachment to tendon, etc.). These tissues need to know when to stop regenerating once the dimensions of the original structure are reached. Thus, the overarching questions that regeneration research is trying to address are:

- What initiates the regeneration response?
- What controls the coordinated regenerative out-growth (despite the high levels of cell proliferation, a tumour never arises)?;
- What tells the cells involved in regeneration to stop regenerating once the new structure has as reach the original dimensions of the lost structure?

The zebrafish is a powerful animal model to answer these regeneration questions for several reasons:

- This fish has a very extensive capacity to regenerate many of its organs and appendages completely – e.g. heart, retina, pancreas, liver, appendage, etc;
- The internal organs in the fish are similar in their composition to human organs;
- The differences in the more subtle aspects in the differences between fish cells and human cells may provide clues about what biological phenomena must take place to allow residual tissues to produce new tissue;
- Two of the primary regeneration strategies (regeneration from stem cells and regeneration from the conversion of differentiated adult tissue cells into progenitor cells) observed in animals can be researched in the fish;

- Zebrafish are easy to maintain and can be bred frequently to produce a large number of progeny. This allows genetic experiments that involve looking for mutant fish that have lost their capacity to regenerate. Finding such mutants and identifying the gene responsible for the defective regeneration response facilitates the identification of the molecular mechanisms involved in regeneration;
- It is fairly easy to produce transgenic fish lines expressing fluorescent proteins to mark different tissue cells and track their behaviour during regeneration, as well as to test how the activation or inhibition of specific genes in specific tissues affect the regeneration process.

Regeneration of the zebrafish caudal fin

Adult zebrafish caudal fin is bilobed structure supported by a skeletal frame of bone rays throughout the fin. Inside the bone rays are peripheral nerves and surrounding them is their vasculature. The pigment cells that make the dark stripes are the melanocytes. Shortly after the loss of the fin lobes the healing process begins. Within 48 hours tissue regeneration begins. Regeneration of fin lobes is complete approximately 28 days after loss.

Zebrafish regeneration in relation to other tissue regeneration models

While the zebrafish fin appendages have a different architecture than the human limb, it contains almost all of the tissues found in them: bone, peripheral nerves, skin, mesenchyme, melanocytes (the same pigments cells in human skin), vasculature, and connective tissues. A second example is the heart, while we humans have a near zero capacity to regenerate heart tissues, the zebrafish can completely regenerate them, including complete loss of the ventricular apex. The ventricular wall not only regenerates the tissues, but, like the fish appendage, it completely regenerates the shape.

Other models for studying vertebrate regeneration are different amphibians (frogs and salamanders), mouse and rat. Amphibians are a good model system for researching the cell biology of regeneration and are starting to be more important for molecular research, but still lag in some of the experimental

tools that are already used in the zebrafish. Mammals, including humans, can regenerate certain structures and organs, too. The liver, hair, skin, blood vessels, blood, immune cells are some of the tissues we (mammals) regenerate, and, thus, the regenerative capacity of these tissues are studied in mouse and rat. Why mammals are more limited in the types of tissues that they can regenerate is still unknown. Speculations are postulated such as complexity, size, and environment, but these explanations alone appear not to be the only reasons.

Organ culture research has focused on how to grow individual tissues for human organ replacement therapies, and this research has been successful with specific tissues (skin, eye lens, and mesenchymal stem cells). However, the three-dimensional architectural complexity and the number of different tissue cell types in a single fully functioning innervated, vascularised organ, is a current hurdle in growing complete organs in culture. Because the zebrafish can regenerate compound organs, and appendages to the same three-dimensional structures that completely regain function, zebrafish research can provide answers to a great number of questions concerning the regeneration of three-dimensional multi-tissue organs and appendages, including proper innervations and vascularisation.

Thus, the zebrafish with its regenerative capacity and its experimental tools to study the cell biology, the genetics and the molecular mechanisms allows for the dissecting of the how cells are used and controlled to recreate organ loss and appendage structures. With all the current work, such research should provide answers to what cell activities and molecular factors are needed to promote regeneration of human organs and limbs in the near future. ■

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An industrial renaissance

Vice-President of the European Commission and Commissioner for Industry and Entrepreneurship, Antonio Tajani, explains the importance of industrial competitiveness for the 21st Century...

Without a strong industrial base, the European economy cannot prosper. As the EU starts emerging from the longest ever recession, we have to bear in mind that competitive enterprises are the foundation of our future economic success. While in 2013, Member States made some improvements in their business environment, exports and sustainability, many roadblocks still remain – particularly for industrial competitiveness. For example, the cost of energy is increasing in almost all Member States, while decreased investment and access to finance are further contributing to the de-industrialisation of Europe. Internal demand also remains weak, keeping intra-EU trade subdued. Only by overcoming these hurdles can the EU achieve the sort of industrial competitiveness it needs in the 21st Century.

In 2012 the European Commission presented a strategy for the re-industrialisation of Europe, with the objective of increasing the share of GDP earned through manufacturing from 15% to 20% by 2020. To reach this target we need to put industry at the top of the European agenda and more needs to be done both at EU and national level. In these challenging economic times, we simply cannot afford to do otherwise, because industry accounts for over 80% of Europe's exports and almost every fourth private sector job.

That is why in March 2014, we will have the European Council dedicated to industry and on January 22nd we issued a Communication for an industrial renaissance. In it, the Commission proposed action for further coordination between EU and national instruments and more coherence in those policies which have an impact on industrial competitiveness.

A growing competitiveness gap

Two industrial competitiveness reports that the Commission issued in September 2013, show that despite some timid signs of recovery, the EU has not yet shrugged off the crisis. While manufacturing is showing some signs of growth – also thanks to positive export figures – the industrial base continues to shrink, from 15.5% last year to the current 15.1%.

Furthermore, the reports show that the root of the crisis is the growing competitiveness gap between European economies. Despite purposeful action by the Commission under Europe 2020 to re-launch competitiveness and reforms in many Member States, there are still major structural imbalances. The productivity gap remains wide, with some countries hampered by punitive taxation, inefficient public sectors or slow judicial systems. Not to mention the limited capacity for innovation, the cost of energy and inadequate infrastructure.

An industry-friendly EU not yet achieved

The competitiveness of European industry is showing an overall improvement in the business climate and environmental sustainability, as well as a trade surplus of €365bn. However, domestic demand remains weak. Similarly, investment is still low and has fallen by €350bn since 2007 (from 21.1% to 17.7% of GDP). Whereas in 2001 the EU attracted 45% of global foreign investment, today we are at around 20%.

Access to finance has also become more restrictive, particularly for SMEs. The cost of energy – already the highest among our competitors has increased even further and is around double that in the United States

and more than triple that in China. Consequently, every day we read about industries leaving Europe to invest in countries where energy costs are more sustainable.

All these factors have contributed to poor results in 2 key areas: productivity and employment. It is here that we are falling behind the United States and Japan. While the EU's average productivity level is 126, that of Japan and the United States is 132 and 135 respectively. Comparison of unemployment is even less flattering: 7% in the United States, 3.8% in Japan and 11% in the EU. Since the start of the crisis in Europe, almost 4 million jobs have been lost in industry.

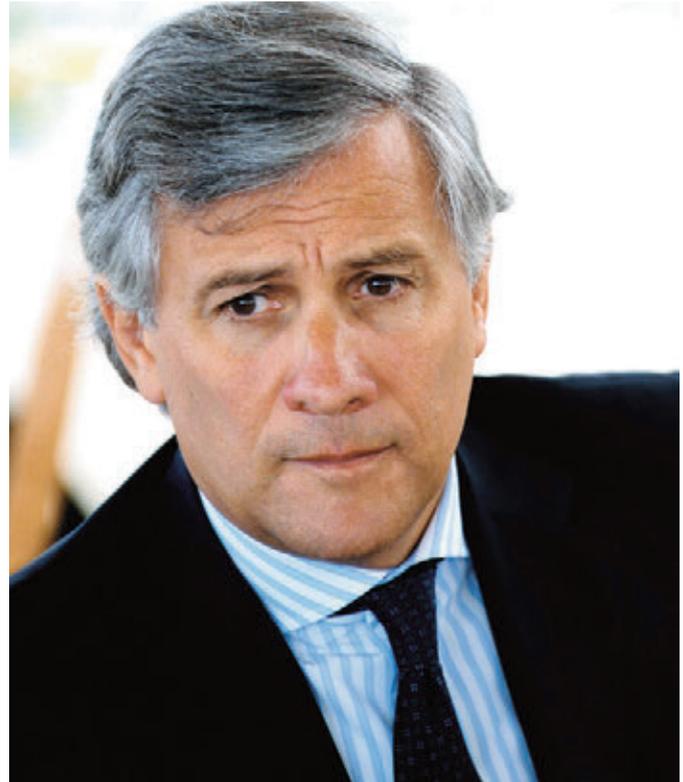
An Industrial Compact to go with the Fiscal Compact

The process of de-industrialisation is going on in most EU Member States. In the October 2012 communication approved by the Member States, the Commission took up the challenge of reversing this continuing decline, and we have made some progress.

Much has already been done in the context of Europe 2020. We have devised industrial plans for, among others, shipbuilding, cars, steel and construction, as well as a strategy to strengthen the defence and security industry. The task forces for strengthening the 6 leading sectors identified in the communication – advanced manufacturing, key enabling technologies, the bio-economy, smart grids, raw materials, sustainable transport and construction – are operational.

However, the most recent data shows that we need to do more and act urgently. A further loss of human resources and industrial capacity in key sectors could take us to a point of no return, weaken our exports and make us more technologically dependent.

We know which problems need to be solved to unleash industrial potential: a public sector that works with business, sustainable energy costs, modern infrastructure and research and training that are geared to the market. However, repeating like a mantra that reforms are needed – some of which we've been waiting a decade for – will get us nowhere. This is why I have been emphasising the theme of governance in making reforms effective.



Antonio Tajani, Commissioner for Industry and Entrepreneurship, and Vice-President of the European Commission

Personally, I am convinced that to make the process of convergence between countries more effective, we must strengthen coordination with the Member States – not only in terms of macro measures for tax consolidation, but also at the micro level, which is more closely connected to industrial competitiveness. Besides the Fiscal Compact we need an Industrial Compact to balance and integrate action for growth and to attract investments and industrial manufacturing. The European Council of March – February 2014, must define this pact as a premise for a return to growth. ■

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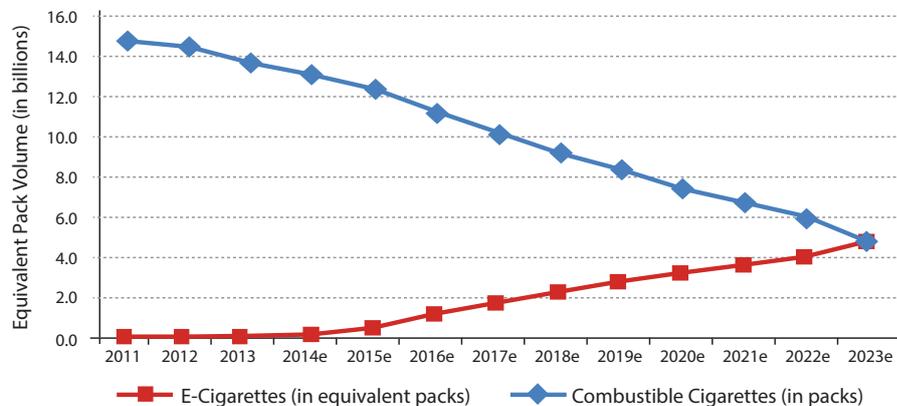
Electronic Cigarettes: Disrupting the giants

The independent Electronic Cigarette Industry is wholly made up of SMEs, and although Big Tobacco is buying in, the main thrust of the innovation driving this sector forward is coming from the independent sector. This is great news for the economic recovery, for Britain and across the EU, since – as European Commission Vice-President, Antonio Tajani – points out: “SMEs are the driving force of the European Union.”¹ Indeed, “SMEs... represent 99% of all enterprises in the EU and... employ 65 Million people”², but this is not the only boost for employment and economic growth. The peripheral industries supporting the ecig sector are also enjoying increased business, with courier, packaging and printing companies gaining new customers.

If Wells Fargo’s analysis proves correct, then ecig sales will overtake those of combustible cigarettes within a decade – and this analysis ties in with other emerging evidence. Professor West’s Smoking Toolkit Study is already reporting drops in smoking prevalence and cigarette consumption, and an increase in the rate of quitting smoking.³ ASH Scotland reported in April 2014 that:

“The use of electronic cigarettes among adult smokers... has increased by over five times in the past four years, from 3% in 2010 to 17% in 2014.”⁴

This dramatic surge in the popularity of these products is a great boon for these SMEs, as well as bringing in much-needed revenue to government



Source for graphs: Company data and Bonnie Herzog, Wells Fargo Securities, LLC estimates

coffers across the EU, in corporation tax, PAYE and VAT – and crucially, because ecigs are not medicinal products, the VAT is at the full rate.

There are many ‘hidden’ benefits to this disruptive technology, too. Health provision is always a strain on domestic budgets, for any nation. With the recently-documented “harm reversal” demonstrated in asthma sufferers:

“Overall there were significant improvements in spirometry data, asthma control and AHR”⁵

likely to be repeated in other smoking-related conditions, a mass migration from smoking to using ecigs instead is likely to mark a significant relief to front-line services. This would also mean a reduction in the ongoing costs of expensive treatments, prescription costs and hospital visits for these conditions. To paraphrase Professor Gerry Stimson: No tax-payers were harmed in the making of this revolution.

Indeed, it may become the case that electronic cigarettes can have a bigger impact on smoking prevalence than

any Tobacco Control intervention in the last 30 years, and without requiring government funding. This is, after all, a consumer-led revolution.

¹ <http://www.venetoinnovazione.it/?q=eng/InterviewTajani>

² http://eeas.europa.eu/delegations/china/press_corner/all_news/news/2009/20090909_01_en.htm

³ <http://www.smokinginengland.info/latest-statistics/>

⁴ <http://www.ashscotland.org.uk/media-and-comment/press-releases-and-comments/yougov-e-cig-results.aspx>

⁵ <http://www.mdpi.com/1660-4601/11/5/4965>



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Open for trade

Adjacent Government gives an overview of the work the World Trade Organisation (WTO) is doing in order to encourage trade to flow freely worldwide...

