



# **Driving the Digital Transformation of the Irish Sector**

## **Vision for an International Centre of Connected Construction – A Knowledge Sharing Opportunity for Ireland’s Construction Industry**

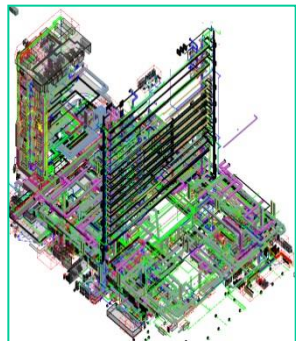
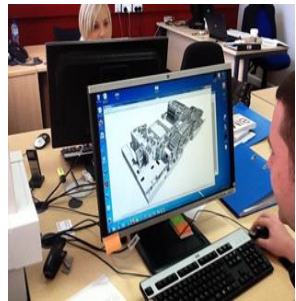
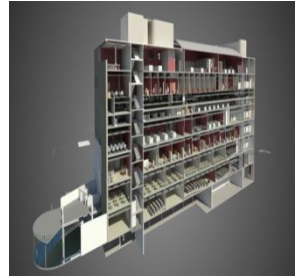
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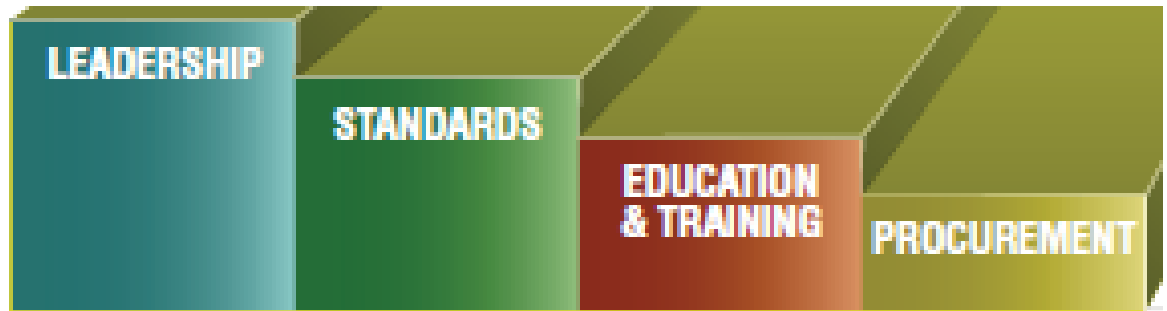
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# The Roadmap (1)



