



BIMcert News

#06 September 2019

BIMcert - Developing BIM training and promoting energy efficiency for the European construction supply chain.

Digital construction case studies discussed at Portuguese BIMcert partner meeting

The international conference 'Digital Competencies in Construction: Standardisation, Capacitation and Internationalisation' took place on the 2nd of July at the auditorium of the Portuguese Engineering Chamber, Lisbon, Portugal. More than one hundred fifty participants attended the conference, representing the stakeholders in the construction industry.

The opening session had the participation of the President of the Engineering Chamber, Eng. Carlos Mineiro Aires, and the coordinator of the Regional Civil Engineering College, Eng. Fernando Pinho. Afterwards, António Aguiar Costa, a member of the Regional College of Civil Engineering, partner of BIMcert and chair of the organisation committee of this conference, presented the challenges of digitisation and the contribution of each of the conference speakers to the discussion of the theme.

The conference discussed the progressive digitalisation of the industry and the importance of standardisation, training and internationalisation in the context of digital innovation. The experience and cases of the following entities were presented:

- DST (construction company) shared its experience and identified some challenges of digitisation and BIM;
- COTEC (National Association for Innovation) inspired and sensitized the audience to the importance of innovation and, in particular, to the inevitability of industry digitisation;

- IPQ, the Portuguese Institute for Quality, presented the standardisation process in Portugal and highlighted its crucial role in more complex contexts;
- CT197-BIM, BIM standardisation committee coordinated by the Instituto Superior Técnico (University), presented the latest normative work in the scope of BIM;
- TOP Informática (software company) presented digital and collaborative solutions capable of encouraging change;



From left, Paul Mc Cormack, BIMcert Programme Manager, Fernando Pinho, Co-Ordinator of the South Civil Engineering Council of the Portuguese Order of Engineers, and Antonio Aguiar Costa, IST/CERIS, Portugal.

- Mineral Rocks Cluster, presented its Inovstone 4.0 project and the challenge of integrating the industry around BIM and the digitisation of processes;
- University of Minho (University) presented the master BIM European BIM A+ and the opportunities for a European BIM education;
- Technological University of Dublin shared the experience of renewing their educational curriculum to integrate BIM;
- Belfast Met presented the ambitious European project BIMCERT, which aims to create and provide BIM certifications;
- APCER (Portuguese Association for Certification) discussed certification in the context of construction and future development opportunities;
- IEFP (National Institute for Employment and Professional Qualification) presented its vision for vocational training in the context of digital skills; and the Architecture, Engineer, and Construction Cluster shared some of its initiatives towards the transformation of the industry.

The closing session had the participation of Eng. Jorge Grade Mendes, coordinator of the Southern Region of the Engineering Chamber.

The conference allowed people to share experiences, as well as discuss the next steps of the digital transformation in construction, valuing the human role in the paradigm shift. Digital skills are not just technological skills. They are also social and managerial skills, which have been very clear throughout the various testimonies. The challenge now is to think about the future, which must be underpinned by a robust normative component, aligned with good international practice and be geared towards qualified professionals.

Antonio Aguiar Costa, IST/CERIS, Portugal



Why BIM is important in 2019

How important is this “BIM-thing”? There is a lot of talk about the “digital transition” of the construction industry, and the adoption of BIM (Building Information Modelling), but how serious is this? Is it a “nice-to-have”, “optional extra”, for construction projects, or is it something more crucial, or vital than that? Who should be concerned about this? And why?

ArcDox have been providing BIM consultancy, production, training and support services, for over 10 years in Ireland, and have extensive experience in implementing BIM on projects.

“We have proved, over thousands of years, that we can construct buildings and infrastructure without using BIM or digital tools”, says Ralph Montague, “That’s not the issue - the issue is the cost of not using BIM and digital tools. Traditional work processes are slow, costly, cumbersome, problematic and even dangerous. Over 30% of the cost of construction is waste. Over 70% of projects either end up over budget, or over time, or both. Productivity in construction has hardly increased at all, over the past 40 years. People are literally

dying on construction sites. And there is a huge environmental impact from construction, contributing over 40% of carbon emissions. So yes, we can build without using BIM, or digital tools, but there is a huge cost to not improving the way we work.”