International trade is a vital component to encourage growth within countries. Across the world the exchange of goods and services plays a major part in developing economic and social importance. However, each country has their own trade agreements, which must enable trade to flow as freely as possible.

Established in 1995, The World Trade Organisation (WTO) helps governments to negotiate trade agreements and settle disputes from country to country. They have helped countries to negotiate lower trade barriers and open markets for trade – but also protecting consumers and preventing the spread of disease.¹

As suggested by the WTO, the economic case for an open trading system based on multilaterally agreed rules can be simple enough and rests greatly on commercial common sense. Evidence shows that tariffs on industrial products have fallen steeply, and now average less than 5% in industrial countries.

Data from the WTO reveals that during the first 25 years after the Second World War, world economic growth averaged about 5% per year, which was partly the result of lower trade barriers. During that period world trade grew even faster, averaging about 8%.

Speaking back in 2012, the former Director General of the WTO, Pascal Lamy, said: “The WTO provides technical assistance in the area of tariffs, merchandise trade and trade in services statistics, for which the WTO is a focal point of inter-agency activities.”

In 2013, Lamy also spoke about removing barriers to trade and cutting red tape in half in order to stimulate the world economy. He said: “The costs of trading across borders is estimated at \$2 trillion dollars. If we further break this down by the actual nature of the barriers we see that of this 15%, 5% is as a result of

tariffs and 10% is as a result of border and customs procedures.

“Globally removing these barriers to trade and cutting red tape in half, which is what a multilateral Trade Facilitation Agreement could deliver, could stimulate the \$22 trillion dollar world economy by more than \$1 trillion dollars.

“Simply reducing this red tape by half would have the economic effect of removing all the tariffs. The income creating impact of that is further multiplied for goods and services in regional and global value chains which may have to cross different borders several times in their production and distribution cycle. This has real economic deliverables for a country.”²

Under WTO agreements, governments must make their trade policies transparent by notifying them about laws in force and measures adopted. Regional Trade Agreements (RTAs) have become increasingly prevalent since the early 1990s, according to the WTO. As of January 2014, there were 31 with some 583 notifications of RTAs being received by the GATT/WTO. All RTAs in the WTO are reciprocal trade agreements between two or more partners.

The WTO is continuing their commitment to help stimulate trade worldwide, whilst helping to remove barriers. This work is crucial in providing a forum for countries to solve trade problems. ■

¹ http://www.wto.org/english/thewto_e/whatis_e/tif_e/fact1_e.htm

² http://www.wto.org/english/news_e/sppl_e/sppl265_e.htm

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Unlocking SME trade competitiveness

Rajesh Aggarwal, Acting Director in the Division of Business and Institutional Support at the International Trade Centre (ITC) provides insight into the role of SMEs in integrating successful international markets...

SMEs play an important role in every economy, more so in developing and the least developed countries, in terms of employment and income generation. Across the OECD countries, they account for 99% of enterprises and two-thirds of employment. In developing countries various studies estimate SMEs' share of employment to be even higher. Furthermore, it is the new high growth enterprises – distinguished by their export orientation and innovative capabilities – that play a disproportionately large role in job creation.

A number of factors impede on SMEs' ability to integrate successfully and sustainably into international markets. "Limited resources and international contacts as well as lack of requisite managerial knowledge about internationalisation have remained critical constraints to SME internationalisation."¹ Market opportunities and structures are increasingly dominated by global value chains (GVCs) dominated by large firms, which bring in their wake a set of new challenges for SMEs to become sustainable suppliers to these chains. Over a period of time, with evolution of international markets, related market access barriers now typically constitute a mix of NTMs, tariffs, private standards and trade facilitation (border) issues. Increasing the power of ICT products and services on the other hand, have also provided opportunities to SMEs to connect to buyers and suppliers much more directly and effectively.

Enterprise competitiveness is a result of 3 sets of factors: (i) enterprise internal factors including total factor productivity and ability to constantly innovate products, the production process and organisational set-up; (ii) efficiency of the business environment in which it operates; and (iii) linkage capabilities of an enterprise to markets and related buyers (e.g. lead firms in GVCs), to finance including FDI, and to relevant

new knowledge, skills and technologies. SMEs need to address this complexity of factors impacting upon enterprise competitiveness, for which they often need support of institutions like the International Trade Centre (ITC).

Integration of SMEs into value chains is greatly facilitated if developing countries have the ability to attract the big firms to invest in production facilities. Low-income developing countries face many challenges in 'efficiency seeking' foreign investments. National governments, therefore, need to put in place investment and trade policies as well as accompanying regulations which are conducive to attract 'efficiency-seeking' investments.

Trade facilitation has emerged as a major area for reform as it contributes tremendously to enhancing business competitiveness, more so of the small and medium enterprises. The new WTO Trade Facilitation Agreement (TFA) has given a fillip to policy and regulatory reform in this area by establishing binding obligations to improve customs procedures, transparency and efficiency as well as cooperation amongst border regulatory agencies and private sector.

SMEs often need direct assistance to connect to value chains of large firms. ITC as a neutral joint WTO-UN agency is well poised to play an intermediary role in connecting big corporations with small enterprises and encourage transnational corporations to balance their interests and that of developing countries' SMEs by fostering sustainable partnerships. For example, micro-producers in marginalised communities in several countries in Africa were connected to international fashion companies and distributors through mentorship of these companies to create high-end products that could find a place on the shelves of



fashion stores in Europe. This 'shared value' paradigm of large companies, to ensure that SMEs become reliable suppliers and integrate into the value chains of bigger firms is likely to gain significance in future.

SMEs' quest for internationalisation may not necessarily be tied up with its linkage with domestic presence of large transnational companies due to the emergence of ICT and related advances, such as, digital trade platforms and associated mobile payment systems. These developments have opened up new opportunities for SMEs to connect directly to international suppliers and buyers.

Rationalising business decisions of SMEs

SME managers must have the skills to take rational business decisions, such as, what and how they source, produce and sell with a view to promoting enterprise competitiveness. Skills development programmes which enables business managers to conduct value chain analysis to map their operations to identify opportunities for value addition and efficiencies across the entire value-chain play an important role in transferring such skills to SME managers. Providers of technical assistance target trade support institutions, established by the governments exclusively or in partnership with the

private sector, to provide skill building and other relevant export promotion services to SMEs.

They are also ITC's main national counterparts for capacity building services, which provide two-fold support to these institutions. Namely, organisational strengthening, using good business practices of similar organisations, and technical services strengthening aimed at enhancing the capacity of trade support institutions to provide technical services to its clients, such as market intelligence, quality management (including sanitary and phyto-sanitary measures), and packaging. ■

¹ OECD (2009), "Top Barriers and Drivers to SME Internationalisation", Report by the OECD Working Party on SMEs and Entrepreneurship, OECD.

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ITM Worldwide boost export in SMEs

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The first step comprises seminars in trade regulations, international market research followed by export coaching to implement an export business plan.

The second step consists of export sales training, and joint international seminars abroad, together with participants from other countries to enlarge the international network of colleagues and trade experts. Seminars in cross-culture, managing change and international marketing are delivered in order to implement a strategy.

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Change Management



Dr Albert A Angehrn, INSEAD (France) is a professor in information technology at INSEAD. His research in the dynamics of change management and collaboration has earned him a worldwide reputation.

International Trade Marketing & Strategies



Dr Per V Jenster, NIMI (Nordic International Management Institute) (China) is a professor of strategic management and marketing, and chairman of NIMI. He has also been professor at IMD, Lausanne Switzerland.

Managing Across Cultures



Dr Fons Trompenaars, is the founder and CEO of Trompenaars Hampden-Turner, (The Netherlands). He is listed as one of the most influential management thinkers of our time and also author of various books.

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INTERNATIONAL TRADE MANAGEMENT





Challenges remain for local economic growth

Aileen Murphie, Director at the National Audit Office examines the government's latest local economic growth initiatives and how they are performing...

The government's plan for local economic growth was set out in the 2010 White Paper Local growth: realising every place's potential. Its core objective was "to achieve strong, sustainable and balanced growth that is more evenly shared across the country and between industries". A key part of this involved transferring decision-making to the local level.

As a result of this, Regional Development Agencies were closed and Local Enterprise Partnerships were introduced. Another of the main principles included focusing investment through the Regional Growth Fund, Growing Places Fund, Enterprise Zones and City Deals.

In our report on Funding and structures for local economic growth, the NAO examined whether departments were implementing the new local growth programmes in a way that would achieve the government's objectives on growth. We looked at six case studies, including the Cornwall and Isles of Scilly Local Enterprise Partnership and North Eastern Local Enterprise Partnership, East Riding of Yorkshire Council and Southwark Council, and two cities with City Deals: Bristol and Nottingham.

We found that although the new local growth landscape is taking shape, a key government objective of ensuring an orderly transition has not been achieved. Although the Regional Development Agencies' functions transferred to central government departments effectively, the new local programmes were introduced over a different time frame. Significant dips in funding and outputs over this period are consequences of this.

The local economic growth initiatives covered in the NAO's report were also not designed as a coordinated national programme with a common strategy and set of objectives, although the Department of Communities and Local Government (DCLG) has made changes over time to help address this. The new initiatives covered in this report are each managed separately. Even though there is joint working on each initiative, the government lacks a clear plan to measure outcomes and evaluate performance, and therefore is unable to demonstrate value for money across the programme.

Local Enterprise Partnerships are allocating funding from the Growing Places Fund to local projects but evidence of outputs in terms of new jobs, houses and

improved transport to date has been limited. Local Enterprise Partnerships allocated £599m of capital funds to 305 local infrastructure projects by mid-2013. However, in 2012-13, those projects spent only an estimated £56m and created just 112 jobs.

The 24 enterprise zones established by the government also face a challenge to create the expected number of jobs. Job creation forecasts have changed from an initial expectation of 54,000 additional jobs by 2015 to between 6,000 and 18,000.

The Regional Growth Fund began to create and safeguard jobs in 2011 12, but the slow start means that the Fund now faces a heavily back loaded spending profile. The Department for Business, Innovation & Skills reported that the fund created 32,000 jobs by the end of 2012-13 against a target of 31,500. However, 40 schemes (21% of currently operational schemes) achieved less than 25% of their annual jobs targets.

If value for money from both the existing schemes and the new £2bn Growth Deals is to be secured, central government needs to make sure that there is enough capacity centrally and locally to oversee initiatives, that timescales are realistic and that there is clear accountability.

In addition, departments need to manage the range of local growth initiatives as a programme and address how they intend to evaluate performance and monitor outcomes across the programme as a whole. Otherwise, departments will have no basis for matching resources against priorities across the portfolio of initiatives to achieve best overall value for money. ■

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The Secretary of State for Communities and Local Government has shown his support for local growth in communities, and how enterprise zones are helping to strengthen and support local growth and innovation.

Speaking in January Eric Pickles said: As part of our long term economic plan, we are backing business and enterprise right across the country, helping town centres and local industries to prosper, and building a stronger economy."

In April the government announced further plans to improve high streets and town centres up and down the country. As part of the government's economic plan a billion pound package was set out to support local high streets, which came into effect in April.

"A key part of the government's long-term economic plan is to back business with lower taxes," said Pickles when the plan can into affect in April.

"Small shops are the lifeblood of local economies, and today's changes will mean a massive boost to our town centres – helping to create more jobs and securing a better future for our children.

"Together with our sensible changes to planning rules and action to tackle unfair parking practices, we are helping local communities secure the future of their high streets."

<http://www.thechamberlainfiles.com/eric-pickles-announces-21m-regeneration-boost-for-birmingham-and-the-black-country/>

<https://www.gov.uk/government/news/local-shops-and-pubs-could-get-a-third-extra-off-tax-bill>

Smart Specialisation and Economic Opportunity in the Heart of Devon

Leading the way for economic growth in the South East

Cities are engines of growth critical to economic performance and indeed leading new opportunities for recovery and real expansion of economic activity. The South East (of England) often makes the headlines but there are places which are comparatively and proportionately for their size, punching 'well above their weight' with a credible track record of job creation, business formation and survival and which are due recognition and further support.

One striking example is Exeter and its wider economy proactively looking to build on its record to date as a true exponent of 'smart specialisation' and working effectively to deliver sustainable growth. Together with its neighbouring local authorities, which also have the real potential to produce more valuable economic growth, it has focussed on selected assets and its strengths attracting significant public investment in vital infrastructure and opening up new strategic employment sites. The partnership has avoided the temptation of trying to appease everyone by spreading its attention and investment thinly over disparate activities.