**Roadmap to Digital Transition**  
For Ireland's Construction Industry  
2018-2021



# BIM in the UK: 2011-2016

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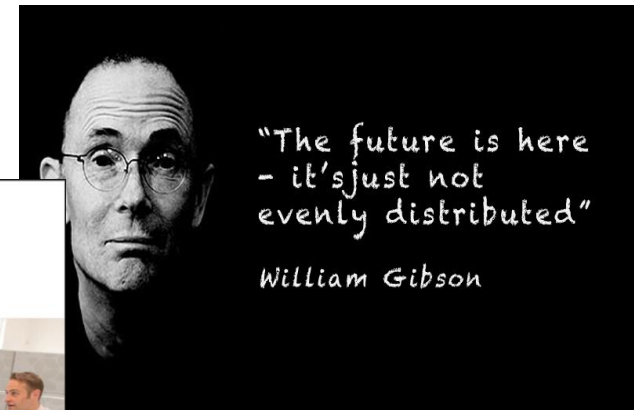
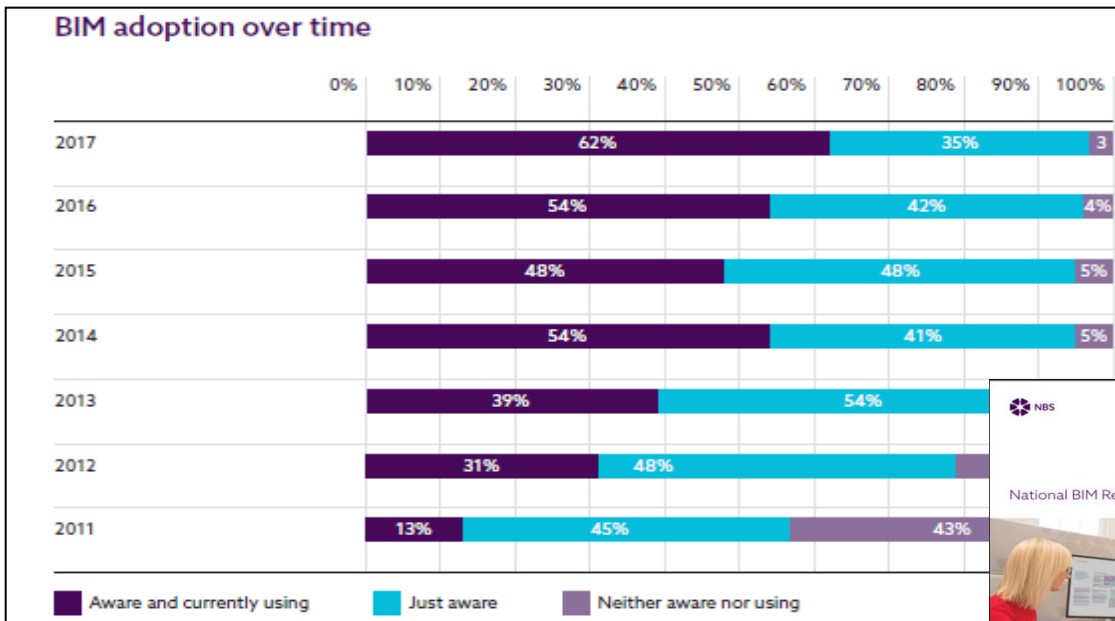
"This Government's four year strategy for BIM implementation will change the dynamics and behaviours of the construction supply chain, unlocking new, more efficient and collaborative ways of working. This whole sector adoption of BIM will put us at the vanguard of a new digital construction era and position the UK to become the world leaders in BIM."



Francis Maude  
Minister for the Cabinet Office

**The Government ... will “require collaborative 3D BIM (with all project and asset information, documentation and data being electronic) on its projects by 2016.”**

- **People**
- **Firms**
- **Projects**



# Our response: a two-way collaboration

## BIM Academy founded in 2010

Northumbria University

+ Ryder Architecture

Based in Newcastle



## Activities

Education

Training

Research

BIM4FM SO Consultancy



## 'Spin-out' Co. formed in 2013

Active in: UK, EU, MENA, Far East, Australasia,



**THE AWARDS 2017**  
Winner  
Most Innovative Contribution  
to Business-University Collaboration



# BIM Academy – Activities

Research Degree Programme at Northumbria

Education

bimacademy

What's involved?

Virtual project is a structured CPD course based on a real project and collaborative multidisciplinary working. Delivered over three days in our VE suite at Northumbria University, the course takes place in a controlled environment with friendly advice and support from our experienced lecturers, software format and IT infrastructure will be provided and our trained staff will be on hand to guide you throughout.

What do I do next?

Contact us on the email below and we will provide more details on course content, pricing and availability.

info@bimacademy.ac.uk  
www.bimacademy.ac.uk  
#bimacademy  
44 (0) 183 227 4333

Training

ICIM

INTEROPERABLE CARBON INFORMATION MODELLING

Research

BIM4FM Software

Consultancy

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HM Government BIM BIM Toolkit

Description

The free-to-use BIM Toolkit on behalf of the UK Government provides step-by-step guidance to validate responsibility and delivery at each stage of the project.

The toolkit provides a structured approach to manage and validate the development and delivery of an asset lifecycle.

What we did

Software development, integration, product development

Digital Engineering Compliance Regimes

Description

This project application for maintenance of building on a model and client/sector specific effective maintenance management and provide a 2-way native building information model.

Durham Cathedral Scan to BIM for FM project Durham, United Kingdom

Description

The estates team at Durham City apply digital solutions to improve management of this 900-year-old building.

The Chapter House was chosen to demonstrate the benefits of BIM buildings. This saw the historic digital 3D model to support the site well visited facility. The digital building technology can manage and operations of transition from traditional FM practice to heritage buildings. Preplaced on architectural drawing century as a base for decision of condition of the fabric.

Sydney Opera House BIM4FM project Sydney, NSW, Australia

Description

BIM Academy beat off international competition to win this major project providing management technical expertise. In collaboration with the Engineering team, we defined facilities management specific stakeholder needs for the project development.

Sydney Opera House has been concept of BIM4FM since it was used as the Cooperative Construction Innovation (CCI) facilities management as a building. Declared a UNESCO world heritage site having celebrated 40 years of House is commencing a long term operation.

M+ Museum W. Kowloon

West Kowloon Cultural District Authority  
M+ Museum of Art  
West Kowloon, Hong Kong

Description

The M+ Museum is the result of an international design competition held in 2013 and won by Herzog & de Meuron, TFP Farrell and Arup. M+ will be the new museum for the 20th and 21st century art and visual culture in the West Kowloon Cultural District. It is an ambitious project to create a museum on the physical scale of the world's largest museums of visual culture, aspiring to over time attain an international status comparable to that of MoMA in New York, Centre Pompidou in Paris or Tate Modern in London. It aims to be a museum that is rooted at and shaped by its location and the unique culture of the city. It is fundamental that it should be a museum for the people living and working here. M+ should have a Hong Kong point of view with a global perspective. The West Kowloon Cultural District Authority has shown vision in demanding the use of BIM and a Common Data Environment throughout the life of the project, to improve project communication and collaboration amongst design team, contractors and ultimately asset and facilities management during operation.

What we were doing

BIM Academy provided the subcontractor role of BIM specialist to the Mr. Joint venture of Herzog & de Meuron, TFP Farrell and Arup. Post-contract BIM Academy were appointed by Hsin Chong Construction as BIM Manager for the construction phase. The BIM specialist role was to coordinate and facilitate the production and management of Building Information Modelling activities throughout the project, together with provision of clash detection and analysis at key milestones. Our role included the development of BIM protocols and the BIM execution plan and leadership of BIM workgroups. We also undertook model management, including federation, auditing and clash detection.

Key achievements

Facilitation and leadership of BIM workshops with the design team and client Switzerland and Hong Kong. Analysis of design team capabilities. Analysis of client's information and requirements. Creation of project BIM and collaborative working standards. Authoring of project model Level of Development (LOD) and responsibility matrix. Advice to JV partners on best practice and BIM working methodology. [source]

“BIM Academy had a role advising the client on the BIM-enabled design development of the scheme, and...is now acting in-house for the contractor Hsin Chong Construction”

BIM+ Website of the Chartered Institute of Building, 12 November 2015.

‘Forest City’ Malaysia

Forest City development in Johor, Malaysia

Description

Forest City is made up of 4 reclaimed islands near Tanjung Kupang, Malaysia with an initial gross development value of RM450 billion and RM110 billion worth of commitment investment. It is expected to create 200,000 job opportunities upon completion in 2035. Adjacent to Singapore and within Malaysia's Iskandar Special Zone, the development offers valuable land at a relatively low cost. Iskandar has attracted more than \$250 billion investment globally. Forest City will pioneer 'great changes' in how international development projects are carried out, both in terms of use of digital technologies and environmental zoning approaches. Forest City is estimated to have a gross development value in excess of RM100 billion (US\$63 billion) over 20 years, and is the most ambitious project by Country Garden, one of China's largest development companies.

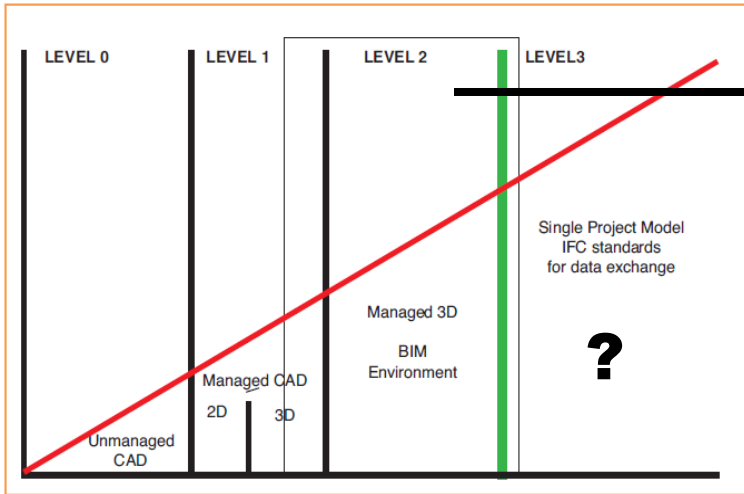
What we will do

BIM Academy's initial commission is to provide consultancy support for the generation of Asset Information Models for the new 'Sultan Ibrahim Larian' football stadium and another landmark building on the main Forest City site. BIM Academy will oversee the development of model geometry and data for the stadium in line with UK-based BIM standards and mentoring the client team using the same approach on the landmark building, with a view to rolling out the same methodology across the rest of this huge development.

“With a project this large, technology like building information modeling (BIM) almost needs to be involved... [and]...the company said that BIM is definitely in Forest City's future.”

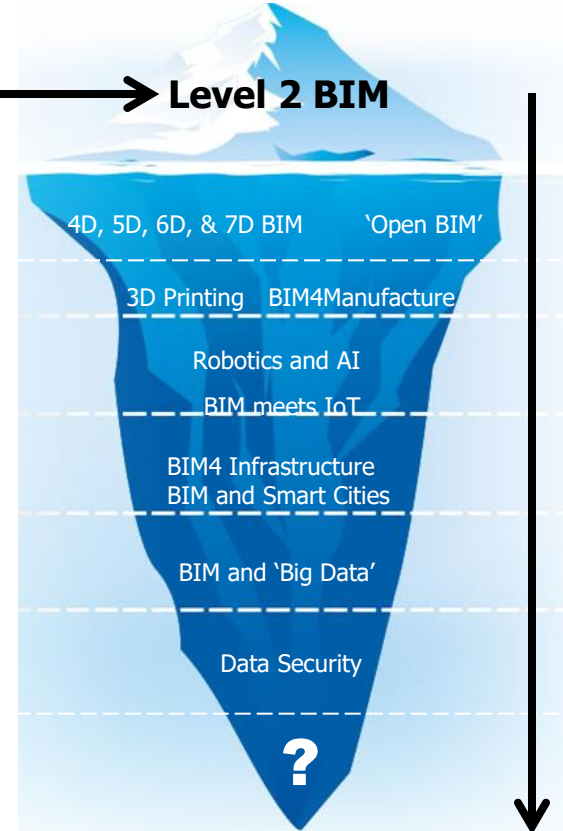

ENGINEERING.com, March 03, 2016

# BIM beyond 'the Wedge'



BIM Maturity Diagram

(adapted from Bew & Richards)

Everything that can be invented has been invented.  
(Charles H. Duell)

izquotes.com

**Commissioner  
US Office of Patents,  
in 1899**

# 'Industry 4.0'



1<sup>st</sup> Industrial Revolution

- *Machines, driven by*
- *Water & Steam Power*



2<sup>nd</sup> Industrial Revolution

- *Electricity*
- *Mass-production*



3<sup>rd</sup> Industrial Revolution

- *Computers*
- *Automation*
- *Robotics (1.0)*



4<sup>th</sup> Industrial Revolution

- *Cyber-physical systems*
- *Cloud computing*
- *'Big Data'*
- *Semantic Web (I.o.T.)*
- *Artificial Intelligence*





# 'Industry 4.0' to 'Construction 4.0'

The image is a composite graphic. On the left is the cover of 'The Manufacturer Industry 4.0 UK Readiness Report' by Deloitte and Oracle. In the center is a diagram showing four stages of industrial revolutions: 1st (Machines, Water & Steam), 2nd (Electricity, Mass-production), 3rd (Computers, Automation, Robotics), and 4th (Cyber-physical systems, Cloud computing, Big Data, Semantic networks, Artificial Intelligence). On the right is a photograph of a construction site where workers in safety gear are working on a green printed circuit board (PCB). The board has various components like a microchip, capacitors, and a battery. Construction signs, including a 'Work Ahead' sign and orange traffic cones, are placed on the board. The text 'MADE IN' is visible on the board.

**Is there a 'Construction 4.0'?**

**...and what is the role of BIM?**

**Yes there is / there will be**

# BIM and 'Big Data'

**N.B.1 Not to scale!**

**Knowledge**

Knowledge is the collection and storage of information in a way that makes for its useful application

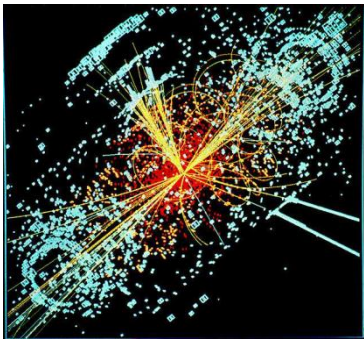
**Information**

Information is data that have been collated, analysed and formed in a way that can be beneficially exchanged between users

**Data**

Data are observations taken in a particular way – deliberately, accidentally, or automatically - by humans or machines (including, increasingly, sensors)

**BIMs offer fixed fields in which data can be structured**



- 'Big Data' refers to
- "... a massive volume of both structured and unstructured data that is so large that it is difficult to process using traditional database and software techniques."
- 90% of the data in the world today has been created in the last two years
- This doubles every 18 months
- By 2020 this is estimated to amount to 40 Zettabytes ( $10^{21}$  bytes)

# 'Construction 4.0'



Integrated and collaborative BIM

3D Printing (Contour Crafting)

Digital manufacture (CNC)

Laser scanning

Robotics and drones

Sensor technologies (IoT)

Machine Learning (AI)

'Big Data' analytics

# Our response: a three-way collaboration



## IC3

International Centre for  
Connected Construction

**A global hub to drive productivity and performance in the built environment through smart processes and world leading technology**

The International Centre for Connected Construction (IC3) is an exciting plan for a centre of excellence building on the North East England's global expertise and world leading cluster of technology businesses in building information modelling (BIM), virtual reality, smart cities and cloud computing.



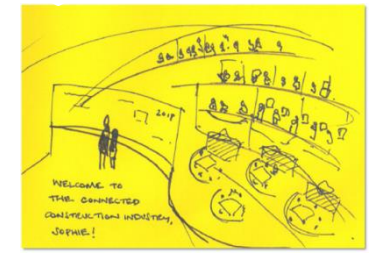
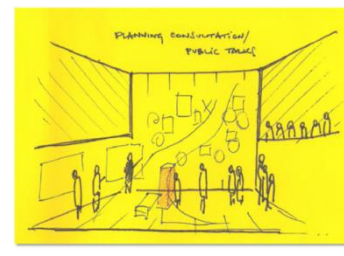
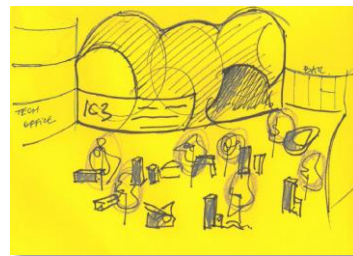
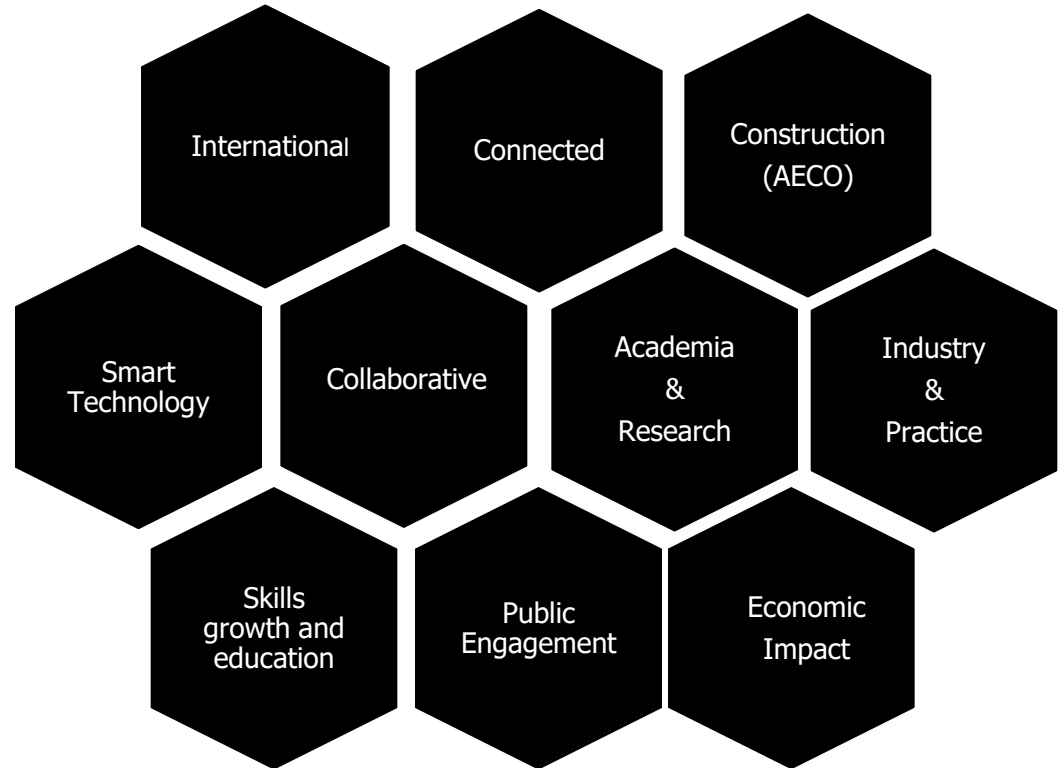
**bimacademy**

NEWCASTLE

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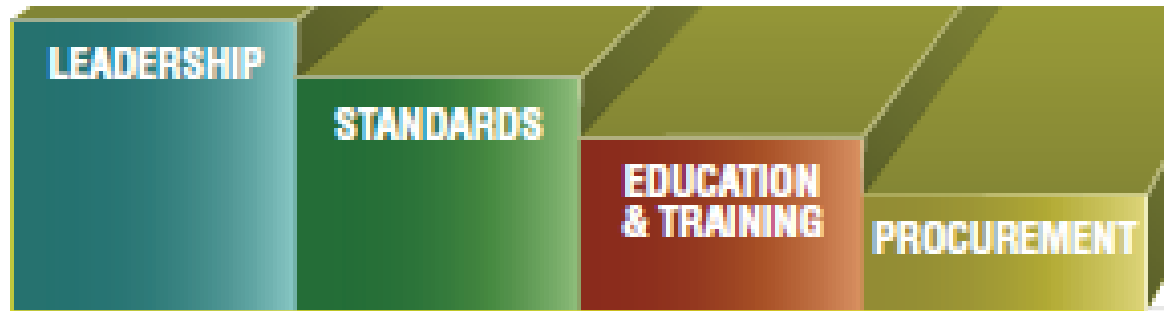


# International Centre for Connected Construction (IC3)\*



# The Roadmap (2)

  
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# Summary

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