Ralph Montague
ArcDox Director

BIM is about providing “Better Information”, using the best available digital technologies and processes, so that people can make better decisions, more quickly, and more confidently. This is digital information that many people can search, query, understand, use and reuse. BIM is about cutting down rework, abortive work, unnecessary duplication of work. Cutting down waste. Creating safer work environments. Doing things quicker, cheaper, and better. Improving productivity and output. Helping to save the planet. In that context, BIM is more than just “nice-to-have”, or an “optional extra”, it is incredibly important.

Who should be concerned about this? Everyone who interacts with the built environment (buildings and infrastructure). And that is almost everyone. But most importantly, those who are investing capital in buildings and infrastructure. They should be concerned about getting better quality buildings and infrastructure, for less cost, and with less impact on the environment. And “better information” at the end of the project, to be able to use for the full lifecycle of their buildings. And all the professionals in the construction industry, who serve those investing in the built environment, should also be concerned. You could say that they have a professional responsibility to be concerned and to use best available techniques and practices. We are living in the digital age, and BIM is available and mature, so why would you perpetuate out-dated practices that are costly and dangerous ?

Ralph Montague
ArcDox Director
Co-Ordinator of the Construction IT Alliance (CITA) BIM group

CITB Construction Talks on BIM for businesses

CITB NI will schedule a series of business improvement events, on various topics, between September 2019 and August 2020 at a number of locations across Northern Ireland for the construction industry. Speakers will deliver two sessions of no more than three hours on BIM for small businesses. The winning tender will deliver a talk which will be recorded by CITB NI onto video. CITB NI will edit the video and incorporate a set of associated slides provided by the supplier.

Barry Neilson, Chief Executive of CITB NI, welcomed the initiative saying: "CITB NI, as part of the BIMcert team and working with the NI BIM Regions group are trying to raise awareness and dispel fears in the adoption of BIM for all levels and disciplines within the construction sector.

"Using BIM and other Digital Construction tools will be the norm in the future. It will help drive better building performance, productivity and quality, improving energy efficiency."

Barry Neilson , CITB,

| Course | Number of Events | Length of Event | Video Taster Course |
|---|------------------|-----------------|---------------------|
| BIM for small businesses - Get ready! • Topics to include: • BIM for Small Companies • CPD Policy on BIM (procurement) • What training is available for BIM? Aimed at companies with 1-50 employees covering three areas. | 2 | 1/2 day | YES |

RSUA BIM report outlines BIM benefits

A recent report by the Royal Society of Ulster Architects (RSUA) BIM Task Group, chaired by Peter Monaghan, Change Manager, Southern Regional College, described a general feeling of optimism amongst its members who have implemented BIM level 2 within a project. The report recognised the benefits of BIM Level 2 (though difficult to measure fully) in areas such as project visualisation, stakeholder engagement, clash detection and co-ordination of M&E with the building structure/ fabric. Improved construction sequencing and buildability were also identified as BIM Level 2 benefits.

The report encouraged the development of resources by Construction & Procurement Delivery (CPD) to assist public sector employers in the implementation of BIM Level 2. It recognised the important role that employers have to play including the provision of 'Employer Information Requirements' (EIRs). The Task Group felt that there was a lack of BIM experience amongst employers and that this was reflected in the low number of informed EIRs being produced. This was considered to be a major barrier to the implementation of BIM Level 2.

The report highlighted the need for fee structures to be 're-profiled' to reflect the additional early stage work now required in a BIM project in order to gain many of the latter stage benefits. The Task Group also felt that the Northern Ireland construction industry would benefit from the sharing of 'lessons learnt' through local BIM Level 2 case studies.

RSUA supports CPD in their goal to encourage BIM Level 2 adoption in public procurement processes. Procurement Guidance Note (PGN) 03/15 is seen as a valuable contribution towards achieving this goal. BIM has in the past been misunderstood by some as merely a 3D modelling process. Those RSUA members with experience in implementing BIM feel that the information management aspect is equally important.

RSUA sees collaboration through BIM as a positive step for the construction industry although it will not be without its challenges until all parties in the process have gained both knowledge and experience through education and application. Recognised BIM qualifications, informed by the industry, will help increase the number of BIM professionals available to meet these challenges.



Ciarán Fox
RSUA Director

Ciarán Fox
RSUA Director

Using BIM to manage the Energy Cycle in Construction- An analysis from the BIMcert Project Team

BIM is a key part of the fourth revolution (digitalisation) of the AEC industry and an enabling tool for a cleaner and more sustainable build environment. This has been recognised by the European commission, and a number of H2020 funded Projects including BIMcert are focusing in providing training frameworks and support in order to upskill the industry.

This article, following previous publications from BIMcert, will continue to hopefully give a summarised insight on how BIM can actively contribute to improve the building stock and make the AEC industry more focused and more effectively achieve sustainability and energy efficiency goals and targets, and why upskilling the industry is a key requirement.

WHAT IS BIM

Although increasingly more adopted and recognised by the Industry, there are still some who do not fully understand or recognise the significance of BIM in the present and future of the industry. For those, a simplified explanation: According to NBS "...BIM is a process for creating and managing information on a construction project across the project lifecycle. One of the key outputs of this process is the Building Information Model, the digital description of every aspect of the built asset..."

We can describe Building Information Modelling (BIM) as a method based in modern digital technology, mainly a 3D model data enriched twin, and associated set of auxiliary tools and processes, that can, among other things, be used to support sustainability trends in the construction sector.

WHY BIM UPSKILLING IS REQUIRED?

There are increasing requirements for energy efficiency competencies and applicable skills, resulting from European decarbonisation and sustainable energy long-term strategies.

Therefore, solving the problem of development of skills for sustainable energy, required by the construction sector, and stimulating demand for sustainable construction and a skilled energy workforce, is closely connected to the upgrading of the BIM skills of construction professionals.

BIM RECOGNISED BY EU COMMISSION, THE UN AND OTHER GOVERNMENTS AS ENABLER OF CHANGE AND DE CARBONISATION IN THE AEC INDUSTRY.

As a sustainable energy supportive technology, BIM is a vital tool for reducing the carbon footprint in the construction sector. BIM is the backbone of the new 'informed' way of working in the construction sector,

triggered and targeted by digitisation and equipped to manage the 'full energy content' of construction. Such is the impact of BIM the European Commission has supported, promoted, and developed several policies and initiatives aiming to foster digitalisation in the construction sector. These include inter alia the Strategy for the Sustainable Competitiveness Of The Construction Sector And Its Enterprises (2012), the EU BIM Task Group and the upcoming EU Digital Construction platform.

"By harnessing the capacity of the building sector, many countries can cut emission rates cost-effectively and achieve energy savings of more than 30%, according to the United Nations Environment Programme".¹

Digitisation and the use of BIM in the construction sector are in its infancy in some regions. The digital journey utilising BIM will generate usages and breakthroughs in the knowledge, use, and results achieved through the deployment of sustainable energy skills.

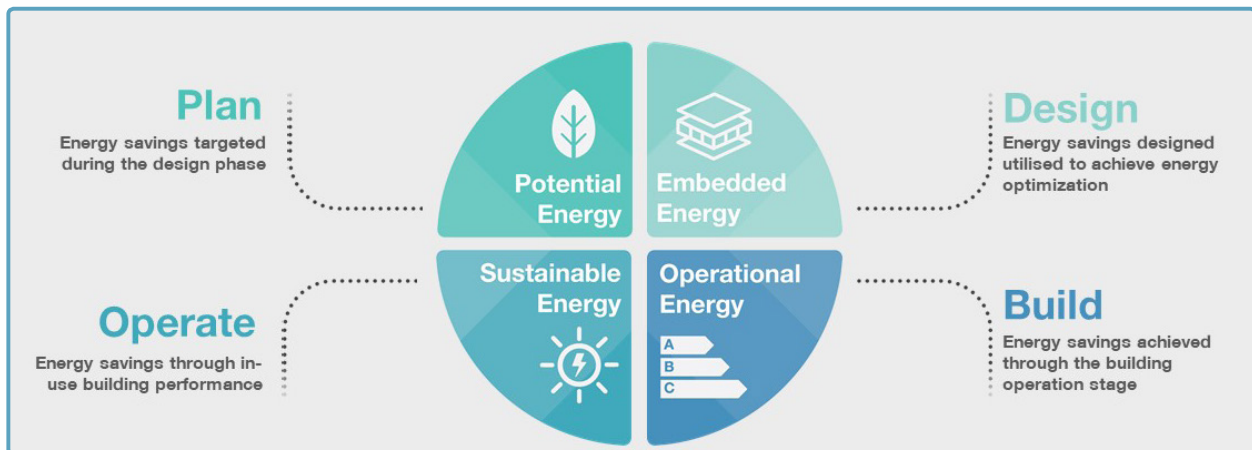
Now is the time for the implementation of digitisation in the construction sector to proactively and effectively reduce the carbon footprint and environmental impact of construction. BIM provides the data for a building's energy consumption. This data can then be used as information to make informed decisions on how best to manage the entire energy circle of a building.

SOME OF BIM'S CONTRIBUTION WITHIN THE FOUR SEGMENTS OF THE ENERGY LIFE CYCLE IN CONSTRUCTION:

There are four segments within the Energy life cycle in construction: Potential, Embedded, Operational, and Sustainable energy. These four segments together account for all of the energy used in the complete construction life cycle and are mutually dependent and therefore, cannot be considered separately. Decisions and actions are not mutually exclusive; decisions made within one segment has significant impacts across the entire energy circle

BIM-based energy modelling provides several benefits including more accurate and complete energy performance analysis in early design stages, improved lifecycle cost analysis, and more opportunities for monitoring actual building performance during the operation phase.

¹ United Nations Environment Programme, accessed 12th July 2019



Using BIM to manage the Energy Cycle in construction



1 Potential Energy

Targeted During the Design Stage
PLANNING AND DESIGNING

Energy savings are planned and targeted during the design phase. It is about utilising BIM tools to possibly reduce the gap between predicted and actual building performance proactively. BIM can be used to model buildings and sequentially perform multiple analysis, enabling energy performance prediction that can be applied to compare design alternatives, allowing for an improved final decision. This involves:

- Using BIM as an enabler of effective collaboration between design disciplines. Reducing performance disparity from conception.

The BIM collaboration method and tools allow for a more efficient coordination, avoiding errors and therefore leading to a more efficient construction phase, avoiding wastage and contributing to decarbonisation in the construction phase.

- Utilising BIM tools for fast and accurate processing and comparison of a large number of design alternatives.

BIM software, based on the 3D model data enriched model, allows for simulations as solar paths, solar gains, thermal behaviour, testing M&E systems. Those, allied to other digital technologies such as cloud computing, and AI and machine learning, are already and will increasingly allow testing and evaluating of several design options until we find the best solution

The design stage will improve as BIM allows for a better informed decision by cataloguing and predicting more accurately with a data based process, the future behaviour of the building.

- Visualisation of energy loads and performance as a specific advantage of BIM.

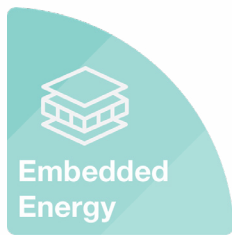
The BIM tools allows you to analyse the model, enriched with the correct input of data, to calculate and graphically visualise/ represent the loads and performance of the building, allow an easier, clear and more direct interpretation and understanding of design choice and changes on the impact of building performance.

- Selection of cost and energy for the most effective design alternative.
- Multi-criteria optimization in terms of energy, environment and economy.

BIM tools also facilitate quantification (5D) which allied with simulation tools, permit a better informed cost vs performance ratio comparison. That helps make an informed decision about feasibility of design options, as well as compare the predictable energy savings and linked cost saving during the operation phase against the investment required in the construction phase. This is of key importance to illustrate that sustainability and energy efficiency are not only environmentally necessary but it can be profitable also.

- Tracing the route for the future decades of a building's optimal service and operational life.

BIM involves a full lifecycle approach in the AEC industry, and the model is a digital twin of the build asset, and BIM simulation tools allow you to establish since the inception/ design phase, a roadmap for the most efficient way to run the building in the future in installation and construction. This is better achieved using BIM tools, improving construction quality, and bringing closer predicted and actual energy performance in buildings.



2 Embedded Energy

Targeted During the Construction stage
BUILDING

BIM is recognised as a tool to support the visualisation of a building's energy performance, sequence and schedule of construction aimed towards the application of sustainable construction materials and techniques, with minimum waste of energy and materials.

Using the BIM 4D tools (time scheduling simulation) and 5D (quantification), these enhanced digital tools allow a more efficient project management in the construction phase, coordinating the works better, reducing and helping construction time, avoiding clashes, or issues with the planning of delivery of materials to site.

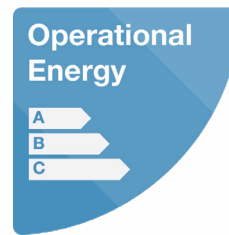
BIM allows you to have a clear idea of the site, how to approach and plan the construction before any work even starts commencing.

Using the 3D BIM model integrated with VR and AR technologies, site work can become more efficient and faster.

BIM based digital design and visualisation permit a better use, planning and site delivery of pre fabrication. In addition, data rich BIM product catalogues can justify and enable an increased use of local materials. Digitalisation integrates different digital data inputs and outputs into new digital workflows applied to construction.

For example, in the case of an existing building, digital survey allows you to measure key hotspots requiring energy efficiency improvements. BIM design can to help simulate and predict how to improve these, and how to implement them during the construction phase. During and after construction this can be re-measured reusing the digital scanning techniques and comparing the BIM model data to verify and reduce the gap between predicted design performance and built performance.

If we account all of this it can lead to reduction of waste, for example carbon footprint of material transport and extra material required in case of clashes and amendment, and reduction of surplus energy spent.

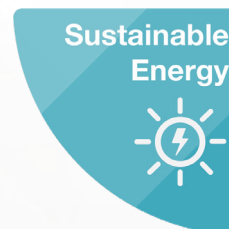


3 Operational Energy

Targeted during the Operation / Service Stage
OPERATE

Energy savings achieved through the building operation stage –are monitored and managed continually with lessons learned fed back to design teams for future projects. The practicality of implementing BIM is evident as it assists performance management through effective data management in building operations by supporting the interlinking of data environments (BIM supported Energy Management System of Buildings). Effective energy management reduces energy consumed while maintaining occupants' health, safety, and comfort conditions. BIM is utilised to improve existing processes aimed towards a sustainable usage of energy.

Smart buildings and smart buildings' usage are combined. Digital sensors and the meters platform are compiled to the building's BIM digital model. The engagement of wider public stakeholders (occupants and users) into a standard action of improving buildings' energy performance is essential.



4 Sustainable Energy

Targeted During the End-Of-Life

Connected with the 3 phases above, BIM is a potential method to enable an easier way of achieving energy savings through the lifetime of the building.

Smart decisions made in the early design stage of construction, including the selection of materials with high recyclability and least carbon footprint when demolished are part of not only reducing the embedded energy content of a building (construction), but makes buildings more sustainable (re-use of materials).

BIM as a tool closing the loop of energy and materials in a building life cycle is the target. Finis coronat opus. Energy for demolition or recycle / reuse is a constitutive part of the life cycle energy of a building and, although in

less amount, can still have a significant contribution to the overall environmental performance.

All materials and products especially those with high insulation properties may require substantial energy and carbon effects for recycling or disposal. EPDs (Environmental Product Declarations) of building envelope materials are incorporated as non-graphic information in the BIM model and used by various stakeholders and professionals in the supply chain.

In the near future, BIM models with help of AI prediction can integrate in design the future use and reuse of the building, allowing easier changes of use and refurbishment processes, reducing the energy requirements for demolition and material use connected with new builds.

There is a huge amount of building stock available already, BIM can be used to analyse and find effective and feasible ways to re-use those building without the need of new builds.

Simulation of energy performance using digital technology- BIM models and simulation - can further help justify via data facts, the use of renewable energy systems, convincing the most sceptical, and enabling its implementation.

CONCLUSION

As we move forward, there is a need for construction techniques, policy formulation and policy implementation to be integrated into a balanced and coherent system delivering sustainability across the entire construction supply chain.

In the EU, Energy Roadmap 2050 BIM is the most effective supportive technology for: sustainable energy, reducing carbon footprint and increasing the energy efficiency in the construction sector.

However, BIM is a tool. BIM is only an enabler. Digital environment is a medium.

It's people, professionals, that can make and implement the change. A tool is only as good as its operator. Considering the importance of digitalisation, and within it, the role of BIM, as the new modus operandi of the AEC industry, and as its the key method to help the industry achieve the energy efficiency and de-carbonisation targets required to tackle the existing crisis and threat of climate change, upskilling the industry professional operating in this new reality is paramount!

How to facilitate this upskilling and qualification of the industry professional, additionally to the current offering and beyond the traditional academic offering (which most of the time is not a suitable pathway for existing professionals) is the question.

The H2020 BIMcert Project is working towards offering a suitable solution.

The BIMcert project is developing a learning framework and associated material based upon a system thinking approach, which will deliver better results in energy efficiency than traditional methods.

This is a holistic methodological approach, based in training the industry from the ground up:

- Starting with BIM awareness and the impact on AEC industry efficiency and benefits;
- Principles of BIM collaboration to help the various stakeholders to become less fragmented;
- Essential It and digital skills to integrate professionals in this digital framework (specially blue collars);
- Covering more specific subjects aimed to specific construction roles, pairing BIM skills with role requirements (eg. 3D modeling, 3D authoring for designers and 6D BIM simulation for designers, 4D BIM for contractors, project managers; etc...);
- All the training and subjects are encompassed and interlinked within a sustainable environmental approach and context.

Training is broken down into bite sized information, in order to facilitate progressive upskilling of the industry, suitable for blue collar workers to white collar and management. It's planned it will deliver via blended methods, further facilitating the adoption by professionals and SME's that operate in an already time and budget tight context.

BIMcert is ensuring that the construction sector has the data and tools to operate in a more 'informed' way to optimize construction through comprehensive deployment of sustainable energy skills.

BIMcert project team.



BIM Alliance Collaboration Growing

As part of the sustainability planning within BIMcert and with other EU BIM projects we have collaborated to form BIMalliance. The primary aim of this is to enable BIMcert to develop an exploitation plan in collaboration with other partners. This collaboration also enables all partners in BIMalliance to share materials, modules and learning material. One example of this is partner ITeC, a member of the Spanish Chapter of BuildingSmart, which have a great activity related to BIM (<https://en.itec.cat/services/bim/>). They have joined BIMalliance in order to develop their digital library of BIM materials (<https://metabase.itec.cat/bim/ca/filter?src=butBim>), and their BIM object creation standard (<https://ecobject.com/>), They with all the other partners share our goals of establishing a common BIM scope in Europe, to develop skills and certification etc.

The four BIM founding members of BIMalliance, BIMcert, BIMplement, Net-UBIEP and BIMEET are collaborating under the title BIMalliance to explore areas of mutual opportunity and to minimise the energy footprint in construction.

1. Energy targets, energy savings – Energy week presentation
2. Dissemination and communication
3. Accreditation and certification - utilise databases
4. Exploitation
5. Future Collaborative opportunities

1. Energy targets, energy savings : To determine the position of BIM in European Energy and Climate Roadmaps beyond 2020; to explore fields of coordination and support actions, research and innovation, as well as potential funding sources for the activities,

2. Dissemination and communication: Establishing a common communication and collaboration platform of the 4 projects (e.g., linking their web pages; sharing information about the Alliance common work, organisation of joint events, etc.), in order to provide better informing and multiple use of individual projects' stakeholders and followers.

3. Accreditation and certification: To initiate a common pan-European recognized certification scheme of BIM and EE skills in AEC industry.

4. Exploitation of results: To prepare and distribute a survey via the common platform / united web pages / for assessment of the progress on BIM maturity and acceptance, as a result of the activities of the 4 projects; to develop a common report with guidelines for future actions.

BIMalliance

*Minimising the carbon footprint of energy use in construction.
Stimulating the demand for energy skills.*

BIM can assist EU construction to be more green, energy efficient and to attain better skills. Net-UBIEP Project Coordinator Anna Moreno, said: "BIM is based on collaboration. We need to share and integrate our knowledge to reach a better life. This is the main objective of our BIM alliance. Partners of different projects dealing about the use of Building Information Modelling to improve energy performance of buildings, decided to share their achievements and go together for the exploitation phase. Welcome to our 50 partners of 20 European countries who decided to join into the BIM alliance for a common exploitation!! "

BIMalliance seeks to continue the work started by the BUILD UP Skills (BUS) initiative that started in 2011. BIM is the first truly global digital construction technology and is going to be deployed in every country in the world. It is a 'game changer' and we need to recognize that it is here to stay. BIMalliance will act at market level, further develop road maps and qualification frameworks and stimulate the demand for energy skills across the entire construction supply chain.

BIMalliance seeks to stimulate the role BIM plays within digitalisation of the building sector. The group recognise that without the integration of BIM into the primary processes of the industry and the public sector, the uptake of energy skills will be slower and less effective.



Plan | Design | Build | Operate

We welcome sustainable building projects and companies who want to join BIMalliance.

Contact: paulmccormack@belfastmet.ac.uk

New Head of School of Multidisciplinary Technologies, Technological University, Dublin

The whole BIMcert team at Belfast Met and the BIMcert partners wish Avril Behan success in her new role. Avril Behan has become the new Head of School of Multidisciplinary Technologies at Technological University – Dublin, our valued BIMcert partner.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 785155



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For more information on BIMcert contact:

Anne Artt
Operations & Communications Manager
Tel: +44 (0) 28 9026 5276
email: aartt@belfastmet.ac.uk
www.energybimcert.eu

Eugene McCusker
Communications Officer
Tel: +44 (0) 28 9026 5277
email: emccusker@belfastmet.ac.uk
www.energybimcert.eu