When Exeter prospers the wider region certainly benefits as the travel to work area is extensive and well served by road, rail and air infrastructure. Between 1999 and 2009, Exeter's economy grew at 6.6% per annum, substantially above the national average with 4,500 jobs created in the city between 2008 and



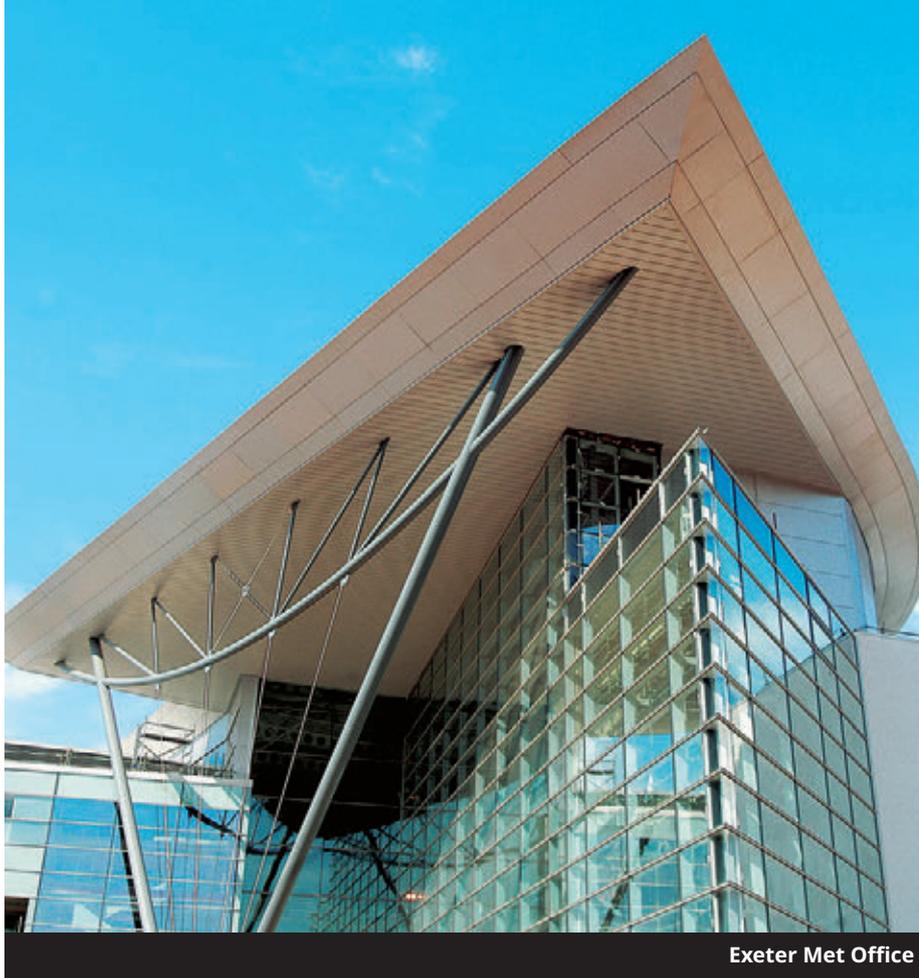
Science Park Centre

2010 whilst other areas were experiencing marked reduction. A 2012 BBC Local Growth Research (Experian) report revealed that SME growth in the wider Exeter area was in the top 10 in England. Moreover the Dupont 2013 Half Year Business Confidence Report revealed that the first half of 2013 showed a new record in company registration in Exeter. With further investment support this growth can continue.

The approach of this mature partnership between the private and public sectors in the city and the Heart of Devon has been about genuine collaboration, pursuing quality not mediocrity and supporting and building upon key assets. Most notable has been the growth and enhanced reputation of the University and the professional and business service sector, both critical to the diverse mix which puts the economy in a good position for the next set of developments.

The University of Exeter is a member of the Russell Group, recognising its world class research and academic excellence and links with business. In an increasingly global higher education market, they attract the very best academics and students from around the world as well as investment from multinational, research intensive businesses. It is high in the world rankings and consistently in the top 10 of various national rankings in the UK.

Exeter has a number of knowledge economy assets including the University and the Met Office which have resulted in a new Knowledge Economy Strategy being developed recommending that the focus of future work be on its strengths and potential in the following broad sectors: Big Data, Climate Change, Health Science, Water and "Agri-Tech". 'Big Data' also provides a key linkage across rich areas of world leading expertise including climate prediction and clinical trials. The potential



Exeter Met Office

investment in the new supercomputer at the Met Office and Exeter Science Park could well provide a transformational impact not just on the wider Exeter economy but on the South West economy as well. The University has acknowledged expertise in big data research and the growing use of big data will help open new commercial opportunities, such as businesses providing data aggregation and analytics services to a diversity of businesses in areas ranging from climate change to agri-tech and health.

The presence of the South West Academic Health Science Network (AHSN) in Exeter also has the potential to impact on the development of innovation in the health sector in the region. Its focus on information and informatics also presents the opportunity to develop more linkages between the health sector and big data. The unique nature of these organisations and facilities is likely to encourage take up from businesses not just from the wider Exeter economy and the South West.

In terms of skilled labour supply, the area has no problem at all with its undoubted environmental and other qualities in attracting highly qualified experienced people and is well capable of producing its own. The University of Exeter was University of the Year 2012, Exeter College was Further Education College of the Year 2012, the only FE college nationally to have been rated as “outstanding” 2 years running (2013/14) and a new specialist maths school is due to open in September 2014, one of only two in the country. Over 36% of Exeter graduates are involved in science, technology, engineering or maths-related subjects.

Exeter has seen a step change in its economic performance and is well placed to play an even more important role. It has demonstrated other key elements of smart specialisation, the importance of agility, an advantage of not being too big, and public and private partners agreeing and working to a clear, comprehensive, proactive and responsive plan.

Economic growth is being pursued hand in hand with housing development in and around the city to ensure successful and sustainable development including the largest low carbon district heating network outside of London reducing costs and the carbon footprint.

The overall development programme for the city’s economy is geared to the creation of at least 26,000 jobs over the next 12-15 years. A study undertaken last year concluded that the estimated investment expected to date in delivering all developments in the planned programme equates to more than £3.9billion. Recognition of the real potential impact of this growth on the wider economy should be as important as the attention being paid to other acclaimed major infrastructure projects creating shorter term increases in employment.

Unashamedly the message is – Invest in Exeter: Expect Success.

Please follow the link for more information.
www.exeter.gov.uk/index.aspx?articleid=13847



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Responsible investment: having your cake and eating it?

Will Pomroy, Policy Lead for Corporate Governance at the NAPF gives an overview of responsible investment and how it impacts on pension funds...

Responsible investment is becoming more and more of a mainstream concept, driven by a growing understanding of the financial implications along with rising regulatory requirements and political and societal expectations. In many ways, there have never been more questions about the activity and responsibility of investors in our economies and societies.

The long-term financial implications of some issues, commonly termed 'extra-financial risks', such as good governance, resource scarcity and labour standards, are becoming ever more apparent. Indeed, the impact of many of these risks – perhaps most notably those associated with climate change – will likely not come to the fore for years to come. It is this inter-generational impact which is particularly relevant to pension funds.

Traditionally, pension funds have very long-term investment horizons; this longer term perspective fits well with the increasingly robust evidence that adopting a 'responsible investment' approach can lead to enhanced long-term investment returns. Pension fund beneficiaries [on the whole] want to retire

with a decent income and into a world characterised by a healthy environment, vibrant economy and peaceful society. The assets pension funds own and have oversight of, can play an important role in determining the future society in which members will live and consequently, the real value of their retirement income.

So in line with their duty to pursue members' best financial interests, pension funds increasingly recognise they have stewardship responsibilities, which include engaging with companies and voting. Unfortunately, meeting these responsibilities and expectations is not quite so straightforward.

Pension funds are constantly trying to find the right balance between the very long duration of their liabilities and the need for liquidity to pay members. This balance sits alongside the growing requirements of regulation for mark-to-market valuation of assets and liabilities. In addition, the day-to-day investment activities of pension funds are generally delegated to asset managers and the proportion of pension funds' investment in UK equities has declined rapidly in recent years: The average defined benefit (DB)



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scheme now has less than 9% of its assets invested in UK equities; for the Local Government Pension Scheme (LGPS), however, this figure is higher at just under 20%.

This does not mean, of course, that pension funds are not able to be responsible owners and exert significant influence on this agenda. As institutional investors, pension funds are in a position to exert influence over the companies (and assets) in which they invest. And it's important that they do so in order to promote members' interests, help improve and protect the risk-adjusted returns on their investments, and also to create a more sustainable economy to maintain the real value of retirement income.

Most pension funds continue to have a material interest in the health of UK companies through their corporate bond holdings – in addition to their equity holdings. Given the demographics of the memberships of most defined contribution (DC) arrangements, these schemes are commonly biased towards equities; whilst day-to-day stewardship activities are delegated, schemes can (and should) still drive for high standards of stewardship and responsible investment from their asset managers.

The pioneering UK Stewardship Code, first published in 2010 by the Financial Reporting Council, aims to promote the long-term success of companies in such a way that the ultimate providers of capital such as pension funds also prosper. The NAPF is a vocal supporter of the Stewardship Code and we are encouraged to see a growing number of asset owners signing up – there was a 30% increase during 2013. More asset owner signatories will further influence behavioural changes that lead to better stewardship by asset managers and companies.

Given the delegated nature of stewardship activities, it is important that pension funds develop a relationship with their appointed managers by monitoring their activities and holding them to account through regular dialogue. Over time funds should be endeavouring to understand how their investment managers invest and how their ownership rights have been exercised.

To drive these behaviours, however, it is crucial pension funds are able to identify those investment managers' commitment to both the spirit and letter of the Stewardship Code. The NAPF's Stewardship Disclosure Framework aims to do just that by allowing funds, and others, to easily compare and contrast different asset managers' approaches to enhancing and protecting long-term value for clients.

Currently, 60 asset managers overseeing in excess of £13.5trn of assets have completed an NAPF Framework for their firms and these are all publicly available on the NAPF website. This extra transparency should catalyse the market for 'good' stewardship and provide an incentive for asset managers to compete in a 'race to the top'.

For pension funds, being 'active owners' is not about 'going greener'; it's about achieving better outcomes for members. In other words, being a responsible owner means that schemes really can both have their cake and eat it. ■

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Transforming the LGPS

Nicola Mark, Head of Norfolk Pension Fund discusses frameworks and how they help to deliver more efficient and effective Local Government Pension Schemes (LGPS)...

Running pension funds in both the private and public sector is an increasingly complex business requiring ever more specialised support. The Local Government Pension Scheme (LGPS) is a national pension scheme, administered locally by 101 administering authorities across England, Wales, Scotland and Northern Ireland. With collective assets of £178bn and 4.7 million members it is one of the largest funded schemes in Europe.

'By LGPS Funds, for LGPS Funds', the National LGPS Procurement Frameworks are a result of collaboration between a number of LGPS Funds. The project provides and supports 'multi-user, multi-provider' frameworks, open to all LGPS Funds nationally to help them procure services from a range of qualified providers.

The project is in its infancy – pensions is a long term game and contractual relationships often reflect this – but with 18 contracts already awarded under the frameworks and a further 20 currently in progress, the project has already delivered significant savings across participating funds and has the potential to deliver many millions.

The frameworks allow Funds quicker and more efficient access to high-quality services by removing the need for each LGPS Fund to independently undertake a full European Union (OJEU) procurement, and they enable LGPS Funds to leverage better prices while crucially still supporting local decision making and service requirements.

The initiative is directly in line with the government's agenda for delivering greater value for money, alongside the reformed Local Government Pension Scheme, and the government is 'keen to see this

opportunity taken up by more of the Funds' (Local Government Pension Scheme: Opportunities for collaboration, cost savings and efficiencies consultation May 2014).

“To give an indication of the scale of benefits achievable, over the lifetime of the contracts, Hackney, Suffolk and Norfolk estimate benefits across the 3 funds to be in the region of £1.25m.”

The first framework – for Actuarial and Benefit Consultancy Services – launched in 2012, followed by the framework for Investment Consultancy services in 2013. The most recent framework – for Global Custody Services – launched at the beginning of 2014. The fourth framework – for specialist legal services – is anticipated to be live towards the end of 2014. The potential for expanding the project into other areas is currently being explored.

The beauty of the frameworks is that any LGPS Fund can use the frameworks to procure services matched to their own specific requirements. All participating Funds benefit from the pre-agreed Terms and Conditions – often a cause of intense and expensive negotiation – and ceiling prices established under the framework, along with a collaborative rebate shared between participating funds.

The framework procurement route also offers benefits to suppliers as well as Funds, significantly reducing their overhead and costs.

The most recent framework established is for Global Custody services and is a good example of the frameworks in operation.

As with all the other frameworks the National LGPS Framework for Custody Services is fully OJEU compliant, meaning that LGPS Funds using the framework to appoint a provider only have to undertake 'further competition' rather than a full OJEU procurement exercise. Timescales are cut from 6-9 months to a matter of weeks as a result. Common Terms and Conditions were agreed by all parties as part of the framework – no mean feat in this arena – removing the need for specialist legal advice and negotiation for each separate procurement. Funds using the framework also benefit from ceiling prices (providers mustn't bid above these in response to tenders) and access to Mercer Sentinel's technical analysis of capability to help match local requirements. As value of business through the framework increases there is also provision for volume based rebates to Funds, further leveraging the purchasing power of LGPS Funds combined assets.

Although the framework only went live earlier this year, the first contracts have already been awarded under this Framework, with the Norfolk, Suffolk and Hackney Pension Funds conducting a joint call-off exercise and appointment.

The 3 LGPS Funds (with combined assets of £5.2bn) chose to work together, using the LGPS Custodian framework for the procurement, to ensure an efficient and effective procurement exercise and also to achieve the greatest overall value for money through leveraging the aggregate size of the Funds.

The Funds worked together to define their particular service requirements, to evaluate the responses and agree a single successful provider. Each then contracted separately with the winning provider.

To give an indication of the scale of benefits achievable, over the lifetime of the contracts, Hackney, Suffolk and Norfolk estimate benefits across the 3 funds to be in the region of £1.25m. Add to this the £.25m savings in procurement costs alone and overall the 3 LGPS Funds will benefit by £1.5m as a result of working together and using the framework.

The National LGPS Frameworks – 'by the LGPS, for the LGPS' – are the outcome of a collaborative project between a number of LGPS Funds, with all benefits and savings being retained within the LGPS.

It is hard work to set up and manage these frameworks and requires huge dedication from the Funds and professionals who give their time and expertise to establish and help manage them. As Lord Hutton envisaged, this is real collaboration in action, already delivering real and significant savings and benefits for the LGPS today. The achieved and potential savings are very significant – based on evidence from the Custody framework alone, as participation matures and grows, the LGPS could collectively benefit by more than £50m. These frameworks are still in their relative infancy and have a lot more to offer, but they've already proved the concept and are transforming the marketplace, potentially with implications wider than the LGPS.

