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Use of Building Information Modelling in Responding to Low Carbon Construction Innovations: An Irish Perspective - Presentation

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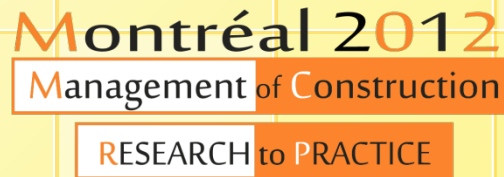
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Use of Building Information Modelling in responding to Low Carbon Construction Innovations: An Irish Perspective

By
Barry McAuley , