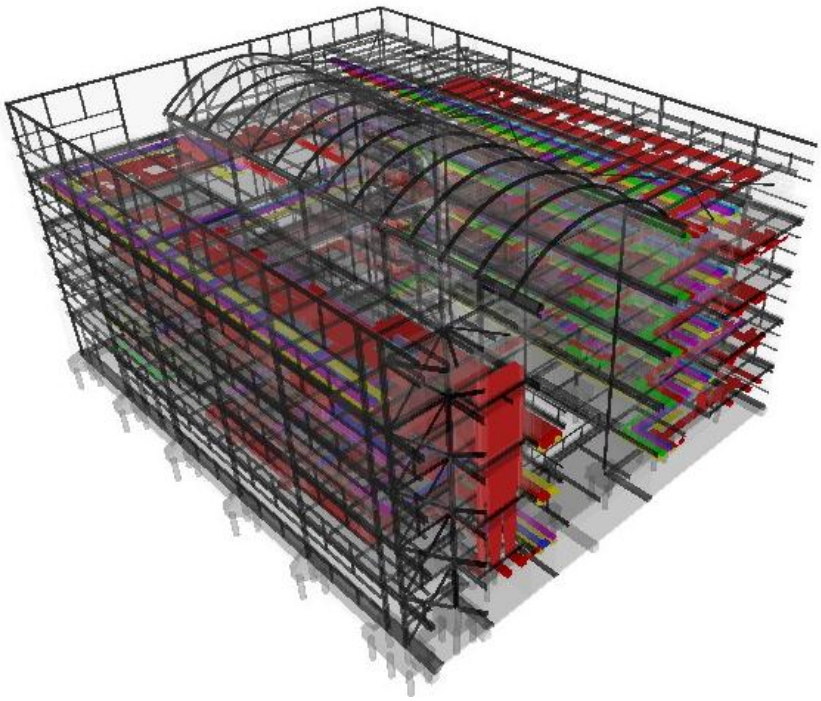
ADEILADU ARBENIGRWYDD YNG NGHYMRU

CONSTRUCTING EXCELLENCE IN WALES

Constructing Excellence in Wales Building Information Modelling (BIM) Task Group

Task Group Working Paper

November 2012



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Acknowledgments

Constructing Excellence in Wales (CEW) relies heavily on the input of and engagement with individuals and organisations across the construction industry to further its work programmes.

Members of the BIM Task Group devoted a significant amount of their time to help establish an industry response to the introduction and utilisation of BIM in Wales.

We would like to express our gratitude to these industry representatives for their contribution as part of the CEW BIM Task Group.

Mike Edmonds

Chair of the CEW BIM Task Group

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1. Executive Summary

Background

Building Information Modelling (BIM) promises to change the way we work and the way in which we procure building and infrastructure projects with collaborative, integrated working processes that will transform the construction sector, redefine the relationships between professionals and drive through cost and time savings at every step of the way. BIM is catching the imagination and attention of senior decision makers nationally.

On 31st March 2011 the Government's Construction Strategy was published by the Cabinet Office and included The UK's BIM Working Party Strategy and Implementation Plan. The report announced the future requirement of Level 2 collaborative 3D BIM across all projects by 31st March 2016, with initial compliance required to deliver building data with non-commercial software COBie 2.

Government departments such as the Ministry of Justice (MoJ) and Ministry of Defence (MoD) are already using pilot projects to test and measure the effectiveness and value of BIM, so far positive results have been recorded. The MoJ has, through its new £2.4 billion frameworks, set its own deadline of 2013 for contractors to demonstrate their ability to use BIM on all projects.

The Strategy has a UK Government focus and is not necessarily applicable to circumstances in Wales; apart from UK Government spend on non-devolved matters. A clear plan for the implementation of BIM needs to be developed to ensure that the industry in Wales maintains commercial and technical competitiveness.

Constructing Excellence in Wales (CEW) BIM Task Group was convened in June 2012 to assist the Value Wales Procurement Steering Group and the Welsh Government with a BIM implementation plan for Wales to provide clear direction to the industry in Wales.

The Task Group which was made up of individuals from the construction industry in Wales who had experience and/or a particular interest in the implementation of BIM would report to the Value Wales Construction Procurement Steering Group and the CEW Board of Directors.

The Chair of the CEW BIM Task Group, Mike Edmonds, has previously chaired the CEW Procurement Task Group and is a member of the Value Wales Construction Procurement Steering Group.

As part of the Task Group three sub-groups were created to consider the appropriateness of the UK strategy to Wales and to view it from three difference perspectives: client, experiential and supplier. Each sub-group met in September and using both the information provided and personal experiences offered their perspective of BIM for Wales taking the objectives (as set out in the UK Strategy) and the four questions posed into consideration.

Recommendations

The following recommendations were generated from the responses of all task group and sub group meetings to provide a single industry response to the utilization of BIM in Wales. This response is intended to assist the Welsh Government in developing a strategy for utilising BIM in Wales.

1. **What level of maturity should be applied to BIM and over what timescale?**
   Alignment with UK Government with all Welsh Government funded projects at level 2 by 2016 and all Welsh Government Department Projects to lead at level 2 by 2015.

2. **What value of project should a BIM Strategy Wales apply to?**
   A value or threshold for Wales could not be established in the timescales allowed. Collaborative working arrangements and internal business development should still be encouraged until such a value is set.
   Pilot projects are expected to inform the thresholds based on value and complexity by 2014/15.

3. **Are we content with the 'Push-Pull' approach for suppliers and clients?**
   Consensus was reached on the 'Push-Pull' approach, at this stage, albeit recognising a greater push currently being provided by suppliers.
   Greater leadership is needed with a significant pull to be developed from the clients for future progression.

4. **Do we consider that BIM Strategy Wales should strive to improve project delivery and operational performance particularly in the areas of improvement – Cost; Value; Carbon Performance?**
   The following improvement areas are proposed:
   i. Added Value
   ii. Cost Predictability
   iii. Carbon Intelligence

From these recommendations and in support of the Value Wales Construction Procurement Steering Group and the Welsh Government the following BIM statement is proposed for the Wales Construction Procurement Strategy. It provides a clearer direction to industry on the future implementation and development of BIM in Wales.

'BIM is a tool that supports integrated collaborative working on built environment projects. The data and models enable improved delivery, performance and management of assets. In support of the collaborative procurement details in this strategy - BIM will be adopted to level 2 by 2016 on all Welsh Government funded projects, with Welsh Government department projects achieving level 2 by 2015.

Strong leadership from clients and suppliers, coupled with collaborative behaviours, will ensure that robust processes in line with BIM conventions are delivered to these timescales. Annual reviews will assess and measure progress against these timescales. The desired outcomes will encompass added value, cost predictability and carbon intelligence.'

Action Plan

In proposing its recommendations and statement the task group recognises that a number of issues remain to be addressed by the industry before a strategy for utilising BIM in Wales can be implemented. As part of the outcomes from the Task Group the following action plan was generated to assist with developing a way forward for BIM in Wales. The suggestions made are based on a general consensus from all task group feedback.

Themes	Action	Completion by
Managing the Strategy	Development of short term (2013 - 2016) and medium term (2016 - 2020) roadmaps to describe a way forward	2013
	Annual progress reviews to monitor and asses the development of BIM in Wales in line with the adopted roadmaps	Annually from 2013
Assessing Current Practice	Undertake an assessment of the maturity of the construction industry in Wales to implement BIM; focusing on sectors, organisation capacities & volume and magnitude	2013
	Examine the issues affecting BIM implementation across the different regions of Wales where geographic factors limit implementation e.g. internet accessibility and speed	2013
	Produce a portfolio of example organisations, projects and individuals already implementing BIM to promote and raise awareness of the benefits of BIM to others	2013
Establishing Pilot Projects	Develop an on-going programme of BIM related exemplar/demo projects showing what BIM is, how it works and the benefits	On-going
	Establish pilot projects to specifically inform future thresholds for the application of different levels of BIM based on value and complexity of the project	On-going
	Include results from case studies and pilot projects in the annual review of BIM implementation across Wales	Annually from 2013
Encouraging Collaboration	Seek clarity of BIM requirements for 21st Century Schools Programme	2012/13
	Establish regional meetings to provide a basis for BIM collaboration and knowledge sharing	2013
	Investigate the possibility of introducing a mentoring scheme whereby early adopters train and teach others to use BIM and pass on their experience from lessons learnt	2014

Establish Protocols	Develop a single BIM Development Protocol Framework for Wales that will encourage consistency and collaboration between the sectors	2014
	Investigate Asset Management principles/requirements which can be integrated within a BIM Development Protocol	2014
Provide Support	Provide support and guidance to help SMEs understand and capitalise on the opportunities offered through BIM	2013/14
	Develop a BIM support map for Wales; identifying training & funding opportunities, pilot projects and contacts for knowledge sharing	2014
	Provide workshops for industry covering; procurement & collaboration rates, hardware& software, implementation models for BIM and case studies of BIM	2013
	Investigate the potential for in-house assistance to businesses in self-assessment, strategic development and implementation of BIM	2014
	Develop a flowchart to enable clients and suppliers to make informed business decisions on implementing BIM and setting their own standards	2014
Managing Operation	Investigate the responsibilities for BIM within current roles: – BIM Co-ordinator (responsibilities for management of the model throughout the project lifecycle) – BIM Maintenance Manager (responsibilities for management of the model post construction -maintenance and operation)	2014
Research & Development	Undertake research to improve the application of BIM requirements in asset management and handover (soft landings)	2013/14
	Produce guidance on the implementation of BIM within a whole lifecycle approach while maintaining flexibility for innovation and long term development	2013
	Undertake research to support guidance on retrospective BIM and development of portfolios and benchmarks of existing stock	2014/15
	Undertake research to support guidance on the applicability and implementation of BIM in retrofitting	2014

2. Introduction

Building Information Modelling (BIM) promises to change the way we work and the way in which we procure buildings with collaborative, integrated working processes that will transform the construction sector, redefine the relationships between professionals and drive through cost and time savings at every step of the way. BIM is catching the imagination and attention of senior decision makers nationally.

The UK BIM Working Party Strategy has been developed as a strand of the Cabinet Office Government Construction Strategy. The Strategy has a UK Government focus and is not necessarily applicable to circumstances in Wales; apart from UK Government spend on non-devolved matters. A clear plan for the implementation of BIM for UK Government spend has been developed, but there is no current plan for Welsh Government funded projects in Wales.

In February 2012 Constructing Excellence in Wales (CEW) wrote to the Minister for Finance, Jane Hutt AM, regarding BIM and CEW assisting Welsh Government with the development of an implementation plan for BIM in Wales. The Minister's office requested that Value Wales officials engage with CEW in respect of BIM and then provide the Minister with advice.

The CEW BIM Task Group was convened in June 2012 to assist the Value Wales Procurement Steering Group and the Welsh Government with a BIM implementation plan for Wales which will provide clear direction to the industry in Wales.

The Task Group which is made up of individuals from the construction industry in Wales who have experience and/or a particular interest in the implementation of BIM will report to the Value Wales Construction Procurement Steering Group and the CEW Board of Directors.

The Chair of the CEW BIM Task Group, Mike Edmonds, has previously chaired the CEW Procurement Task Group and is a member of the Value Wales Construction Procurement Steering Group.

As part of the Task Group three sub-groups were created to consider the appropriateness of the UK strategy to Wales and to view it from three difference perspectives: client, experiential and supplier. Each sub-group met in September and using both the information provided and personal experiences offered their perspective of BIM for Wales taking the objectives (as set out in the UK Strategy) and the four questions posed into consideration

This report sets out the discussion which took place at each of the task group and sub group meetings and distils these into a series of conclusion and recommendations supported by an action plan to move the process forward. More specifically the report sets out a statement for a way forward for BIM in Wales for consideration by the Value Wales Construction Procurement Steering Group. It is proposed that this statement be included within the Wales Construction Procurement Strategy.

3. Background

In September 2009 Paul Morrell, the Government's Chief Construction Advisor, presented a short paper to the Governments Construction Clients Board proposing an Industry working group, commissioned by the department for Business, Innovation and Skills (BIS), to provide a report on the potential future use of BIM. The Government Construction Clients board adopted the working group and agreed to receive its final report. On 31st March 2011 the Governments Construction Strategy was published by the Cabinet Office and included The UK's BIM Working Party Strategy and Implementation Plan.

The intention of the report was to provide the Government's Construction Clients Board with a suggested roadmap and strategy to enable the progressive use of BIM on Government Building Programmes as well as providing a framework for procurement and delivery standards, including the training and support required to enable the industry to rise to the BIM challenge.

The report announced the UK's Government's intention to require Level 2 collaborative 3D BIM across all of its projects by 31st March 2016, with initial compliance required to deliver building data with non-commercial software COBie 2.

The government initially considered a £50 million project BIM application threshold, but this was then brought down to £5 million and has now disappeared altogether.

Government departments such as the Ministry of Justice (MoJ) and Ministry of Defence (MoD) are already using pilot projects to test and measure the effectiveness and value of BIM. The MoJ has, through its new £2.4 billion frameworks, set its own deadline of 2013 for contractors to demonstrate their ability to use BIM on all projects. In Local Government, despite not being mandated to require BIM, some Local Authorities are adopting BIM voluntarily across projects.

The Construction Industry Council (CIC) has established BIM Regional hubs in partnership with the Government's BIM Task Group. The BIM hubs have been set up to support and help deliver the objectives of the Government Construction Strategy, bringing together experts from industry, government, public sector, institutes and academia. The BIM Hub for Wales was formed in July 2012 under the chairmanship of Clive Webb, Director of Boyes Rees Architects, to provide support for the Welsh construction industry.

4. Industry's Response

The three sub-groups (client, experiential and suppliers) used both the information provided and personal experiences to develop a perspective of BIM for Wales taking the objectives and questions into consideration. The feedback from the three working groups has been combined and categorised under the 5 Initial Objectives and 4 Questions which were the basis of discussions (as set out in the UK Strategy). The feedback from each individual group can be found in the Appendix 4.

Discussion - The Initial Objectives

1. Review, Confirm or Modify 6 key specific recommendations

i. Leave complexity and competition in the supply chain

The Market

For BIM to succeed the market needs to be left open to drive innovation. Competition is key to promote and increase the uptake for BIM through the competitive advantages gained such as increased quality, reduced errors and decrease in cost. To ensure this the Welsh Government will need to encourage BIM without being too prescriptive.

However in maintaining competition, they will have to be aware of exorbitant rates for software/models developing as previously seen with mobiles phones when first produced. With competition the Welsh Government will need to uphold a level playing field across industry in Wales.

BIM in the future aims to be a fully detailed product model including time, resources (4D model), cost (5D model) and facilities management (6D model). The current 3D model is set to meet the 2016 requirements as well as providing flexibility and adaptability for the future. The development of the 4D, 5D and 6D models for mass market will need to be driven by functionality through competition with a parallel decrease in cost.

A BIM Premium

A BIM premium, similarly to the introduction of CAD has been suggested to allow companies to charge extra for BIM models. Currently due to the economic climate, the majority of early adopters have seemed to avoid increasing fees due to the weight placed on cost. This may currently discourage some organisations from implementing BIM due to the investment required. However early adaptors have stated that the benefits gained payback and over time save on costs substantially.

Software Standardization

BIM technologies have been around for 20 years with multiple versions being developed and utilised today. It is important to ensure that with this development they converge on the same targets to maintain compatibility.

Often collaborating companies struggle to share BIM models due to different versions of software or different software entirely. The issues when collaborating need to be addressed

with some form of protocol; however this should in no way stifle innovation or future software development.

This potential lack of compatibility may result in contractors simply ensuring that they have staff trained in every type of software to satisfy a variety of clients. BIM should be about creating a system that everyone can use and collaborate with effectively.

ii. Be very specific with supply chain providers, they will only provide that which is asked for

Understanding

Suppliers and clients need to firstly fully understand BIM before they can ask or provide for it for it successfully. Once they individually understand BIM especially the inputs and outputs required, they will be able to educate each other on their individual requirements. Understanding across all parties is vital for BIM to succeed.

Asset Management

For many clients, asset management is key and they in turn need to advise the suppliers as to what information is required over the life of the asset. This will enable the supply chain to prepare and respond effectively.

Protocols

A BIM Protocol will need to be developed by clients to provide rules/standards for the supplier outlining their roles, responsibilities, expected outcomes etc. A key focus should be placed on data throughout.

Implementation

In preparation for BIM the supply chain could look to identify their systems and structure to assist with the implementation of BIM when required. BIM needs to go beyond a 3D model to truly capitalise on the benefits provided. Suppliers need start addressing BIM for their organisation now. For many a BIM model or strategy is likely to partially exist, so minimal changes will be needed.

iii. Measure and make active use of outputs

Measuring

It was suggested that it would be helpful to develop a common format of measuring BIM model outputs so the benefits can be clearly demonstrated. This would then help in justifying the investment costs and provide assurance.

Variations in the outputs depending on the sector and the stage of the project will need to be taken into consideration when developing a format to ensure every projects entire lifecycle is captured. This may involve providing number of individual formats or as favoured, allowance/flexibility to alter the common format accordingly.

Value

The benefits of BIM may not always be tangible, such as instant updating, information exchange, reduction in insurance premiums and asset running costs. BIMs success depends on demonstrating its ability in 'all' cases i.e. bridging companies, software, projects type and stage etc. BIMs demonstration of its ability to go beyond a model and from cradle to grave will influence industries response.

For the individual companies a value needs to be identified for both individual projects and their whole project portfolio to evaluate if BIM is a success. If a consensus on a way to quantify and asses such 'non-tangible' benefits can be developed then this will help prove and convince others that BIM is worth investing in against the full implementation costs. Without this a lot of industry will not have the confidence to invest and back the implementation all the way.

Data

Reliable, accurate, efficient data is required across all sectors of industry. BIM is based on such data input/ transfers from all parties throughout the project lifecycle, helping to improve datasets for all. Live updating with flagging was suggested to maximize the utilisation of BIM and therefore the benefits, such as minimal redesign and better standard of quality.

BIM data drops were highlighted as especially beneficial when collaborating due to the structuring and streamlining of approaches towards standardised outputs. This along with other aspects of BIM allows for forecasting and transparency across a project enabling accurate and efficient reporting. With their increased certainty they are able to share greater amounts of information even when bidding.

Another form of information being currently sought by all governments is carbon. Carbon data due to the lack of legacy information and the current requirements to meet various targets has made it a key requirement for all. Needs to monitor and report on carbon for industry can be met through BIM models throughout the project lifecycle.

The ability to link historic data and current data is important for all records and should be included as part of any BIM strategy or protocol. Retrospective BIM is currently being undertaken by some Local Authorities to provide models of the whole housing stock.

3D Models

Industry opinions generally favour 3D models as visual aids and as result has seen substantial decreases in hand drawings across the whole supply chain. 3D models like that produced by BIM helps when explaining or selling a project at any stage. With BIM in particular it has allowed for early engagement with occupants to provide crucial feedback and input at key stages e.g. hospital corridors and rooms with nurses and school classrooms with teachers and pupils.

Post construction the model is still beneficial for operation and maintenance as not only a visual guide but with programming and monitoring.

Materials

BIM (IFC) enables you to run 'what if' scenarios on individual materials and whole objects from data provided. This allows for the impacts of different scenarios to be seen quickly. However, currently delays are expected due to insufficient data for many components not meeting BIM requirements.

The National Building Specification (NBS) owned by the Royal Institute of British Architects (RIBA), launched their National BIM Library in March 2012. It features a range of generic and proprietary construction elements suitable for BIM. This provides not only a hub for the data

needed but provides alternatives until every manufacturer produces the data necessary for every component.

iv. Provide appropriate support infrastructure

Policy

In Wales the construction industry needs to be 'lead'. BIMs position in Wales is currently uncertain, but a growth of interest has been seen over the last year across industry.

It is vital for a Welsh Government Policy to be put in place to support all levels of BIM and its vision. A lot of the industries attitudes rest on Welsh Government telling them what to do e.g. the push for BREEAM being provided by grant changes.

The policy will need to set the scene for all parties to follow, outlining current and future requirements. This will enable industry to make informed and structured decisions to align with Welsh Government.

The policy will provide an opportunity for Welsh Government to drive collaboration, promote the sharing of information and introduce step changes towards asset management and procurement.

Local Authorities

England has a structured framework of agencies aiding it's spend and financial distribution, while Wales's authority structure relies heavily on Local Government to spend and distribute finances.

Therefore unlike the UK Strategy, Local Authorities (LA) will need to be targeted, educated and supported so they can make informed decisions about the extent to which they want to use BIM and how they can then implement it for asset management in the long-term.

They will need to look at the whole picture; beyond project stages, beyond individual projects and not just the cheapest option. It is hoped that their views will change once they have seen BIM in action and have been through the process.

It is necessary with LA's to get the chief executives to buy in and drive it down. Financial departments are currently seen as the greatest barrier and need to be addressed before BIM can progress.

Key Areas:

- Asset management needs to be made a priority for all LA's and highlighted throughout any BIM strategy/ protocol.
- Post Construction issues are constantly raised across all of industry in terms of maintenance being delegated out and handover material often being ignored or poorly used. A clear outlined process involving early engagement needs to be developed to streamline and address these concerns.
- The viability of implementing BIM for some regions of Wales is a significant concern for some LA's where geographical factors limit internet accessibility and speed. Research into the extent of limitations within these regions would be beneficial to aid forward support.