More information about the frameworks – including the benefits, how they work, their scope and who can use them – can be found at www.nationallgps-frameworks.org, or alternatively by contacting the team supporting them at: +44 (0)1603 495922, or emailing nationallgpsframeworks@norfolk.gov.uk. ■



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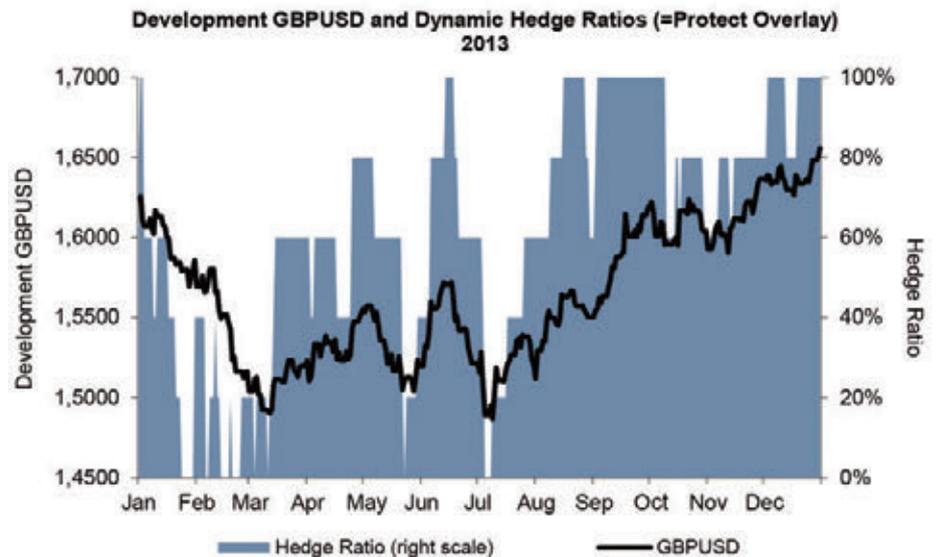
www.norfolkpensionfund.org

Managing risk to improve returns

The importance of return generating classes such as equities is proving beneficial to local authorities

The LGPS and its constituent Local Authority Administered Pensions Funds have provided local government employees with high quality and secure pensions for many years. They have been able to do so by remaining open to new investment thinking and embracing new investment opportunities whilst carefully managing the associated risk that comes with the search for higher returns. In doing so, one of the first significant steps that LGPS funds took some years ago was to reduce the natural “home bias” of investing in Sterling denominated assets and looking to foreign investment markets to both increase and diversify the investment returns available to them.

More recently, as both legislative changes and financial crises have taken their toll on funds, turning surpluses to deficits, the need to produce consistent investment returns has become ever more pressing. Unfortunately, officers and trustees are faced with a classic dilemma – the traditional “low risk” assets of cash and government bonds are offering historically low, in some cases, negative returns, whilst the appetite for taking on more risk in order to generate more returns is constrained by the already large deficits that many funds face. Thus, the management of risk in return generating asset classes, such as equities, has become of paramount importance.



With its German roots, going back to its foundation in 1590, its private ownership and personally liable partners, Berenberg has always paid particular attention to managing risk. Management of risk is at the heart of what Berenberg’s asset management division can offer local authority clients. By actively managing the risk of owning return generating assets, funds can reduce volatility of returns, i.e. reduce the risk of owning the asset, and therewith choose to own more within their overall risk budget.

Of particular interest to LGPS funds has been management of the currency risk that they bear through owning assets, predominately equities, quoted in currencies other than Sterling. The currency risk is an

inescapable and unrewarded risk that comes with the benefit of diversifying outside the home market. It can be ignored, opening the possibility that any returns arising from a rise in share prices is negated, or even reversed, by a fall in the underlying currency. It can be removed by way of passive currency hedging – selling the foreign currency in to Sterling as soon as the purchase of the asset is made. This has the disadvantage of requiring large liquidity to be available to feed the hedge positions if the hedge goes against you, and the underlying currency appreciates against sterling. In practise many funds have chosen to adopt a middle way, and hedge 50% of their currency exposure on a static basis. However, we believe that by adopting a flexible approach, and

employing a trend following model that automatically hedges when currencies depreciate, but removes the hedge when they appreciate, funds can not only protect themselves against depreciation but also benefit from currency appreciation, and all at a much reduced demand on the liquidity of the fund. Berenberg are already working with a number of UK funds, including members of the LGPS, in managing trend following quantitative based dynamic hedging solutions to enhance the returns that can be generated for Sterling based clients owning foreign assets.

Whilst LGPS funds have recognised the desirability of managing their currency risk, and continue to evolve their approach to doing so as they move from static to dynamic hedging, the risk of owning equities more generally has not been so fully addressed.

Historically, UK pension funds, including local authority funds, have had a high exposure to equities – typically more than 50% of their assets. Whilst this has fallen over recent years, equities remain a very significant component of the return generating engine for most funds. This is particularly so at a time when alternatives, such as bonds, are sitting at historically low yields, along with the other “lower risk” assets. If deficits are to be reduced, investment returns must be generated, implying the acceptance of higher risk. In Europe, and especially in Germany, equities have always been perceived as risky assets, leading to a much lower allocation to

them, relative to bonds, than in the UK. To reduce the risk of owning equities further, most German funds seek to protect themselves from equity market falls by putting in place a hedging strategy against underlying equity indices. This has not been common practice in the UK, but, with funds already in deficit and requiring returns, but with very limited capacity to stomach even short-term falls in capital values, it is becoming of more interest. Berenberg has long experience with working with German pension funds in creating equity market hedges that protect funds from general market falls whilst allowing participation in market rises. These are totally independent of the underlying stock selection process undertaken by third party fund managers employed by the fund, but address the risk of exposure to equity markets in general. As a result, funds can choose to reduce the risk of an allocation of equities or increase the allocation for the same level of risk. By avoiding the big market falls through efficient hedging, returns from equity investment are also substantially increased.

The same techniques are also employed to hedge duration risk in bond portfolios – of particular significance at a time of historically low bonds yields and interest rates, although of course a rise in bonds yields would have the impact of reducing actuarial deficits. However, a dynamic hedge on a fixed income portfolio would also reduce the financial deficit of a fall in capital values in bond markets as interest rates rise.

It is our privilege at Berenberg to work closely with members of the LGPS. We have the solutions and the expertise to meet the unique requirements of local authority clients, in helping them to substantially improve the returns that they can generate by managing the risks that they are forced to take to do so.

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Restructuring local pension schemes

Tony Hall, Journalist highlights how the changes to the Local Government Pension Scheme (LGPS), will affect a number of schemes including TfL and Dumfries and Galloway...

Changes to the Local Government Pension Scheme (LGPS) which were introduced from 1 April this year through the Public Service Pensions Act 2013, will fundamentally restructure the ways in which its 4.6 million members will save for their futures. Although the reforms are being centrally driven by government, the delivery of LGPS 2014 will be achieved regionally by administrators within local authorities, acting with the support of stakeholders including unions and employers.

Arriving at this consensus, although it has taken over 2 years to achieve, has been a basic tenet of the process. The idea of reform by consent was established by the Independent Public Service Pensions Commission, chaired by Lord Hutton which published its final recommendations (the Hutton Report) in March 2011, and on which the government set out its proposals for a comprehensive overhaul of public sector pension provision the following November.¹

The government's primary objective, set out in the 2010 Spending Review, was fiscal: to make £2.8bn in savings in public sector pension schemes by April 2015, including a £900m saving in the LGPS. The Hutton Report took a broader view, addressing issues of an ageing population, unequal treatment of members within the same profession, and the unfair sharing of costs between employee, employer, and taxpayers. In his Foreword to the Report Lord Hutton said that he believed it would be possible to balance taxpayer's legitimate concerns about present and future costs of pension benefits with continued access by public sector employees, "to good quality, sustainable and fairer defined benefit pension schemes."

Reform, "must not simply become a race to the bottom" Hutton said. "Establishing a relationship of

trust and confidence," would be very important, with a process of dialogue, "fundamental to build consensus over long term pension reform in the public sector." How people are treated in this process, he stressed, "Will be as important as the changes to the pension schemes themselves."

Bringing Hutton's recommendations to the heart of its policy, the Department of Communities and Local Government (DCLG) began a LGPS consultation process in the summer of 2011. It established a Project Board consisting of employers, represented by the Local Government Association (LGA), trade unions, and government representatives in order to begin negotiations.

The changes agreed include a move from a final salary to a career average scheme; an accrual rate of 1/49th of pensionable yearly earnings; a revaluation of active members' benefits with the Consumer Prices Index; and the introduction of a new lower cost savings option allowing 50% benefits on 50% contribution rate.

While agreement was reached at national level, communicating the changes to scheme members and applying them remains a local responsibility. The LGPS is supported by investments and assets controlled by the regional funds which also act to distribute pensions, because payment and fund administration is based on where members worked, or where they paid into the fund, not where they live. For those reasons issues of local governance and fund management across individual funds may have an impact on how LGPS 2014 is delivered to its members.

Transport for London (TfL) is a case in point. TfL as an Executive Agency of the Greater London Authority

is a scheme contributor to the London Pensions Fund Authority (LPFA) LGPS scheme. TfL employees are entitled to membership of the LPFA.

While TfL employees are entitled to membership of the LPFA as of right, TfL also has to provide financial support to the Public Sector Section of the separately constituted TfL Pension Fund, a non LGPS scheme. These responsibilities now include paying contributions to reduce the TfL Pension Fund deficit of £699m. Payments that include a lump sum of £37m by 2018 and a ten per cent increase in employer contributions of over 10% until 2020. The success of the current funding plan, Trustees admit, “relies on TfL continuing to support the [Public Sector] Section because the funding level can fluctuate, and when there is a shortfall, TfL will usually need to put in some more money.”²

TfL’s responsibilities as an employer within the LPFA add questions of sustainability. Despite assets of £4.69bn in 2013, LPFA runs a funding deficit of £1bn, and currently spends over £30m a year in investment management expenses and administration. To help resolve these issues LPFA Chairman Edmund Truell has proposed a merger of all London’s local authority pension schemes – there are currently 32 – plus the TfL scheme into a pan-London fund. This proposed initiative, which has Government support, would come on top of the changes imposed by LGPS 2014.

The delivery of a reformed LGPS in Scotland presents a different set of issues. Because of the devolved nature of Scottish Government public sector pension reform is being undertaken under separate legislation and within a later timetable.

The Local Government Pension Scheme (Scotland) Regulations 2014 will see the new scheme introduced across Scotland’s 11 pension fund administrative authorities from 1 April 2015, after the Independence Referendum takes place on September 2014. The Scottish Government has taken an active role in developing it’s own consultation process organised through the Scottish Local Government Pensions Advisory Group (SLOGPAG), which states its primary aim as being “the delivery of a scheme that takes a balanced consideration of the unique Scottish position.”³

SLOGPAG has brought together the Convention of Scottish Local Authorities (COSLA), representing local

councils and administrating authorities, Scottish trades unions and the Scottish Public Pensions Agency (SPPA) – the regulator of LGPS Scotland. Following discussions on the delivery and governance of the new scheme, stakeholders signed Heads of Agreement within the terms of the 2013 Act in December 2013. This was followed by a short consultation on the draft regulations that concluded in February 2014.

The result of the Independence Referendum – if it is a ‘Yes’ - will create questions of accountability for administrators of the new LGPS Scotland, such as the Dumfries and Galloway Council Pension Fund. Dumfries and Galloway is a comparatively small fund, with assets of £589m and a membership of just over 12,000 including 3,500 pensioners.⁴ The fund’s participating employers, however, include UK-wide companies such as Amey Plc, Shanks Group Plc, and Lovell, and UK established statutory bodies including the Scottish Police Services Authority.

How a fund of the size of Dumfries and Galloway, which already spends over £340,000 a year on fund administration, can take on the burden of squaring these issues remains an unknown. As is the future of the LGPS in Scotland if there is a ‘Yes’. The SLOGPAG Heads of Agreement makes no reference to the independence vote. ■

¹ www.gov.uk/government/uploads/system/uploads/attachment_data/file/207720/hutton_final_100311.pdf

² See TfL Pension Fund, Annual Review 2013 page 10 www.tfl.gov.uk/microsites/pensions/documents/tfl-pension-fund-annual-report-and-accounts-2013.pdf

³ Head of Agreement New Local Government Pension Scheme (Scotland) 12 December 2012 www.unison-scotland.org.uk/pensions/SLGPS2015_SummaryHead-sofAgreement_September2013.pdf

⁴ See Dumfries and Galloway Council Pension Fund Annual Report and Accounts 2012/13 www.dumgal.gov.uk/CHttpHandler.ashx?id=10676&p=0

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Is it Déjà Vu all over again or is this time different?

“There is so much liquidity in the market right now that financing is easy to come by. Companies that normally would have found themselves in default have been able to refinance their debt.”

David Kleisman, Moody's Investor Service

“Because spreads between high-yield and U.S. Treasuries are much tighter than normal, investors have to take on more risk for less reward. But the economy is still strong, and companies still are able to pay off their debt.”

Rick Fulmer, D.A. Davidson & Co.

Both of these quotes are sourced from an article written by David Hoffman of InvestmentNews dated May 21, 2007. These were not uncommon sentiments at the time. The markets appeared to be resilient and the U.S. and global economies seemed robust. However, one month later, on June 22, 2007, Bear Stearns & Co. was forced to pledge support to the Bear Stearns High-Grade Structured Credit Fund and the Bear Stearns High-Grade Structured Credit Enhanced Leveraged Fund, the combined collapse of which precipitated the collapse of Bear Stearns itself and ushered in the Global Financial Crisis in 2008 and 2009.

What interests us is that these quotes are recognizable in current literature. In fact, when we look back to published research, we see default activity of approximately one percent for much of the first half of 2007 and estimates from that time frame that default activity would remain in this general area for the remainder of that year. These are the very same sentiments conveyed in research, at conferences and around board tables in 2014.

The truth of 2007 is that, as liquidity concerns surrounding the Bear Stearns entities permeated other aspects of the capital markets, the LBO boom of 2007 quickly halted and capital activity rapidly began to change course. Within a year, Bear Stearns was no more and sights were set on other precipitous financial institutions including Lehman Brothers, Fannie Mae, Freddie Mac and AIG.

Have we learned from our past mistakes or are we doomed to repeat them?

Nearly seven years after the fateful days of early summer 2007, the markets appear resilient and the U.S. and global economies appear robust again, due in part to the active participation of central banks around the globe. However, once again, we observe signs of market excess. High yield and leveraged loan new issuance surged to more than \$1 trillion in 2013, approximately twice the prior peak.

The driver of this issuance is the combination of the quest for yield and low interest rates. According to the Standard & Poor's LCD, the high yield and leveraged loan markets attracted as much capital in 2012 and 2013 (\$239 billion) as they did in the three years prior to the Global Financial Crisis (\$229 billion). In addition, LBO issuance has returned to similar leverage ratios on new issue transactions but with less support from subordinated tranches. Finally, since 2009, the purpose of issuance or use of proceeds has been dominated by refinancing or general corporate activities rather than expansion activities such as acquisitions or operational improvements. The combined effect of lower quality borrowers leveraging or re-levering their balance sheets and using the capital for purposes other than those that are accretive to earnings has historically contributed to an increase in default activity.

We are concerned with these and other observable market characteristics. In fact, Siguler Guff believes the environment that has driven these characteristics is a manufactured one and that market participants have been influenced by these forces to search for yield regardless of risk. As markets normalize, we expect to identify and invest in mispriced and dislocated market opportunities.

As an institutional distressed investor with a long history rich with experi-



ence, Siguler Guff has identified many mispriced market opportunities and invested across cycles. We define our distressed strategy as an opportunistic and tactical discipline of accessing attractive investments that have the potential to generate strong risk-adjusted returns. If executed appropriately, distressed investing is a de-risking strategy driven by dislocations or perceived stress due to inefficient capital structures, organizational or leadership issues, or other non-economic forces such as tax considerations, regulatory changes and general market supply/demand imbalances. In fact, distressed investing is a deleveraging strategy as the investor is generally acquiring a corporation, a business or an asset at a depressed valuation through the debt and then converting through a bankruptcy or, more commonly, through a negotiated process into equity or other less onerous capital plus control or influence.

But it is not just the corporate markets that have provided investment opportunities for distressed investors. Since 2010, corporate distress has been a smaller portion of our overall distressed investment activity compared

to prior years. In fact, in 2013, the majority of our corporate distressed activity was in the form of secondary investments. We have leveraged our firm expertise in real estate and our historical experience in structured credit to access opportunities in other asset classes. The expansion of our skill set has provided a more global perspective to accessing the most attractive investments at the appropriate point in their respective cycles. In addition, we have developed broader structuring capabilities, which has driven a more efficient use of capital and improved the risk characteristics of the portfolio.

Given the complexities of today's market, we have turned our focus to other special situations while maintaining a view on the broader markets for greater dislocation. The opportunities of today are vastly different than those of 12 months ago. Capital moves quickly and undervalued opportunities attract investors quickly. A vigilant investor can identify new opportunities and deploy capital ahead of the masses. Including our real estate and healthcare teams, Siguler Guff has 15 investment professionals dedicated to

sourcing, structuring and managing investments in distressed assets. Of particular note, today, we have identified select strategies in non-performing loans, commercial real estate, healthcare royalties and royalty lending, global shipping and secondary portfolios as attractive opportunities.

Timing is everything and Siguler Guff believes that an actively managed and tactically deployed strategy that targets undervalued, stressed and distressed investment opportunities has the potential to generate strong risk-adjusted performance in today's market.

**SIGULER
& GUFF**

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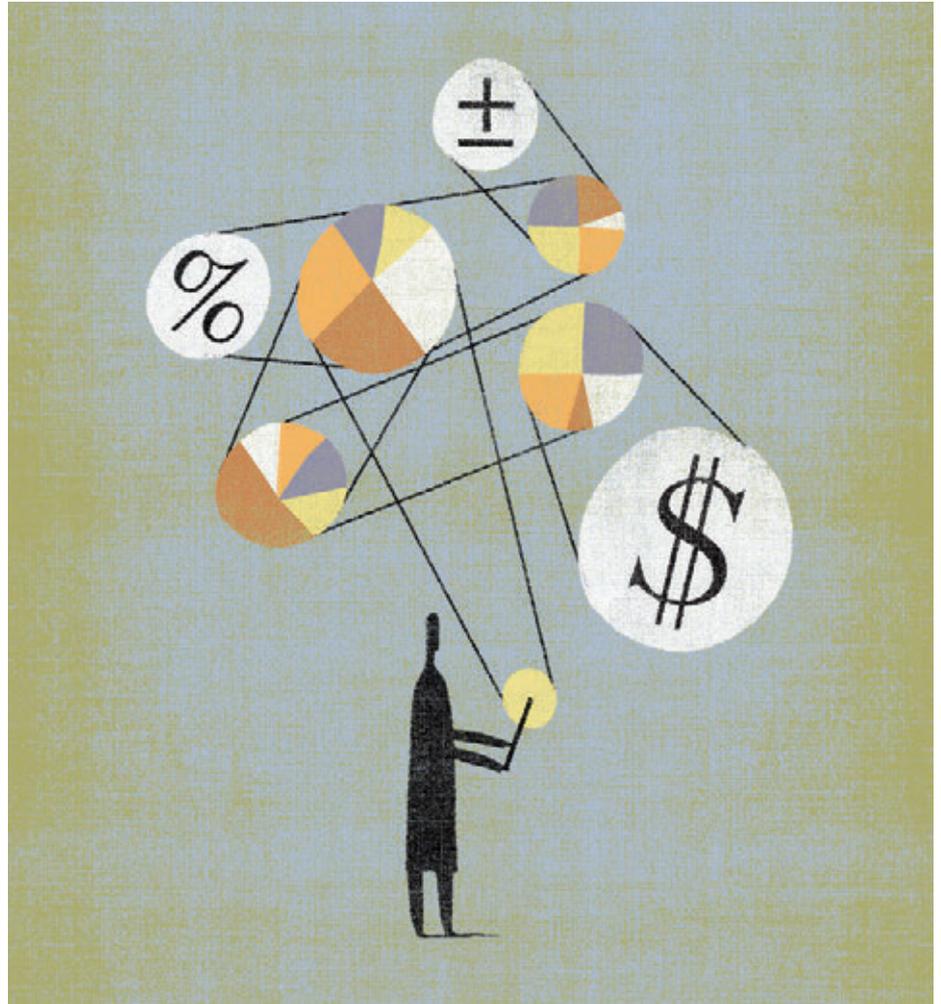
Return to fundamentals

We are proud to work with our clients in the UK public sector and help them deliver world-class pensions and investments to their employees. As investment professionals, we believe that a hallmark of our offering is our dedication to remaining true to our investment philosophies through all market cycles.

We have and will continue to focus on what we have always been best at, and what has driven our long term success: using our research to identify companies with attractive valuations and/or improving growth prospects, which will allow them to outperform.

Of course, markets are not always rational. Fashions and fads can overtake logic, and buying momentum can sometimes drive up the prices of some shares that defies the reality of their business models. That's been a feature of equity markets in recent years – as an old John F Kennedy saying goes, *'the rising tide has lifted all the boats'*.

But now, we think it's time for the second half of that saying, as completed by Warren Buffett, to come to the fore – *'it's only when the tide goes out do you find out who's been swimming naked'*. Companies have recovered strongly, with the strong companies gaining stronger balance sheets, and the most successful companies gaining larger cash piles. Our research shows this is creating a clear differentiation between companies who will be the winners – and those that will be the



losers. Encouragingly, we are seeing a return to fundamentals among investors, and a greater focus on the elements that differentiate stocks.

A commitment to innovation

One of the most important lessons we have learned is that diversification is crucial to success, both from an investment perspective and a business perspective.

In terms of our investment process, our philosophy of how we invest money for our clients is unwavering.

However, we are not blinkered to the changing world around us, so we strive to improve our investment approach. We have a research-driven culture with one of the largest commitments to superior and innovative research in the asset management industry. This research-based culture of intellectual curiosity and dedication to clients' interest is essential in shaping our investment strategy as we evolve.

In addition to the evolution of the way we invest, we are also seeking to

enhance our core offering and add 'tailored traditional' and 'alternative' investment capabilities that help future-proof our clients' investments.

In equities, our focus has been on creating a better balance between our traditional equity services and those designed to address the wide range of our clients' equity needs ranging from high return to risk mitigating strategies. We have also made strategic acquisitions. In May 2011, we acquired a team of equity fund managers from hedge fund Caxton Associates, which added valuable expertise in US long-only and long-short portfolios. In December 2013, we acquired W.P. Stewart, a New York-based growth equity investment manager. And in February 2014, we announced an agreement to buy CPH Capital, a Denmark-based, global core equity asset management firm.

In fixed income, we have substantially expanded and strengthened our global fixed income product platform. For example, we are building our capabilities in less-liquid credit, which includes real estate debt, direct middle-market lending, infrastructure debt, and residential real estate. Our infrastructure-debt platform offers investors the opportunity to diversify their broader credit portfolio by investing in real assets, particularly in utilities and transportation.

Our presence in both alternatives and multi-asset services are areas of growing demand. Among these are multi-manager, real estate, transitional loans, alternative credit, real

asset, long-short equity, and a full suite of liquid alternative funds, many with three-year track records. Our alternatives business has more than \$16 billion of assets under management, while our multi-asset business unit manages \$99 billion of assets in multi-asset strategies that use a full range of approaches with varying risk and return profiles.

Today, AllianceBernstein offers a broad array of global and local investment solutions, spanning asset classes, risk/return seeking objectives, investment styles and base currencies. With such a broadly diversified platform, our firm is well-positioned to deliver success to our clients, even when a particular asset class, style or geography is out of favour in the market.

AllianceBernstein in the UK

We seek to build on our long history of helping many of the world's largest pension funds – including many in the UK public sector – address their challenges and objectives. Alongside our investment management services, we have pioneered new approaches to pension saving. Our efforts are focused on the range of unprecedented problems faced by pension funds and their savers. Longer lives, financing shortfalls and increasing regulation are all making retirement planning much more difficult. The UK government's most-recent announcement on pension savings will ensure further change and we believe our strategies are already well-positioned and flexible enough to ensure the best outcomes for the widest range of member possibilities.

We have developed innovative DC pension services ranging from managed drawdown products and proactively-managed target date funds (TDFs) to risk management solutions.

AllianceBernstein at a glance

Our investment solutions are powered by more than 400 research analysts and investment professionals in offices around the world, with expertise that spans geographies, asset classes and styles.

As a leading global investment manager, we have a substantial European retail and institutional business, with offices in Amsterdam, Geneva, London, Luxembourg, Madrid, Milan, Munich, Paris, Stockholm and Zurich.

As of December 31, 2013, the AllianceBernstein Group managed approximately £271 billion in assets.

Find out more

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A change for better services

Clive Betts, Chair of the Communities and Local Government Committee explains why effective procurement is essential to local government...

Local government expenditure is rarely out of the news, with the public and media focussing keenly on whether councils are achieving value for money for their local communities. Effective procurement is central to this. Every year councils spend billions on procuring goods and services and how that money is spent is vital in delivering the services that people rely on, from having their bins collected to receiving care in their home. On 17th March, following 6 months of scrutiny, my Committee published its local government procurement report¹ on what the local government sector should be doing to improve its procurement operations.

We found that whilst there is much good practice out there, it is not being spread consistently across all councils. In short, too many local authorities are failing to deliver high quality procurement. A step-change in effort is required to support councils in tackling more effectively all the complex aspects of buying the goods and services their communities need.

I believe passionately that it is for the sector itself to lead this change. The Local Government Association (LGA), with the support of the Communities and Local Government Department (DCLG), should establish a task-force, pulling in private and third sector expertise, aimed at improving council capacity to conduct effective procurement. Plus, the Cabinet Office should invest in building local government capacity and must ensure that lessons learnt in central government are translated into effective council action and vice versa.

Councillors must have a clear role reviewing and scrutinising their authorities' procurement, including of contracts outsourced to the private and other

sectors. Executive political leadership is also key, and councils should identify a lead cabinet member and a senior officer who will take overall responsibility for ensuring effective procurement. These people should make an annual report to a full council meeting on the council's procurement policy and how this has impacted on local economies and services.

Businesses and residents need to get a better deal from council procurement. The cost to companies wishing to bid for council business can be an eye-watering £40,000-50,000 per tender – higher than in most other countries in the EU. In addition, the average procurement exercise takes some 53 days longer in England than in the rest of the EU. A culture of over-zealous application of EU procurement guidelines currently pervades too much of local government. Too often councils retreat into the bureaucratic bunker instead of developing expertise.

As outsourcing becomes increasingly prevalent, councils must ensure that residents receive a quality and consistent service irrespective of who delivers it. After all, outsourcing a contract does not mean outsourcing responsibility for ensuring effective service. This should include ensuring that residents have a clear point of contact with external delivery bodies, so that they receive a seamless service.

Whilst we found little evidence of fraud within local government procurement, there is growing unease that unless local authorities develop the management skills to manage the growing number of outsourcing contracts, the risk of fraud will grow. Councils must not 'let and forget' but should pro-actively tackle fraud throughout the lifetime of a contract. More must also



be done to encourage whistleblowers, which are one of the best means of identifying fraud; we suggest an anonymous reporting channel.

Procurement is simply too important to be seen as a niche activity conducted in back offices by specialist staff. Rather, it must be viewed as a vital cross-cutting activity. This requires in-depth skills from all those involved in designing, commissioning and managing services, not just procurement officers. The sector, led by the LGA, must ensure that the required skills are embedded across councils. Such investment is essential, even, and indeed especially at a time of financial constraint, since spend now will lead to significant future savings. Improving procurement is a win-win for local authorities, as councils from Hampshire to Halton are demonstrating. Procuring well not only allows them to save money whilst still protecting frontline services, but also allows them to better meet the needs of their communities.

The government will be responding to our report in the next few weeks. My Committee will be examining this closely, together with the response from the LGA and local government community, to see what action has resulted. Put simply, without effective procurement the already difficult financial position of local government will become ever more precarious. It is now for the government and the sector to ensure that this does not happen by acting on our recommendations so that all councils procure at the level of the best. ■

¹ <http://www.publications.parliament.uk/pa/cm201314/cmselect/cmcomloc/712/71202.htm>

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Clive Betts MP
Chair
 Communities and Local Government Committee



Driving cost-effective collaborative procurement

Julian Clarke Head of Fleet Services for CPC Drive explains the benefits of using framework agreements within the NHS...

North of England Commercial Procurement Collaborative (NOE CPC) provides collaborative and bespoke procurement solutions to the public sector. NOE CPC is one of the leading players in collaborative procurement within the NHS in England, and is wholly NHS owned. Since its establishment in 2007, a range of procurement and commercial services have been developed to support their customers. The primary role is to help them to function more efficiently through cost-effective collaborative procurement.

As one of numerous contracts on offer, CPC Drive is a salary sacrifice car scheme which offers NHS trusts the opportunity to drive a brand new car at a heavily discounted rate. Here, Julian Clarke, Head of Fleet Services for CPC Drive, tells us about some of the

benefits of framework services for areas such as fleet management within NHS trusts.

How can the public sector use framework agreements to save costs and provide efficiency within services?

Framework agreements offer the public sector an efficient and speedy route to purchase a wide variety of goods and services, however in our view it is really important that authorities make sure they are fully informed before electing to use a particular agreement. That is certainly our approach when talking to the public sector about the merits of using CPC Drive. Ultimately while frameworks can be both efficient and convenient, authorities must never lose sight of the need to secure value for money.

How important is it for NHS trusts to provide cost-effective services and solutions?

In the current financial climate the need for the NHS to provide high quality, efficient and cost effective services has never been greater. Everything the NHS can do to improve the efficiency and cost effectiveness of its support functions ultimately helps to maintain and improve patient care.

What are some of the benefits of accessing CPC Drive?

Our salary sacrifice car scheme offers a number of benefits to both trusts and their employees. As well as saving you money, on average around £700 per car per year through reduced Class 1A National Insurance Contribution (NIC) and pension contributions, accessing this framework also saves you time as we've already done the procurement legwork meaning that lengthy administration processes are cut out and you can rely on our dedicated procurement approach to maximise relationships with manufacturers to negotiate and secure the best possible deals for your employees. Other benefits include an award winning fully supported online system to make the process as straightforward as possible, supporting the environment through reduced CO₂ emissions with our choice of 'green' vehicles, all with CO₂ emissions of 150g/km or less and the opportunity to offer your employees a generous and highly valued employee benefit. We also offer a number of solutions to mitigate any risk associated with employees leaving the scheme early.

What other services are procured this way in order to provide more cost-effective and better customer services?

NOE CPC offers a range of solutions to meet our customers' needs. Our broad range of contracts and frameworks cover a spectrum of areas which includes clinical consumables, disposable drapes and gowns, e-tendering solutions, hearing aids, IT solutions and hardware, and medical and surgical equipment maintenance and calibration. These examples are

just a small sample of those on offer – currently over 90 contracts and frameworks are available for both members and non-members to take advantage of.

We are constantly working with our members to improve upon the contracts that we offer and new contracts are continually being added to our portfolio of services.

NOE CPC believes it is important to take a very conservative approach to ensure NHS organisations achieve savings. In our experience it is easy to position potential savings and recurrent year on year savings. However it is much harder to ensure each organisation actually realises savings to their bottom line. Therefore we focus on the savings our members verify as cash releasing. To this end we are well on track to deliver more than £10m of new cash releasing savings to our members in 2013/14 financial year. This demonstrates the importance of procurement in supporting NHS trusts to make valuable savings in a number of areas. ■

To find out more about CPC Drive visit www.cpcdrive.nhs.uk
You can also view a full list of the contracts and frameworks available through NOE CPC at www.noecpc.nhs.uk/procurement/contracts



North of England
Commercial Procurement Collaborative

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Julian Clarke
Head of Fleet Services
North of England Commercial Procurement Collaborative (NOE CPC)
www.noecpc.nhs.uk



Empowering the public sector

Louise Tibbert, President of the PPMA explains the importance of understanding the true costs of providing a good service, and how performance should be managed...

The perception of the public sector is that we do not focus on performance in the same way that perhaps the private sector does. Whilst this may still be true in a minority of councils, the reality is now very different. The double whammy of budget cuts and demography pressures has acted as a significant catalyst for change over the last few years.

The integration of some NHS services with those social care services delivered by councils and commissioned partners to elderly or disabled people, is one example where innovation and customer centric focus is dramatically shifting the approach. Accountability will also sit more with front line workers who will become multi skilled and will be trusted to make the right decisions quickly for the people they support – rather than waiting for a remote manager to give their

sanction. Empowerment will be much stronger and so will outcomes for people. This is the holy grail of joined up, preventative and person centric care. Performance is likely to be assessed on the outcomes of the whole system. How many people were admitted or re-admitted to hospital? What is their quality of life? How does this compare to the 'old' approach in terms of outcome and costs? How does support for families help create better outcomes for children – to give them a better chance of a prosperous and happy life rather than becoming the next generation of service users?

The way that externally provided services are commissioned is also changing to become more outcome based, whilst not losing the cost imperative. Market shaping through procurement and partnership working

is emerging as one way of addressing this need and the performance management of contractors is also changing as a result.

Local councils are run by locally elected councillors who are now held much more to account by the public through the ballot box and through increased transparency of their decision making and spending. Changes to service design and delivery are supported by business cases and delivery is monitored via performance indicators and reporting, so far so good. But they too will need to think about what good performance looks like in a more complex landscape. The shift of Public Health services from the NHS to councils in April 2013 is now enabling a joined up approach centred on preventing later demands on services. So everything from preventing teenage pregnancies, to mental health, to obesity awareness and through to more strategic approaches to housing and planning decisions are designed to have an impact over the longer term. Well-being is a key component now of how strategies are being developed. It is not the job of your local council to make people happy, but they do have role in helping people to make themselves happy.

There is much discussion about workforce productivity and how to achieve this in a service, rather than a production based culture. Approaches like 'lean' and an understanding the true costs of providing a service are paramount. But the key to performance is good employee engagement. Most council's recognise this now and measure and report on employee engagement. A few link it through to measures of organisational performance. Great leadership around the basics like appraisals, is now much more prevalent and programmes to multi skills or re-skill workers are becoming common place. Increasingly pay or 'contribution' is also being linked to performance of the organisation, department, team and individual. People are clearer about what is expected of them and of the impact they make to those who use public services. Most people working in the public sector are highly committed and our job is making sure we do

not gradually break down that commitment through poor people management practices. Moreover, we need to harness it as a force for good and to leverage all the creativity and compassion that is undeniably there for the taking.

Research has shown that poor standards of care in hospitals or care homes are very much linked to employee engagement levels and culture, as well as how services are designed. Actually involving workers at all levels in the design of services is the way forward – they often have the insight and commitment to high quality services that is needed and will own the new approach. Leadership is also crucial, particularly in modelling the required values and behaviours.

So, great organisational performance is all about people and culture. It is about getting the best from people and supporting them to reach their full potential, whilst allowing them space to make the right decisions. Cross sector integrated working means that a single culture focused on the needs of the service user will be crucial. This is no easy task and will need careful handling by Organisational Development (OD) specialists to help shape ownership, behaviours and outcomes.

At the recent annual PPMA Seminar in Leeds, one speaker, who also happened to be an accountant, stated that 'culture eats strategy for breakfast'. I couldn't agree more. Turning the massive challenges in the public sector into opportunities that make a real difference to real people is all about culture and workers – who are real people too. ■

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The art and science of continuous improvement

For many years I have been both fascinated by and looking for an answer to the question of why individuals respond so differently to the concept of Continuous Improvement. In the course of my research, it has become apparent that however much we invest in building the qualities of resilience and engagement in our people, there is link that underpins every action taken by every person, every day. And that link is Trust.

In my quest, I became acquainted with the work of Stephen M R Covey and especially his excellent book *The Speed of Trust*. I am indebted to him for his wisdom.

BACKGROUND

All of us Trust, to a greater or lesser degree, according to the context being defined. Trust underpins and affects the quality of our every waking moment; our relationships, our communication, every effort in which we are engaged.

A recent survey conducted by British sociologist David Halpern revealed that whereas only four decades ago in Great Britain, 60% of the population believed other people could be trusted; today it is down to 29%.

In the work context we would seem to be in a crisis of trust that is affecting individuals and businesses at all levels. Low trust causes friction. It creates

hidden agendas, politics, inter-personal conflict, defensive and protective communication. It shows itself in a breeding of suspicion and cynicism which becomes self-perpetuating, resulting in a downward spiral. Low trust damages resilience, with each new set-back making it more difficult for the person to recover.

Trust also plays a critical role in engagement.

Employee engagement worldwide is running at an all-time low. Data from Gallup states that while 96% of engaged employees trust their companies, this drops to 46% with disengaged employees. It is recognised that the number one reason people give for leaving their jobs is a bad relationship with their manager and here in the UK, I have seen first-hand the devastating effect lack of trust has on the retention of key staff.

Times are tough and business decisions can be hard to accept. Low trust can make it all but impossible for managers to motivate people, to encourage them, to get things done – and especially so when the mere suggestion of Continuous Improvement is scrutinised for evidence of a set-up!

WHAT IS TRUST?

Put simply, trust means confidence. When you trust people, you have confidence in them – in their integrity and

in their abilities. You feel safe in their hands. It really is that simple. But the difference is not small, it is dramatic.

Think of someone with whom you have a high-trust relationship. What's it like? How does it feel? How well do you communicate? How quickly can you get things done?

Now think of someone with whom you have a low-trust relationship. Again, what's it like? How does it feel? How is the communication? Does it flow quickly and freely... or do you feel like you're walking on land mines and being misunderstood? Do you work together to get things done quickly... or does it take a disproportionate amount of time and energy to reach agreement?

WHY INCREASE TRUST?

The difference between a high and low trust relationship is palpable. Just consider the effect on communication. In a high-trust relationship, you can say the wrong thing, and people will still get your meaning. In a low-trust relationship you can be as measured and precise as you can and they'll still misinterpret you. Can you even begin to imagine the difference this could make in your organisation?

There is also a direct correlation between trust and efficiency. When trust is low, speed comes down and cost goes up. When trust is high, speed goes up and cost comes down.

You have only to think of the differences in the time it takes when dealing with clients who either do or don't trust your organisation.

Trust is one of the most powerful forms of motivation and inspiration, and the ability to establish, grow and restore trust is now a key leadership competency for managers. People want to be trusted. They respond to trust. They thrive on trust. Managers need to be good at establishing, extending, and responding trust - not as a manipulative technique but as the most effective way of relating to and working with others; and of getting results.

KEY COMPONENTS OF TRUST

It is easy to think of trust only in terms of character - of whether or not someone is good or sincere with trustworthy ethics and integrity; and there is no doubt that these are essential qualities. But to think that trust is based merely on character misses out a fundamental truth.

Trust is a function of two things: Character and Competence. Character includes integrity, motive and intent. Competence includes capabilities, skills, results track record.

However sincere and honest a member of staff may be, you won't trust them fully if they don't get results. And the opposite is also true. Someone may have great skills and a good track record, but if they're not honest you're not going to trust them. From a man-

ager's perspective, the competence dimension helps give trust its harder more pragmatic edge.

If resilience and engagement are the leaves of the tree, Trust is the root; the source of life, movement and energy. But the biggest bonus is this: resilient staff who Trust their manager and the organisation are more likely to remain loyal and bounce back from a crisis.

All you need are the right leaders. Managers who can demonstrate empathy, who understand people and can pull their team together. Trust is the fuel that allows resilience, engagement and Continuous Improvement to flourish.

HOW TO INCREASE TRUST

We are passionate about helping individuals, teams and organisations deliver massive improvements and we have an excellent track record.

On a Personal level, the EASIEST way to increase Trust is to do what you said were going to do! On a Corporate level, the FASTEST way to increase Trust is to engage with your managers to inspire a Trust culture.

WHAT NEXT?

Of course, to harness the benefits of increasing Trust in your organisation, there's no better place to start than by finding out where you are most Trusted yourself! And you can find this out by clicking on the link below which takes you through to The Trust Test and a whole library of information.

The Trust Test

This is a facebook app and you are more than welcome to share this link with as many people as you like - from your own team members to work colleagues and even friends and family. And it's absolutely fantastic for young people too.

The second International Trust Conference is being held in London on the 11th September with speakers from around the world including Stephen MR Covey himself. We are also live-streaming a Global Webinar for our overseas clients or those who can't attend in person.

Global Trust Conference

I thank you for reading this article and look forward to accelerating Continuous Improvement.



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Maximising improvement – delivering change

Debbie Simpson, Acting CEO of Institute for Continuous Improvement in Public Services (ICiPS) gives an overview of how Continual Improvement can recover competence within organisations...



Continual Improvement (CI) is a way of working that has 3 key questions at its heart: questions that can be applied at local or organisational level;

1. What do our customers need?
2. How can we meet this need as efficiently as possible whilst maximizing the benefits to be derived from closer alignment?
3. As we adjust, how do we reduce the negative impact of the changes we are making?

This may sound simplistic but to address the questions robustly will result in a long list of objectives that will have an impact on every aspect of how the organisation operates.

For example: the word 'we' means every single employee; back office and front line staff and ancillary staff. It means empowering employees and addressing all the implications this brings, including risk management and considering the impact on lines of authority and control.

Alignment means working with suppliers, internal and external stakeholders and partner organisations. It raises questions of joint objectives, leadership, reporting and aligning disparate cultures.

In organisations where CI is embedded, every activity is designed and aligned to minimise the gap between customer requirement and present performance, as well as present performance and emerging opportunities for change. Every employee is actively engaged in delivering change rather than change being a bolt on or planned activity. Communications ensure the



Continuous improvement can help bridge the gap between knowledge and practice through an ongoing cycle of review and evaluation. This starts with knowledge being turned into intelligence, which highlights improvement opportunities; which in turn results in actions to improve. It is a classic learning cycle that should take place both at individual and organisational levels.

By its nature, CI requires looking for new ways to do things, not only to improve efficiency of how things are done today but also to identify ways to ensure that services are fit for the future. This could result in the identification of innovative approaches.

What is classed as innovation will vary from organisation to organisation but innovation in its true sense is something new and untested, and there is therefore a degree of uncertainty inherent in this type of change. To embrace innovation therefore requires the willingness to invest time and money into an untested solution and accept the risks inherent with that.

This may all sound incredibly hard work and indeed to build a culture that supports CI does require significant investment in time and effort. However once embedded, continuous improvement is a powerful force for change, and with a more engaged and motivated workforce you will benefit from a constant stream or localised and beneficial changes that not only improve performance today, but equip the organisation to meet the future with confidence. ■

right information is in the right place at the right time to enable opportunities for change to be identified and successes celebrated.

The glue that binds all of these activities together should be the organisational strategy. This is often supplemented by a CI strategy, but all too often these strategies are no more than a list of projects and training requirements.

A CI strategy should be a key document aligned with objectives which has a clear focus on ensuring the infrastructure that enables CI is effective. So the plan should consider cultural aspects, how data is converted to intelligence, how employees are empowered and how transformation and change align. These are complex and cross cutting themes which will require participants from many areas to be involved.

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Debbie Simpson
Acting CEO

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Mind the Gap!

Keith Parsons, Managing Director of Dembridge, provides an insight into the power and intelligence of continuous improvement deployment

With considerable pressures on the public sector to improve efficiency and enhance effectiveness, it is no wonder that more and more organisations are turning to the strength of continuous improvement (CI) as the vehicle for positive change.

Average cost return on investment of 16:1	For every £1 spent on a QM programme, costs were reduced by £16
Average revenue return on investment of 6:1	For every £1 spent on a QM programme, revenue increased by £6
Average profit return on investment of 3:1	For every £1 spent on a QM programme, profit increased by £3

Source: The contribution of quality management to the UK economy (Report for the Chartered Quality Institute and Chartered Management Institute)



Organisations that embed CI as part of their strategic agenda really do reap their rewards in terms of greater efficiency and improved customer service. A focus on this as part of the CI culture really does help ‘close the gap.’

In the summer of 2013, Greg Hobbs, Cabinet Office, published an article (in collaboration with Dembridge) emphasising the need to embrace continuous improvement. In this publication, he stated:

“Now is the opportunity for more investment and more time on integration, not just operating continuous improvement on projects side by side, but bringing them

together, perhaps becoming more intelligent in how we implement continuous improvement and more sophisticated in how we design projects, processes and policies.”

Greg Hobbs, Cabinet Office

According to a recent survey, those organisations that employ quality management systems e.g. Lean, Six Sigma, the contribution to the success of those organisations is substantial, with the returns on investment significant. It cited three key statistics (above):

The impressive RoI findings indicate that if QM programmes were instituted more widely, businesses would stand to benefit from net reductions in costs and net increases in revenues and profits. In this continually demanding market and difficult economic climate, realising sustainable and often quick benefits from the implementation of continuous improvement can only be seen as a positive step in organisational effectiveness and people development. How can this be achieved?

CFO: “What if we invest in training our people and then they leave?”

CEO: “What if we don’t invest in training our people and they stay?”

Making it happen Converting knowledge to intelligence

Whichever route you take to enjoy the riches that continuous improvement can bring, there is one thing that you will certainly need – a core of people who have the knowledge and necessary skills to ‘make it happen.’ Inevitably, this means the necessity for training in the tools, techniques and application of the available comprehensive tool box. The intelligent use of data and process management enables opportunities for improvement to be identified more quickly which in turn facilitates the achievement of quick wins.

To take full advantage of the opportunities for improvement requires a balanced, but structured approach.

Having one or two trained personnel will not facilitate behavioural change, neither will it produce the sought after results. The importance of the team in having at the very least, an awareness of the objectives and purpose of continuous improvement, cannot be overstated. In addition, having a depth of talent from functional experts to high level practitioners is the most effective way of delivering results. In other words, the structure must be in place to ensure delivery and sustainability of the gains.

[Click here to view testimonials](#)

Barriers to success

The desire to embrace continuous improvement methodologies is sometimes compounded by a number of barriers. There are many reasons why organisations (in particular the public sector) do not channel their energies into a proven vehicle for positive change:

- Lack of senior management commitment
- We don't have the time
- Fear of change
- "It's not broken, so why fix it?"
- The budget doesn't allow for it

It is the first and last of these that tend to be the most common resistors. Taking the first point, any project will only be successful when there is demonstrable commitment from 'the top.' When the people of the organisation see this observable commitment, the resistance to change becomes more manageable, particularly when all people in the organisation are involved and it becomes habitual. The



deployment of continuous improvement requires behavioural change (culture change) and this can only be achieved when driven from the top.

The second, and very common reason for not embracing CI is due to a 'lack of funds.' This is understandable given the constraints placed within the public sector due to years of economic stress, but, as with all businesses, failure to invest often results in at best, a static organisation and no growth. To see what others have achieved through deployment of CI, [click here](#).

In a recent conversation with a council, we were advised that "We have the time, we just don't have the budget to do it." We'll let you make a judgement on that comment.

Close the gap by opening the opportunities.

To be continued in the next issue...

Useful links:

- [Case studies](#)
- [Testimonials](#)
- [What is Lean Six Sigma](#)

For more information on how continuous improvement really can help you and to request the Cabinet Office article, please contact us.



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Making business improvement enjoyable and sustainable

Benefitting from business process management

The only constant in business, private or public, is **Change**; and most people whether they admit it or not do not like change enacted upon them. It is therefore important as you approach designing and implementing a Continuous Improvement (CI) programme that you fully recognise and manage the change aspects. Continuous improvement is not a new concept, well promoted in manufacturing businesses; it requires intensive teamwork with team members that have the delegated responsibility to improve the processes they are part of.

Leadership is key in selling the vision of the future beyond the proposed improvements and designing a reward and recognition scheme that has a personal dimension to it. Change Management is multi-dimensional including education and training, business process modelling, and communications. All of these elements are then designed to match the organisational culture.

External Intervention and facilitation can be effective, in challenging the status quo, providing analysis tools and programme management; but sustainability can only be achieved from within and enthusiastic participation can only be guaranteed if the process is enjoyable.

Making this process enjoyable requires



that you ensure that each of the participants:

- Has a sense of control over the outcome.
- Understand their personal benefit.
- See how they will improve their skills making them more employable inside or outside the organisation.
- Receive recognition of their achievements through the monitoring of benefits and the difference the change has made.

Why does this make it enjoyable?

Firstly, if you can see and feel in control of your own destiny you are more likely to participate in changing it. This

means leaders need to be able to project a vision of where they think continuous improvement is going to take the business, and then what part the participants will play in it. Leaders also need to emphasise and promote the personal benefits such as training as well as monetary rewards.

For example demonstrating that by participating in programmes such as this so they can progress within the business and in some cases this progression might be significant enough that they move out of the business into a new career.

Sustainability requires that the business:

- Provides a strategic framework in which continuous improvement is

managed through process improvement targets set over a 3-5 year period.

- Provides for the monitoring of these targets as part of departmental 'business as usual' activities.
- Continues to provide training in analysis, communication and decision making skills perhaps using the early practitioners to develop others.
- Communicates regularly describing how the business is progressing and the contribution from CI.

What are the key elements of a successful CI programme?

We consider the corner stone to be a dynamic business process model. By understanding the present maturity of the processes, comparing to best practice provides the 'Gap' that must be closed by the CI programme. We debate process performance in a qualitative manner in cross-functional workshops. The maturity of these processes will vary and this will lead to different categories of improvement such benchmarking, step change and break through.

When redesigning processes we take into account that different processes have different values within the business, therefore there should be little discussion about streamlining activities and removing rework from back office processes and can be set to a 'best practice' standard; whereas 'added value' processes need careful design to ensure we deliver the most beneficial outcome.

The benefits model of the continuous improvement programme will directly be related directly to these processes

also. Executive workshops enable senior managers to define the type of benefit and the degree of difficulty to achieve it. We use 3 categories Displaced Costs, Improved Productivity and Increased Revenue; and three degrees of difficulty High, Medium and Low to enable managers to allow for the level of control they have in implementing the process improvement. This qualitative method engages managers better than traditional single target benefit measures.

Throughout a CI programme a significant level of honest communication is required, all stakeholders need to be understood and communication will vary from results notification to visioning. All the communicators will need to have a good level of skill and be able to address their work colleagues and senior managers in equal measure.

This ability requires structured training and to ensure good 'internalisation' of change we use workshops to engage the change agent in all participants; other skills training will include the ability to communicate with colleagues, facilitate workshops and present analysis and assessment results to senior managers. The senior managers role in this is to be listening, facilitating and mentoring, guiding; not managing and implementing.

In Summary

Throughout the next 12 months we will be looking at some of these techniques and approaches in more detail, but in conclusion the implementation and management of a successful continuous improvement programme requires good planning, a shared vision of the future, skilled internal change agents and extensive open communication.

We hope that we have shown that the human element is the key issue in the whole process; take your staff with you. In addition do not think you can delegate the whole process to outside agencies though they can help to provide tools and techniques and create initial momentum. For example there are many examples of where a change have been made without performing business modelling and in some cases this has resulted in extremely effective, short term cost reductions in head count, but an inability to perform the processes effectively after the programme stops.

Finally CI should be seen as redirecting your resources to add more value in activities that you may not be able to perform effectively because they are either not recognised, there is not enough resource in the business to do them or they are being protected by departmental approaches to process design and management that are ineffective in today's agile business climate.



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Embracing performance management

Johnny Gifford, Research Adviser at the CIPD – the professional body for HR and people development, gives thought to the complex factors involved in achieving performance management with purpose...

Few things are solved by a silver bullet, but performance management stands out in this regard. Even a revolver full of silver bullets wouldn't guarantee you'd got it covered.

The purpose of performance management has been described as establishing 'shared understanding about what is to be achieved and... ensure that it is achieved'.¹ Sound all encompassing and slightly nebulous? It can be. It's certainly far broader than a line manager running through an annual appraisal form, or even taking a member of staff to one side to discuss their under-performance.

Instinctively, we know this is true. We don't expect an organisation's performance to be sorted simply by virtue of a discrete management system. We need

processes in place to help employees develop the right capabilities and get them to buy in to the vision of the organisation. Line managers need sufficient time and resources to support their teams and ideally, should be given the authority to ensure they are realistic. If not, performance runs the risk of being short lived, as systems crack and individuals buckle under pressure.

Performance management has a lot in common with employee engagement, an increasingly common focus of people management. The notion of engagement describes employees who are not only willing to go the extra mile, but have the physical well-being and energy to be able to do this and – equally important from a performance lens – are going the extra mile in the right direction. In other words, as the MacLeod



Jonny Gifford
Research Adviser
 CIPD

Report² puts it, they see the ‘line of sight’ between their role and the organisation’s purpose and strategy.

But while there is no simple answer for how to ‘do’ performance management, I would single out the following guiding principles.

The opportunity to discuss aims and targets is important not only to develop shared understanding but also to help shape them. This may be a question of avoiding unrealistic targets that set you up for failure, but equally it can be a way of stretching targets and being more ambitious. If teams and individuals are given ownership of targets by being involved in setting them, they take more responsibility for their performance and often aim higher.

Focus on leadership at all levels

Leadership development should not be the sole preserve of a selected few at the top of the organisation. At any level of the organisation, people managers should not be dishing out orders, so much as helping their reports live and breathe the overall aims and deliver on their personal objectives.

A holistic approach

We should recognise that performance management is not an isolated activity that can be clearly delineated. The implications are far reaching, affecting our day-to-day conversations and business planning, as well as the more obvious aspects like appraisals. We also need an integrated approach, as pulling a lever in one area can affect performance elsewhere. This can be the case either negatively, with unintended consequences, or positively, taking the opportunity to build shared purpose or cross-departmental collaboration that benefits different aspects of the organisation.

Performance management systems are undoubtedly an important strand, for example, helping ensure poor performance is picked up and addressed. Well

constructed systems will also include support both for line managers (for example, training on giving feedback on performance) and reports (for example, stress management courses). But no matter how good the design, we also need to recognise that performance management relies upon regular interactions, not just periodic reviews of targets.

There is a perennial temptation in performance management to fall back on what Douglas McGregor called a ‘Theory X’ view of the world, adopting a do/tell, command-and-control style of leadership.³ For most employees in most situations, we are far better working to the ‘Theory Y’ assumption that the role of managers is to inspire and support, rather than dictate. This does not deny the existence of certain non-negotiable objectives, or the need to hold people to account. But in today’s climate, employers are invariably looking to do more with less and get employees to contribute more widely to the performance of the organisation. It is hard to see how this will be done sustainably if people are treated like robots. ■

¹ ARMSTRONG, M. and BARON, A. (2004) *Managing performance: performance management in action*. London: Chartered Institute of Personnel and Development.

² See: www.engageforsuccess.org/ideas-tools/employee-engagement-the-macleod-report/#.U2zWEdtwbow

³ Douglas McGregor (1960) *The human side of enterprise*.

.....
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Research Adviser

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Raising Concerns at Work

Free guidance for workers and employers on Whistleblowing

Raising concerns about poor practice, as part of people's day-to-day work, should be the norm. That's the message in the new guidance that the Whistleblowing Helpline published on 17 March, which provides information, advice and support for health and social care staff and managers about whistleblowing. You can download the Raising Concerns at Work Guidance for free at: <http://wbhelpline.org.uk/resources/raising-concerns-at-work/>

Whistleblowing policies and legislation can seem complex and overwhelming. Our Guidance aims to help managers and staff navigate their way through what can seem like a minefield. Key messages in the Guidance include:

- Top Tips for workers who wish to raise concerns, written in plain English and signposting to sources of advice and support.
- A flowchart of the whistleblowing process, in line with the legislation.
- Top tips for operational managers to help them respond positively when staff raise concerns.
- At corporate level, the Guidance sets national standards for whistleblowing policies, together with a summary of employers' responsibilities.
- And there are case studies of good practice, to inspire and encourage us all.

From an employer's viewpoint, whistleblowing can be an opportunity to stop poor practice or wrongdoing at an early stage. It makes business sense to find out about issues before they get out of hand. For the worker, the freedom to raise concerns without fear means that they can go ahead and 'do the right thing'. There are signs that the climate of opinion may be changing, with growing recognition for the bravery of people who "blew the whistle".

In the Foreword to our Guidance, the Secretary of State for Health Jeremy Hunt states that "staff should be supported and protected when they raise concerns, as well as praised for their courage and thanked by management as a key part of the effort to build the safe, effective and compassionate culture that patients, service users, the public and the overwhelming majority of staff across health and social care expect."

Crucially, the communication of the whistleblowing policy and the training for staff and managers needs improvement. Because the numbers of incidents raised under formal whistleblowing procedures are quite low, it is difficult for managers to develop confidence through experience alone.

The Whistleblowing Helpline aims at making staff feel less isolated and stressed by offering support and advice on the whistleblowing process.

And our new-look website, launched earlier this month, offers toolkits and resources to inform managers and staff in a practical way. We offer policy reviews and can also advise on training for managers and for staff in health and social care – please get in touch if you want to know more. Details of how to contact us are at the bottom of the page.

