

ADJACENT PLANNING & BUILDING CONTROL TODAY

SCOTLAND

MEASURING SCOTLAND'S HISTORIC ENVIRONMENT



IN THIS ISSUE

07 | The Disintegration of the Housing Debate

Professor Alister Scott believes key participants need to embrace the drivers of development in a more joined-up discussion about the housing crisis

15 | The toolkit for BIM - completing the jigsaw

Stephen Hamil, Director of Design and Innovation at NBS, discusses the digital toolkit that will complete the Level 2 BIM suite

43 | The challenges of thermal bridging

Alex Taylor, NHBC Senior Energy & Environmental Advisor, examines the challenges that thermal bridging presents from an energy assessors point of view

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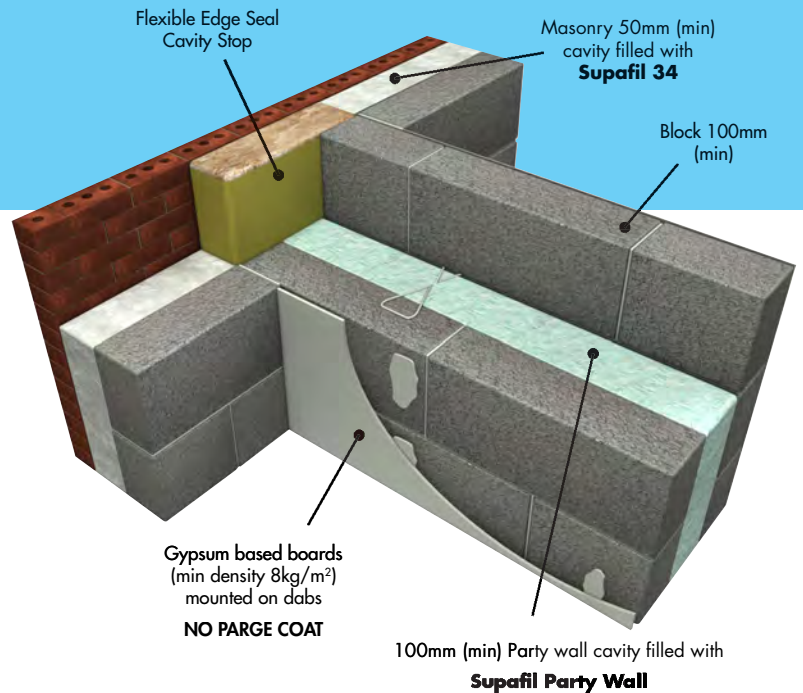
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Introduction

Welcome to the March edition of PBC Today Scotland.

In the most recent news, the ePlanning portal in Scotland has reported a significant growth in popularity in the last year which has been marked by two key milestones. It claims that more than 60% of all applications and appeals are now submitted online, and that the 100,000th application was submitted through ePlanning Scotland in February this year.

However, nestling within this new and improved way of working, it is important not to forget that Scotland has a rich historic environment to protect. Embracing new systems is a key driver to enable us to protect our history, and this is reflected in an article from Jo Robertson, Senior Policy Officer at BEFS (Built Environment Forum Scotland). The article outlines the vision for the future of Scotland's historic environment and how, by developing a measurement framework, success can be assessed.

Planning policy has seen a great deal of change since the Conservative-Liberal Democrat coalition took over the political reins, but as general election fever heats up, experts believe some planning committees will practically stall on making decisions until after the election in May.

This hiatus in proceedings certainly won't help the housing crises, but we will see the various political parties addressing the issue in their manifestos. Developing a meaningful

housing policy blueprint will be seen as recognising a basic social need and could well be a vote-winner.

Professor Alister Scott believes that the wrong question is being asked. It shouldn't be simply a question of how many houses we need, but rather "what kind of future places do we want to create?" Scott argues that this fundamental societal question is overlooked as the housing debate becomes increasingly disintegrated.

In terms of BIM, this year has been incredibly busy with the Digital Plan of Work toolkit released. Stephen Hamil explains the toolkit in this edition. Steve Thompson of BIM4M2 provides a discussion on BIM for manufacturers, and Anthony Burd, Head of Market Development, and Stephanie Kosandiak, Lead Programme Manager for Construction at BSI have contributed a really helpful article outlining all the key BIM standards currently in use. Whether you're new to BIM or not, this article will act as handy reference tool.

This edition is also looking at energy efficiency with articles detailing fuel poverty and mitigating energy losses within buildings.

Whatever your profession, I hope you find something of interest in this issue and look forward to hearing your thoughts and comments. ■

PLANNING AND DEVELOPMENT

05

Success measures for Scotland's historic environment

Jo Robertson, Senior Policy Officer at BEFS outlines a ten-year strategy to achieve a clear vision for Scotland's historic environment and how that is measured

07

The Disintegration of the Housing Debate

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

10

Planning for SuDs

Sam Ibbott, Deputy Public Affairs Director at Environmental Industries Commission examines the latest government consultation on SuDs and the new approach of delivering it through the planning system

12

Archaeology for all?

Dr Mike Heyworth MBE, Director at the Council for British Archaeology assesses the current situation of archaeological services in the UK and the vital role it plays in our heritage

15

The toolkit for BIM - completing the jigsaw

Stephen Hamil, Director of Design and Innovation at NBS, discusses the digital toolkit that will complete the Level 2 BIM suite and how it will enable everyone in the industry to use BIM as an integral part of their everyday working lives

20

BIM and GIS: A harmonious future?

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

25

BIM and the data challenge

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

32

BIM: the story so far

Anthony Burd, Head of Market Development and Stephanie Kosandiak, Lead Programme Manager for Construction at BSI, outline the growing BIM landscape

BUILDING CONTROL

35

CDM2015 and domestic projects

James Ritchie of The Association for Project Safety answers the questions most raised about the new CDM Regulations with regard to domestic projects

38

Building a more accessible future

The retail and hospitality industry have been challenged to increase the levels of accessibility for disabled people. Chris Moriarty, Head of Insights and Corporate Affairs at BIFM examines the challenge ahead

ENERGY EFFICIENCY

40

A solution to combat fuel poverty

The NIA is calling on all political parties to recognise that home energy efficiency needs to be defined as a National Infrastructure Priority to combat fuel poverty

41

For low energy office buildings, keep it simple

The design, construction and operation of low energy buildings should favour a simple 'fabric first' approach wherever possible writes Tom De Saulles, building physicist at The Concrete Centre

43

The challenges of thermal bridging

Alex Taylor, NHBC Senior Energy Consultant, examines the challenges that thermal bridging presents from an energy assessors point of view

50

Insulating party wall cavities - a crucial step

With the welcome announcement from DECC that insulating existing party wall cavities is now included as a measure in the latest RdSAP calculations for both the Green Deal and ECO funding, Nick Ralph from MIMA explains why measures such as this are so crucial

56

Thermal model calculations: A lesson in accuracy

Andrew Lundberg, thermal modelling expert at the Association of Thermal Modellers details the challenges faced in accurately assessing building fabric performance, hailing competency as the key

FINANCE

59

Capital allowances - boosting your bottom-line

Steven Bone, Director at The Capital Allowances Partnership Ltd explains the tax relief on offer under the capital allowance scheme and what it can mean for businesses



Success measures for Scotland's historic environment

Jo Robertson, Senior Policy Officer at BEFS outlines a ten-year strategy to achieve a clear vision for Scotland's historic environment and how that is measured...

About a year ago the Scottish Government published an overarching strategy for Scotland's historic environment called [Our Place in Time](#). Informed by stakeholders, this presents a vision for the future of Scotland's historic environment; that it is 'understood and valued, cared for and protected, enjoyed and enhanced'. As a ten-year strategy, it describes a long term outcome 'to ensure that the cultural, social, environmental and economic value of Scotland's heritage makes a strong contribution to the wellbeing of the nation and its people'.

The strategy goes on to set out strategic priorities under four co-dependent themes:

- Understand: that in order to understand the value of the historic environment we need to continue to develop knowledge and to make this as accessible and useful as possible;
- Care and Protect: secondly, in managing the historic environment we need to continue to apply and develop effective and proportionate protection and regulation with controls and incentives;
- Value: thirdly, much of this depends on public awareness and appreciation of the historic environment – especially given that the vast majority of older pre-1919 buildings and archaeological sites are in private ownership. We need to improve opportunities for active participation with the historic environment;
- Cross-cutting: cutting across these themes are priorities around informed decision-making, high-quality leadership and collaborative working, developing skills and capacity and 'mainstreaming' the historic environment across policy areas.

The strategy not only sets out a clear vision for Scotland’s historic environment, it also poses a new challenge around how we go about measuring success in delivering the above priorities. The Strategy states ‘delivering the vision will require the range of bodies, groups and individuals with an interest in, or responsibility for, aspects of the historic environment to work together towards a common purpose, making effective use of the skills, experience and resources of all parties to realise the benefits and values of our historic environment’. The emphasis is on collaboration – working together towards achieving common goals. But how do we go about measuring success that is generated through collective effort?

To this end, BEFS (Built Environment Forum Scotland) was asked to facilitate discussions around preparing a performance measurement framework for the whole historic environment sector. This will develop measures that will inform collective progress towards achieving long term outcomes. The work is ongoing but a number of key themes are emerging.

Why measure performance?

We all do this to varying degrees; in seeking funds, in forward planning, in promoting achievements. The idea behind developing a sector-wide measurement framework is that it will provide a transparent ‘road map’ that practitioners may use to determine what is working and what is not. It will build on the Scottish Historic Environment Audit (already a well-recognised resource of information on the historic environment) to provide a credible source of evidence, which may be used to impart messages, to demonstrate wider relevance and in so doing help reach new audiences. The framework will also provide a mechanism for highlighting successful initiatives and also look at where things are going wrong; this to inform where more support is needed. Fundamentally, this is not an exercise in ticking boxes. It is a way of deciding what to do and to direct resources and effort accordingly.

Operation

What does success in the historic environment look like? It is important to recognise that the meaning of success must be defined first, before determining

measures, otherwise the framework risks accepting success as what we can already measure, rather than what needs to be achieved. There are questions to work through around how such a sector-wide framework would operate. It is envisaged the framework will accommodate a core of headline measures along with ‘softer’ information which will help flesh out the meaning of the headline measures.

Capacity-building

The strategy recognises that many organisations will have their own methods of performance measurement and evaluation in place already to suit their own purposes. Workshop discussions on this initiative have highlighted its value in building capacity across the sector, by strengthening our ability to evidence the impact of our work. It is argued that collecting data is the pursuit of why; this starts a conversation and ultimately conversations inform policy. Therefore the task of creating, contributing to and using a measurement framework should, in itself, help generate clarity and confidence in collaborative working.

This initiative is not necessarily about finding perfect measures to illustrate key messages – rather it seeks to challenge, to identify failure as well as success, to identify and address gaps, and to share best practice and celebrate achievements. This initiative is intentionally ambitious and we are keen to reach out to practitioners with an interest in measurement and data holders who may be able to contribute data or help define measures. If you would like to find out more or contribute your ideas/share your experience, please get in touch using the details below. ■

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The Disintegration of the Housing Debate

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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



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Planning for SuDs

Sam Ibbott, Deputy Public Affairs Director at Environmental Industries Commission examines the latest government consultation on SuDs and the new approach of delivering it through the planning system...

The photo-op, when staged, can be a politician's dream. If you follow politics, particularly at a local level, they can often be unintentionally hilarious – such as the classic pose of an MP crouched down and pointing at a pothole with a look of horror on his or her face as if the pothole had just said something rather untoward about their mother. So when the country saw widespread flooding last year it was unsurprising that MPs of all colours hastily donned waders and took the opportunity to get photos of themselves looking sympathetic next to people whose lives had at best been inconvenienced and, at worst, devastated by rising water levels.

Flooding is a national infrastructure concern, and with the issue so high in the public's consciousness it would have been an opportune moment to announce at least one practical step forward – the implementation of Sustainable Drainage Systems (SuDS). SuDS are the process of dealing with excess surface water by mimicking natural processes which slow the movement of water before it enters rivers or streams, or stores the water so it can either soak into the ground or evaporate. Not in themselves the answer to all flooding concerns by any means, but SuDS have an important role to play – particularly in an urban environment.

The independent Pitt Review on flooding, which first recommended the greater uptake of SuDS, was published in 2008 and they were formally legislated for two years later in the Flood & Water Management Act (2010). An initial consultation on their implementation (as required by Schedule 3 of the legislation) closed in early 2012, and two 'go live' dates were subsequently announced and later rescinded.

Then in September of last year the government went to consultation again with a new approach for implementation which intends to deliver SuDS through the planning system. The government published its formal response to this consultation in late December.

The consultation saw a diverse range of submissions from local authorities, water companies, property developers, consultants, community groups and trade associations (including the Environmental Industries Commission (EIC)). At EIC we raised a number of concerns, many of which were at least acknowledged in the government's response and/or subsequently dealt with to varying degrees. Chief among the issues we raised were that:

- The latest consultation document framed SuDS almost exclusively in terms of flooding, and did not take into account their potential impact on water quality;
- Whilst the consultation's focus on the ongoing maintenance of SuDS is welcome, hastily delivered but inappropriate or poorly installed SuDS have the potential for much higher maintenance costs in the long run;
- Local planning conditions have not always been effective in the past – with houses being built on flood plains for example;
- There is a potential loophole in the proposed exemption from SuDS requirements for 'micro' developments (fewer than nine properties) in that a major development could be reclassified as

numerous smaller ones. There will also be an onus on the local planning authority to monitor the cumulative impact of numerous micro developments in their area.

In a Written Ministerial Statement published alongside the consultation response, the government made clear their “expectation” that sustainable drainage should now be included as part of major new developments “unless demonstrated to be inappropriate” – which could, for example, be the result of ongoing SuDS maintenance not being “economically proportionate”; if SuDS were to impair the deliverability of the development; or if they were to place “an excessive burden on business.”

Despite this, EIC welcomed the government’s emphasis on a requirement for SuDS to be maintained over the lifetime of a development. Although the market in third party SuDS maintenance is relatively immature and there are potential difficulties in gauging the robustness of maintenance providers and their expertise, we feel it is an important principle to have set out from the start. There is in any case a suite of maintenance options for developers to choose from, allowing a level of flexibility in the methods by which this maintenance will be funded and delivered. Responsibility for putting an arrangement in place, whatever its make-up, however, remains the responsibility of the developer as part of the planning application process.

Responses to the consultation did however raise concerns over a lack of technical expertise at local government level, particularly in smaller local authorities, to determine the suitability of sustainable drainage proposals when assessing planning applications – which can lead to inconsistencies. Although not originally proposed in the consultation document as a channel for securing the required expert advice, the government has subsequently accepted that the Lead Local Flood Authority (LLFA) are well placed to provide advice on such issues due to recent provisions in the Flood and Water Management Act which gives these bodies overall strategic responsibility for local flood risk management, including surface water. The government now intends to consult on making

LLFAs a statutory consultee for planning applications on surface water management.

These changes to planning will take effect from the 6th April 2015 and the government intends to publish revised planning guidance in advance of this date, in addition to engaging with local government on a capacity building programme.

By this time it will have been seven years from recommendation to implementation – far longer than had been hoped. The new approach of delivering SuDS through the planning system will likely see them delivered more quickly, if not automatically to a high standard given the disparity of resources and expertise within and across local authorities. It is the path of least resistance, but whilst not ideal it is workable and certainly preferable to even further delays by going back to the drawing board.

With an ever-increasing call for more housing to be built, and all political parties likely to make a related commitment in their general election manifestos this year, it is important to get SuDS regulations in place as soon as possible as our towns, cities, and urban spaces become ever more densely populated. If the result of a wider spread use of SuDS is fewer photo opportunities for MPs, that’s a price worth paying. ■

EIC is the trade association for the UK’s environmental technologies and services sector.



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Archaeology for all?

Dr Mike Heyworth MBE, Director at the Council for British Archaeology assesses the current situation of archaeological services in the UK and the vital role it plays in our heritage...

A survey undertaken in 2012-13 showed that over the previous five years, the number of archaeologists employed in the UK had dropped from nearly 7,000 to under 4,800 – a 30% decrease. This mirrored the reduction in development and building work at that time. Now development-led archaeology is booming once again, and the larger archaeological contractors are all advertising for more staff to fulfil the demand for their services.

This is good news for archaeologists, but also good news for everyone with a passion for British history and archaeology. It is also good news for developers who appreciate that they have a responsibility to enable the recording and understanding of the archaeological heritage which will be damaged or destroyed by their development. They also realise that this is part of the risk management strategy for their development, ensuring that there are no surprises during the building work when previously unknown archaeological remains might otherwise be uncovered and cause unnecessary delay and cost for the developer.

The system which is in place across the UK to allow archaeological work to be specified as part of the planning permission given to developers, relies on the planning policies in place in the constituent parts of the UK. In England, the National Planning Policy Framework gives a clear steer on the planning system's expectations for archaeological work to be undertaken in the public interest.

Yet the implementation of this system relies on expert advisors working within local authority planning services who can assess proposed developments for



Image: Oxford Archaeology

archaeological implications, consulting the Historic Environment Record which they maintain or have access to. Without these advisors it is always going to be hard for local planning authorities to carry out their responsibilities as there are specialist skills and considerable expertise involved in making judgements about the archaeological potential of development sites.

So it is of considerable concern that ongoing public sector funding cutbacks which are having an increasing impact on local government are in some areas now eroding the expert advice available to the planning authority. A report produced in July 2014 indicated that across England there were 300.5 FTE posts providing advice to local authorities – a drop of nearly 10% in twelve months and a drop of 26% since 2006.



Image: Museum of London Archaeology

to be hoped that it will be accompanied by a strong government statement which reiterates the importance of the archaeological advice services and the HERs across the country. In Wales, a Heritage Bill is due to be introduced into the Senedd for debate in the coming months and is likely to include clauses to give statutory status to HERs in Wales. Similar legislation may soon be needed in England and Scotland, or we may see a return to the bad old days of ‘rescue digs’ which were often undertaken at short notice while developments were in progress and were inevitably inadequate as a consequence and potentially extremely costly for developers.

There is considerable public interest in history and heritage across Britain and no-one likes the idea of unique and valuable knowledge being lost through development work. The vast majority of developments have no archaeological implications and less than 5% require an archaeological condition associated with the planning permission. The key thing is that we sustain a network of advisors and the knowledge base that they rely on to ensure that everyone benefits from the information that is gleaned from appropriate and proportionate archaeological investigation work. This is very much in the public interest and a key foundation of the heritage protection system in Britain – not blocking change, but ensuring that change is informed and enlightened: providing archaeology for all – and of course, less risk for developers.

The concern about this drop led the Culture Minister Ed Vaizey MP to commission a report on the situation in 2014. He asked John Howell MP and Lord Redesdale – two parliamentarians with archaeological qualifications, and both members of the All Party Parliamentary Archaeology Group – to undertake research on the problems and look for innovative solutions. Their call for evidence solicited nearly 80 responses – many of which called for a statutory duty to be placed on local planning authorities to ensure that they maintained or had access to a dynamic Historic Environment Record – the database of all known archaeological evidence in the area – to inform planning decisions. Many respondents argued that this was necessary to protect these vital services against the threat of greater cuts in the coming years.

The report of the inquiry is to be published soon by the Department for Culture, Media and Sport. It is

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The toolkit for BIM – completing the jigsaw

Stephen Hamil, Director of Design and Innovation at NBS, discusses the digital toolkit that will complete the Level 2 BIM suite and how it will enable everyone in the industry to use BIM as an integral part of their everyday working lives...

The previous issue of BIM Today carried the news that the NBS-led team had been appointed to develop the digital toolkit that will complete Level 2 BIM; now we are almost half way through the process and on track for a Spring 2015 launch.

So what is the toolkit? What will it do and why is it important?

At the outset, it is important to remember that Building Information Modelling (BIM) is not an end in itself. The Government's Construction Strategy identifies predicted growth of 70% in the global construction market and is determined that UK businesses will be well placed to take advantage of this.

By delivering projects quicker, more cheaply and more sustainably, the industry can take the lead in a market where it already has a strong competitive edge and drive up exports. More broadly, BIM has a role within the burgeoning digital economy, as UK construction businesses need to be in a position to compete for the £200bn per annum market for integrated city systems that is forecast for 2030.

It is within this context that we are developing and delivering the digital toolkit on behalf of the UK BIM Task Group and Department for Business, Industry and Skills to sit alongside the five existing pieces of guidance that make up the Level 2 'suite'.

Collaboration is at the heart of BIM and at the heart of the toolkit. As David Philp, Head of UK BIM Task Group, said in BIM Today at the end of last year, BIM is a behavioural change programme which will enable and promote the closer integration of disciplines and it is this that will lead to the improve-

ments in project delivery that lie at the heart of the construction strategy.

Up to now, BIM has been seen by many as the preserve of a few, rather 'techy' people, but this misses the point and the industry runs a risk of getting side-tracked by almost endless technical discussions held by small groups.

The digital toolkit is aimed at addressing this: it will simplify processes and be intuitive and easy to use, enabling everyone to use BIM as an integral part of their everyday working lives, whatever stage of BIM adoption they are currently at. The toolkit will be fit for purpose right across the industry, including all disciplines and all scales of projects from large infrastructure schemes to small, domestic scale works, so no-one should feel that it is "not for them".

While the mandated use of BIM on central-Government funded projects from April next year is clearly providing much momentum, discussions with architects, contractors, engineers, clients, manufacturers and facilities managers have reiterated that there's a real need for this initiative across the board.

At a recent roundtable held at NBS Live, the widespread view was that, although everyone's current processes allow projects to get built, there are many holes in these existing methods of working. It's these holes that the digital toolkit aims to fill, providing the missing pieces of the BIM jigsaw.

This kind of discussion makes the team hugely optimistic that it will be used in the private sector as well as public, because it's just a smarter way of working.



Stephen Hamil, Director of Design and Innovation at NBS

So what exactly is the digital toolkit? Put simply, the project involves devising a standardised and digitally-enabled classification system and a digital plan of works tool. This will create a unified, single, classification system for use within construction and will provide an easy to use web portal which guides users through the construction process.

The first piece, the classification system, will be a new version of Uniclass which will be based on the international ISO/DIS 12006-2 framework. This will build on the work NBS has already carried out over recent years under commission from the Construction Information Committee (CPIC). By completing this, the industry will have a unified structure which will provide mapping and guidance so objects can be configured at a project level to have the correct multiple classifications where required.

Some 5,000 templates will be developed, setting out guidance for Levels of Detail (LOD) and Levels of Information (LOI) for construction objects. Initially these will be spaces, systems and products for architecture, building services, structural engineering,

landscape design and civil engineering. These will be freely available online and will also be available in both IFC and MS Excel format. These will form the “construction language” that all project teams can use to define their information exchanges for a particular stage of a project.

The second piece, the digital plan of work, will enable the project leader to clearly define the team, responsibilities, and an information delivery plan for each stage of a project, who, what and when – in terms of documents, geometry and property-sets.

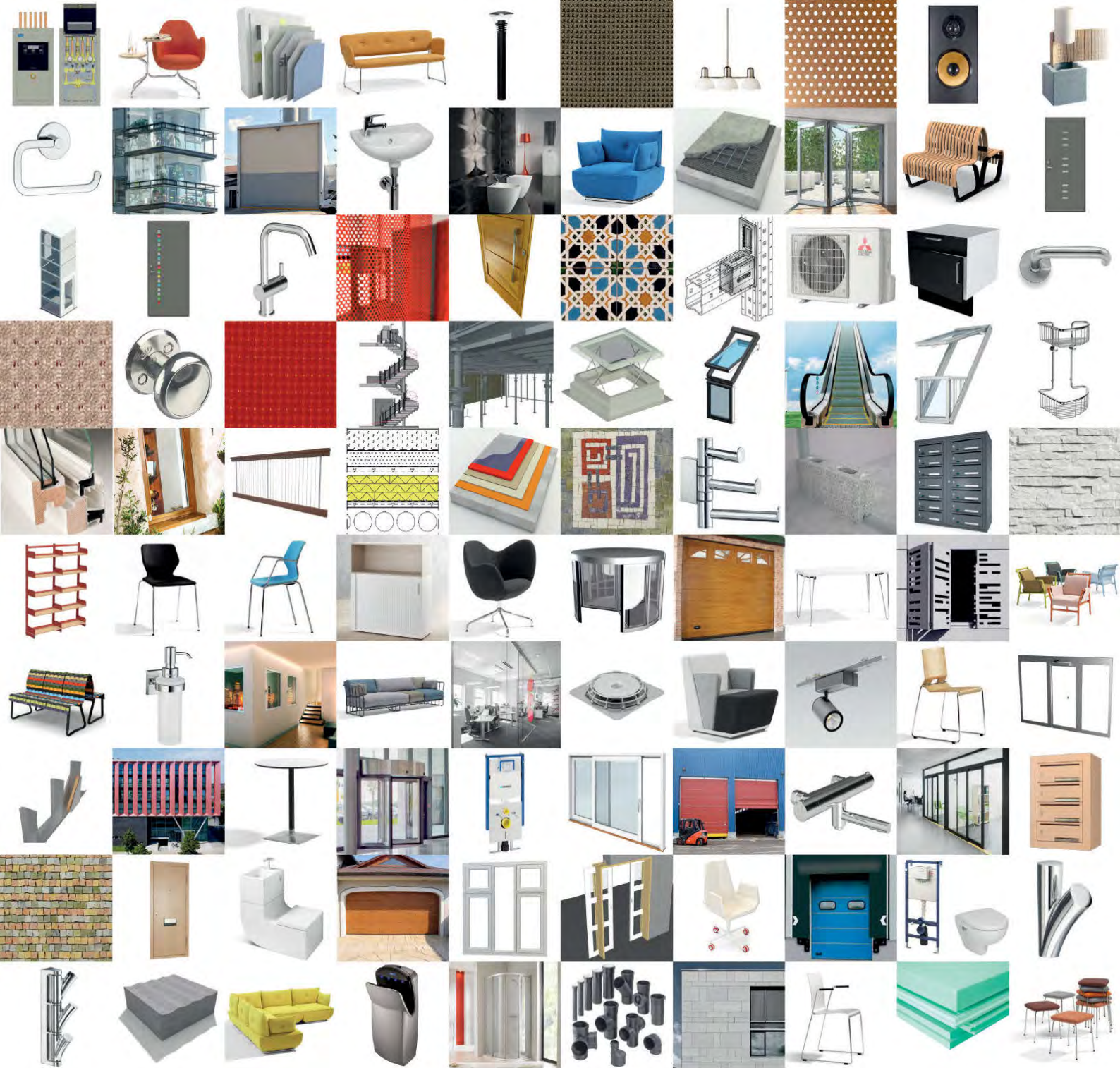
Over the next few months the project team will continue conversations with representatives of all disciplines and will be asking for feedback on progress. To assist this, events, webinars and seminars will be organised by NBS in partnership with the professional bodies that sit on our steering group.

The digital toolkit is for the whole industry and to have the greatest chance of success, we want it to be developed by the industry. To get involved and to keep up with latest developments, please visit the NBS website (www.thenbs.com/bimtoolkit) and the NBS BIM Toolkit and Digital Plan of Work Discussion Group on LinkedIn. ■



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COBIE – UK CASE STUDY

STRIDE TREGLOWN

In 2012, architects Stride Treglown were appointed to deliver a UK Government early adopter BIM project. As 'pathfinders' working with newly defined processes and delivering COBie outputs, Stride Treglown faced a number of challenges. To find out how Stride Treglown successfully implemented the project, Solibri UK Managing Director David Jellings, chatted with Anthony Walsh, Senior Associate and Sector Lead for Public & Community Projects and Dean Hunt, BIM Co-ordinator for Stride Treglown.

How did you first become aware of the Government BIM and COBie requirements?

'We had been working in a BIM environment for a number of years and as one of our key client groups is government, in particular justice and defence, we were aware of the new COBie requirement as a government directive from the outset. To help improve our knowledge, we've attended numerous conferences and seminars and disseminated the information internally to raise our overall company awareness. We knew this was going to be important and that it would involve developing new working practices, so we wanted to be properly informed.'

When/how were you first involved in a COBie project?

'In 2012 we were appointed to deliver one of HM Government's Early Adopter projects. Our appointment was as the technical delivery architect, initially to deliver the scheme to COBie data exchange stage 3 (representing the technical design solution). This changed however and we were eventually became tasked with fully coordinating the BIM process and COBie data requirement (with the lead contractor, other consultants and the supply chain) to stage 6 – i.e. practical completion.'

Stride Treglown is an international architectural practice with overseas offices in Dubai and Abu Dhabi and eight offices in the UK including London, Cardiff and Bristol, making them the 10th largest architectural practice in the UK.

Sustainability influences the way Stride Treglown runs its practice and since 2009 they have reduced their carbon footprint by 40%. Their expertise covers most sectors and they apply commercial awareness to balance the sometimes conflicting aspects of time, cost and quality to achieve the best outcome for our clients.

Stride Treglown have always invested in technology and are at the forefront of BIM implementation.

What were your individual roles in the project?

Anthony Walsh: 'I am a Senior Associate and Stride Treglown's Sector Lead for Public & Community, which incorporates this particular work stream.'

Dean Hunt: 'I am Stride Treglown's BIM Co-ordinator responsible for directing the project team in a collaborative BIM environment to ensure that the geometric coordination and data requirements were achieved and fully coordinated. I needed to develop new workflows and strategies to achieve the COBie data requirements for the project.'

How did this project change the way you worked?

'We were already familiar with current BIM processes, such as coordinating geometry and clash detection. However, the new process required us to output intelligent data in a format that could be easily accessible to all. This necessitated implementing new working practices and protocols to ensure that these outputs could be incorporated into the COBie schema. Technically, we had to invest in additional add-ins for authoring tools to enable a more efficient workflow. We also had to invest time working with other project partners to help them deliver the data requirements.'

“Early engagement of the whole project team is essential to ensure productive output. The management and collaborative culture of the team is just as important as the technical manipulation of the data.”

Anthony Walsh, Senior Associate, Stride Treglown

What was the main initial challenge?

‘This was a new way of working, not just for us, but everyone from the client down. The biggest challenge at the start of the process was the initial lack of understanding by the project team. The information requirements and formats were at first ambiguous, but after research into the requirements of COBie, the required levels of data became clearer and more understandable to us all.’

And the wider challenges?

‘The whole team were fully committed to delivering the project, but not having previously worked with COBie, it was a steep learning curve for everyone involved, including the mechanical & electrical engineers, civil & structural engineers, catering suppliers and key supply chain partners. All were very enthusiastic about working in a collaborative environment. We believe our lead role was instrumental in ensuring that all parties were fully integrated into the process.’

How did Solibri become involved?

‘We were aware of the options available to output COBie data, including directly from the authoring software itself. Initially this seemed like the obvious and easiest option but unfortunately it did not satisfy the requirements. It was important to us that we found a way of automating what was essentially a very manual process, in order to develop a repeatable workflow for our future COBie requirements. We originally became aware of Solibri Model Checker from our attendance at the ICE BIM Conference in 2012 and it seemed to provide the solution to many of our problems.’

How was Solibri Model Checker (SMC) applied in the project?

‘One of the main problems we faced was how to ensure that the model contained the complete and correct COBie data. It is very inefficient to spend time validating, and checking COBie outputs only to have to correct them further down the line. Using SMC rule sets, we were able to validate the completeness of the COBie output before exporting to the data sheets. Using the classification tables to coordinate all

consultant models is a particularly powerful feature of SMC, furthermore, SMCs infinitely configurable user interface makes coordinating data straight forward and particularly excels when using IFC models prepared by varying authoring software. Within SMC we were able to federate all discipline models using IFC, which is the industry standard exchange format and also a requirement of the COBie deliverable. At every stage, the Solibri UK team worked with us closely to optimise these solutions.’

How successful was the application of SMC?

‘We believe we successfully implemented the workflow that we initially set out to achieve. We strongly believe that COBie should be an output provided by data in the authoring software which is then federated, coordinated, validated, and checked by SMC, which then automates the export to the completed COBie sheets. By eliminating any manual data entry in the final COBie sheets we not only save a huge amount of time, but more importantly eliminate user error from the process. Large projects that require data output from many maintainable assets becomes almost impossible to achieve without using automation software such as SMC.’

How do you see the future for COBie and Solibri’s role in its implementation?

‘Being championed by government, COBie will be business as usual from 2016 and we are already seeing elements of COBie being requested by some private clients. We feel ultimately that Excel as the output will gradually disappear; however, COBie data will remain and become the universal delivery method across all projects. Stride Treglown has now adopted SMC software to undertake internal coordination so that as a practice we can deliver fully co-ordinated buildings. We feel confident that SMCs communication method is far superior to its competitors and will be an essential component of future project deliveries.’

“It was important to us that we found a way of automating the process, creating a workflow that was repeatable. It was imperative to generate the data requirement via industry standard IFC format as COBie data is a subset of IFC. We strongly believe COBie data should reside in the authoring software which can then be federated, coordinated, validated, and checked by Solibri Model Checker”.

Dean Hunt, BIM Co-ordinator, Stride Treglown

BIM and GIS: A harmonious future?

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

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

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

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

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

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

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

must carry these lessons forward as we extend our use of digital technologies to convey our understanding and interface with the world around us.

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

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

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

comprehensive dataset of our buried infrastructure is hindered – not by technology – but by lack of policy and process. If as a country we really want to realise the vision of Digital Built Britain, then we must as an industry pull together and make this happen. Without doubt, there are problems around security. Without doubt there are challenges with standards. And without doubt there are issues around education and training. But what we really need is agreement – an understanding, and galvanisation around a common framework which can allow us to take this next important step, integrating both geospatial and BIM practices toward a coordinated, comprehensive and integrated model of our underground world equivalent to that above the surface. A number of activities are underway to seek to achieve this. Do get in touch if you would like to find out more. ■

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

If you are, please contact Richard Armstrong on 0207 665 2411 richard.armstrong@ice.org.uk Information Systems Panel, Geospatial Engineering Panel and BIM Action Group secretariat.



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BIM: The bigger picture

At the Viewpoint North American user conference in Portland Oregon earlier this year I presented the theory behind Viewpoint's BIM strategy. Because our goal of developing the best Common Data Environment in global construction is heavily influenced by the UK BIM mandate, the diagrams and processes of PAS1192:2/3 featured heavily, and information exchange and activities either side of the contract line were discussed in some depth. Nowadays, the audience rates the speakers on mobile devices and comments were captured in snappy tweet sized snippets, so the feedback wasn't long in coming. The most fascinating was 'Very informative, but the session wasn't about BIM'. If the process of building an information model as a team to inform and enrich the design – build – operate lifecycle isn't BIM, what then is?

It's clear that BIM means many things to many people.

This seemingly bizarre comment made me think. Words and concepts behind acronyms are overshadowed by the desire to adopt new technologies to improve the processes and parts of the project puzzle the beholder occupies. The designers see reusable design artefacts, the contractors see the greatly improved design review process, estimators can see the quantity take-off potential, and the clients are promised better handover information. It's rather similar to the Indian fable of The Blind Men and the Elephant – the true form of BIM is masked by perspective.

At 4Projects by Viewpoint in Newcastle we see the whole picture, or indeed, the elephant in the room, every day. Our users span the entire asset lifecycle from concept sketches, through construction and use to demolition. The B555 roadmap describes

the need for a common data environment on both sides of the contract line so that information in the project information model (PIM) can be curated collaboratively by the tier 1 appointments and their supply chains, before being passed into an asset information model (AIM) for the clients operational use. Critically this AIM information should be structured in the same way as PIM. When the next project starts, the information can be churned back into the project as a key element of the briefing and tender process. But the self-populating employers information requirements (EIR) based on learnt wisdom from previous projects is currently a long way from fruition.

Car manufacturers have already created cleaner flows of products and data from inception to the hands of consumers. A new car comes with a handbook on operation and maintenance, the specification of the wiring or chassis is not relevant to the owner. In a similar way a building should be delivered with a well ordered handbook of relevant information. COBie is designed for this purpose; although each building is unique and requires tailoring of the required elements.

Why, also, do major construction companies and design practices adopt an internal facing strategy for BIM, when the government is encouraging a more external facing collaborative approach? Moving past this phase as we approach 2016 is the key challenge, and no one business can do it alone.

Perhaps delivering Level 2 ahead of the mandate is stalling for some because they believe their partners haven't completed the required work to reach this level, and focus therefore on matters that can be addressed today like developing a clash detection strategy, or deploying new BIM authoring software.



One of the most commonly cited shortcomings is the quality of EIRs. Lacking a fundamental digital project briefing document draws the focus away from creating a rigorous COBie delivery process. This is a symptom however, rather than the cause. How can a client prepare an adequate EIR when they don't know what data they need, or are able to, procure.

With prime responsibility are the facilities management software vendors. It is often said that until the FM tools can take COBie, the requirements cannot be set and, in turn delivered. FM software vendors refute this. They say that as soon as they know which parts of COBie their customers care about, they'll happily map COBie to their tool without risking access to legacy data. The FM world is aware of BIM and its consequences, but delivering BIM for FM tools which are fully 'COBie ready' is like designing HD ready televisions in the days when we only had 4 channels. The recent release of BS1192:4 was a key step towards BIM for FM in the UK, but software is not developed overnight and until this standard takes hold in live contracts the scope of works will remain incomplete.

Clients also take issue with the project team for not offering a menu of data for them to choose from; a kind of data takeaway menu allowing decisions to be made at the tender stage about which bidder offers not only the best price and value in terms of the physical project, but allowing the data product on offer to be judged as part of the process. But as with the FM conundrum the contractor counters with the need to understand the scope of works before pricing the job. As it is, BIM consultants are currently working hard to uncover the client's data needs by playing the role of a digital archaeologist, and the resultant bespoke EIRs lack consistency.

The government is also to blame for weak BIM Execution Plans leading to BIM projects resembling traditional projects but with more models and some new software tools. 'They haven't even finished Level 2, so how can we work to it?' This is true; it isn't all there yet despite 2016 approaching fast, and the situation described may appear to be a Mexican standoff, but the government has addressed

the issues they are charged with resolving believing it will have a domino effect on the other issues that prevent progress. They believe that through standardisation and a mandated process, a world leading construction industry will prosper in the UK, selling its services to the world whilst delivering better projects at home.

Substantial investment in UK construction has delivered the right platform to deliver more efficient, more predictable and better informed projects than ever before. The 1192 suite of documents has been designed and delivered to address the situations discussed above. The classification system required to unify the way we order work across the supply chain to deliver information exchanges has been chosen and is on its way to delivery. The dPoW work is underway to allow clients to plan their projects and specify their requirements in a standardised way. All this with the COBie schema mandated some time ago to offer a framework for passing information from PIM to AIM, combined with the imminent EIR template make for a compelling description and facilitator for Level 2 BIM maturity. When all of this effort is outlined, or even distilled into the Bew-Richards wedge, which first appeared in 2008 it is no wonder the world is paying attention, this includes global software providers like Viewpoint.

Although UK defined, these are not just UK specific issues. Every modern construction industry needs to extract structured data from their projects, distilling it into information, which, combined and interrogated produces knowledge, impacting their business with wisdom won.

As for BIM, has the concept outgrown its acronym? Maybe it's just 'Big Data' with BIM

processes as a mere source. We now have software as a service (SaaS) databases for construction, offering cross project knowledge capture and the collaborative data capture as and when it is created either on site, in the office or in the factory. This is why Viewpoint, as a software company that focusses solely on construction and which has a wealth of experience in SaaS and databases, is really focussing its energy in the BIM arena. We know construction and understand how challenging every day can be in your business and develop tools to help. We are already the home of thousands of live projects with all of the complex needs this brings. However, as construction industry processes evolve, the more structured data the supply chain will be able to produce to clients demand, creates a need for construction to have software tools that facilitate the delivery and acceptance of a digital product alongside the built fabric. So if you want to talk about how to construct, procure and take advantage of the 'I' in BIM call the 4Projects by Viewpoint team.



John Adams

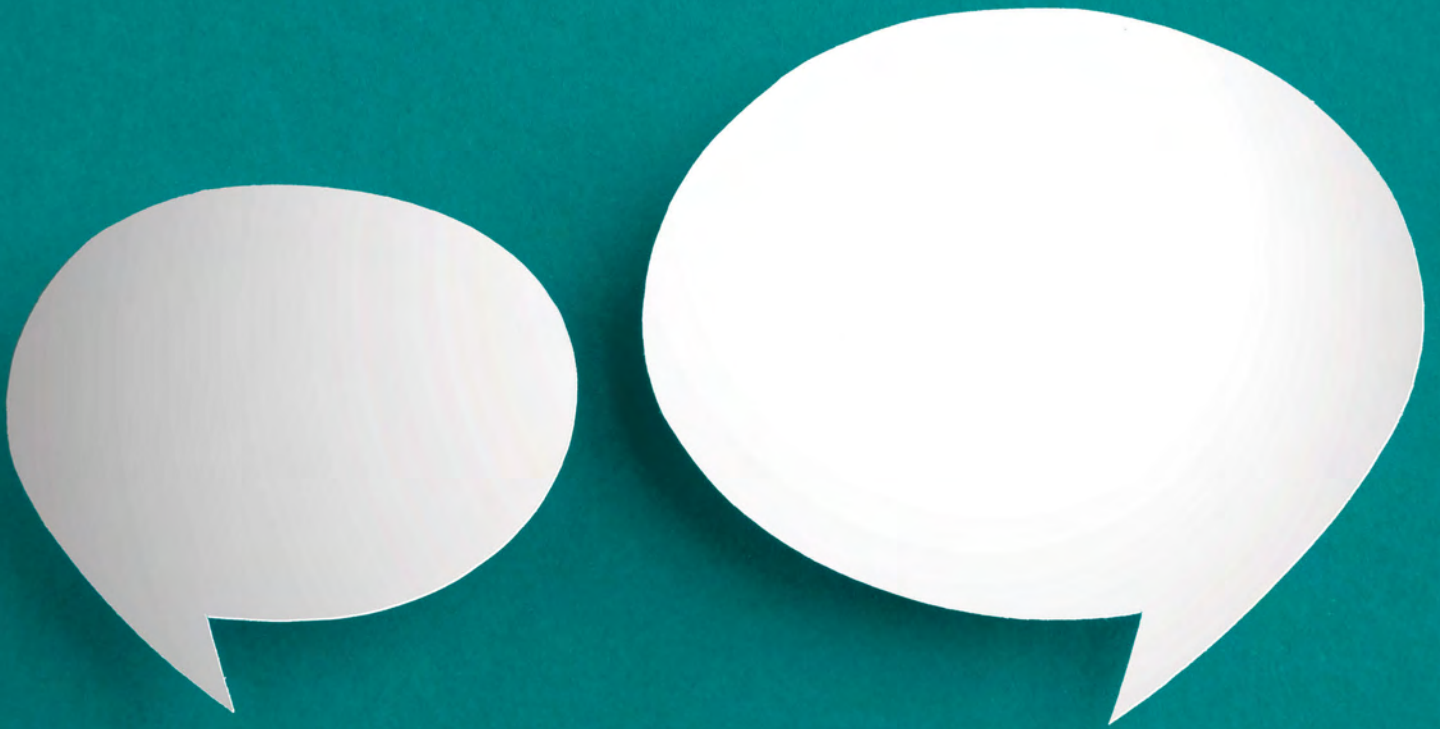
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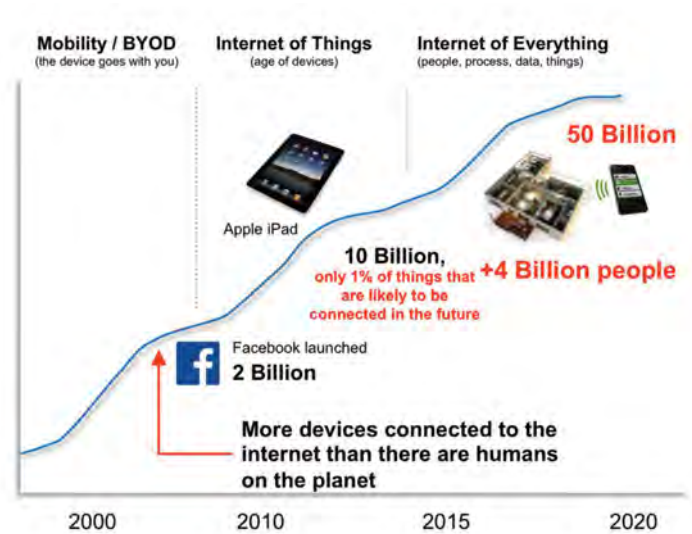
BIM and the data challenge

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

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

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

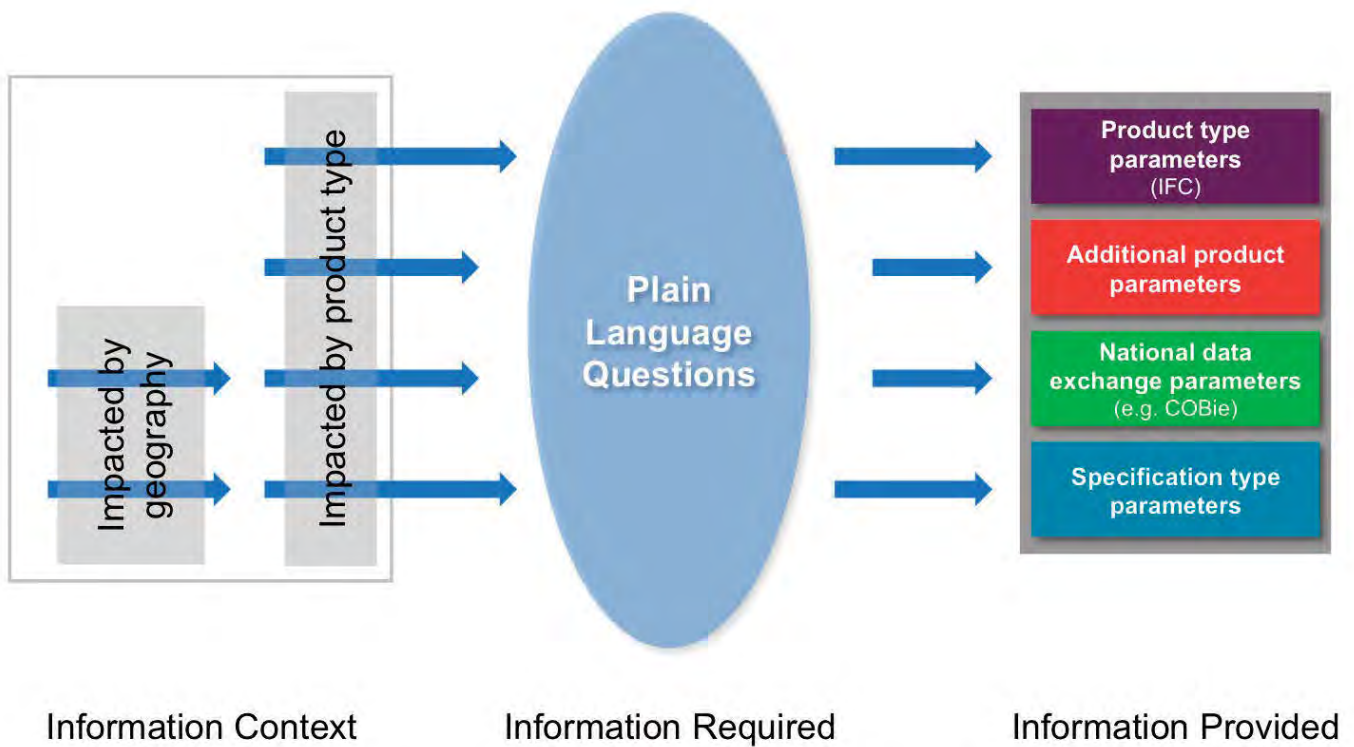
In addition to the predicted significant increase in connectivity, the United Nations are predicting a global urban population growth of over 2.5 billion between 2014 and 2050 (United Nations Population Division, 2014). In short, that means that if we house the increase in population at an average of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



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

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

To get to the Level 2 basecamp we need structured, accurate, reliable and accessible product data that



not only clearly describes what a product is and how it performs, where it comes from and how it needs to be maintained, but also helps in the specification, supply and construction stages of its lifecycle. The challenge for the manufacturer amongst others, is to provide the right information in a suitable format to support a vast range of players, across different sectors and in different territories, using different approaches. If that is going to be achieved, there are a few key issues to address:

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

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

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

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

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

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

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

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

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

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

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

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

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**Steve Thompson RIBA
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The Lloyd's Register Route to BIM Level 2 Accreditations

Lloyd's Register Accreditation to BIM Level 2 is the provision of a public statement of the credibility of BIM business practice and effective performance of the certified organisation.

The first step towards Lloyd's Register BIM Level 2 accreditation is the gap analysis. The gap analysis represents a high-level assessment undertaken to examine not only the overall status of the BIM processes, systems and competencies against the requirements of PAS 1192 and associated documents, but also business good practice and collaborative culture. The objective of the gap analysis is to identify any major gaps against the standard and scheme principles, and report on any identified weaknesses. The purpose of the assessment at this stage is not to undertake a detailed analysis of all different elements of the BIM related systems, but to establish an overview of the whole system, identifying areas for improvement which present most risk to the achievement of the organisation's BIM-compliant practices and objectives.

The gap analysis is typically performed through discussions with key reports. The audit technique adopted for this process provides the freedom for the auditee to explain their management systems without concerning themselves with how this meets the requirements of PAS 1192 and associated documents and scheme requirements. This approach is based upon the view that it is more important that interviewees use the time to explain how they do their job within their existing BIM related system, without worrying about 'another' specification. Using a Socratic approach, the assessment team promotes a challenging discussion around key issues, which teases out the important areas for change and often helps the organisation understand their own system more fully. The challenge for the assessment team is

to relate the information gleaned in these discussions to the requirements of the scheme requirements, reflecting the context within which the organisation is working and providing relevant feedback.

On the conclusion of the gap analysis, which typically represents 1 day, a verbal report of the findings is presented in a closing meeting to the management team of the organisation under assessment. This is followed by a detailed report as to findings, classified according to the seriousness of the weakness identified. Whilst the discussion may start around the items identified requiring improvement, the key focus is on how the organisation can explore options to make changes, taking them further along the road to an effective BIM Level 2 compliant system.

The next step – certification assessment – is performed when the organisation seeking accreditation is satisfied they have addressed the findings, identified during the gap analysis, classified as major deficiencies and have made significant progress on an action plan to close out the findings classified as minor deficiencies.

The certification assessment will draw on the output of the gap analysis and the progress made, and will seek evidence that processes are in place addressing all areas of the scheme requirements. This more detailed assessment represents a verification, not only that all major issues identified during the gap analysis have been addressed, but also that the systems processes and competencies described during the gap analysis have been efficiently and effectively implemented. An important area examined at this stage is the communication within the organisation and extending to its consultants and subcontractors, such that all key contributory resource understand the scheme requirements and are themselves fully compliant.

Experience of the implementation of a number of accreditation schemes that Lloyd's Register currently operate has shown that added value to the assessment process is best delivered through the adoption of the following assessment principles:

- Seeking Evidence of Conformity rather than looking for non-compliance, represents the most positive approach to assessment and provides better value add to the organisation and individuals being assessed whilst additionally providing assurance that weakness in the system will be found.
- Socratic Questioning provoking discussion and debate and assisting clients to identify the best practices that may be relevant and applicable to their circumstances.
- Domain Sector Expertise – Assessors assigned based upon their operational knowledge and experience in the domain which represents the core business of the client organisation. Ensuring that the assessors “speak the same language” are empathetic to the concerns and issues of the client and have a broad awareness of the risks to which the sector is exposed and are therefore best placed to add value to the assessment process.

The achievement of BIM Level 2 accreditation requires effort and management commitment. It is a step along the BIM good practice journey and reflects that organisations have met or exceeded the requirements of the Lloyd's Register BIM Level 2 Accreditation Scheme. To retain the accreditation requires a sustained approach to improvement and management commitment which must be evidenced during the surveillance programme which is undertaken during the three year accreditation validity. Failure to demonstrate such ongoing commitment may result in accreditation suspension

or withdrawal – a measure of the effectiveness of the accreditation scheme

The Lloyd's Register BIM level 2 assessment process incorporates PAS 1192 and associated documents but additionally evaluates wider performance of the business in order to support its BIM related corporate goals. Accreditation represents independent confirmation of the achievement BIM level 2 good practices leading to best practice through defined, continuous improvement milestones, set out over the three-year accreditation term.