SMEs

A great risk for Wales and Welsh Government is in the development of a two tiered system; those who can and those who can't. It is important to develop the mentality across the Welsh industry that BIM is achievable for all.

Various pieces of research back this stating that the current infrastructure is already at level 2 BIM with many companies implementing at level 1 or 2 on all projects. However in the push towards level 3 or above, it is likely that only the larger companies will go ahead solely. Implementing BIM for such companies is viable as they have the resources to invest in the new technology.

However smaller companies and SMEs are unlikely to have the funds available to invest and can't run the risk of failure. Therefore it's vital that the government provides adequate education to prevent the disenfranchisement of these companies and to support them through the implementation process until they have started generating the savings and benefits promised by BIM (a bottom up approach).

For BIM to truly succeed and the full benefits gained, a buy in from all parties is required regardless of size.

Collaboration

An infrastructure needs to be in place to ensure that all organisations involved in a BIM project are brought together to begin collaboration at an early stage. BIM has so far been demonstrated mainly in silos (3D lonely), which does meet level 2, but for level 3 onwards an integrated web based interface is required that can't be met in silos.

Combining models into one interface will require complete collaboration (3D collaboration) and therefore a clear single understanding and vision by all. The transfer and communication of information at this point will prove vital. Support in developing a structured approach across industry would help to avoid multiple variations across sectors, organisations and projects.

A suggestion to assist in 3D collaboration models involved a flagging system to highlight modifications made to the project throughout its lifecycle, especially after its completion. This would provide a record of changes saving on time, effort and costs by avoiding constant remodelling but still providing the necessary information for future model users.

Training

BIM training is frequently queried due to the lack of understanding regarding roles and responsibilities. Identifying who should pay for a learning curve in this current climate and involving multiple parties is a key question to be address. Many look towards Welsh Government to develop and provide the training necessary with funding available.

Suggestions:

- Within contracts a statement could be included regarding the provision of training and amount of support.
- Introduce a scheme whereby early adopters train and teach others to implement and utilise BIM. Allowing the trainer to pass on their experiences and learning learnt, helping the trainee to avoid duplication of errors and speed up the learning process

across industry. This will also reward the early adopters through the revenue generated, again providing pay back for the initial investment spent.

Finance

When looking into the investment system for authorities, companies and SMEs assistance could be provided in many forms such as loans, grants, subsidies etc.

Suggestions:

- Grant conditions could made to provide the push for BIM and force a step change (similarly to BREEAM)
- Funding could be ringed off and provided for all projects below £1 million, centring on SMEs

v. Take progressive steps

Understanding

The biggest step needed across industry is overcoming the perception that BIM is a completely new concept. Numerous models and strategies already exist within different organizations that meet the requirements of BIM level 1 and 2.

Implementing and utilizing BIM for the majority requires only minimal changes and will mainly involve practice to get familiar with implementing the BIM process. Early adopters have undertaken several trial projects and learnt from their experiences to find a process to suit.

Software

Throughout the strategy and implementation plan it will be important to explain that BIM is more than just a software package. BIM involves not only a model but a way of integrating and collaborating the working processes and relationships. However it will also be essential to keep BIM relatively simple to avoid overloading people with information.

Infrastructure

Another perception for BIM to overcome is encouraged even within the name 'Building Information Modeling'. Infrastructure equally to buildings can implement, utilise and benefit from BIM. Highlighting this within any Strategy or Policy for Wales is crucial for future development. Possible integration of building and infrastructure projects by ensuring compatible programming is seen a natural progression for many in the years to come.

Strategy

The outcome of the task group and report is to assist Welsh Government in developing a strategy for utilizing BIM for Wales. The Strategy will form the basis for BIM in Wales outlining the protocols and requirements for Wales. This will cover roles, responsibilities, collaboration, data drops, asset management, training etc. Aligning the requirements with other protocols such as Climate Change and Carbon will be expected.

Welsh Government

In Wales the Welsh Government should be leading the way with exemplar pilot projects and share the outcomes so that each entity can build on current levels of knowledge instead of starting over again each time. It would be necessary to pick a wide-variety of projects

including the more mundane, everyday projects to clearly demonstrate exactly where the efficiencies will be.

The government should also look into how BIM has already been used across the border and wider in other countries to see what lessons can be learned. Leading contractors of BIM such as Skanska have implemented BIM all over the world on various types and scales of projects and therefore have vast experience and knowledge of BIM that could be utilised.

The government could also assist with talks and training programmes to help bring the industry up to the same or similar level helping to avoid the development of a two tiered system. This could also be tailored to the various roles within BIM e.g. asset managers, CEO's, designers etc.

Education

The education systems (Further Education and Higher Education) also need to be supported and encouraged to include BIM in all related courses to ensure that the next generation have the right skill set at a practical level. However care must be taken to ensure that young inexperienced graduates aren't used to substitute those with more experience who may be struggling to adapt to BIM.

Some cases have highlighted a generation gap with younger employees who have grown up in the 'digital age' being more accepting and adaptable to technology like BIM. However it was argued that approximately half of the students/graduates really know how to utilise BIM and similar technologies effectively within a real working environment.

It was questioned whether it was the role of the government to drive and influence the next generation to uptake BIM or that of educational authorities and institutions. Industry doesn't need to start all over again but build on current programs and knowledge.

Local Authorities

For local authorities it was frequently mentioned that the financial departments were the main barrier blocking their implementation of BIM. Therefore it may be necessary to educate them and ensure they appreciate the long-term whole project benefits and savings.

Internally authorities struggle to collaborate due to their structure being split into numerous small departments. This needs to be addressed to provide a base that is familiar with collaborating, other sector and roles requirements, data sharing etc that are the key within BIM.

Schools were raised as a problem area with limitations on budget and complications with roll out. Work needs to be undertaken in collaboration with Welsh Government to address this. Through the governments new 21st Century Schools scheme, schools will provide plenty of opportunities to implement BIM with around £1.4 billion over the next 5 years being spent.

vi. Have a clear target for the "Trailing Edge" of the industry

Some companies, especially SMEs simply don't know how to go about implementing BIM, which has developed a perception that it could prove detrimental to a lot of the industry in Wales.

SMEs

It is estimated that less than a third of SMEs know how to use or collaborate with 3D models like BIM. This places extra pressure on Welsh Government to ensure a 'one size fits all' approach is not developed. Entry points to BIM need to be made achievable for all sectors, organizations (regardless of size) and projects (regardless of value).

The government needs to be careful how it publicises any targets to make sure that SMEs understand and appreciate the benefits to their company and don't feel isolated and excluded.

It may be beneficial to set a lower initial BIM maturity level for SMEs to help them adjust to the new way of working. However some are of the opinion that SMEs managed to cope with the adoption of CAD, so they should be able to manage with the implementation of BIM.

Suggestion:

- Practical guidance should be provided by the government outlining how companies can get to where they need to be in time to meet any targets that are introduced.

2. Identify what Welsh Public Sector Clients need to do to encourage the use of BIM (Consistent approach)

Clients are seen as the appropriate leaders of BIM, as they need to make the biggest commitment for it to succeed. They are key with Welsh Government in selling and driving BIM to the rest of industry.

Local Authorities

Local Authorities (LAs) are in control of a large amount of public expenditure, so will be key in delivering BIM and need to be brought on board. Level 2 is easily achievable and they along with the support of Welsh Government need to publicise their confidence for industry to follow. An early buy in from Ministers and the Welsh Audit Office will help provide authentication needed.

Understanding

Before the Welsh Public Sector can provide any 'pull' as clients it first needs to ensure that it is educated on the possibilities of BIM so that they can fully understand the options available to them and make more informed decisions. This will help them confidently and efficiently encourage BIM across the whole supply chain. Clients (pull) need to be supported and brought up to speed as soon as possible for Wales to reach the UK targets set.

Engagement

The clients have the key ability to demand early engagement of the whole project team including those involved post construction. They like everyone do have a learning curve ahead, but they need to start heading engagement now to support industry in meeting level 2 BIM by 2016.

Asset Management

Considering that around 70% of building costs come after the construction, it's important that clients lead the way in demonstrating how BIM can be used for asset management. A focus within any approach needs to be placed on Asset Management especially for LA's where there are different views and approaches to management. The fundamental question of 'what does the asset manager really need?' needs to be addressed.

The asset manager's themselves need to develop their knowledge of savings post construction. Gathering and understanding the requirement for effective facility management; 'what do you really need to run a building?'

A lack of real information i.e. examples/case studies has been highlighted in this area. Research should be undertaken in this area to gather the necessary information and disseminated to industry.

Tenders

Incorporating BIM requirements into contracts by influencing the tender scoring system (PQQ's) could encourage the uptake of BIM and its principles towards the best long-term value not the cheapest option. To this end the Procurement Strategy in Wales will be vital in ensuring BIM uptake within Local Authorities.

Retrospective BIM

It is advised that all clients should look into undertaken and encouraging retrospective BIM. This will address the existing stock in Wales that covers the greatest proportion of the built environment. It has been found to beneficial in bringing existing stock management up to standard and consolidating the numerous 'silos' that are currently used to store data.

3. Review, Confirm or Modify the test details in the BIM Hypothesis

The working group set up by the UK Government devised a hypothesis and a number of 'tests' to guide and validate its work and to develop a strategy for the phased widespread introduction of BIM with increasing maturity. This was designed with the express desire not to attempt to try and define what BIM is, rather to focus on the outputs of BIM. The majority of these tests were generally accepted in relation to Wales, however some modifications were suggested and a few other options were proposed.

A general consensus was reached on the following:

i. Valuable: The overall aim is to maximise client value by increasing benefits at little or no extra cost.
ii. Understandable: The approach is to be presented in an understandable learning package suitable for different types of government asset procurers.
iii. General: The approach is equally applicable to buildings and infrastructure whether large and small new build and where possible existing structures.
iv. Non Proprietary: All requirements are non-proprietary as to applications and as to the required formats of the deliverables.
v. Competitive: Wherever possible there are at least two solutions or methods available so as to minimise market influence in terms of anti-completive clauses.
vi. Open: Wherever possible, low-cost methods are to be made available to allow all stakeholders to participate, irrespective of size and experience, so as to minimise barriers to involvement.
vii. Verifiable: All contractual expectations are documents with transparent and testable measurements of pass/fail.

Variations for the following were given:

i. Compliant: Measurement of Whole Life Cost/Carbon/Sustainability/etc. is published to GB, EU and ISO standards
   - A Welsh context for BIM is seen as vital for its success.

ii. Implementation: The approach is self-funding by the client and the industry
   - Support from the Welsh Government has been consistently mentioned by all, especially focusing on the vast amount of SMEs present in Wales.

iii. Timescale: The approach is phased in over 5 years
   - Agreement was given that a phased approach is needed, but over varying timescales for project sectors i.e. government, public, and private and for project value i.e. less than £2mill, £5mill etc.

Suggested additional tests included:

- Expenditure: Capital Expenditure (CAPEX), Operational Expenditure (OPEX)
- Equitable: Client Savings, Contractor Profits, Supplier Fee
- Carbon: Savings and Targets
- Efficiency: Primary Energy, Operational Energy

4. Set a benchmark for BIM Wales maturity levels, scale and timeline

Throughout the meetings there were heavily varied views on imposing a benchmark for Wales and more importantly the level and timescale to set.

UK

The UK's target of 'Level 2 collaborative 3D BIM across all of its projects by 31st March 2016, with initial compliance required delivering building data with non-commercial COBie 2' was set as a baseline to follow.

In Wales a general consensus was met that a minimum target of level 2 by 2016 is required. This alignment with England has been stressed as vital due to the potential loss of work and therefore takeover by England. A lot of organisations across England are said to have set earlier targets of level 2 by 2013/14 to perfect their use of BIM and get ahead of the competition. These decision across the border regardless of the Welsh target set, will affect industry by bid contractors who work across the border implementing BIM. For the Ministry of Justice (MoJ) and Ministry of Defence (MoD) a level 3 deadline has been set for 2013 for all projects including those to be undertaken in Wales.

Wales

In Wales some have seen the UK's target of 2016 as an opportunity for Wales to get ahead and jump the border by setting an earlier target of level 2 by 2015.

While in opposition others stated this to be in practical with projects spanning across the border and the current climate simply not having enough Welsh Projects to sustain an earlier push, especially with the majority valued at less than £5 million.

If an earlier date was to be accepted, it could possibly take the form of a 2015 deadline for big government contracts and 2016 deadline for local authorities allowing more time to support SMEs.

Therefore the government would start the learning curve, sharing their results to reduce the risks for others. Information could then cascade down through the industry with government considerations towards compliance embedded to ensure the BIM mandates are met.

Alternatively the same 2016 deadline could be applied requiring Level 2 BIM with the additional integrated web services, which would be one step closer to level 3.

Local Authorities

In England Local Authorities have been left out of initial public implementation, but after seeing the efficiency savings in BIM are looking towards BIM on their own.

Local Authorities in Wales similarly to England have witnessed the benefits of BIM, but feel they will be unable to implement BIM unless a target is set. Their Chief Executives and financial departments still see it as an unnecessary cost and therefore a block any development. Signing off by the minister would help push Local Authorities by showing the commitment and future of BIM.

SMEs

SMEs on the other hand see a target as a barrier that will simply create resentment across industry. The fear of a two tired system; those who can and can't, could develop if the target set doesn't take into account their limited resources and knowledge of BIM. If the target set is in practical to SMEs it is likely to isolate and exclude them from the majority of future projects resulting in a drastic loss of SMEs across Wales.

Welsh Government needs to ensure the target is achievable by the whole industry and maybe even variations in the requirements to support those who are likely to struggle. To assist this portraying BIM as a journey and not a single date could help address current perceptions.

Exclusion

Across all sectors it was debated what the target should apply to. The word 'all' was heavily contested with queries on its practicality when undertaking a boiler replacement compared to the construction of an extension. Taking this into consideration some believe that some exclusion may be necessary and therefore allowance to organisations to dictate their on project value.

Any benchmark set would have to duplicate this decision with rewording towards 'all appropriate projects' and the setting of a short term allowance to exclude projects with a future long term goal of 'all'.

Roadmap

It was suggested that a roadmap should be developed to support all of industry in visioning the long term investment of BIM and outline a journey to follow up to and beyond 2016.

Predictability is frequently raised as an issue across industry with no one really knowing what is going to happen beyond the near future. Predicting the long-term is seen to be left to a lot of guess-work and estimates.

Outlining both a short term (pre 2016) and long term (post 2016) journey will help to reassure industry that BIM is achievable, necessary and long term. Within this the process and targets need to remain relatively flexible, to allow for adaption as the industry develops and avoid over-specifying early on.

For this to work, it will be essential to get ministers involved early on and for them to agree to a long-term commitment.

5. Identify what needs to follow a BIM Wales Strategy to enable implementation and mobilisation

Procurement

The Wales Construction Procurement Strategy in Wales is an underpinning factor for the construction industry and therefore a key area for the Task Group to address.

The CEW BIM Task Group was convened to assist the Value Wales Construction Procurement Steering Group and Welsh Government with providing a clearer direction to the industry on the future implementation and development of BIM in Wales. A necessary part of this was in the development of a BIM statement for the Wales Construction Procurement Strategy that would be placed towards the Minister.

The statement needed to be short, sharp and punchy identifying BIM as a tool for collaboration, asset management and data gathering that needs to be lead (push & pull).

It was also recommend that the Wales Construction Procurement Strategy implements deadlines in cohesion with any BIM targets or requirements. This could include the need for annual reviews to be undertaken on the Procurement Strategy and therefore the BIM statement to ensure it remains consistent with industries development. As well as some prioritization of BIM i.e. the tender scoring to help push industry to develop.

Policy & Protocols

Organizations that have been looking into BIM recently have produced a BIM policy, strategy and timeline. These identify the costs, requirements (training, software), transition (pilots, reviews), roles and overall process. All of industry should look to start developing similarly with an initial self-assessment. Collaboration with this development would prove beneficial in avoiding duplication of efforts and multiple versions. Any support or guidance that could be developed for this stage would be vital in enabling a Wales mobilisation.

Strategy

The principles behind BIM around collaboration, data sharing, early engagement etc raised the suggestion of developing an Integrated Project Delivery (IPD) Strategy that will embody

these principles allowing BIM to fall within. This would help assist the implementation and mobilisation of BIM while allowing areas of further development to be identified to take industry beyond BIM.

Contracts

Contractual maturity was raised as a concern by the task group. BIM is currently expected to have no impact on contractual maturity up till level 2, which according to the UK target will be up till 2016. However beyond level 2 and therefore 2016 is unknown. A further analysis of the impact at higher levels of maturity on contracts, framework and relationships is needed and should form part of the pilot studies underway.

Cooperative Agreements

Decisions in Wales need to be made on investment and risk in relation to the whole team and supply chain. Cooperative agreements/packages would provide a group buy in which is seen by many especially SMEs as a more approachable and affordable and therefore a beneficial way to implement BIM. Similarly small contractors have stated frameworks as their favored approach to implementing BIM.

Roles

The idea of being 'lead' across industry was consistently raised, with even the early adopters seeming to be driven by an individual champion.

The idea of a champion when implementing seemed to be favoured, placing an individual in charge of the whole process i.e. software, training, pilots etc. Once set up a number of roles could be developed such as a BIM Co-ordinator (responsibilities for management of the model throughout the project lifecycle) and/or a BIM Maintenance Manager (responsibilities for the management of the model post construction – maintenance and operation)

However with any roles it should be ensured that BIM doesn't become just another 'tick box exercise' like BREEAM. It is necessary to ensure that there is ownership and accountability of the model and that it doesn't just become an electronic filing cabinet.

Ownership, roles and responsibilities of BIM will need to be outlined within the Welsh BIM Strategy to avoid any future conflicts.

Visual Aids

Various suggestions were made on how to clarify the benefits of BIM and assist with the implementation process in the form of visual aids. The proposals included diagrams, graphs and flow charts to illustrate various aspects of BIM.

1. Clarify the exact benefits of each BIM maturity level

Although the general benefits of BIM were recognised within the task group, it was suggested that many in industry are only vaguely aware of what they are. To assist it was proposed that a simple diagram or table could be developed to clarify the benefits of BIM. The idea was to simply list the requirements and the benefits of each maturity level similarly to the UK 'Wedge'.

Suggestion:

- Adoption or adaptation of the UK BIM Wedge showing the requirements and benefits of implementing BIM at each level of maturity

2. Provide assistance with the initial self-assessment for those looking at implementing BIM

Many companies are already working at the lower levels of BIM, but maybe unsure exactly what level that is and therefore what they need to do to develop. To assist this it was proposed that some form of checklist for each maturity level could be developed that would allow companies to assess their current standard and create strategies for further development.

Suggestion:

- Develop a checklist to enable clients and suppliers to assess their current BIM maturity level

3. Help clients and suppliers make informed decisions on which level of BIM is appropriate for each individual project

During the task groups, there was a lot of debate regarding if a threshold should be applied to BIM and what the threshold should be i.e. level, time and project. From this there were various proposals depending on how specific the Welsh Government is prepared to be on the implementation of BIM.

Two ideas seemed favoured;

One, a graph placing BIM maturity level against project value (cost) helping demonstrate what level of maturity should be applied at what value i.e. <£2m level 1, £3m level 1.5, £5m level 2 etc.

Two, a graph taking into account complexity helping demonstrate what level of maturity should be applied at what value and complexity i.e. low value & low complexity level 1, low value & high complexity level 3, high value & low complexity level 2, high value & high complexity level 3. If this is developed a complexity scale to measure would need to be determined.

Suggestion:

- Develop two graphs to enable clients and suppliers to make informed decisions on implementing BIM and setting their own thresholds

4. Help disseminate the learning from projects that have already used BIM

An alternative suggestion to the previous two graphs looks at assisting through information and lessons learnt from completed BIM projects instead of assigning specific levels. It could supply information on projects that have already been completed using BIM and therefore enable clients and suppliers to compare and make their own informed decision. This could be provided in various forms; a list, grid, map, graph etc.

The graph proposal would be similar to the previous graph placing maturity level against project value (cost), with the flexibility of allowing some projects to fall between two levels if applicable. Each project completed would appear as a point on the graph and provide further information if selected. As more projects are completed using BIM various graphs for the different sectors i.e. schools, transport, housing and types i.e. new build, refurbishment, maintenance could be produced.

Suggestion:

- Produce a case study portfolio of organisations, projects and individuals to promote and raise awareness of the benefits of BIM

Conclusion - The 4 Questions

1. **What level of maturity should be applied to BIM and over what timescale?**
   - Alignment with UK Government with all Welsh Government funded projects at level 2 by 2016
   - All Welsh Government Department Projects to lead at level 2 by 2015
   - Development of a short term (2013 - 2016) and medium term (2016 - 2020) roadmaps
   - A phased process working closely with industry groups to allow time for industry to prepare for the development
   - Annual progress reviews to monitor and asses the development of BIM in Wales

2. **What value of project should a BIM Strategy Wales apply to?**

   A value or threshold for Wales could not be established in the timescales allowed.
   It was heavily debated at all meetings with a number of suggestions proposed:

   - A monetary threshold is seen as both an essential component to drive implementation and a risk as it could result in excluding projects and companies.
   - A threshold based on the value of a company's portfolio of projects to determine what value of BIM they should be working at, not on the value of individual projects. (a potential way forward for a monetary threshold)
   - Alternative parameters such as data, time, scale, complexity (£/m^2) etc.
   - Early adopters stated that they found it difficult to apply a value to schemes and projects and therefore assessed each job by scale rather than value.
   - Multiple thresholds could be set in terms of the requirements and value of BIM.

     For Example:

     - Sector i.e. government level 3, local authorities level 2
     - The organization i.e. big contractors level 3, SMES level 2
     - The job i.e. new build level 3, extension level 2, maintenance flagging
     - Parties involvement i.e. architect level 3, contractor level 3, client level 2
   - Pilot projects should inform the thresholds based on value and complexity by 2014/15
   - Collaborative working arrangements and internal business development should still be encouraged until such a value is set
   - Smaller schemes should be noted as an ideal opportunity to get funding, get everyone on board and trial BIM.

3. **Are we content with the 'Push-Pull' approach for suppliers and clients?**
   - Consensus was reached on the 'Push-Pull' approach, at this stage, albeit recognising a greater push being provided by suppliers

- Greater leadership needed with a significant pull to be developed from the clients for future progression
- SMEs will need support to understand and capitalise on the opportunities offered through BIM'
- An Action Plan geared towards both clients and suppliers is needed to develop BIM capabilities

4. **Do we consider that BIM Strategy Wales should strive to improve project delivery and operational performance particularly in the areas of improvement – Cost; Value; Carbon Performance?**

Cost

- Consensus agreed that a monetary benchmark is essential
- Rewording to 'reduced costs' or 'cost predictability' or even just 'predictability' to embody wider factors
- Cost could be separated out with short term; cost certainty and long term; reduce cost

Value

- Uncertainty over what 'value' includes and therefore how to define and quantify it, especially without overlapping with cost
- Outline needed to clarify what is 'value' as a measurement

Carbon Performance

- Fragmented response with carbon performance within BIM being seen as different levels of importance.
- Some see it as just another measurement and therefore data within BIM rather than a focus
- While others see it as a key deliverable, providing accurate data to the Government at a time when meeting various carbon targets is vital.
- In summary in terms of carbon, BIM can only be used as a way to facilitate more accurate measurement of carbon footprint, not as a tool for setting standards

Alternative suggestions included:

- Efficiency; Covering factors such as time and errors
- Energy Use; Covering supply (source) and demand (construction & operation)
- Sustainability

From the discussions and the point above the following improvement were agreed for Wales:

iv. **Added Value**
The wider/external 'value' gained as a result of BIM
Further work needed to clarify what is 'added value' and how to measure it

v. **Cost Predictability**
A monetary benchmark that embodies other principals of collaboration such as risk, time, consumption and quality

vi. **Carbon Intelligence**
Data is required to improve the understanding of Carbon Performance

5. Recommendations

The following recommendations were generated from the responses of all task group and sub group meetings to provide a single industry response to the utilization of BIM in Wales. This response is intended to assist the Welsh Government in developing a strategy for utilising BIM in Wales.

1. **What level of maturity should be applied to BIM and over what timescale?**

   Alignment with UK Government with all Welsh Government funded projects at level 2 by 2016 and all Welsh Government Department Projects to lead at level 2 by 2015.

2. **What value of project should a BIM Strategy Wales apply to?**

   A value or threshold for Wales could not be established in the timescales allowed. Collaborative working arrangements and internal business development should still be encouraged until such a value is set.

   Pilot projects are expected to inform the thresholds based on value and complexity by 2014/15.

3. **Are we content with the 'Push-Pull' approach for suppliers and clients?**

   Consensus was reached on the 'Push-Pull' approach, at this stage, albeit recognising a greater push currently being provided by suppliers.

   Greater leadership is needed with a significant pull to be developed from the clients for future progression.

4. **Do we consider that BIM Strategy Wales should strive to improve project delivery and operational performance particularly in the areas of improvement – Cost; Value; Carbon Performance?**

   The following improvement areas are proposed:

   i. Added Value
   ii. Cost Predictability
   iii. Carbon Intelligence

From these recommendations and in support of the Value Wales Construction Procurement Steering Group and the Welsh Government the following BIM statement is proposed for the Wales Construction Procurement Strategy. It provides a clearer direction to industry on the future implementation and development of BIM in Wales.

Wales Procurement Strategy – BIM Statement

'BIM is a tool that supports integrated collaborative working on built environment projects. The data and models enable improved delivery, performance and management of assets. In support of the collaborative procurement details in this strategy - BIM will be adopted to level 2 by 2016 on all Welsh Government funded projects, with Welsh Government department projects achieving level 2 by 2015.

Strong leadership from clients and suppliers, coupled with collaborative behaviours, will ensure that robust processes in line with BIM conventions are delivered to these timescales. Annual reviews will assess and measure progress against these timescales. The desired outcomes will encompass added value, cost predictability and carbon intelligence.'

6. Next Steps

In proposing its recommendations and statement the task group recognise that a number of issues remain to be addressed by the industry before a strategy for utilising BIM in Wales can be implemented. As part of the outcomes from the Task Group the following action plan was generated to assist with developing a way forward for BIM in Wales. The suggestions made are based on a general consensus from all task group feedback.

Action Plan

Themes	Action	Completion by
Managing the Strategy	Development of short term (2013 - 2016) and medium term (2016 - 2020) roadmaps to describe a way forward	2013
	Annual progress reviews to monitor and asses the development of BIM in Wales in line with the adopted roadmaps	Annually from 2013
Assessing Current Practice	Undertake an assessment of the maturity of the construction industry in Wales to implement BIM; focusing on sectors, organisation capacities & volume and magnitude	2013
	Examine the issues affecting BIM implementation across the different regions of Wales where geographic factors limit implementation e.g. internet accessibility and speed	2013
	Produce a portfolio of example organisations, projects and individuals already implementing BIM to promote and raise awareness of the benefits of BIM to others	2013
Establishing Pilot Projects	Develop an on-going programme of BIM related exemplar/demo projects showing what BIM is, how it works and the benefits	On-going
	Establish pilot projects to specifically inform future thresholds for the application of different levels of BIM based on value and complexity of the project	On-going
	Include results from case studies and pilot projects in the annual review of BIM implementation across Wales	Annually from 2013
Encouraging Collaboration	Seek clarity of BIM requirements for 21st Century Schools Programme	2012/13
	Establish regional meetings to provide a basis for BIM collaboration and knowledge sharing	2013
	Investigate the possibility of introducing a mentoring scheme whereby early adopters train and teach others to use BIM and pass on their experience from lessons learnt	2014

Establish Protocols	Develop a single BIM Development Protocol Framework for Wales that will encourage consistency and collaboration between the sectors	2014
	Investigate Asset Management principles/requirements which can be integrated within a BIM Development Protocol	2014
Provide Support	Provide support and guidance to help SMEs understand and capitalise on the opportunities offered through BIM	2013/14
	Develop a BIM support map for Wales; identifying training & funding opportunities, pilot projects and contacts for knowledge sharing	2014
	Provide workshops for industry covering; procurement & collaboration rates, hardware& software, implementation models for BIM and case studies of BIM	2013
	Investigate the potential for in-house assistance to businesses in self-assessment, strategic development and implementation of BIM	2014
	Develop a flowchart to enable clients and suppliers to make informed business decisions on implementing BIM and setting their own standards	2014
Managing Operation	Investigate the responsibilities for BIM within current roles: – BIM Co-ordinator (responsibilities for management of the model throughout the project lifecycle) – BIM Maintenance Manager (responsibilities for management of the model post construction -maintenance and operation)	2014
Research & Development	Undertake research to improve the application of BIM requirements in asset management and handover (soft landings)	2013/14
	Produce guidance on the implementation of BIM within a whole lifecycle approach while maintaining flexibility for innovation and long term development	2013
	Undertake research to support guidance on retrospective BIM and development of portfolios and benchmarks of existing stock	2014/15
	Undertake research to support guidance on the applicability and implementation of BIM in retrofitting	2014

Appendix 1 – Terms of Reference

BIM Task Group

Terms of Reference

March 2012

BACKGROUND

The Centre for Constructing Excellence in Wales (CEW) is essentially a Welsh Government (WG) policy delivery vehicle whose role is to help the industry to improve itself in order to deliver better quality and value for money to its clients and users. CEW champions the merits of best practice and collaborative construction methods. It relies upon individuals and organizations to share their experiences, knowledge and information of best practice methods.

CEW works with the Welsh Government, the industry and various influential bodies at Board level. CEW's target is to make sure the Welsh construction industry continuously improves, learns from its past experiences and delivers the infrastructure the country's economy requires through collaborative working.

From time to time, CEW convenes Task and Finish Groups to deal with issues relevant to the construction industry in Wales. These Task Groups are made up of individuals from the construction industry in Wales who have experience and/or a particular interest in the topic being addressed.

The UK BIM Working Party Strategy has been developed as a strand of the Cabinet Office Government Construction Strategy. The Strategy has a UK Government focus and is not necessarily applicable to circumstances in Wales. A clear plan for the implementation of BIM has been developed for England but not for Wales.

In February 2012 CEW wrote to the Minister for Finance, Jane Hutt AM, regarding BIM and CEW assisting Welsh Government with the development of an implementation plan for Wales. The Minister's office requested that Value Wales officials engage with CEW in respect of BIM and then provide the Minister with advice.

The CEW BIM Task Group has been convened to assist the Value Wales Procurement Steering Group and the Welsh Government with a BIM implementation plan for Wales which will provide clear direction to the industry in Wales.

AIMS AND OBJECTIVES

The UK BIM Working Party Strategy and Implementation Plan, produced in March 2011, does not apply in Wales. The objectives of the Task Group are to review the UK BIM Working Party Strategy Document and develop an implementation strategy for Wales.

The objectives are as follows:

- Review, confirm or modify the 6 key specific recommendations;
- Identify what Welsh Public Sector Clients need to do to encourage the use of BIM using a consistent approach;
- Review, confirm or modify the test details in the BIM hypothesis;
- Set a benchmark for BIM Wales maturity levels, scale and timeline;
- Identify what needs to follow a BIM Wales Strategy to enable implementation and mobilization.
- Deliver a Report to the Value Wales Construction Procurement Steering Group in time for the publication of the Draft Strategy in Autumn 2012.

The Task Group will consider the following questions:

- Over what timescale should a BIM Wales Strategy be adopted and what level of maturity should it have?
- What value of project should a BIM Strategy Wales apply to?
- Are we content with the 'push-pull' approach for suppliers and clients?
- Do we consider that BIM Strategy Wales should strive to improve project delivery and operational performance particularly in the areas of improvement - Cost; Value; Carbon Performance?

CHAIR

The Chair of the CEW BIM Task Group will be Mike Edmonds. Mike Edmonds chaired the CEW Procurement Task Group and is a member of the Value Wales Construction Procurement Steering Group.

ROLES AND RESPONSIBILITIES

Members of the BIM Task Group will be expected to:

- Adhere to these Terms of Reference;
- Show commitment to achieving the aims of the Task Group through constructive working, support and openly sharing information and best practice;
- Be able to devote the necessary time to attend meetings;
- Be aware of procedural or process changes within their own organization and/or sector which could impact on the successful achievement of the objectives of the Task Group.

Members of the BIM Task Group will, where appropriate:

- Contribute expertise, experience, insights, information and good/best practice;
- Link in associated activities to avoid duplication or inconsistency;
- Help CEW develop effective communications;
- Inform the Task Group of relevant developments from their organization/sector;
- Take responsibility for speaking on behalf of and reflecting the views of their organization/sector;
- Actively consult with their organization/sector;

- Promote and champion the Task Group's actions;
- Review and provide sign off to proposed documents;
- Undertake and progress actions where agreed;
- Identify sources of relevant data, or contact points.

GOVERNANCE

The Task Group will report to the Value Wales Construction Procurement Steering Group and the CEW Board of Directors.

ROUTE MAP FOR DELIVERY

1. Initial Workshop in May with all interested parties introducing the Task Group outline plan.
2. Workshop with Task Group split into three working groups – Client, Supply Side, and Experiential.
3. Meeting with each working group to collate responses to the Objectives and Questions posed.
4. Undertake a final workshop with all Task group members to conclude the outputs from the working group meetings to formulate a strategy for BIM Wales.
5. Prepare a Report of the findings of the Task Group and present to the Value Wales Procurement Steering Group.

Appendix 2 –Timeline

April

- Preliminary BIM Meeting

May

- BIM Overview Event

July

- Initial Task Group Meeting
- Collation of Initial Outputs

September

- Individual Task Group Meetings
- Collation of Individual Groups Outputs
- Steering Group Meeting

October

- Draft Report
- Final Task Group Meeting

November

- Final Report
- Presentation of BIM Wales Procurement Statement to the Value Wales Procurement Steering Group

Appendix 3 – List of Delegates

Haydn	Ames	Newport City Council
Nick	Bebb	Atkins
Russell	Bennett	Welsh Government
Jamie	Best	Melin Energy Consultants
Sue	Bolter	Newport City Council
Jason	Burke	Arup
John	Counsell	Cardiff Metropolitan University
Neil	Davies	NHS Wales Shared Services Partnership - Facilities Services
Sarah-Jane	Davies	Welsh Government
Andrew	Dawe	Cowlin Construction Ltd
Andrew	Dobbs	Willmott Dixon
Jonathan	Dore	Euro Clad Limited
Paul	Evans	Dawnus Construction Ltd
Nigel	Froom	City & County of Swansea
Alan	Gillard	Gillard Associates
Melanie	Godfrey	Welsh Government
Andrew	Gough	Provelio Ltd
Chris	Gray	C D Gray & Associates
Daniel	Griffith	Arup
Donna	Griffiths	ConstructionSkills
Vince	Hanly	Rhondda Cynon Taff County Borough Council
Hywel	Harries	Carmarthenshire County Council
Rob	Hartwell	Excitech Ltd
Chris	Hughes	Welsh Government
Allen	Hurst	Pembrokeshire County Council
Ian	James	Willmott Dixon
Jon	James	Scott Brownrigg Ltd
Iwan	Jenkins	Morgan Cole LLP
Richard	Jenkins	Federation of Master Builders
Mark	Jenkins	Costain Ltd
Maria	Jones	Pembrokeshire County Council
Rhodri	Jones	Civil Engineering Contractors Association (Wales) Ltd
Jonathan	Jones	HLM Architects
Jason	Jones	Carmarthenshire County Council
Stephen	Lawrence	Mott MacDonald Group Ltd

Guy	Leach	Knox & Wells Ltd
John	Lewis	City & County of Swansea
Huw	Llywelyn	Alun Griffiths (Contractors) Ltd.
Phil	Lumley	Carmarthenshire County Council
Emmajane	Mantle	University of Glamorgan
Bruce	Massie	B3 Architects
Darren	McNeill	Cowlin Construction Ltd
Justin	Moore	Leadbitter
Tony	Norris	Geldards LLP
Robert	O'Dwyer	Monmouthshire County Council
Martyn	Osborne	Kier Construction Limited
Patrick	Riordan	NWSSP - FS
Daniel	Rossiter	Cardiff City Council
Joanna	Rothwell	Cardiff University
Ann Marie	Smale	Powell Dobson Architects
Nick	Sullivan	Value Wales
Andrew	Thomas	Room 4 Consulting Limited
Michael	Tinney	Leadbitter
Gavin	Traylor	Cardiff County Council
Zane	Ulhaq	BRE Wales
Andrew	Waddington	NHS Wales Shared Services Partnership - Facilities Services
Jane	Wade	Vale of Glamorgan Council
Ian	Walsh	Capita Symonds
Pierre	Wassenaar	Stride Treglown
Clive	Webb	Boyes Rees Architects Ltd
Paul	Webber	Arup
Chris	Weston	Scott Brownrigg
David	Whitter	Scott Brownrigg
Darren	Wilkins	Stride Treglown Architects
Kelly	Williams	Vale of Glamorgan Council
Huw	Williams	Gwynedd Consultancy
Jon	Williams	WRW Construction
Trefor	Williams	University of Glamorgan
Paul	Wong	Lee Wakemans Ltd
Barry	Woodman	Costain Ltd

Appendix 4 – Task Group Feedback

This appendix sets out a record of the discussion which took place at each sub-group meeting.

Aim: to develop recommendations to be incorporated into the Wales Construction Procurement Strategy

Client Focused Group – 3rd September 2012

Current Situation

- Current England deadline of March 31st 2016, only for government projects, not local authorities. Some authorities want to use BIM, others don't.
- Original £50 million threshold brought down to £5 million and now disappeared altogether. The majority of welsh projects are under £5 million.

Early Adopters

Arup

- Implementing BIM for around 5 years and it paid itself back in around 2 years
- They had to have a leader to take on responsibility
- Resulted in decreased redesign & increased confidence
- Didn't apply a BIM premium – no extra charge to clients
- ARUPs implementation across all projects has raised the standard of quality

Local Authorities

- Main focus is schools however they delegate maintenance so they need a tool that is simple to handover and will actually be used (Opportunity with 21st century schools projects)
- Currently school building handover material is ignored – this is the danger with BIM
- May be necessary to train a full time building specialist
- Only a small percentage of assets will have BIM
- One of the main benefits is speeding up public consultation – easier to communicate ideas
- Difficult for authorities to collaborate internally as they are split into lots of small departments
- Many local authorities wont implement BIM unless a deadline is created as the financial departments see it as an unnecessary cost (financial blockers)
- Schools are likely to be a problem area with limitations on budget and complications with roll out

Initial Objectives

1. **Review, confirm or modify the six key specific recommendations**

    i. **Leave complexity and competition in the supply chain**

- BIM premium - Should companies charge extra for BIM models (like they did initially with CAD)
- BIM needs to keep evolving

ii. Be very specific with supply chain providers, they will only provide that which is asked for

- Need to identify what management systems already exist. BIM needs to go beyond a 3D model to sell.
- Need to identify what clients require and need i.e. project size in relation to BIM level and speed of uptake/ implementation.
- Asset management is key - need to maintain the legacy as 70% of building costs come after construction so this is a focus for clients
- Client needs to fully understand the options available to them

iii. Measure and make active use of outputs

- Need to improve dataset: standardise outputs
- Some way of assessing/ quantifying the benefits may help to convince others
- Initial start-up costs are high – hardware, software, training etc. – need assurance of benefits
- Reduction in costs to be stated but not predicted
- The value of BIM needs to be compared to investment (implementation costs)
- The appropriate level and price differentiations should be highlighted through pilot projects
- Savings should be stated in terms of revenue and capital
- BIM needs to be valued for the whole lifecycle for the project and wider for the organization
- Benefits can be seen for multiple projects. These need to be demonstrated and valued.
- BIM has numerous non-tangible benefits i.e. the sharing and exchange of information as well as instant updating. How can these be measured and highlighted?
- Database should be developed to capture data and help to demonstrate asset value
- BIM has already proved beneficial in reducing insurance premiums and asset running cost
- BIM allows for forecasting and transparency across a project enabling accurate and efficient reporting.

iv. Provide appropriate support infrastructure

- There is currently an issue with predictability, no one really knows what is going to happen in the long-term, a lot of guess-work is going on and software is constantly being developed and upgraded
- The type of contracts used to require BIM are essential to assure good quality, not just the cheapest price
- Needs to avoid overloading organisations and projects with information and skills
- BIM needs to be made easy and simple to suit all
- Limitations need to be identified and addressed i.e. team collaboration, subscriptions, roles/responsibilities
- Education required - view currently held that BIM is solely a 3D model

- Needs to support the unity of systems/software between various architects, contractors, etc. - Industry needs a common format
- The project needs to lead to ensure a 'one size' fits all approach isn't applied i.e. BREEAM Excellent
- Within organizations should BIM be flexible or championed?
- Have to cater to needs of different sectors e.g. education and health compared to highways
- Should government aim to influence next generation big BIM uptake
- BIM needs to demonstrate its ability to bridge stages, companies, software etc.
- It is expected with BIM due to initial upfront costs and trialing that there will be a lag before savings and full benefits can be demonstrated

v. Take progressive steps

- Education is key – we need to build on current programs and knowledge not start over again
- Need to carry out case studies, but it's important to pick a wide-variety of projects including the more mundane, everyday projects to prove the benefits and demonstrate exactly where the efficiencies will be – this will vary dramatically depending on the sector and the stage of the lifecycle the project is at
- Danger of becoming a tick-box exercise like BREEAM
- Standardisation is required for easier collaboration – which programs should everyone be using and do they really interact effectively?
- Flow chart could be developed as a toolkit to help identify the level of BIM applicable and avoid the 'one size fits all' approach
- What is the cost of BIM? Pilot projects could be undertaken to measure and value
- Put BIM Wales Strategy into a Welsh Context, but be careful not to reinvent the wheel; use UK's strategy as a base
- LA need education about end use of BIM - it can be a challenge to maintain
- Welsh Audit office need to buy in to BIM and provide authentication
- Implement a document management system to assist
- Need to overcome perception that BIM is a completely new concept
- Small contractors need a framework to gear up

vi. Have a clear target for the "trailing edge" of the industry

- Many authorities see BIM as detrimental to SMEs and it's a political aim to support SMEs
- Less than 1/3 of SMEs know how to use/ collaborate with 3D models/ BIM - can't take the one size fits all approach
- SMEs managed with CAD so they should be able to manage again with BIM

2. Identify what Welsh Public Sector clients need to do to encourage the use of BIM (consistent approach)

- All companies/organisations are going to need to do several trial projects to get familiar with the process
- BIM needs to be used by the whole management team together; otherwise it can be proven to be ineffective. Currently, BIM often fails to link the project with asset management

- Within contracts a statement should be included to provide BIM training and support. This would prove beneficial across the whole supply chain.
- Welsh Government should champion BIM by providing best practice examples for Local Authorities to follow
- LAs are in control of key amount of expenditure so they are key to delivering BIM and need to be on board
- Everyone needs to be open and share information to drive BIM
- Maintenance , improvements, extensions are a key area of worry

3. Review, confirm or modify the test details in the BIM hypothesis

- Nothing Applicable

4. Set a benchmark for BIM Wales maturity levels, scale and timeline

- Important to sign up to a process and keep targets relatively flexible so they can adapt as the industry develops: don't over specify. Danger of focusing in on the near future, need to look at it as a long term investment
- We need to at-least match the English 2016 target so as not to miss out on work, maybe even aim for 2015 on some projects to get ahead of the game
- Or all level 2 by 2016 with integrated web services
- Maybe the threshold should be about complexity as well as cost, for example: value per metre squared
- Maybe a flowchart system could be used to decide on BIM suitability for projects, take into account complexity, risk, approach, cost,
- Would you get good value by implementing BIM on small budget projects?
- Threshold could be open to abuse e.g. which parts of the project should be included in the price.
- Different levels of BIM could be required for different size projects

5. Identify what needs to follow a BIM Wales Strategy to enable implementation and mobilization

- Welsh policy needs to address all 3 pillars for clients; social, economic & environmental
- A punchy statement for BIM is needed to input into the procurement strategy and to be placed towards the Minister
- Clarification of the long term picture will need minister's agreement. This makes it vital to get them on board and involved early to accelerate progress.

Questions

1. What level of maturity and over what timescale?

- We need to at-least match the English 2016 target so as not to miss out on work
- Maybe even aim for 2015 on some projects to get ahead of the game
- Or all level 2 by 2016 with integrated web services

2. **What value of project should a BIM Wales Strategy apply to?**

    - Different levels of BIM could be required for different size projects
    - Other threshold suggestions
        - Complexity (value per metre squared)
        - Risk
        - Approach
    - Flowchart system to take into account multiple criteria

3. **Are we content with the 'push-pull' approach for suppliers and clients?**

    - The client must provide the drive for BIM to support the suppliers implementing it voluntarily and encourage others

4. **Do we consider that BIM Wales Strategy should strive to improve project delivery and operational performance particularly in the areas of improvement - cost; value; carbon performance?**

    - Current markers overlap a lot, need more definition
    - Worry that carbon Capture may become a distraction (like BREEAM?)
    - Other potential measures could be efficiency or energy

Suggestions

- BIM maintenance – an employee from the contractor/designer/client could remain with the project and be trained up to assist/run maintenance through BIM model, but only for 'one off big schemes'

- Suggestion to develop a calculator to help demonstrate savings and efficiencies for BIM – could be made similar to the SAP sensitivity test or carbon calculators

Other Issues/Points

- Retrospective BIM could also be profitable – Australian government are doing it
- Internet speed maybe an issue is some areas of Wales

Experiential Group – 4th September 2012

Current Situation

England

- Current English 2016 deadline for COBIE 2 (modified version of American COBIE)
- England started developing BIM 4 years ago but it was expected to be industry funded, not supported by the government
- England benefits from a structured framework (agencies) aiding its spend and financial distribution. Wales currently lacks a similar authority structure
- Ministry of Justice deadline of 2013. Current pilot projects have been used to help reduce errors in future projects
- Despite local authorities not being mandated to use BIM, many are still adopting it

Wales

- The current infrastructure is already at level 2 BIM (although not quite level 3) with many companies are already implementing level 1 or 2 on projects
- Supply chain have been 'pushing' so far, but clients will inevitably need to pull
- A lot of the industries attitude rests on Welsh Government telling them what to do i.e. similarly to BREEAM with grant changes providing a push
- Suggested to add grant conditions to BIM to force a step change

Early Adopters

Welsh NHS perspective

- Focusing on using BIM in the construction phase for the moment (for projects of £4 million and up) as the benefits are very obvious, however they don't know how to maintain models
- Will look into using BIM for maintenance in the near future as those hurdles arise
- BIM increases the upfront cost of the project making it more expensive to cancel a project
- Models are useful for demonstrating layout to nurses etc.
- Need a consistent approach for the various contractors on a project
- BIM projects will be a minority compared to existing estate
- NHS own BIM Task Group
- NHS benefits framework – BIM across
- Issues with handover to maintenance (lack resource)
- No one against – local health boards and support
- NHS standardising
- NHS principal or policy to update – in discussion within researcher

Carmarthen Council

- Uses delegated maintenance
- Currently scanning existing schools for all major projects
- Currently have lots of different locations for different types of building information (e.g. asbestos), BIM would help combine these
- It's important to be able to link the historic data to the new data – retrospective BIM

Others

- MOJ decrease risk by using trial projects early on to future proof later designs. They are pushing to reduce inefficiencies.
- Manchester and Cheshire using BIM in all areas: transport links, railways, retail etc. Building on experience and knowledge

Initial Objectives

1. **Review, Confirm or Modify 6 key specific recommendations**
   i. **Leave complexity and competition in the supply chain**

- Supply chain needs to respond to client therefore client needs to know what is required
- 1 & 2 are linked depending on client input/brief
- Don't stifle future innovation and development

- 3D software is already currently used, but it lacks the mechanisms which BIM provides (financial management, cost analysis, extending project life, 3D architecture, design, product details)
- Opinions generally seem to favor 3D models such as BIM when explaining and selling. This has already seen a decrease in hand drawings.

ii. Be very specific with supply chain providers, they will only provide that which is asked for

- Clients need to advise what info is required over life of asset
- What outputs are required? Will these change as clients become educated? (probably yes)
- Education may need to come from supply chain
- Need to avoid contractors simply ensuring that they have staff trained in every type of BIM software to satisfy a variety of clients
- Within the BIM strategy it is vital to identify what the client needs (client driven)
- Numerous BIM 'models' or 'strategies; already exist within different organizations
- Individuals have had different experiences with BIM resulting in it meaning different things to different people
- Fundamental question outlined as: What does the asset manager really need?

iii. Measure and make active use of outputs

- 'Live' updating required to maximise benefits
- Provision of 3D design models early is beneficial to the clients/ end users
- Need to identify the project value for each level of BIM for the client against the savings throughout the construction programme
- Normally needs time to test and try
- Ownership/ Accountability – shouldn't end up as just an electronic filing cabinet
- Could be used for programmed maintenance
- Payback needs to be identified for both individual projects and the whole lifecycle to evaluate if it is cost effective
- The value of BIM goes beyond delivery. Need to demonstrate this within the whole life cost (the person who lives with the building, road etc.)
- Useful for carbon data/ legacy information – government has a lack of data currently

iv. Provide appropriate support infrastructure

- Need to know the full cost of implementing BIM within a company
- Companies need to have the confidence to invest and back the implementation all the way
- Clients don't always know how to use the model for asset management
- Multiparty building contracts currently don't fully integrate and collaborate, they need to deliver in partnership
- Need clarity of roles and responsibility within BIM and need to bring the whole team together earlier in the construction process
- Need to identify the relationships involved to relate to systems
- Variations within industry such as the level of knowledge and understanding, their strategies and approach, level of current maturity etc. will need to be taken into account
- In a lot of organizations implementing up to level 2 shouldn't require drastic expenditure, more so on just remodeling
- Need to ensure that BIM can cross over numerous systems to combine the information to produce similar outputs for the future.

- BIM pulls together all the data for the asset life cycle, but clear guidance needs to be developed on what is needed to be truly beneficial
- BIM needs to be developed as part of the 'project' i.e. design, construction, operation etc. for it to succeed and progress

v. Take progressive steps

- Experience needs to be developed in private sector
- Need to develop the asset manager's knowledge of savings post construction (lack of examples/case studies)
- Benefits will be highlighted and extenuated from repetition
- Outline how to efficiently capture and utilise data
- Need to market package 'beyond software' to address perception issues
- Important to achieve consistency between strategies i.e. Procurement Strategy
- In Wales including BIM as a mandate seems to be the 'gateway' to implementing it within decision making.

vi. Have a clear target for the 'Trailing Edge' of the industry

- Entry point (needs to be more achievable)
- One single accessible bespoke model (shared by workers and suppliers)
- Licenses (software)
- Set clear requirements at tender stage
- Education programme required
- Important to engage with SMEs so as not to disenfranchise them
- Some worries that the process is going too fast and is too complex, hard loss SMEs strategy – focus what and why
- Big alteration to SMEs – keep up to date – how? resources?

2. Identify what Welsh Public Sectors Clients need to do to encourage the use of BIM (Consistent approach)

- Level 2 easily achievable – publicise the governments confidence and provide support
- BIM as a statutory service? How accurate is BIM? What level of BIM?
- BIM varies in relevance across different Local Authorities, the NHS, departments, etc.
- It is suggested including within the Procurement Strategy some prioritization of BIM to be seen in tender scoring.
- The Procurement Strategy in Wales is vital and therefore a key focus for driving the implementation of BIM.

3. Review, Confirm or Modify the test details in the BIM Hypothesis

- Nothing Applicable

4. Set a benchmark for BIM Wales maturity levels, scale and timeline

- Wales criteria (sustainability) – embody all principles
- A cost/benefit analysis is required to determine which project to apply BIM and its value
- How appropriate is BIM across all projects particularly at a lower level i.e. highways/ civil projects - £5m highway / £5m building
- What proportion of project and to what scale should BIM be applied?
- A need/want for a long-term perspective beyond 2016, with a clear road map outlining a smooth path for the next 10/15 years
- Suggestion of a 2015 deadline for big government contracts, and 2016 deadline for local authorities (to support SMEs) – government would start the learning curve sharing their

results to reduce risk to others, information could then cascade down through the industry
- MOJ – deadline of 2013
- Year or 2 year reviews of process/projects e.g. WG 2015
- 2016 complete framework – ramp up/ step up now
- Fixed date could be a barrier for some and create resentment
- LAS sign off of minister – can't push without journey plan – e.g. targets and deadlines
- Portray BIM adoption as a journey not a single date (barrier)

5. **Identify what needs to follow a BIM Wales Strategy to enable implementation and mobilization**

- Need certainty: one clear protocol to ensure collaborative software other – not entirely separate from UK
- Software divergence – need to keep all the software going in the same direction – even across borders regardless of different or older versions of software i.e. BR
- Some authorities have a 'will do if have to' attitude so a clear target will be required to encourage BIM take-up
- Implement Pilot projects to develop expertise and pass on learning

Questions

1. **What level of maturity and over what timescale?**
    - Suggestion of a 2015 deadline of level 2 for big government contracts
    - 2016 deadline for local authorities
    - long-term perspective beyond 2016
    - Regular progress reviews
2. **What value of project should a BIM Wales Strategy apply to?**
    - Application threshold should not necessarily be value based, but take into consideration other aspects such as project complexity
3. **Are we content with the 'push-pull' approach for suppliers and clients?**
    - Currently more push than pull, will need to educate clients so they can improve the pull aspect
4. **Do we consider that BIM Wales Strategy should strive to improve project delivery and operational performance particularly in the areas of improvement - cost; value; carbon performance?**
    - General consensus, but other suggestions were also put forward including a cost/benefit analysis and sustainability

Suggestions

- Small adjustments to projects after completion would result in time and effort to modify model – potentially use a flagging system instead – automate system
- Models can be run from spread sheets of data e.g. Arup's bid for the Beijing birds nest for which 60 different BIM models were assessed by modifying the data

- Use COBIE as a framework as it's not commercial
- Should BIM involve bringing in contractors at an earlier stage to improve streamlining?
- Clients need to ask what else the contractor can provide and explore the possibilities
- Need to share feedback from BIM projects
- Target directors, they control the finances needed to successfully implement BIM
- A BIM Co-ordinator should be chosen for each project with responsibility for managing the development and use of the BIM model. Further points to consider;
    - Which party should the co-ordinator work for?
    - Currently the NHS view is that the contractor & supply chain own the model during construction and therefore have the BIM co-ordinator
    - Should the contractor have an in-house co-ordinator or bring in a specialist
    - Streamlining to similar level – supply chain
    - Coordinator – quality time budget
    - Sharing of knowledge – increase efficiency consultants architect etc.