The Whistleblowing Helpline offers free*, confidential and independent advice about whistleblowing processes to people working in the NHS and adult social care. It is provided by Mencap and commissioned by the Department of Health. The helpline can be reached by telephoning 08000 724725, emailing enquiries@wbhelpline.org.uk or visiting www.wbhelpline.org.uk. The helpline is available weekdays between 08.00 and 18.00 with an out of hours answering service on weekends and public holidays.

*Call charges from mobiles may vary.



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2020 vision for public services

Jos Creese, Head of Information, Corporate Resources & IT Service at Hampshire County Council gives an overview of how public services need to rise to the digital challenge...

Following George Osborne's stark picture for further cuts to public services, things are going to get tougher still, and by 2020 public services will be very different. The austerity programme in the UK is following 3 distinct phases:

Cumulative cuts:

- **2011-13** – 10-15%, Typically achieved by stopping things reducing overheads, and some automation;
- **2013-14** – 20-25%, Typically achieved by transformational change, greater use of IT for mobile working to drive productivity;
- **2014-18** – 25-40%, something new, something more?

Achieving 25%-40% spending reduction is unprecedented in the public sector or even most organisations. Most public service organisations will already have cut discretionary spend, overheads, corporate services where possible and have already had to undertake fundamental change just to get through to 2015. Yet it won't be nearly enough to get through to 2018.

To be able to operate within these new budget levels post 2015, new business models will be needed – and leading public services are already embarking on this challenge:

- New front line delivery: 'digital dominance', use of volunteers, divestment to community partnerships, franchised delivery models, co-production of service design and delivery.

- New supply chains: new risk models, joint partnership interests, different style contracts, 'agile' delivery, softening of hard client/supplier splits.
- New partnering: modernised or replaced outsourcing contacts, 'Cloud' beyond IT, collaboration for economies of scale, collective budgets, shared risk to reduce cost, public-public partnerships (PuP) dominate.

These changes are not 'more of the same' – for example, simply outsourcing more will not be enough to reduce cost and neither will the most efficient in-sourced services based on existing delivery methods. They each depend on public services becoming 'digital businesses' – which is not the same as spending more on 'IT'. Done together, they will protect and improve services, create new capacity to meet demand and yet deliver significant further savings. They will also completely transform how we design, deliver, view and use public services.

These models in one form or another are unavoidable. They offer a new and sustainable model of public service delivery in the future.

Organisations will need to take stock of their preparedness for this 'digital change' if services are to be sustainable in the years ahead. For example: overcoming reluctance to reduce travel, the 'meetings' culture and a reliance on paper. The changes also imply new risk models in a digital world – business continuity, reputation and cyber threats.

Not all organisations can or will want to be leaders



and it won't be necessary – there will be a 'shake down' which drives broader shared services with the leaders supporting delivery for multiple public service organisations and related services.

There is no shortage of examples of how digital can fundamentally change what we do and how we do it for the better. Empowering front line staff such as social workers with tools to allow them to be more productive can dramatically improve service responsiveness – but better still, when a service user can do it for themselves using simple 'apps' to access complex services in more meaningful ways.

We tend to think in traditional ways about using IT, using new technology to automate and streamline a process. It often takes the service user to challenge that – reporting potholes using a mobile app and GPS with a direct link to the company who can fix it, or using video and audio records for social case work, rather than traditional forms made electronic.

True, there are risks and these do need to be managed. Experimentation with public services is not for the faint-hearted given the external scrutiny from the press. We cannot waste public money or risk the well-being of those we are there to serve. Yet if we do

not change to a new model of design and delivery we will, over time, increase both costs and risk.

Whatever your view about the necessity or nature of cuts, change happens. But it is the way we handle the change which will determine whether we are left with a costly legacy or modernised sustainable services built to take full advantage of digital opportunities.

.....
Jos Creese
Head of Information, Corporate Resources,
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www.hants.gov.uk

iMuseums, uMuseums, wiiMuseums

Using technology to personalise and enhance the museum experience

As a youth, I was taught that museums are about the past. As I grew older, I saw newly minted museums dedicated to the same subjects. I came to realise that these institutions were really about the present because whatever 'past' was addressed could only be understood from the point of view of the present. Each and every object, word, and media piece was informed by a filter of the present.

There are visionaries who conceptualise the museums of the future, but these too, only manifest the cares and concerns of today. A clever curator in the 'real' future could look at any of these cultural institutions and identify its 'vintage', just as wine writer Jancis Robinson might peg the year of a Bordeaux's bottling (give or take a year).

In other words, we only have museums of now. And there are trends that are making them much more interesting, complex, and responsive to increasingly nuanced missions than the museums of yore. These trends are all interrelated:

Museums have evolved from collections-based to message-based institutions, but this evolution does not mean replacing one type with another. Instead there are layers of messages added to touchstones of material culture and historical events.

Museums and their constituents are becoming more self-aware and

engaged in the creation of meaning in a museum, rather than simply consuming content. Museums are, however, not a wiki-democracy where every selfie-tweet has equal value; nor are they something that, like an internet website, is merely digital, infinitely replicable, and unverifiable. One of the problems of the 'wiki-museum' is that you can't tell what is important or accurate. Museums are the vehicle by which we define and acknowledge what we instinctively know is important.

Technology advances. Unlike the military or big business, the relatively small market size of museums means that technology packages available to museum developers are far behind the cutting edge. And, because of the development/implementation cycle of a museum installation, the technology deployed in a museum is far behind the consumer curve. It's likely that the average visitor has better and newer technology in his or her pocket or purse than is used in the museum. However, museums can create site-specific environments that immerse the visitor in dynamic environments that support dynamic interpretations about dynamic processes, recognise and track individuals and their interests through an experience, and allow visitors to see patterns across space and time.

These trends all converge in exciting possibilities for needed and relevant venues – the museums that tell me about myself, and tell me about you



National Civil Rights Museum, Memphis

and about us – the iMuseum, the uMuseum, and the wiiMuseum. In the museum of now we can see and address historical trends and data in ways that were previously inaccessible. Rather than drowning in data, we can use technologies and techniques to focus our content delivery to build experiences that are unique and individually meaningful – particularly for topics where individual needs and vast datasets converge; such as Health, Cultural Identity, Economics, and Sustainability in all its forms.

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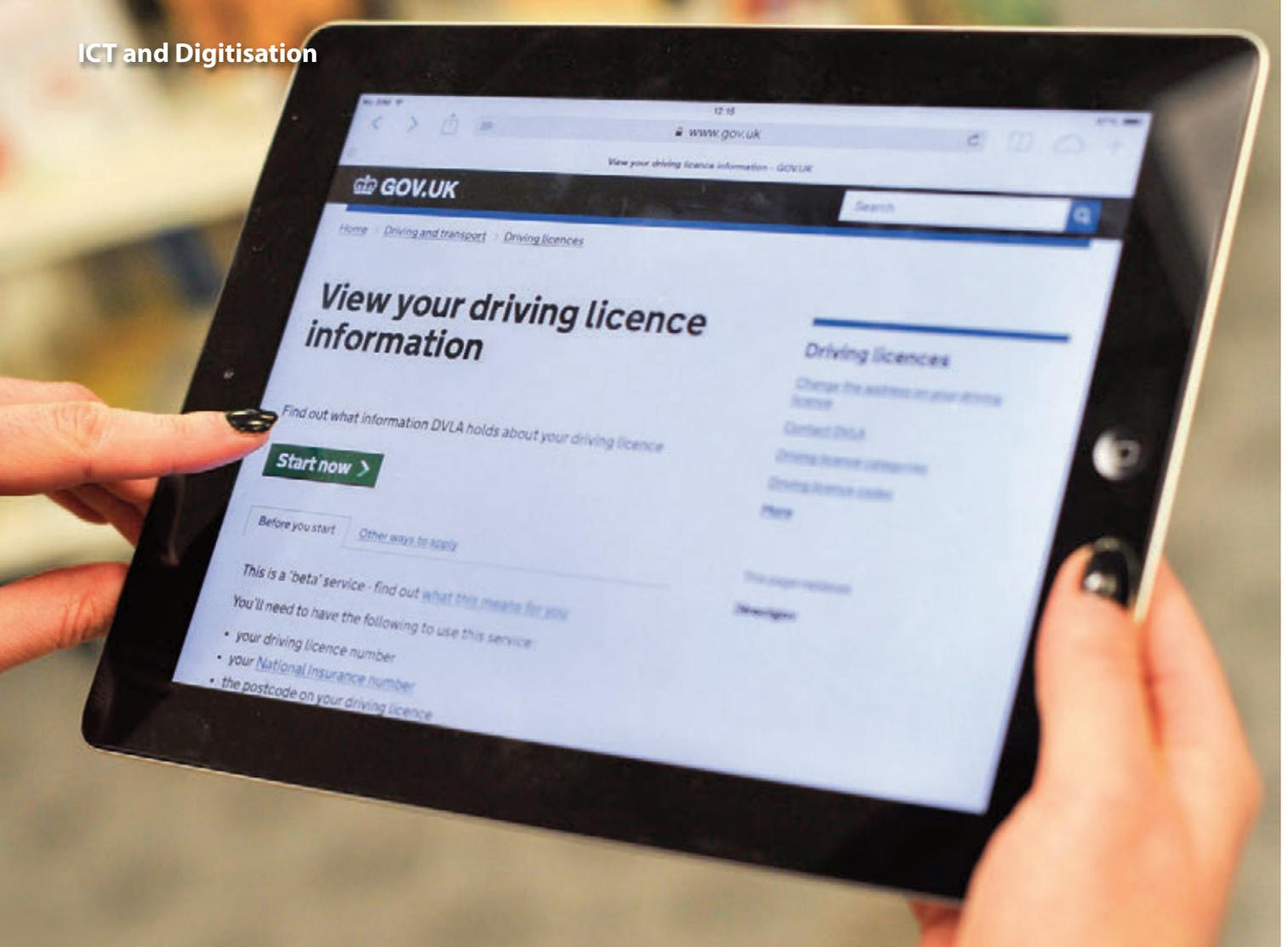
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Driving forward digital services

Rohan Gye, Digital Exemplars Service Manager at the DVLA sheds light on the new digital services to help millions of people access their online records...

View Driving Record, or VDR for short, is DVLA's first digital exemplar. It has provided DVLA with an enquiry platform capable of handling hundreds of millions of requests for data from individuals, the public sector, and organisations who have a right to view it.

VDR is the first service to use the new enquiry platform and allows individuals to view their own driver record. Drivers are able to check the driver data DVLA holds is up to date and the service will remove the need for customers to contact DVLA by phone or in writing for straightforward things like checking their address, what vehicles they can drive or, if held, when their penalty points expire.

We have worked closely throughout the development with the Government Digital Service to develop VDR, ensuring it meets the 'Digital by Default' Service Standards. Part of this relationship has been about challenging existing ways of doing things and transforming DVLA services. To this end, we were the first service in DVLA to host data in the secure cloud, the first to procure a small medium enterprise to lead development, the first to use our own in-house support team and the first to use agile as a development method.

Part of meeting the standard involves building the service around user needs. To meet this requirement, we conducted a survey with 1500 drivers before we



started to find out why they contacted DVLA for information, their preferred means for doing so, and what information they needed to see. Interestingly, over half of the respondents stated that they would telephone DVLA as a first resort. Taking that into consideration we decided to build a service for our call centre agents that replicated the on-line service for customers. This meant that should our customers using the service need assistance, our agents could see what the customer was seeing. It also provided a simpler means of displaying the data for our agents, shortening the length of calls.

“Drivers are able to check the driver data DVLA holds is up to date and the service will remove the need for customers to contact DVLA by phone or in writing for straightforward things like checking their address, what vehicles they can drive or, if held, when their penalty points expire.”

As part of our development we also conducted an exhaustive series of user insight testing. This involves real users testing the service on a preview site, which looks, feels and works exactly like the real thing but without real data. Doing this provides valuable and insightful feedback. For example, is the language easy to understand, can people find the information they need, how easy is it to navigate, is it what users want to see? From each session we took the feedback and

put some of the suggestions into the development backlog so by the time of our next insight session, we could test the new features with another set of users. This constant refinement process, led to the design you see today. Part of the continuous improvement process means that as part of the service we will keep getting customer feedback and will use this to keep improving the service.

The development process has been challenging, but also very rewarding. Seeing how the capability and confidence of DVLA's team members has grown has been incredible. For most of DVLA's team this was our first experience of digital service delivery, some new into our roles, or deeply embedded in old ways of working. I hope I speak for everyone when I say, we would never wish to go back.

No time to rest on laurels though as our next phase of development starts as we begin the process of improving the VDR Beta to make it ready for transition to full live status. Next we will be delivering the My Licence service which will provide driver data to the insurance industry. This will be swiftly followed by allowing employers, hire car companies and others who need it, secure and enhanced access to support abolition of the paper counterpart to the driving licence.” ■

.....
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www.gov.uk/browse/driving

www.twitter.com/dvlagovuk

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the NHS Clinical Commissioning Groups

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- Target files
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- Patient files
- Payment vouchers
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- Pharmacy files
- Practitioner performance files
- Rent & rates files
- Various computer printout listings for BACS payments

If this is of interest please contact:

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Featured eBook

Cosmogenic Radionuclides

invaluable quantitative tools
for Earth's sciences



The production of cosmogenic radionuclides on Earth result from nuclear reactions initiated by primary and secondary energetic cosmic ray particles which, during their passage through the atmosphere and into the first few meters of the Earth's crust, interact with various atoms of atmospheric gases and surface rocks, respectively.

In this way there are two types of cosmogenic produced radionuclides – the atmospherically produced cosmogenic nuclides and the in situ produced cosmogenic nuclides. The former production is far more intense because cosmic rays dissipate most of their energy in the nuclear reactions occurring in the Earth's atmosphere. In their digital ebook CEREGE in France explains more.



To read the digital ebook

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Faculty of Medicine

The Faculty of Medicine in Hradec Králové was founded on November 25th 1945, initially, as a part of the Prague Faculty of Medicine. The town of Hradec Králové regularly ranks among the top places to live in the Czech Republic for quality of life.

Our biggest projects are on new procedures in diagnostics and the treatment of civilization diseases and diseases related to an ageing population.



Hradec Králové Railway Station, Relaxing zone. Photo: Milos Vojír



Faculty of Medicine lecture theatre

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