For information on the Lloyd's Register BIM Level 2 Accreditation Scheme please visit the BIM scheme guidance document on our website which may be accessed by the following link:

<http://www.lloydsregister.co.uk/documents/249617-building-information-modelling-bim-guidance-document.aspx>

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BIM – where will the product information come from?

The potential impact of BIM on all stages of construction is undeniable. Expectations on the part of clients and other stakeholders are great and growing all the time as experience accumulates and as case studies based on successful projects emerge.

Part of the reason for this is that BIM can best be seen as belonging to a suite of related technologies and new ways of working – such as off-site manufacturing, smart buildings, data management, higher performing buildings – which collectively have been called digital engineering. The impact on how the built environment is designed, constructed, maintained, operated and dismantled or rebuilt will be profound.

Such statements are becoming commonplace and almost taken for granted. Indeed, to illustrate this, the Construction 2025 strategy launched last year is to a large extent formed around the idea that properly implemented, digital engineering will be capable of supporting the industry's need and desire for transformation, to perform at an altogether higher level (33% lower cost, 50% faster delivery, 50% lower impact).

It is becoming clear that as an industry either we already have the necessary tools, or that tools will be developed in the foreseeable future. BIM itself will continue to evolve and we can expect the flow of innovation to continue, but it is also clear that we face a step

Products manufacturers, like Saint-Gobain, carry out extensive testing on their products, both in laboratory conditions and on-site. With access to all this test data, who is best placed to provide high quality BIM datasets?

change, or a discontinuity, initially as more of the industry gets on the first rungs of the ladder of this new way of working. It is easy to see BIM level 2, namely forming and using the digital libraries of core information, as representing these first steps. Having addressed level 2 we will need to embrace BIM level 3 and all that that might bring with it, which many observers are expecting to enable the real transformation of the industry which is ultimately sought.

However good and efficient the software tools are, it is easy to overlook the other elements which need to be in place to make the whole design and build process work to actually deliver the quality and benefits expected by stakeholders, supply chain and clients. Some of these elements, such as collaborative working and sharing of information, are touched on in the other articles in this supplement. One specific area, of interest to manufacturers and suppliers like Saint-Gobain, is to do with the data, especially that to do with products, materials and assemblies, which form one aspect of the information input into the building or construction model.

A moment's reflection enables one to realise that the library of product information being used by the BIM design tool needs to be appropriate, accurate and up to date, or errors will be hidden only to emerge at a later date in say the build or assembly process, or during operation, which will potentially be very costly to resolve.

As the use of BIM progresses from level 2 to level 3 it is clear that the depth and range of product information required by the designer will continually grow – from dimensional data, to include performance (thermal, structural properties, acoustics, embodied carbon, recyclability etc). Since BIM is not just about working in a different way but it also includes the idea that ultimately the client expects it to contribute to higher performance at a lower cost, then competitive commercial pressures will be brought to bear and will help to shape how

BIM is used. To win work the designer will need to have confidence that the optimum design is being offered, in all senses, and that this design can be delivered in reality. This means that the task is not just about the elimination of errors and uncertainty in the raw data, but that the right products are being used and those products have the precise properties (and associated data) sought and assumed by the designer in assembling the solution to be offered to the client. As additional dimensions of data start to be integrated into the BIM model this challenge will only grow.

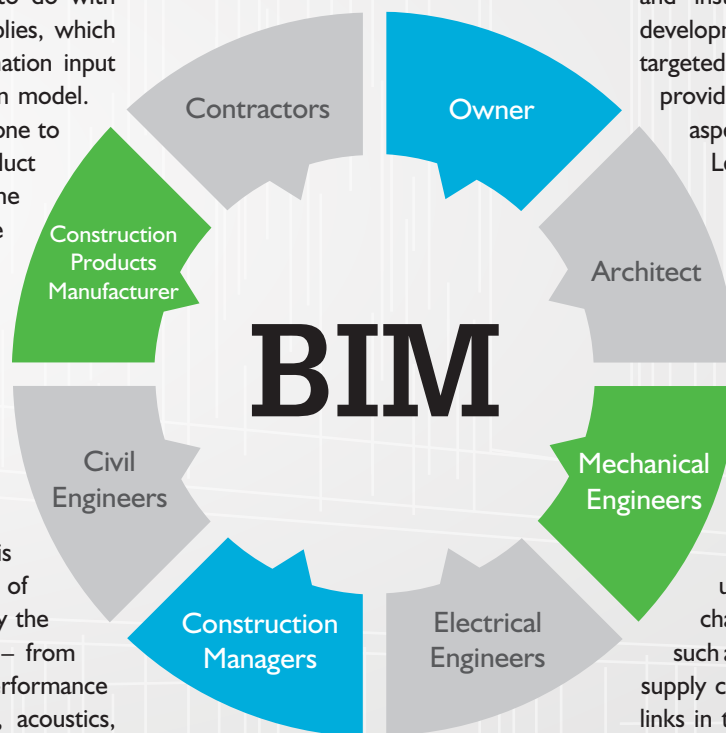
One solution offered is to use a library of generic product data – using average or typical data taken from across the market of a number of different versions of similar products (insulation, glass, wall linings, structural components, cladding etc). At first sight this solution may appear to offer a way through: a third party takes on the task of collating, interpreting and analysing the

data to form a set of typical numbers which the BIM model can then simply connect with and extract. But what are the disadvantages and is there a better way?

In any industry, manufacturers will vie with each other to develop and bring to market more competitive products and solutions. Construction is no exception. In the information-rich age of BIM, an integral part of this improvement process is the dataset associated with each product which will enable competent modelling and design optimisation. The use of generic or average data, of ill-defined ownership, would increase the risk of inaccurate data as well as resulting, in all probability, a sub-optimal design with the consequent risk of it also being less competitive commercially than one resulting from the use of better quality data relating to the actual physical solution being proposed.

Where does this higher quality, more useful, data come from? Manufacturers are in the best position to be able to offer this: they own the raw data for their particular product portfolio; they understand how to use their products in terms of design and installation; they invest in product development to bring to market solutions targeted to address specific needs; they provide technical support services on all aspects of their product or solution. Leading manufacturers, such as Saint-Gobain, are developing the delivery of this information in an on-line format for BIM so that the data is 'live'.

In the digital engineering age – where a building is built twice, once virtually in the BIM model and once on the construction site – product characteristics need to be captured in the form of electronic datasets which can be utilised and relied on by the supply chain. If a product feature is not in such a format its value is reduced. For the supply chain as a whole, and for individual links in the chain, to operate at maximum effectiveness and competitiveness the best quality data, namely the latest live data from the manufacturer, should be used. As digital engineering evolves, and demand for richer information grows, it will become even more critical to use manufacturers' live data.





BIM: the story so far

Anthony Burd, Head of Market Development and Stephanie Kosandiak, Lead Programme Manager for Construction at BSI, outline the growing BIM landscape...

The architecture, engineering and construction (AEC) industry previously relied on CAD and marked-up drawings to build. With the need to improve efficiency and reduce costs across the process, BIM software has filled the gap and shown that it can do both. The creation of a virtual 3D map (embedded with all the relevant data) of a building using digital technology, means that an accurate model can be constructed. This has major uses for everyone involved from the planning, design, construction and facility management aspects of the build, where all elements can be integrated and viewed by the architects, engineers and constructors.

Building in a simulated environment means that unforeseen issues can be corrected before any physical work can begin. As traditional methods have dominated the AEC industry for such a long time, this shift in process requires a shift in perception and working too. This includes a move towards a faster pace of working especially as BIM acts as a traceable database for the project. Therefore, all the associated costs of every design change can be tracked in real time. Stakeholders do not need to wait as long as they once had to, to see the implemented changes and can see what the final project will look like with demos and walkthroughs.

BIM is effectively changing the face of construction and is recognized not just by industry but the government as a key tool. As older methods eventually become obsolete, the AEC industry will have to adapt. In anticipation of the importance of BIM, BSI has developed a full BIM suite of standards to support the use of BIM.

The key BIM standards

BS 1192:2007 *Collaborative production of architectural, engineering and construction information. Code of practice.* The standard establishes the methodology for managing the production, distribution and quality of construction information, including that generated by CAD systems, using a disciplined process for collaboration and a specified naming policy.

PAS 1192-2:2013 *Specification for information management for the capital/delivery phase of construction projects using building information modelling.* The requirements within PAS 1192-2 build on the existing code of practice for the collaborative production of architectural, engineering and construction information, defined within BS 1192:2007. It focuses specifically on project delivery, where the majority of graphical data, non-graphical data and documents, known collectively as the Project Information Model (PIM), are accumulated from design and construction activities.

PAS 1192-3 is the partner to **PAS 1192-2**, and focuses on the operational phase of assets irrespective of whether these were commissioned through direct capital works, acquired through transfer of ownership or already existed in an asset portfolio. Like PAS 1192-2, PAS 1192-3 applies to both building and infrastructure assets.

BS 1192-4:2014 *Collaborative production of information Part 4: Fulfilling employers information exchange requirements using COBie – Code of practice COBie (Construction Operations Building Information Exchange),* is required on all Government construction projects where information must flow into portfolio, asset planning and facility maintenance tools. BS 1192-4 provides users with recommendations on how to use COBie to structure information required

for the operation of an asset or facility during the construction process, supporting the processes outlined in PAS 1192-2 and PAS 1192-3.

BS 7000-4:2013 *Design Management Systems: Guide to managing design in construction.* This BIS funded revision has been radically updated to take into account the development of BIM within the construction industry. It replaces **BS 7000-4:1996**.

BS 8541 Series of Library Objects for architecture, engineering and construction – provides construction product manufacturers and suppliers with guidance on how to provide product information for inclusion in Building Information Models. It comprises **BS 8541-1:2012** *Identification and classification*, **BS 8451-3:2012** *Shape and measurement* and **BS 8541-4:2012** *Attributes for specification and assessment*.

Upcoming BIM standards

There are several standards that work in synergy with the **BS 1192** suite of standards. The key ones expected in 2015 are: **BS 8541-5** and **BS 8541-6**. As BIM Level 2 becomes more widely adopted in the UK, BSI is adding two new British Standards to the BS 8541 Library Object series in early 2015. They provide best practice recommendations on how to develop library objects for assemblies and product and facility declarations.

- **BS 8541-5** *Library objects for architecture, engineering and construction: Assemblies* (on the sharing of sub-models representing combinations of components and spaces covering naming, classification and nesting) and;
- **BS 8541-6** *Library Objects for architecture, engineering and construction: Product and facility declarations – Code of practice* (on the sharing of data expected from product declarations, labelling and environmental tables) will be published in February or March 2015.

Lead Technical author, Nick Nisbet, explains, “Repeatable rooms and prefabricated modules, on the one hand, and the Construction Products Regulation

and energy performance reporting on the other, are issues of growing importance in the construction sector. These codes of practice build on the earlier parts of the series to help the industry achieve higher quality and accuracy when exchanging product (and facility) information."

BS 8536:2010 *Facility Management briefing is being revised as Facility Management briefing for design and construction – Code of practice*, to take into account current industry best practices in briefing and the emergence of the soft landings process and BIM. The revised standard will give recommendations for design and construction to ensure that design takes account of the expected performance of the asset/facility in use over its planned operational life.

BS 8536:2015 will introduce the integration of the principles of the soft landings process, combined with effective information management and the requirements for post-occupancy evaluation (POE) to strengthen the link between asset/facility owners, operators, and their facility managers and the design and construction team to assure performance of the design and the operational asset/facility in all aspects.

The standard cross-references information requirements associated with the mandated documents for BIM Level 2 PAS 1192-2, PAS 1192-3 and BS 1192-4 and is expected to publish in July 2015.

BS 8536:2015 is intended for use by individuals and organizations preparing or contributing to design, construction and operations, in both the public and private sectors, including owners refurbishing an existing asset/facility, organizations procuring a new asset/facility and the designers, constructors, subcontractors, operators, operations teams, facility managers and other specialists engaged in such activities.

PAS 1192-5. The UK BIM Task Group's "Security Working Group" announced late last year at "ICE BIM 2014: Business as Usual" Conference in London that "PAS 1192-5: Specification for security-minded building information management, digital built

environments and smart asset management", is currently in development.

The PAS will outline a risk assessment process to determine the sensitivity of information already held, or which will be acquired during the course of a project, and identify appropriate, proportionate security requirements for BIM collaboration which should be applied during all phases of the lifecycle of an asset, i.e. concept, design, construction, operation and disposal. It will then address the steps required to assist in creating and cultivating an appropriate security mind-set, and the secure culture necessary to enable business to unlock new and more efficient processes and collaborative ways of working.

The intended audience for this PAS includes organisations and individuals responsible for the procurement, design, construction, delivery, operation and maintenance of buildings and infrastructure assets. Although specifically targeted at the use of Level 2 BIM, the requirements will provide a foundation to support the evolution of future digital built environments and will contribute to smart asset management.

The standard is expected to publish in quarter two in 2015. ■



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CDM2015 and domestic projects

James Ritchie of The Association for Project Safety answers the questions most raised about the new CDM Regulations with regard to domestic projects...

Frankly, the APS phone line has been red hot since the beginning of the year. Everyone wants to know the implications of the new CDM Regulations; what they mean for their jobs, clients, designers and contractors. Can I be a Principal Designer? My client wants to appoint me to carry on giving him advice on his construction projects – is that allowed? How strict is the Principal Designer duty to ensure designers comply with the regulations? What is going to happen on domestic projects? What if my domestic client appoints all the contractors separately?

CDM2015 is aimed at small and domestic projects – the very area where most construction accidents and incidents are occurring – and many of the calls are about this area.

So what do Domestic Clients Need to do?

CDM2015 understands that most domestic clients will not be familiar with design or construction projects or associated legislation. If someone is about to alter or extend their house or buildings, thinking of putting up a new one or demolishing an existing one, then the Construction (Design and Management) Regulations 2015 (CDM2015) place a number of specific duties on them as a construction Client.

The aim of the CDM2015 Regulations is to make health & safety an essential and integral part of the planning and management of projects and to make sure that everyone works together to reduce the risk to the health or safety of those who work on the structure, who may be affected by these works, or who will use it once it's completed. A domestic client is someone who has construction work done on their

own home, or the home of a family member which is not in connection with a business. Unlike CDM2007, domestic clients have duties under CDM2015.

The extent of these duties varies with the type of project involved. On projects that are likely to involve more than one contractor, the domestic client is required to appoint a Principal Designer before significant detailed design work starts so that they can advise and assist the client with their health and safety duties and plan, manage, monitor and co-ordinate the health & safety of the pre-construction phase of the project. The Principal Designer is a designer (architect, building surveyor or engineer for example) who can demonstrate to the client that they have knowledge, skill and experience of CDM2015 and understand the process of design risk management.

When clients are talking to a designer or designers about their project they should check that the designer has the capability and experience to do the work. A designer might be a member of one of the following professional bodies - ARB, RIBA, RIAS, CIAT, RICS, IStructE etc. and, in order to carry out the Principal Designer role, should have an accreditation in construction health & safety risk management (Registered membership of APS for example) or can provide evidence of having undertaken appropriate training on CDM2015.

The Regulations recognise that Clients hold the power to influence and control the designers and contractors they engage or appoint on a project, and therefore that the ultimate responsibility for the achievement of a safe and healthy project is in your hands as much as theirs.

The Regulations are about making sure that there is:

- Early appointment or engagement of capable key people or organisations that have sufficient skills, knowledge, experience and resources;
- A realistic project programme which gives enough time for planning and programming as well as carrying out the work itself;
- Early identification and reduction of construction risks and proper management of those that remain, so that construction is safe and does not damage the health of workers or others;
- Co-operation between all involved in a project and effective coordination regarding health & safety issues;
- Adequate welfare facilities provided from the start and throughout the construction phase; and that
- Appropriate information is made available to the right people at the right time so that work can be carried out safely and without risk to health.

However, it is very important that the amount of effort devoted to managing health & safety is kept appropriate and proportionate to the complexity of the project and level of risks. It is particularly important to be aware of, and avoid, unnecessary paperwork. Most domestic work should be relatively simple and therefore require minimal paperwork.

What type of domestic project is being planned?

Irrespective of size or duration, the CDM2015 regulations separate construction projects into two types – dependent on how many contractors will be involved in the project.

The two types are:

Projects with only one contractor – where the project will only require one contractor working on the site. An example of this might be an electrician rewiring the house or a plumber installing a replacement boiler, when no other trades are required to do any work. Where the project only involves one

contractor, the client duties specified in CDM2015 Regulation 4(1) to (7) and Regulation 6, must be carried out by the contractor. The contractor needs to undertake these duties in addition to their own duties as a contractor.

When clients are selecting a contractor, they should ensure that the contractor is aware of the client duties under CDM2015 as well as their own contractor duties. Clients are advised to ask for examples of how the contractor has done this on previous projects.

Projects that are likely to involve more than one contractor – this will be the majority of projects. For example, if the work will require a bricklayer, electrician, plumber, roofer and plasterer, then that is five contractors.

If it is likely that the project will require more than one contractor, then the client must appoint a designer with control over the pre-construction phase as Principal Designer and a contractor with control over the construction phase as Principal Contractor. These appointments must be made as soon as practicable and before the construction phase begins. If the client fails to make these appointments, then the designer in control of the pre-construction phase is deemed to be the Principal Designer and the contractor in control of the construction phase is deemed to be the Principal Contractor.

If the client is in doubt, they should assume that the project will require more than one contractor. The appointed designer or contractor should be able to help clients decide or alternatively clients can contact the free Public CDM Helpline as a source of independent advice on 0333 088 2015. ■

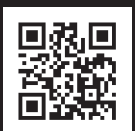
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Building a more accessible future

The retail and hospitality industry have been challenged to increase the levels of accessibility for disabled people. Chris Moriarty, Head of Insights and Corporate Affairs at BIFM examines the challenge ahead...

The beginning of December saw a report published by a government backed audit of over 30,000 businesses, which aimed to assess the levels of disabled access in high street shops and restaurants. The findings gathered from this report proved to be quite unexpected and significantly disappointing for the retail and hospitality sector.

The results identified emphasised how a large percentage of businesses within this sector were underperforming in their approach to facilitate their disabled customers. As a result of this, the Minister for Disabled people, Mark Harper, turned his focus onto the Catering and Hospitality industry, looking at what measures could be put in place to better cater for disabled people.

Reviewing some of the figures obtained from the report, it was evident that there would be strong concern. Two in five food outlets had no accessible

toilet, whilst two thirds of staff had received no appropriate training to cater for disabled customers.

Disabled consumers are expected to spend around 200bn over the Christmas period, it would therefore seem essential for businesses to invest a lot more time and money into their care.

There are two ways to frame this. The first is to look at how we design our new buildings, taking into consideration accessibility from day zero. We have recently seen a shining example of this approach two years ago at London 2012. The Games were considered the most inclusive and accessible ever. The success of the Games has led to the Built Environment Professional Education Project (BEPE), an initiative announced by Government and the Mayor of London aimed at improving accessibility by taking the learnings from 2012 and building it into professional education. BIFM has taken the lead, having



Chris Moriarty
Head of Insights and
Corporate Affairs

launched our revised standards which include accessibility and inclusion, we aim to deliver these through our qualifications early in the New Year.

However, it's even more crucial that we get this knowledge and competence to those operating existing buildings that may not have been built with accessibility in mind. These buildings will need to be adapted and reshaped. Whether the building is being designed from scratch or is being retro-fitted to make this happen, it is crucial that facilities managers are involved in the process as they will bring the experience of operating buildings which will be vital to getting this right.

That said, making buildings accessible is one thing but often the inclusivity part is not considered enough. Whilst there may be an accessible toilet in the building, is it tucked away somewhere inconvenient? I have heard stories of people entering buildings that have to visit other floors, but need a lift to do so, being asked to use the goods lift or trade entrances. The impact of this demeaning process goes well beyond ticking a compliance box. A good example was a building described to me where there was a lavish spiral stairway going up through the centre of the building. It was stunning. Should someone not be able to use the stairs then they could miss out on this excellent design feature, so they built a glass elevator through the centre of the spiral meaning that people using the lift can still enjoy the experience. Those with disabilities know that they aren't able to do everything other people can, but we should actively be trying to match their experience with others, to the best of our ability.

As with many things this is not a straight forward challenge. Whilst there is a critical eye being cast on the retail and hospitality sector, there are stories of retailers submitting applications to amend their building only to see it being knocked-back by the planners. So there are a number of people, and professions, that need to take a collective, collaborative approach.

Also, there is no short-cut to making this happen. The responsibility lies not just within the retail sector, but UK business more broadly, and we only have a chance of successfully achieving a truly inclusive approach if we get the firm commitment that is currently lacking from businesses of all sizes. Those businesses who fail to act run the risk of missing an important trick and alienating an important market.

Disabled customers should be able to obtain goods and receive services in the same way as other customers who are not disabled. The UK should be leading the way, setting a positive example and sending an important message to the rest of the world. Small changes can lead to big improvements, not just for customer experience, but for the bottom line of UK business and, essentially, the wider economy. ■

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A solution to combat fuel poverty

The NIA is calling on all political parties to recognise that home energy efficiency needs to be defined as a National Infrastructure Priority to combat fuel poverty...

The National Insulation Association (NIA) is advising that energy efficiency interventions provide the best long term solution to reduce energy bills and tackle fuel poverty. They are also the most cost effective way to reduce carbon emissions.

Neil Marshall, Chief Executive at the National Insulation Association said: "Following the significant reduction in insulation activity under the Energy Company Obligation and the closure of the SWI funding in the 2nd phase of the Green Deal Home improvement Fund, the government has to rethink its stop start schemes and incentives. It really needs to put in place a long term plan and funding mechanism if we are to insulate the UK housing stock in a timely manner. With over 7 million homes having inadequate loft insulation, over 5 million that require cavity wall insulation and almost 8 million homes that need solid wall insulation, we need to significantly strengthen energy efficiency policies and programmes."

Make Energy Efficiency retrofit an Infrastructure Priority

The Energy Bill Revolution Campaign which the NIA supports is calling for 2 million low income homes to be brought up to EPC Band C by 2020, and 6 million low income UK homes up to EPC Band C by 2025.

To achieve these targets energy efficiency needs to be made a UK infrastructure investment priority on a par with energy generation and transport etc. To meet the 2020 target requires increasing annual investment to £2bn per year. This could be achieved by supplementing the ECO with either half of the £2bn annual proceeds of carbon revenue from the

Carbon Emissions Trading Scheme and Carbon Floor Price projected for 2015 to 2020, or by using a small percentage of the UK infrastructure budget. An extra £1bn of government investment each year only represents 2% of the annual £45bn government infrastructure budget. Investment in retrofitting homes to make them energy efficient not only provides the best way to cut energy bills, reduce carbon emissions and tackle fuel poverty, it also represents one of the best economic investments the government can make in terms of growth, jobs created, value for money and tax revenue. The government's infrastructure programme and budget should be prioritised accordingly.

Marshall added: "The NIA is calling on all political parties to recognise that home energy efficiency needs to be defined as a National Infrastructure Priority with public investment to support the most vulnerable households and to create the confidence for the industry to scale up investment over the long term." ■



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For low energy office buildings, keep it simple

The design, construction and operation of low energy buildings should favour a simple 'fabric first' approach wherever possible writes Tom De Saulles, building physicist at The Concrete Centre...

For effective long-term sustainability you need to get the fundamentals of building design right. Increasingly, architects and their clients are returning to fundamental passive design principles that allow fabric performance to be fully optimised. This integrates the thermal mass of exposed structural elements with the design of glazing, ventilation, shading and mechanical systems. This helps ensure comfortable conditions can be maintained during spring and summer, whilst avoiding or minimising the need for mechanical cooling.

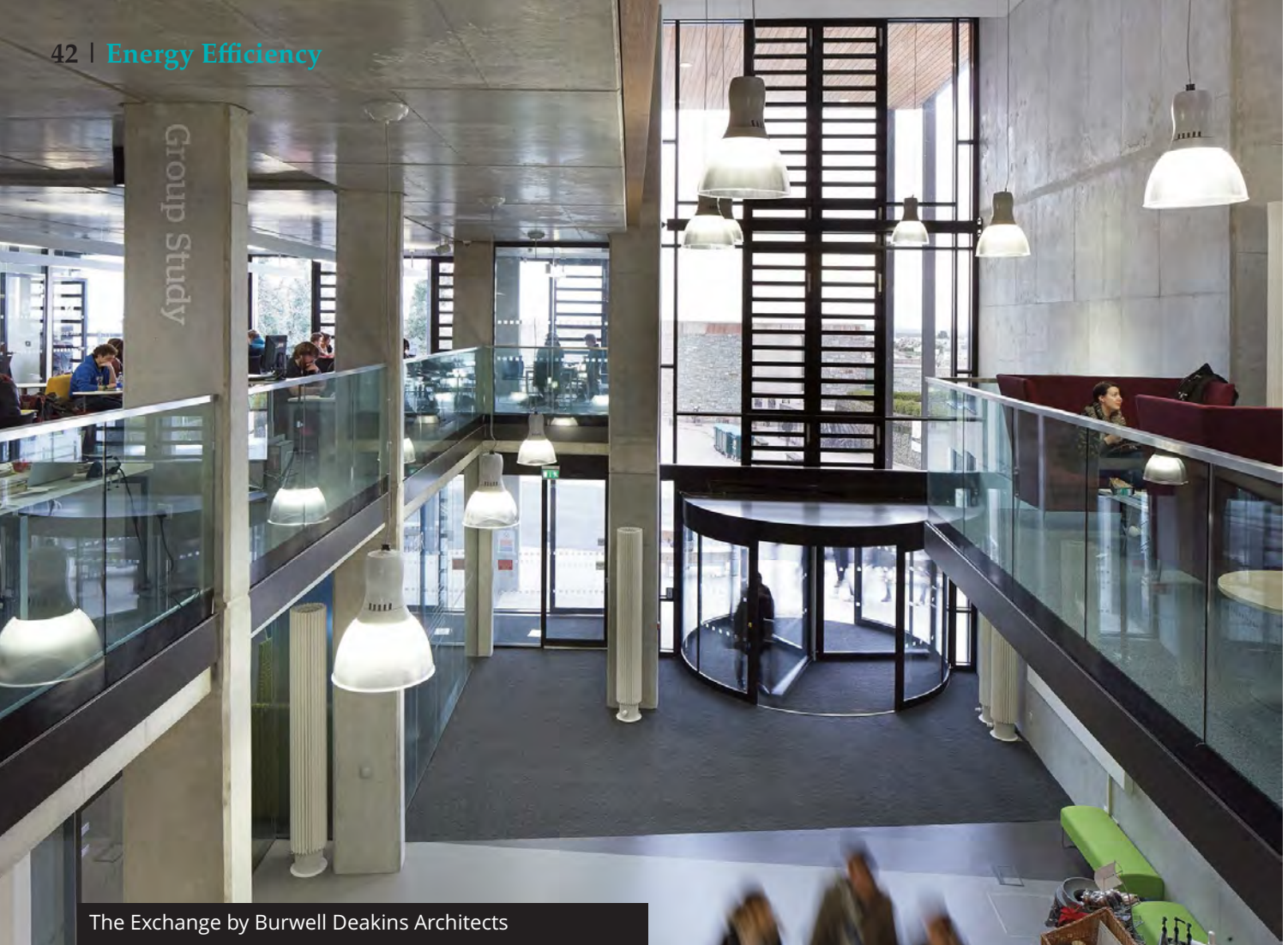
In practice, thermal mass is typically provided by heavy-weight floors synonymous with concrete frame buildings. Lightweight timber construction and typical steel frame buildings cannot match the performance provided by concrete floors, which can be constructed with an exposed soffit to fully access its inherent thermal mass. The large surface area of the soffit absorbs unwanted heat, helping regulate the internal temperature and peak cooling demand. Using concrete floor slabs in this way makes good sense, as they typically provide by far the greatest source of thermal mass in non-residential buildings and can readily absorb heat during the day and release it at night with the aid of night-time ventilation.

A question often asked by architects and designers is 'how much concrete do you need to provide thermal mass?' The answer largely depends on the extent to which you want to optimise the building design. It is sometimes thought that 100mm of concrete is sufficient, but this fails to take account of a range of factors including how buildings actually respond to real weather conditions. For example, a naturally ventilated office with exposed 100mm composite

floors (steel decking/soffit with in-situ concrete topping) should have sufficient heat capacity to cope with a simple 24 hour heating and cooling cycle. However, in addition to a building's daily cycle, there are also longer cycles related to a typical hot spell (usually three to five days) and also the five working days per week cycle, from which heat will reach different depths within the available thermal mass.

In the case of floors in a non-air conditioned building for example, the greater the slab depth, the longer the time period it responds to; the core of a 300mm thick concrete slab responds to the monthly average condition and draws heat in deeper over an extended period of hot weather. For longer time periods these factors are important because it is the longer-term average room temperatures that define the thermal storage core temperature and hence the temperature gradient that draws heat in. So, whilst a 100mm of concrete offers some element of thermal mass, the thicker slabs used in concrete frame buildings provide greater temperature stability and increased cooling performance across a range of conditions, including hot periods.

In terms of embodied CO₂, research shows there is little difference between concrete and steel frame office buildings. Perhaps of more relevance, is the operational CO₂ savings provided by thermal mass, through its ability to avoid or minimise the need for air conditioning. Over a 20 year period the savings achieved can account for around 75% of the initial embodied CO₂ of the concrete, or in other terms, the whole life CO₂ performance of a concrete frame office building is a tiny fraction of its initial embodied CO₂ when the thermal mass is exploited.



The Exchange by Burwell Deakins Architects

When another factor known as carbonation (the absorption of CO₂ by concrete) is factored in, along with a slightly longer life span, the initial embodied CO₂ of the concrete can be fully offset. As this demonstrates, it is always more useful to view concrete buildings in whole life terms.

So there you have it, the simplest approach in office design, which utilises thermal mass can significantly reduce energy consumption, help maintain comfortable conditions and deliver impressive whole life CO₂ performance. ■

Related Information:

Publication: Utilisation of Thermal Mass in Non Residential Buildings
http://www.concretecentre.com/online_services/publication_library/publication_details.aspx?PublicationId=786

Publication: Concrete Floor Solutions for Passive and Active Cooling
http://www.concretecentre.com/online_services/publication_library/publication_details.aspx?PublicationId=797

Publication: Thermal Mass Explained (2012 update)
http://www.concretecentre.com/online_services/publication_library/publication_details.aspx?PublicationId=781

The Concrete Centre will be exhibiting as part of the Concrete and Masonry Pavillion at Ecobuild – 3-5th March 2015, ExCel, London. North Arena.



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The challenges of thermal bridging

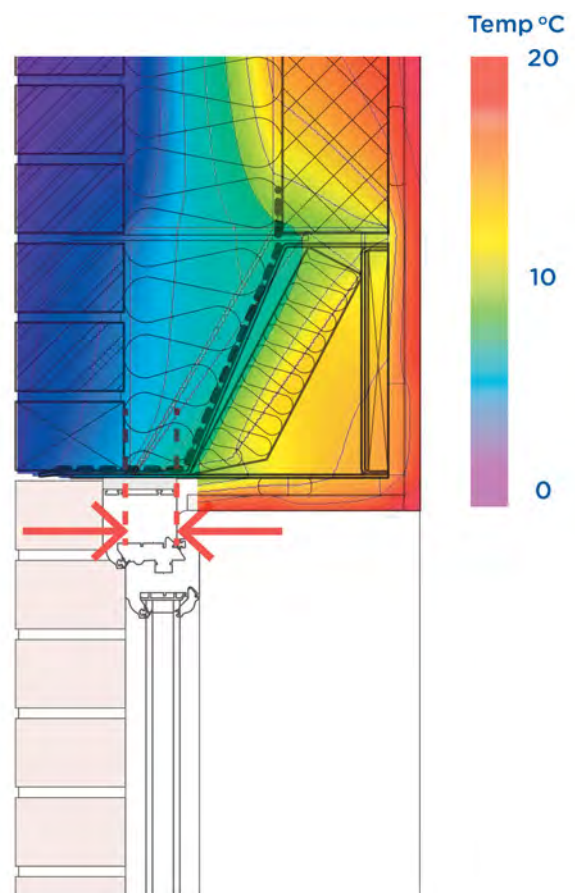
Alex Taylor, NHBC Senior Energy Consultant, examines the challenges that thermal bridging presents from an energy assessors point of view...

The Standard Assessment Procedure (SAP) now contains 42 separate definitions for thermal bridging details. As part of an energy assessor's role, they need to understand how each detail is applied whilst assessing a dwelling for compliance with Part L1a 2013.

It is unlikely, but not completely impossible, that any one dwelling will contain all junctions, but spread across a single development all 42 may be encountered.

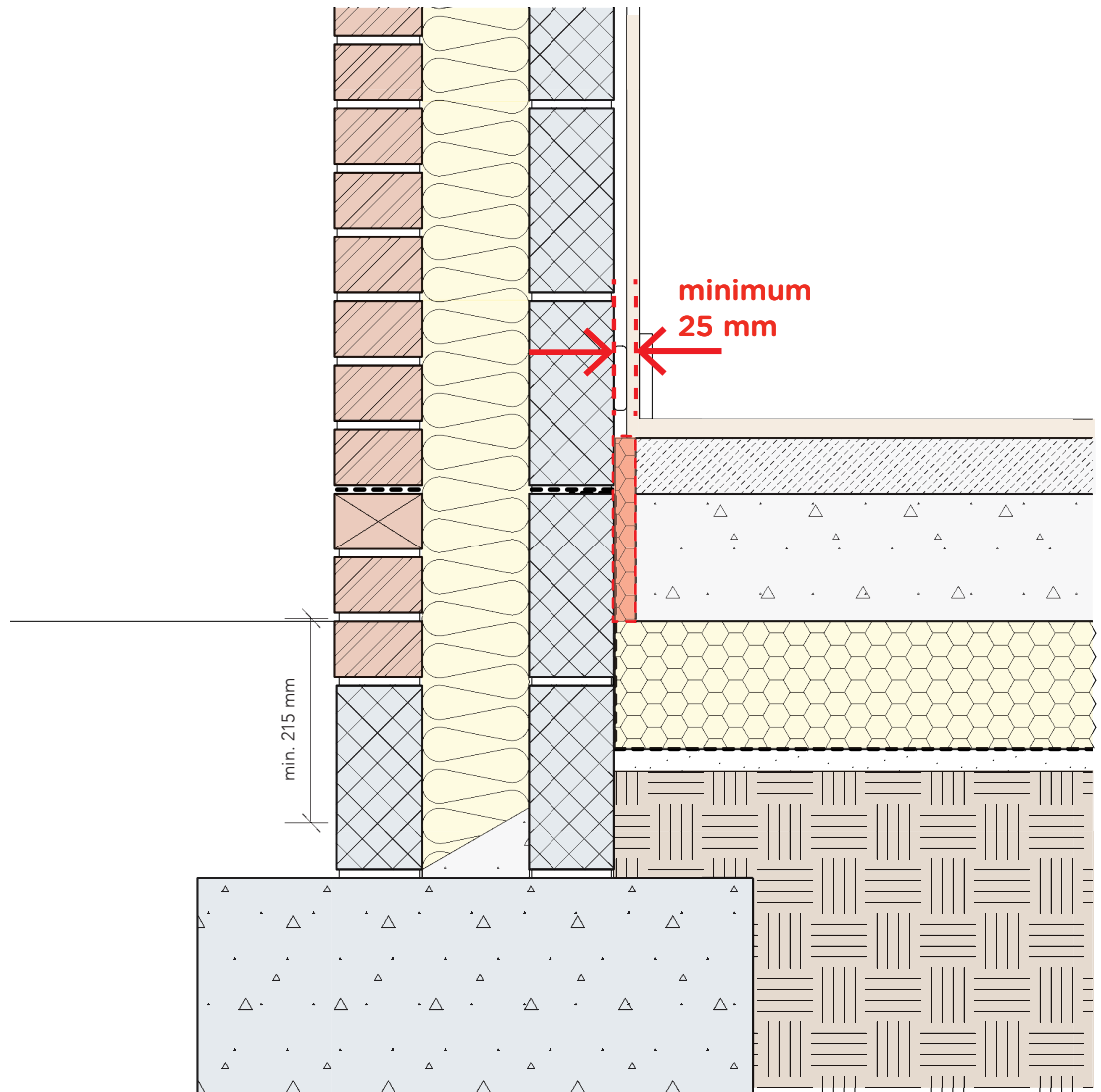
What does this all mean, and why has so much effort gone into this seemingly dark art? In 2006 as building regulations turned their attention to reducing carbon dioxide emissions, the amount of insulation going into a typical dwelling rose by 20%. This had an unfortunate consequence of exacerbating the effect of thermal bridges at junctions in the building fabric and at structural openings. These possibly unchecked paths had the potential for significant cold spots within the dwelling which could lead to internal condensation and mould growth.

At the time, Accredited Construction Details (ACDs) were introduced as design/construction details aimed at preventing these problems. Additional heat loss from the dwelling was modelled in SAP by multiplying the total exposed area by a heat loss factor (or 'y-value') of 0.08 W/m²K. If ACDs were not followed, the additional heat loss almost doubled to a default y-value of 0.15 W/m²K. An alternative option in SAP 2005 was for the designer to provide a set of psi values for their proposed constructions (a psi value provides a measure of the heat loss per unit length of a junction). Once in receipt of these



Where combination steel box lintels are commonly used, considerable heat loss may occur because of the proportion of steel, the minimal and discontinuous insulation, and the length of the bridge

details the additional heat loss from thermal bridging would be determined by the SAP assessor by measuring the length of each junction (thermal bridge) and multiplying by the appropriate psi value. The summation of the heat loss from all junctions,



expressed over the total exposed area, would give the dwelling's ψ -value.

At this time SAP 2005 considered 16 junctions – many common junctions were excluded, and SAP conventions sought to plug the gap – any 'junction' which did not appear in SAP or have a convention was ignored (in the SAP calculation).

From Part L1a 2010 (SAP 2009) the ψ -value approach based on the adoption of a standard detail set was no longer permitted, and in order to determine heat loss through thermal bridging, the energy assessor had to adopt the 'lengthy' approach detailed above. In SAP 2009 the number of junctions also rose to 23 – now recognising that flat roofs and junctions to party walls had a part to play in this uncontrolled heat loss - and further conventions continued to address 'unreferenced junctions'.

ψ values can be provided from a multitude of sources, and although they should be prepared to the same standard (BRE 497) there is no formal accreditation scheme and therefore it is unlikely an energy assessor would be able to question the values presented. Energy assessors can be presented with ψ values from a variety of sources:

- SAP Appendix K Default values – in the absence of a detail the assessor must resort to these – compliance with Part L 2013 is very unlikely if this is the sole source;
- SAP Appendix K Accredited Values – by adopting the ACDs published to support Part L in 2006, more favourable ψ values can be adopted;
- Publicly-available details, such as those published by NHBC Foundation (Part L 2013 – Where to



Alex Taylor, Senior Energy Consultant

Start – Masonry & Timber Frame Construction), Constructive Details Limited, Concrete Block Association, Scottish Building Standards to name but a few;

- Product Specific Details – for example a lintel manufacturer may have commissioned details for use alongside their product;
- Bespoke Details – most likely the final resort (as the calculations can be quite expensive, and may not always return a favourable answer), these may be commissioned for junctions which are unique to a particular builder or development.

During the design of the project there needs to be consultation between the energy assessor and the builder's design team to provide a fully working specification which will deliver compliance with Part L. At the end of this work the SAP Ratings and supporting documentation should be provided to

the builder for submission to building control and delivery to site. Within the package of information there should be a summary of all thermal bridge details used in the energy calculations with appropriate references. The builder should now be absolutely clear on what has been used to determine compliance and therefore what they need to build on site – if they are not it is very likely the performance gap between the SAP and EPC and the constructed dwelling will continue to exist.

In accordance with Regulation 27, building work should only commence once the above has been completed. So in order to ensure the dwellings continue to comply and to provide a degree of checking on site, what should Building Control be looking for?

- Is a detailed specification available on site which relates to the energy assessments?
- Does the specification include references to thermal bridges?
- Does the drawing pack on site include details of the referenced thermal bridges?

If the answer to any of the above is 'no', it is highly unlikely the homes are going to be constructed as per the specification agreed at the design stage. Does this mean the homes are going to be less energy efficient? Not necessarily, but any variations need to be fed back through the design office and remodelled within SAP, to ensure continued compliance with the requirements. ■



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Improve the acoustic performance of party walls: stick to specification

The specification process forms the backbone of the construction industry. For developers, architects and building control it offers a way to control performance and regulate the built environment for end users, as well as providing an accurate brief to installers. Tom Foster, senior product manager at Saint-Gobain Isover, looks at potential issues around sticking to specification, the process itself and the role all parties have in ensuring acoustic performance in buildings.

For contractors and subcontractors, specifications provide a safety net. If specification is followed, a building will meet the acoustic performance requirements it was designed for, but problems can arise if substitute materials are used or a detail is constructed incorrectly. An example where specification is key is in party walls, where acoustic performance 5db above building regulations requirements is often needed. In this area specifically, Robust Details has become very popular because it provides pre-approved details and specifications.

Robust Details

The Robust Details Scheme is an alternative to pre-completion sound testing and offers a way for contractors to demonstrate the compliance of party walls or floors with acoustic building regulation standards. In order to be approved, each Robust Detail must be capable of consistently exceeding acoustic regulation standards, be practical to build on site, and be reasonably tolerant to workmanship. This ensures manufacturers develop systems that are consistently achievable on-site.

Robust Details offer numerous constructions to demonstrate compliance, all of which have thorough design and installation details, as well as specific product requirements. In the case of masonry party walls, products such as Type A wall ties, 10 kg/m³ plasterboard and Isover's RD Party Wall Roll insulation are all specifically required to provide high levels of acoustics. Moving away from any of these products may impact the acoustic performance of the structure.

“The Robust Details Scheme is an alternative to pre-completion sound testing and offers a way for contractors to demonstrate the compliance of party walls or floors with acoustic building regulation standards.”

Consequences

Moving away from specification can put system performance levels at risk. Failing to follow spec can reduce the acoustic 'efficiency' of a building, meaning that it does not meet target performance levels. Most importantly, it does not provide the end user with a dwelling that performs to the level it should. This could mean, in the arena of acoustics, a noisy house that is uncomfortable for inhabitants.

Not sticking to specification can also cost housebuilders and developers large amounts of money. Control bodies will ask for installation errors to be corrected, so the initial savings made by compromising the specification during the installation stage will be lost when having to rectify constructions.

Failure to use specified products can also result in long term issues. In the case of party walls, homeowners will not receive the standard of property that they are paying for, potentially damaging a housebuilder's reputation.

Conclusion

Manufacturers, specifiers and contractors all have a role to play in improving specification compliance and the performance of buildings in situ. Manufacturers should ensure their newly developed systems are practical and tolerant to workmanship and support the industry at design and build stages. However, specifiers and contractors also play a pivotal role in ensuring specified products and systems are used and constructed correctly on site.

If all parties play their part, we can improve the in situ performance of our buildings to the benefit of the end user and the construction industry as a whole.



Tom Foster

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A Sustainable Future Begins With Retrofit

It is estimated that 22 million houses in the UK need to be thermally upgraded in order to achieve a worthwhile level of energy saving, with 8.5 million homes over 60 years old and considered hard to treat. But how are we tackling this and how has the past 12 months shaped up to meeting the UK's long-term targets? Mark Weaver, Project Director for Retrofit for Saint-Gobain in the UK, explains the importance of retrofitting to reduce the energy consumption of the UK's older, inefficient housing stock.

It is recognised that the UK has probably the oldest and least energy efficient housing stock in the western world. Residents in such properties feel the effects of this in the form of high energy bills, leading to unacceptable levels of fuel poverty. In order to meet the UK's 2050 CO₂ commitments, the existing housing stock needs to be a high priority amongst Government policies.

Upgrading the thermal performance of the building envelope will reduce the

energy required to maintain a comfortable environment. Insulation solutions and low emissive glazing are solutions at the core of Saint-Gobain's construction products sector. They can tackle all house types and elements of the building – walls, floors, roofs, windows and doors. Individually, treating these areas of the house can offer significant energy and savings on bills.

However, as demonstrated by Saint-Gobain's unique Energy House

project, carried out in conjunction with leading academics from Leeds Metropolitan University, the University of Salford and Saint-Gobain Recherche, taking a whole-house fabric first approach to retrofitting a house can prove hugely beneficial for thermal improvement, air tightness and comfort for the habitants of the building.

During the three-month project, we identified that, with the installation of multiple measures, energy savings of up to

63% can be easily achieved, especially on poor performing properties, with a 50% reduction in unwanted air leakage.

Representing 21% of the UK's hard-to-treat housing stock, the Energy House is a full-scale typical 1919 end-of-terrace house. Built in an environmentally controlled chamber, tests can be accurately monitored, varied and repeated while maintaining exactly the same conditions – something that most whole-house testing cannot achieve when done outdoors.

There has, and continues to be, much publicity about energy efficiency in the domestic retrofit sector in both the industry and national press. Much of it started late last year with the political debate around so-called 'green levies'. This ultimately led to significant changes and the dilution of the original Energy Company Obligation (ECO), and, most recently, the sudden closure of the Green Deal Home Improvement Fund (GDHIF). The GDHIF initiative offered up to £7,600

for home improvements such as solid wall insulation, cavity and loft insulation and heating measures. This series of events has resulted in an increased number of energy efficiency schemes being operated, but industry is reporting that fewer installations are actually being carried out.

I'm confident that things will improve, but 2014 is unfortunately shaping up to be a year of missed opportunities for the market. Perhaps this illustrates the need for more structural fiscal incentives such as discounts from council tax rates for homeowners installing energy efficiency products in their homes. Saint-Gobain is supportive of such measures to create sustainable growth in this sector.

However, we need to look to the positive elements and celebrate the retrofit projects that are happening across the country, many of which Saint-Gobain businesses such as Weber, Isover and Celotex are supplying to. These include social housing projects still funded by

the smaller and newly defined ECO, the Green Homes initiative in Scotland, where interest has been high, the 24 Green Deal Communities schemes for street-wide solid wall insulation and the one-off homeowner retrofits through the first wave of GDHIF vouchers. We are beginning to see genuine 'blending' of finance streams to deliver affordable retrofit for public and private properties – exactly how the Green Deal structure was envisaged. These are encouraging examples; we'd like to see the volumes reach a healthy level for industry investment, alongside a consistent policy framework for greater industry confidence.

In the meantime, Saint-Gobain will continue to develop retrofit solutions to meet the needs of the existing housing stock, and train and educate installers and contractors through the nationwide network of Saint-Gobain Technical Academies, leading the industry in providing a competent workforce to tackle the significant retrofit challenge.



Insulating party wall cavities – a crucial step

With the welcome announcement from DECC that insulating existing party wall cavities is now included as a measure in the latest RdSAP calculations for both the Green Deal and ECO funding, Nick Ralph from MIMA explains why measures such as this are so crucial...

MIMA was instrumental in influencing the latest changes to RdSAP, through its work with Leeds Beckett University and the BRE; which proved the case for retrofitting existing party cavity walls using blown fibre mineral wool.

Over recent years MIMA has funded a series of co-heating trials and forensic investigations by the Buildings and Sustainability Group of the School of the Built Environment at Leeds Beckett University, to gain a detailed understanding of the factors influencing and contributing to party wall bypass, as well as quantifying its effect.

Historically, there was an assumption that cavity party walls were an area of thermal equilibrium between two heated spaces and not a source of heat loss. However, initial studies between 2005 and 2007 showed that, for example, in a mid-terrace dwelling the heat lost through the untreated party cavity walls could be greater than that which is lost through all of the other external elements combined.

The study demonstrated that heat energy from both dwellings can escape into the party wall cavity. This causes free moving air in the cavity to warm and rise up through the cavity, bypassing the loft insulation and – in a majority of cases – continuing to the roof line where the air and heat energy escape to the external environment.

Where cold air enters the uninsulated cavity at exposed edges, the uninsulated cavity creates a ‘chimney stack effect’ as the cold air rises and is

warmed by heat conducted through the leaves of the party wall from the adjoining homes, before escaping from the cavity to the external environment – either into the loft space or through the roof. Additionally, windy conditions can induce differential pressure that leads not only to heat losses at the junction of the party cavity with both external walls and suspended floors, but also increased heat loss due to the stack effect of the cavity.

Once this highly detailed work had been undertaken and widely accepted, it was possible to monitor a number of dwellings in lower detail, whilst still making quantitative measurements of heat flux, to show that the heat loss phenomenon was common to all party walls with cavities to the roof. The quantum of heat losses was also considered to be consistent.

Leeds Beckett University’s work also demonstrated that filling the cavity with insulation would consistently reduce this heat loss. Taking a mid-terrace house, which was built between 1990 and 2001, the study demonstrated an annual saving of 1,978 kWh of energy and 0.38 tonnes of CO₂ – equating to a £70 reduction in household energy costs. RdSAP attributes a heat loss equivalent to an effective U-value of 0.50 W/m²K to an unfilled party wall with a cavity to the loft and a U-value of 0.20 W/m²K when it is filled.

When you take into account estimates that there are 3.77million bypass walls in England alone, equating to 5 million households, the potential to reduce fuel usage and CO₂ emissions through filling party cavity walls with blown fibre mineral wool is therefore



huge. In fact, the BRE has estimated it would save approximately £465m per year and 2.5 million tonnes of CO₂.

Putting that into the context of increasing fuel poverty and the government's ambitious CO₂ emission reduction targets and the importance of such a measure being included in RdSAP becomes clear.

According to a recent report from Cambridge Econometrics, millions of people are living in fuel poverty in the UK; and one of the biggest causes is the poor condition of our housing stock, which is one of the least energy efficient in Western Europe.

The report undertook detailed modelling to assess the economic, fiscal and environmental impact of a recommended investment programme aimed at bringing homes up to Band C on an Energy Performance Certificate. Included within the recommendations is a national super-insulation scheme that would result in £8.5bn annual energy bill savings for British households.

In addition to making all low income households highly energy efficient and reducing the level of fuel poverty, it also demonstrates the comprehensive

economic benefits of taking radical action to fix Britain's energy wasting homes. Overall, it is estimated that a radical programme to make all homes highly energy efficient would add £13.9bn annually to the UK economy by 2030, with the government receiving £3.20 through increased GDP for every pound they invest.

With the UK's existing housing stock posing the greatest barrier to us achieving ambitious CO₂ reduction targets and over 5,000 people a year dying from cold housing, recognising those measures that can make a significant contribution to improving the energy efficiency of our housing stock – such as insulating existing party wall cavities – is crucial. And as per the Cambridge Econometrics report, tackling these measures has an economic benefit too. ■

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Full Fill for the perfect fit

How fully filling with a mineral wool insulation can be the most practical and cost effective solution

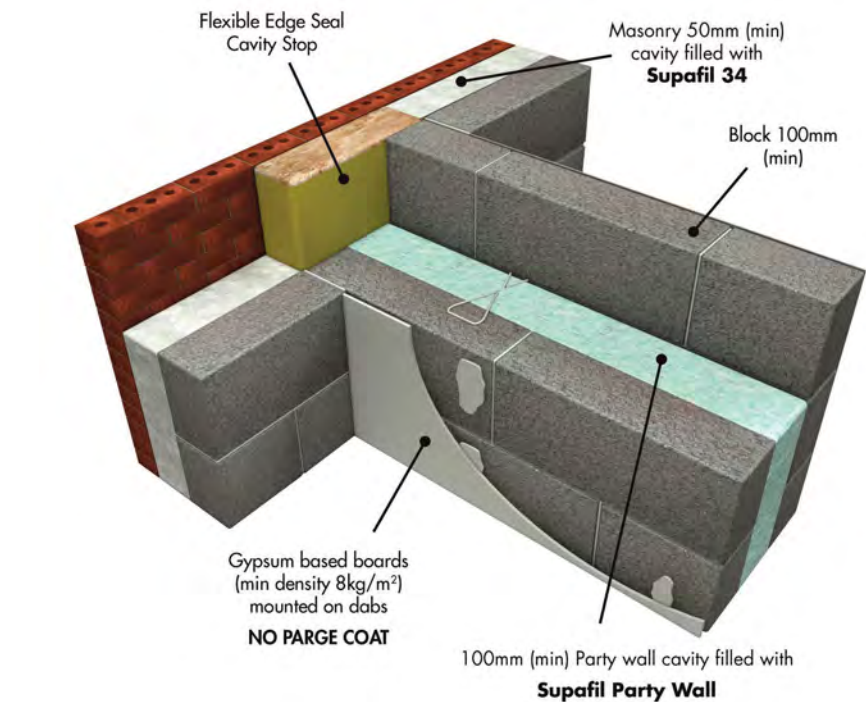
When it comes to installing any form of insulation, the performance characteristics of a product must always be considered. Indeed, when approaching a masonry cavity wall application, the fire and thermal performance of the insulation, in addition to the prevention of water penetration are vital issues that must be addressed – the selection of appropriate materials and jointing methods for the outer leaf are therefore crucial.

Alongside these factors, another key consideration can be cost. Fundamentally, housebuilders and developers require high performing products that can save them time and money. With this in mind, there is a solution that ticks every box. The recommended masonry cavity wall solution is full-fill mineral wool insulation, either injected (such as Supafil) or built in slabs (such as Earthwool DriTherm Cavity Slabs).

These systems not only provide U-values that comply with Building Regulations, but they are also the lowest in cost. Even with dense concrete blocks it is possible to achieve very high thermal performance in a manageable wall width; and a full-fill solution is suitable for all types of buildings.

Full-fill solutions are the most commonly used in the market with approximately 55% of new build cavity walls incorporating them, and 85% of all residential cavity walls when including refurbishment.¹

Housebuilders using full-fill solutions will make significant savings, whilst still achieving the thermal performance required to meet compliance with Building Regulations. In fact, compared to partial fill solutions, specifiers



can save up to 50 per cent of the cost, which can equate to up to £535 per plot – a substantial cost saving for housebuilders when they are building multiple plots.

Meanwhile, mineral wool insulation products are non-combustible and classified as Euro-class A1 to BS EN ISO 13501-1 – the highest possible “Reaction to Fire” classification – compared to a D or E typically achieved by foam plastic insulation materials.

Furthermore, there is a common misconception that water can bridge the cavity and a full-fill solution cannot be used in severe exposure zones. In reality, there are mineral wool insulation products available on the market that contain a water-repellent silicone additive to ensure that no liquid water is able to pass through and reach the inner leaf of masonry. Specifiers should only choose those products that are BBA certified for all exposure zones

– even when a site is being insured by the NHBC².

Undeniably, a full-fill mineral wool insulation to cavity walls offers the most practical, high performing and cost effective solution. This all helps in contributing to keeping properties warmer and for the homeowner, saving money on their energy bills in the long run.

For more information please visit www.knaufinsulation.co.uk

¹ Building Insulation Market, Construction Markets 2011

² Consult NHBC Standards for guidance regarding wall construction in each exposure zone

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PARTY WALL



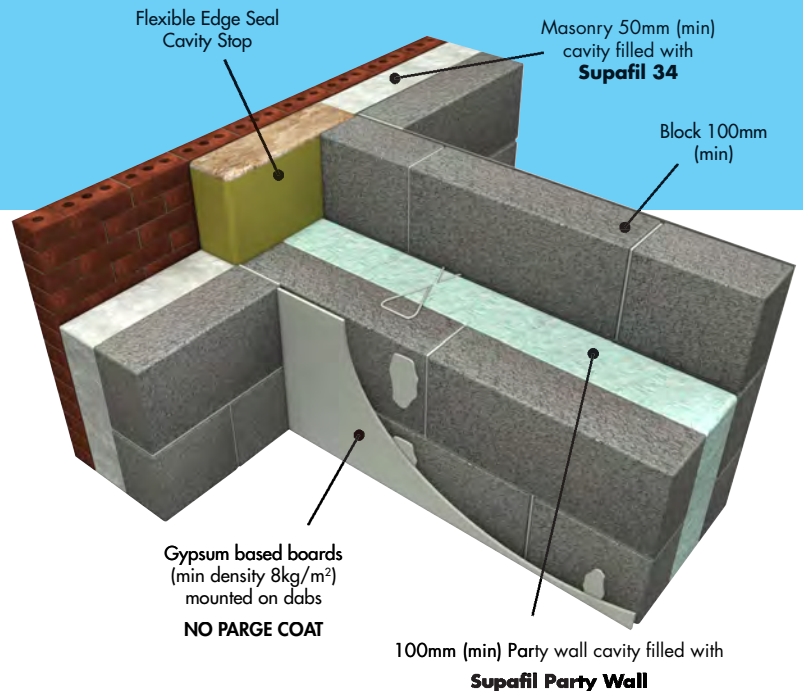
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<http://www.robustdetails.com/TheHandbook/RobustDetail/E-WM-28>



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A New Model for Affordable Housing



How has a collaborative student-designed project become one of the first of its kind designed to some of the world's most stringent design codes? Stacey Temprell, New Build Sector Director for Saint-Gobain, tells us how the world leader in sustainable habitat paired up with The University of Nottingham on the project.

Stacey Temprell
Residential Sector Director

"The project is the result of an extraordinary journey that provides an exemplar 'zero carbon' solution that is a viable, repeatable family home suitable for the UK housing market of the future."



**The University of
Nottingham**

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Nottingham H.O.U.S.E (Home Optimising the Use of Solar Energy) is a full-scale, fully functioning family home that complies with the future Fabric Energy Efficiency Standard (FEES), likely to be the requirement for the 2016 Zero Carbon Homes performance requirement.

The house has been designed to perform at a very low level of energy usage by optimizing both the building's fabric and services to meet the Zero Carbon Hub's FEES and the Government's agenda for reduction of impacts on climate change and fuel poverty.

FEES is the proposed maximum space heating and cooling energy demand for zero carbon homes.

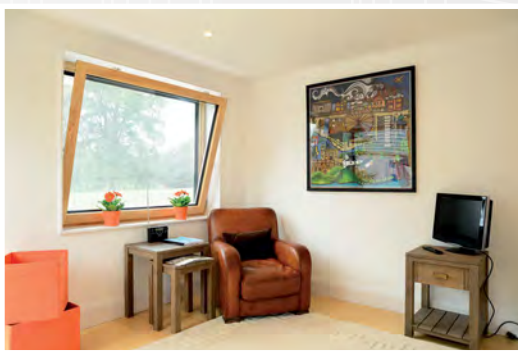
This is the amount of energy which would normally be needed to maintain comfortable internal temperatures. In a dwelling, this can be influenced by a number of factors, including building fabric U-values, thermal bridging, air permeability, thermal mass, external heat gain (solar) and internal heat gains such as metabolic activity or as a by-product of services.

FEES should ensure that a good minimum standard of building fabric (the longest-lasting part of a home) will be embedded in all new homes. It is measured in kWh/m²/year and is therefore not affected by carbon emission factors for different fuel types. For the majority of homes, levels of 39 and 46kWh/m²/year are proposed. Nottingham H.O.U.S.E achieves 36kWh/m²/year on the fabric alone, exceeding fabric standards required under FEES for even an apartment block. With an EPC rating of B, this represents a 46% reduction in CO₂ emissions compared with Part L 2010 Building Regulation requirements.

Saint-Gobain contributed a range of products and systems selected for their appeal of minimizing total energy consumptions and maintaining an inexpensive structural scheme, as well as assisting the students with the specification of the house and providing technical support.

Find out more about the Nottingham H.O.U.S.E project by visiting:

<http://www.saint-gobain.co.uk/university-students-zero-carbon-house.aspx>



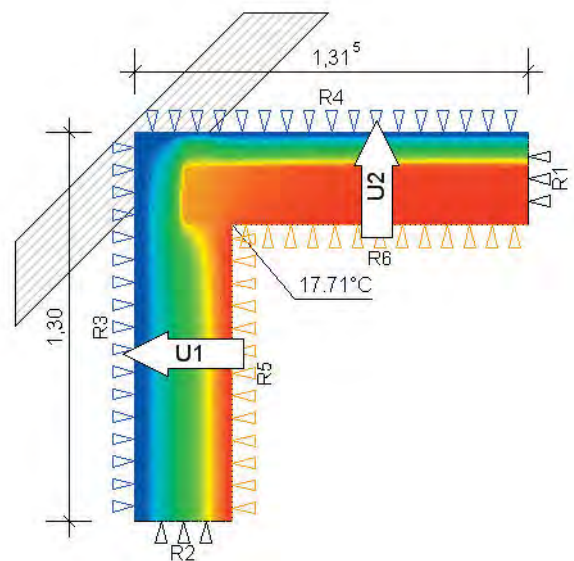
Thermal model calculations: A lesson in accuracy

Andrew Lundberg, thermal modelling expert at the Association of Thermal Modellers details the challenges faced in accurately assessing building fabric performance, hailing competency as the key...

When it comes to delivering low-energy buildings in a bid to produce homes which come with both increased comfort and lower running costs for occupants, the race is well and truly on. Any designer or specifier would likely confess to sometimes struggling to keep up with the myriad of new products entering the market claiming to deliver what their predecessors or competitors never could – even lower-energy buildings. Running in parallel with these challenges is also the need to keep one's eye on regulatory compliance, something which has essentially become a numbers game, particularly when it comes to Part L1a for new dwellings.

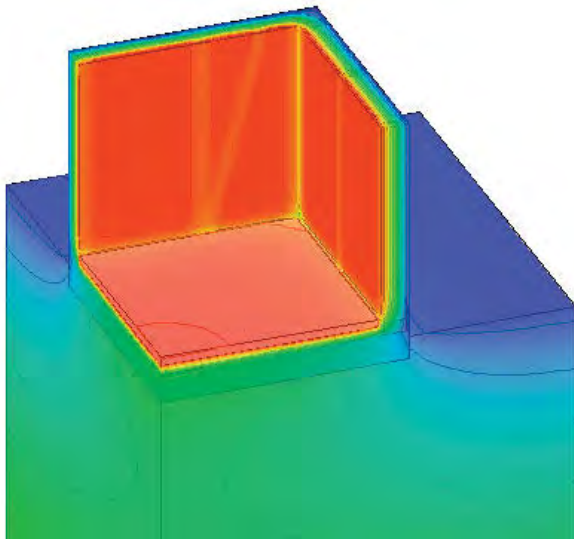
Amid the rapid development of renewable heat and electricity producing products, it is often easy to forget that the best approach to energy efficiency is not to produce required energy in an efficient way, but to limit the required amount of energy in the first place. This requires first and foremost, a fabric-first approach, which can have a great effect on final heat demand. SAP assessors, who may or may not be members of the design team, are having to find new ways of inputting building data in order to demonstrate regulatory compliance. The risk then becomes one whereby the SAP assessor has to input a value which the actual building, by design, cannot achieve. One area receiving increased focus is thermal bridging. However it is still too little understood by the industry. What is a thermal bridge? How is it assessed? Who should assess it, and what qualifications should they have?

Thermal bridges exist in every single building ever built. Anywhere that otherwise uniform heat flow through the building fabric is affected by a change in



the fabric's properties, a thermal bridge is presented. This could be junctions of the various building elements, such as wall, floor, roof & window intersections, or any location whereby the building fabric is penetrated by a single point item such as a beam resting on a wall. Even in a straight wall with an embedded structural component at one point, a thermal bridge is present due to the variation in heat flow around that component, even if the U-value is maintained at the same value across the entire structure.

Thermal bridges are assessed in accordance with a national convention document produced by the BRE (Building Research Establishment) entitled BR497: Conventions for calculating linear thermal transmittance and temperature factors. This is carried out using numerical analysis software by means of finite element analysis. As the name suggests, the assessment criteria focuses both on determining

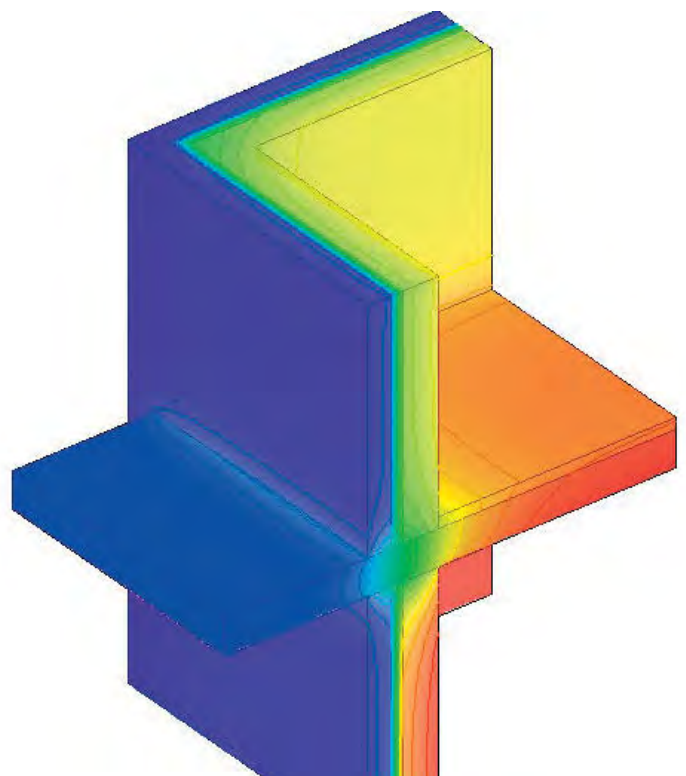


for providing the thermal bridge values for the junctions to the SAP assessor, or the SAP assessor themselves, where non-standard values are being used. The questions being asked of anyone claiming competency therefore should be, at least, “have you completed formal training in thermal bridge assessment?”, and “can you demonstrate that you’ve completed the validation cases from BR497 within the stated tolerances?” Once these questions are answered, the competent thermal bridge assessor is in a position to deliver accurate assessments of junctions, advise on necessary changes to junction design to reduce heat loss, thereby reducing heat losses via thermal bridging, improving SAP values, and eliminating mould growth risk.

In determining energy loss via thermal bridging, three distinct approaches are presented in the Approved Document L1a. Firstly, the building can be designed in accordance with the DCLG Approved Construction Details or another government-approved source involving independent assessment of the construction method. This allows the psi-value for each junction to be taken from table K.1 of the SAP

the excess energy being lost at junctions, as well as surface temperatures which occur at junctions and what the subsequent risk of mould growth and surface condensation may be for various building types. The former criterion will result in changes to energy consumption and directly affect heating bills, the latter criterion will determine whether mould is likely to form at a specific location under standard conditions. So we must remind ourselves that mould growth doesn’t happen by coincidence...it’s an inherent design property of our buildings. It therefore makes sense to focus firstly on eliminating mould growth, and secondly on reducing excess heat loss across the junction. The thermal bridge assessor needs to have a keen understanding of both phenomena.

So who is the thermal bridge assessor, who determines their competence and where can one find one? Under the latest edition of Approved Document L1a, the competent assessor is someone who has completed training in the software tool that they are using and has achieved results within the range of accuracy in assessing the validation cases in the aforementioned document BR497. No further requirements of the assessor are presented in the document. Previous mentions of a national government-approved assessors register have been removed from the latest iteration, so the onus on finding a ‘competent’ assessor lies with whoever is responsible





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2012 document. Simple? Well almost too much so. The table presents one psi-value for each junction type, e.g. wall/floor junction with insulation over slab, and is applicable to any construction type and over any range of U-values. The reality is that an external wall corner in a timber frame will likely have a very different psi-value compared to that of an external wall corner built in masonry cavity wall construction and so on. Furthermore, changes to U-values of planar elements will result in changes to the psi-value for the same junction. So although one may satisfy building control with this method of accounting for thermal bridging, it would be folly to think that it's in any way an accurate account of a junction's performance. Catalogues of thermal bridges are also being produced by some product manufacturers or private organisations, however, if one is truly interested in an accurate determination of building fabric performance, one should look closely at the background to any published psi-values. Many of these sources have psi-values which are applicable over any range of U-values below a liberal value, making them vague and ambiguous.

Where a junction is not constructed in accordance with the ACD, a default psi-value for the equivalent junction should be used from table K.1. These values are exactly double those of the equivalent ACD psi-value, which means that improvements to the building design elsewhere will have to compensate for the fact that this bespoke junction hasn't been assessed by a thermal modeller, in order to maintain compliance. This will almost certainly have cost implications for the overall design & build. Another

option is to enter a global psi-value (y-factor) of $0.15\text{W/m}^2\text{K}$, which in theory encompasses the combined heat losses from all thermal bridges in one figure. This is certainly an approach best avoided, indeed the compensatory measures required elsewhere in the design due to its use could be beyond sensible or reasonable. To put this figure in context, if a building is designed with an average elemental U-value of $0.15\text{W/m}^2\text{K}$, and a thermal bridge y-factor of $0.15\text{W/m}^2\text{K}$ is also used, essentially it is being stated that 50% of building fabric heat losses are due to thermal bridging alone. This is in almost any standard building a gross over-estimation.

And so we return to the concept of the competent thermal modeller. Their integration into the design team from the outset can ensure that junctions are designed in a manner which reduces excess heat loss & eliminates mould growth whilst also maintaining build-ability, reducing the need for expensive compensatory measures elsewhere in the design, and ensuring accurate estimation of building fabric performance. Until we are at a stage of assessing every design by modelling, or available catalogues of details and their respective psi-values take a quantum leap, we are in energy terms thinking one-dimensionally, with our estimations of performance in the second or third dimension being at best an uneducated guess. ■



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Capital allowances – boosting your bottom-line

Steven Bone, Director at The Capital Allowances Partnership Ltd explains the tax relief on offer under the capital allowance scheme and what it can mean for businesses...

Clients with building projects can save substantial amounts of tax by claiming capital allowances. This is tantamount to securing a Government-funded discount on the overall cost of their building, which improves the financial viability of projects and ensures that build quality remains high.

What are capital allowances?

A business pays tax on its profits, ie income less expenditure. However 'capital' expenditure is not a tax-deductible expense. Capital expenditure is money spent with a longer-term outlook, such as constructing new buildings or extensions, or altering or fitting out existing buildings (as opposed to maintenance or repairs).

Instead, tax relief is available through 'capital allowances' - which are given to property investors, owner-occupiers and tenants. The most common allowance in practice is something called 'plant and machinery allowances'. This provides tax relief when the business or investor spends money on 'plant' or 'machinery' (P&M). It does not assist for money spent to buy or alter land, or on bricks and mortar such as the substructure and superstructure (eg, walls, floors, ceilings, doors, windows and stairs).

What assets qualify as machinery or plant?

'Machinery' takes its dictionary meaning and most construction projects include lots of obvious machinery, such as pumps, motors, fans and the like, as well as more obscure machines such as door handles or closers with moving parts. Because these are all machinery, the money spent on them qualifies for tax relief.

'Plant' is more difficult to identify though. It is sometimes defined by statute, but generally by more than 100 years of case law. In essence, 'plant' is apparatus used in a business. The surprising thing though is that most of the assets which qualify for tax relief in buildings are standard fixtures that you would find in almost any commercial property. These include sanitary and water installations, heating, ventilation and air conditioning systems; electrical installations; lifts and conveyors; fire protection; communication, security and control systems; and many furnishings, finishes and fittings.

What types of properties benefit?

Because the definition is so wide, most commercial buildings contain P&M. However, some property types are more P&M-rich than others. For these, between 20% and 45% of the money spent can be allocated to P&M. Particularly good buildings from a capital allowances perspective are those which are fitted out to a high standard, including (amongst others):

- Hospitality – hotels, public houses, restaurants;
- Healthcare – care homes, doctors and dentists practices, veterinary facilities;
- Offices.

In most cases, capital allowances statute prevents tax relief being claimed for residential property. And because capital allowances are a tax relief they can only be claimed by businesses or investors who pay income tax or corporation tax. Therefore, they



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cannot be claimed by not-for-profit owners or occupiers, such as central or local government, charities or the like.

What is the benefit?

Capital allowances are a tax adjustment only and do not affect the market value of the property, or the business's financial accounts.

In effect, capital allowances reduce the taxable profits of the business or investor. This saves tax at whatever tax rate they pay. For example, if a company paying 20% corporation tax spends £100,000 on P&M and claims capital allowances, this can reduce its taxable profits by £100,000 and therefore save tax of £20,000 (ie, £100,000 x 20%).

For the vast majority of businesses all (or most) of the tax savings are immediate. This is because of an accelerated capital allowance called the 'Annual Investment Allowance' (AIA). The AIA is available for expenditure on P&M up to an annual limit or cap, which is currently £500,000. When working out the business's tax bill the AIA allows up to £500,000 of expenditure on P&M to be written-off for tax at 100%. In addition, certain energy-saving and water conserving or quality improving P&M qualifies for 100% relief under a scheme called 'enhanced capital allowances' (ECAs) – based mainly on specifying particular products listed on government websites.

To the extent that the money spent on P&M exceeds the AIA cap, or is not eligible under the ECA rules, tax relief is given over several years at either 18% or 8% a year. The 8% rate mostly applies to so-called 'integral features'. These are the electrical system (including power and lighting); cold and hot water systems; heating, ventilation and air conditioning; lifts and escalators; and external solar shading. Other plant usually attracts the 18% rate.

Why is this relevant?

Whilst there is an old saying in tax that "you should never let the tax tail wag the commercial dog", in any construction project there are always choices. These can affect the tax savings available to the building employer. If the client can identify ways to save tax this boosts the bottom-line and ultimately makes the project more viable. Taking an early interest in capital allowances permits the design and specification to be 'tweaked' to improve its tax-efficiency (for example, some floor finishes qualify for relief, whereas others do not; or ECA-qualifying assets can be chosen). It also allows the right paper trail to be put in place so the client can meet its tax obligation to submit a correct and complete tax return and avoid the time, hassle and cost of an unfavourable HM Revenue compliance check.

However, to ensure proper identification and compilation of a claim, it is often wise to obtain specialist input beyond the involvement of generalist quantity surveyors and accountants.



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Index

4Projects	22, 23
BIMobject UK Ltd	17, OBC
JCB Finance	61
KNAUF Insulation	IFC, 52, 53
Lloyd's Register	28, 29
Saint Gobain	30, 31, 48, 49, 54, 55
Saint Gobain Isover	46, 47
Solibri UK Ltd	18, 19
The Association of Project Safety	37
Viewpoint	22, 23

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Scotland

Building Regulations

The Technical Handbooks provide guidance on achieving the standards set in the Building (Scotland) Regulations 2004 and are available in two volumes, Domestic buildings and Non-domestic buildings.

The 2013 Edition of the Technical Handbooks are now available to view or download. These handbooks provide revised guidance and support the Building (Miscellaneous Amendments) (Scotland) Regulations 2013 which were laid before Parliament on 13 May 2013. The amended regulations and technical guidance came into force on 1 October 2013. Through the same amendment regulations, changes are also made to the Building (Procedure) (Scotland) Regulations 2004 and the Building (Forms) (Scotland) Regulations 2005.

All handbooks can be found here:

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/techbooks/techhandbooks>

STRUCTURE:

Technical Handbooks 2013 Domestic: Structure

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013dom1>

Technical Handbooks 2013 Non- Domestic: Structure

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013ndom1>

The structure of a building is fundamental to ensuring the safety of people in or around new and existing buildings and can be affected by a number of factors inside and outside the building including environmental factors. These factors should be considered to prevent the collapse, excessive deformation or the disproportionate collapse of buildings.

To achieve a structure with adequate structural resistance, serviceability and durability the following should be taken into account:

- a. the loadings (actions) on the building;
- b. nature of the ground;
- c. collapse or deformations;
- d. stability of the building and other buildings;
- e. climatic conditions;
- f. materials;
- g. structural analysis; and
- h. details of construction.

FIRE:

Technical Handbooks 2013 Domestic: Fire

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013dom2>

Technical Handbooks 2013 Non- Domestic: Fire

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013ndom2>

Life safety is the paramount objective of fire safety. Domestic buildings should be designed and constructed in such a way that the risk of fire is reduced and, if a fire does occur, there are measures in place to restrict the growth of fire and smoke to enable the occupants to escape safely and fire-fighters to deal with fire safely and effectively.

The purpose of the guidance is to achieve the following objectives in the case of an outbreak of fire within the building:

- to protect life;
- to assist the fire and rescue services; and
- to further the achievement of sustainable development.

ENVIRONMENT:

Technical Handbooks 2013 Domestic: Environment

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013dom3>

Technical Handbooks 2013 Non- Domestic: Environment

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013ndom3>

Water, air and soil are intricately linked and all can be affected by various forms of pollution that affect our environment. Other issues such as condensation have been a constant threat to people and buildings for many years. The Scottish Government encourages the use of previously developed land (brownfield) and local authorities may wish to promote brownfield land in preference to greenfield land. Some of this land will be contaminated and will need to be made safe.

The intention is to ensure that, as far as is reasonably practicable, buildings do not pose a threat to the environment and dwellings, and people in or around buildings, are not placed at risk as a result of:

- a. site conditions;
- b. hazardous and dangerous substances;
- c. the effects of moisture in various forms;
- d. an inadequate supply of air for human occupation of a building;
- e. inadequate drainage from a building and from paved surfaces around a building;
- f. inadequate and unsuitable sanitary facilities;
- g. inadequate accommodation and facilities in a dwelling;
- h. inadequately constructed and installed combustion appliances;
- i. inadequately constructed and installed oil storage tanks;
- j. inadequate facilities for the storage and removal of solid waste from a dwelling.

SAFETY:

Technical Handbooks 2013 Domestic: Safety

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013dom4>

Technical Handbooks 2013 Non- Domestic: Safety

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013ndom4>

Safety has been defined by the International Standards Organisation as 'a state of freedom from unacceptable risks of personal harm'. This recognises that no activity is absolutely safe or free from risk. No building can be absolutely safe and some risk of harm to users may exist in every building. Building standards seek to limit risk to an acceptable level by identifying hazards in and around buildings that can be addressed through the Building (Scotland) Regulations.

The intention is to give recommendations for the design of buildings that will ensure access and usability, reduce the risk of accident and unlawful entry. The standards within this section:

- ensure accessibility to and within buildings and that areas presenting risk through access are correctly guarded;
- reduce the incidence of slips, trips and falls, particularly for those users most at risk;
- ensure that electrical installations are safe in terms of the hazards likely to arise from defective installations, namely fire and loss of life or injury from electric shock or burns;
- prevent the creation of dangerous obstructions, ensure that glazing can be cleaned and operated safely and to reduce the risk of injury caused by collision with glazing;
- safely locate hot water and steam vent pipe outlets, and minimise the risk of explosion through malfunction of unvented hot water storage systems prevent scalding by hot water from sanitary fittings;
- ensure the appropriate location and construction of storage tanks for liquefied petroleum gas; and
- ensure that windows and doors vulnerable to unlawful entry are designed and installed to deter house breaking.

NOISE:

Technical Handbooks 2013 Domestic: Noise

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013dom5>

Technical Handbooks 2013 Non- Domestic: Noise

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013ndom>

Noise is unwanted sound. In order to limit the effects of unwanted sound the standards intend to improve the resistance of building elements to sound transmission. Research has presented clear evidence that noise can indirectly contribute to a range of health issues such as stress and anxiety.

Inadequate sound insulation can impair health by allowing noise from other people to disrupt normal life. A number of people in attached homes complain of neighbour noise.

The 2010 edition of Section 5 has been completely rewritten to include:

- an increase in the sound insulation performance of separating walls and separating floors;
- a robust post-completion testing regime;
- guidance for carrying out work to existing buildings;
- guidance to reduce sound passing between rooms in dwellings; and
- section has been updated to reflect then updating of Planning Advice Notes.

Including residential buildings (Non-domestic):

- separating walls and separating floors forming rooms intended for sleeping (Non- domestic)

ENERGY:

Technical Handbooks 2013 Domestic – Energy

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013dom6>

Technical Handbooks 2013 Non- Domestic – Energy

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013ndom6>

Within Scottish building regulations, improvements in energy standards have been made over many years, culminating in 2007 with the move to a carbon dioxide emission based methodology for assessing carbon and energy performance in new buildings.

In 2007, Scottish Ministers convened an expert panel to advise on the development of a low carbon building standards strategy to increase energy efficiency and reduce carbon emissions. This resulted in The Sullivan Report – ‘A Low Carbon Building Standards Strategy for Scotland’. A key recommendation of this Report is staged improvements in energy standards in 2010 and 2013, with the aim of net zero carbon buildings (emissions for space heating, hot water, lighting and ventilation) in 2016/17, if practical.

Domestic: Section 6.0.3 addresses the carbon dioxide emissions and energy performance of all domestic buildings (houses, flats and maisonettes) and ancillary buildings. In respect of dwellings, all parts of a building intended to form part of the dwelling should be within an insulation envelope.

This section should be read in conjunction with all the guidance to the Building (Scotland) Regulations 2004 but in particular Section 3 Environment has a close affiliation with energy efficiency, regarding:

- a. heating of dwellings;
- b. ventilation of domestic buildings;
- c. condensation;
- d. natural lighting;
- e. combustion air and cooling air for combustion appliances;
- f. drying facilities; and
- g. storage of woody biomass.

Non- Domestic: This section covers the energy efficiency for non-domestic buildings. Such buildings include: factories, offices, shops, warehousing, hotels, hospitals, hostels and also buildings used for assembly and entertainment.

- ventilation
- condensation
- combustion appliances and
- biomass fuel storage.

SUSTAINABILITY:

Technical Handbooks 2013 Domestic: Sustainability

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013dom7>

Technical Handbooks 2013 Non-Domestic: Sustainability

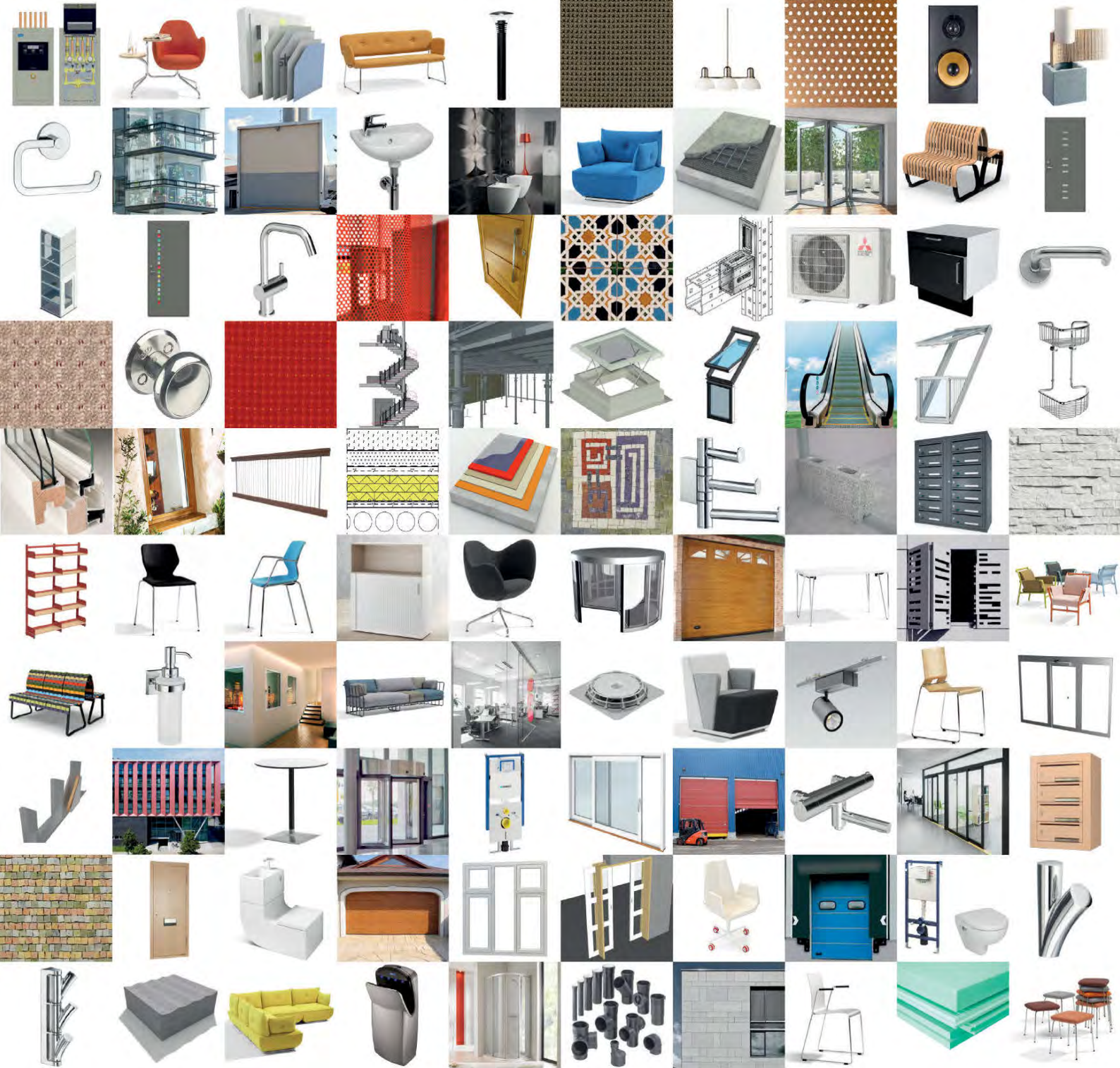
<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/th2013ndom7>

Sustainable development has been defined as meeting “the needs of the present without compromising the ability of future generations to meet their own needs” by the Brundtland Commission of the United Nations in 1983. It follows that the process of sustainable development and the quality of ‘sustainability’ to aspire to within the built environment should account for:

- social, economic and environmental factors;
- the potential for long-term maintenance of human well-being in and around buildings;
- the well-being of the natural world and the responsible use of natural resources, without destroying the ecological balance of the area where these resources originate or are processed; and
- the ability for the built environment to be maintained.

The intention of this standard is to:

- recognise the level of sustainability already achieved by the building regulations. By setting the 2010 Standards as the benchmark level, credit is given to meeting the standards within Sections 1-6 of the building regulations. This will emphasise that a degree of sustainable design and construction is not a niche market but must be achieved in all new buildings;
- encourage more demanding sustainability standards through enhanced upper levels;
- encourage consistency between planning authorities that use supplementary guidance to promote higher measures of sustainable construction in their geographical areas. By making reference to this standard, local aspirations can be met by selection of clear national benchmarks. Levels of sustainability have been defined that must include a low or zero carbon generating technology, with reference to Section 72 of the Climate Change (Scotland) Act 2009.



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