Other Issues/ Points

- Risking a two-tiered systems – those who can and can't use BIM, it's important to develop the mentality behind using BIM
- In some cases it's an age issue – younger employees who have grown up in the 'digital age' maybe more adaptable to BIM, however it's also argued that only around a half of students really know how to use computer programs effectively
- How do you ensure compliance with strategy dates? Incentives, grant conditions?
- Useful for SMEs like joinery and carpentry to do complex joints
- Allows for bespoke designs
- BIM premium can be avoided if competition is maintained in the industry
- BIM could combine multiple outputs from numerous contractors carrying out small jobs such as lighting, extensions etc.
- Biggest benefit is the prevention of clashes in management at the design stage
- Industry seems to agree that BIM has been beneficial mainly due to more efficient build but the benefits to the end user are still unclear
- Much data already exists for current projects but in separate locations

Supply Side Group – 12th September 2012

Current Situation

- BIM is going to be included in the revisions to PAS91
- The step-up to BIM has been compared to that of CAD but as larger
- The Construction Industry Council (CIC) is holding regional BIM hubs starting this Autumn
- The Ministry of Justice (MoJ) and Ministry of Defence (MoD) will be bringing through projects in Wales utilising BIM
- Liaising with WG over proposed match funding e.g. £1.5mil = £3mil

Early Adopters

Scott Brownrigg

- Scott Brownrigg are really starting to see the efficiency benefits allowing them to be more competitive as it results in fewer queries on site, it reduces the cost of risk management and allows for more cost certainty overall
- Their opinion on the targets is that the consultants will use BIM anyway however the full benefits require buy-in from all parties.
- Their current situation is that the Cardiff office is at the forefront of BIM use and have had it for around 2 years, whilst the other offices (including London) are only just starting to catch up
- They are also starting to apply costing's to models which allows them to work more closely with quantity surveyors
- They currently help teach BIM to students at the Welsh School of Architecture at Cardiff University so graduates are emerging with a greater understanding, knowledge and skill set in BIM.
- With their increased certainty their structure and approach has provided greater sharing of information even when bidding

Others

- Local Authorities such as Manchester City Council
- Other industries such as Network Rail and Tesco (retail)

Initial Objectives

1. **Review, confirm or modify the six key specific recommendations**

i. **Leave complexity and competition in the supply chain**

- View is to encourage and not be prescriptive
- Need to understand and outline exactly what BIM is - A clear definition will help provide a vision for SMEs
- Maybe the defects liability period should be extended (5 years?) thereby forcing designers and contractors to plan the projects more carefully (i.e. to use BIM) and to look more into the asset management and long-life quality. For example Toyota currently provides 7 year warranties on their cars.

ii. **Be very specific with supply chain providers, they will only provide that which is asked for**

- Clarification is needed around definitions used
- A bottom up approach is preferable, to avoid capping on the level of projects

iii. **Measure and make active use of outputs**

- Need to understand the critical factors and their value – understand what the client is actually receiving
- Need to understand the whole life of the project
- Need to develop a common format of measuring outputs
- 4D sequencing helps complex projects to run a lot more smoothly

- Often the BIM model is ignored once the construction stage is complete (e.g. a new school in Bridgend). However it is still useful to have in case they change their mind in the future.

iv. Provide appropriate support infrastructure

- Welsh Policy needs to be developed to support all levels of BIM and its vision
- Clients (pull) need to be supported and brought up to speed
- Vital for a Welsh Government Policy to be in place to support
- All parties are cautious about investing in the right technology however the government has to be careful not to be too prescriptive. The market needs to be left open to drive innovation, however there is a worry that this could result in exorbitant rates (like the situation with mobile phones when they were first produced)
- Government needs to demonstrate the benefits of BIM and then conditions can start to filter into authority grants

v. Take progressive steps

- Simple and smaller prospects
- Allow a level playing field
- Push – pull vital within the supply chain
- Focus on SMEs in Wales
- Clients require BIM at a low level
- No cap to the level of BIM application
- Weighted PQQs biased towards BIM
- Do we need to insist on BIM by 2016?
- Identify the levels of BIM rather than size of project
- What is BIM to Wales? Need to include other areas i.e. civils
- Expected roll out time of 3 to 5 years
- Progressive steps need to be taken along a phased transition

vi. Have a clear target for the 'Trailing Edge' of the industry

- Training
- Welsh Government Policy
- Identify all levels
- Definitions
- What level of maturity is relevant i.e. level 2 by 2015
- Ensures SMEs push by providing training (despite potential lack of project threshold)

2. Identify what Welsh Public Sector clients need to do to encourage the use of BIM(consistent approach)

- Need to set the scene for clients

- It's hoped that clients will change their views one they've seen BIM in action and been through the thought process. (one such example is by consultants Scott Brownrigg on the Gateway to the Valley's Project)
- It's necessary to get the chief executives of authorities to buy into BIM so they can then drive the asset management side of things
- Authorities need to look at the whole picture, including asset management, and shouldn't just go for the cheapest option
- Step change to asset management approach and procurement
- It's hoped that developers in particular will be able to see the cost benefits and may even be prepared to pay a premium for BIM application
- Push steep learning curve
- Currently 'push' supply, client needs to increase understanding and knowledge and interest – future 'pull'

3. Review, confirm or modify the test details in the BIM hypothesis

- Nothing Applicable

4. Set a benchmark for BIM Wales maturity levels, scale and timeline

- Is BIM required for all? I.e. Public Sector. Different levels need to be identified and matched rather than project or size
- Opportunity to get ahead of England's proposal (jump the border) with 2016 and maybe aim for 2015
- However, is it practical to go ahead of England by a year? There aren't enough Welsh projects to sustain the industry
- We need to apply at minimum, a similar target to England, otherwise all the major contractors will apply BIM for English and Welsh projects and the smaller companies will be left behind
- If a monetary threshold is required then maybe it would be better to apply it not to the whole project cost but for other criteria such as the consultancy fees so it is judged based on each parties contribution (commercial decision)
- Could the change be staged but with different maturity levels for different projects? For example the government could require level 2 BIM whilst local authorities would only need to require level 1 BIM
- If a flowchart system was introduced to assess the level of maturity to apply then it would need to take into account various criteria such as the complexity, cost, time scale etc. Analysis of cost of improvements in comparison to projects uptake
- The view is that Level 3 BIM is where the real benefits will be found, however it will be a while before the industry is ready to implement that
- BIM will enable a higher degree of accuracy in measurements by feeding an changes in use into the model

5. **Identify what needs to follow a BIM Wales Strategy to enable implementation and mobilization**

- Start small with support and training of SMEs
- Authorities often can't afford the investments required to use the BIM models – may be necessary to look into the investment system
- Fundamental question of: What is BIM to Wales?
- Need to identify what would make the small and big businesses invest
- Funding should be provided to help SMEs on all projects below £1millon – what should they get?
- Education is key; at the BIM for learners meetings it's clear that there are many people who don't fully understand the concept of BIM
- The government has to be careful how they publicise the new changes to make sure the SMEs don't feel isolated and excluded
- Can we make the costs and benefits equitable for all parties? Everyone needs to invest in the software and training, with the client investing to allow better asset management.
- Practical guidance is needed from the government giving more detail on how companies can get to where they need to be by the deadline
- It is important to paint the long-term picture for clients so they can appreciate the long-term benefits they will have in asset management
- Need fully integrated models across building and infrastructure projects
- There is also the issue of who pays for the learning curve
- In every company there will be those with little experience but who adapt well to BIM and those who have many years of experience but find it very difficult to adjust to BIM which may prove problematic
- BIM isn't just about the software, it involves earlier contractor involvement which is easy for large projects but can be a problem for much smaller projects
- Welsh Government need to address policy issues and make training available
- Process needs made equitable which can be its selling point. If deals are based on equity then the client saves and the contractor profits

Questions

1. **What level of maturity and over what timescale?**

    - Definitely need to match the English deadline of 2016 for level 2 BIM, maybe introduce an earlier 2015 target for some projects, however there were concerns over this being impractical due to limited high-value projects in Wales

2. **What value of project should a BIM Wales Strategy apply to?**

    - If a monetary threshold is required then maybe it would be better to apply it not to the whole project cost but for other criteria such as the consultancy fees so it is judged based on each parties contribution (commercial decision)
    - Another alternative is to look at the company size based on their asset portfolio, to decide what level of BIM they should be working at

3. **Are we content with the 'push-pull' approach for suppliers and clients?**

    - Approach is approved, however clients need a better understanding of BIM to provide suitable pull, and SMEs need training and support to participate in the pull

4. **Do we consider that BIM Wales Strategy should strive to improve project delivery and operational performance particularly in the areas of improvement - cost; value; carbon performance?**

    - Cost & Carbon were generally accepted though it was pointed out that in terms of carbon, BIM can only be used as a way to facilitate more accurate measurement of carbon footprint, not as a tool for setting standards
    - Value was thought to be very hard to define, let alone quantify

Suggestions

- A clear definition needs to be put in place between the task groups to follow out to industry
- Limitations on resources to overcome
- Need to ensure that the strategy is specifically for Wales to get ahead of the game
- Utilise examples such as Skanska and their work with BIM in Scandinavia and the US
- It is predicted that welsh schools; future schools programme will require around £1.4 billion of work in the next 5 years. This is a substantial opportunity to apply BIM.
- Overall capital spend (portfolio) criteria needed considering the fees/capital expenditure
- ME and structures within contractor contract to use BIM
- Can we produce figures on the payback % value?
- To use the early adopters to help train others, rewarding them through revenue and assisting with the implementation of BIM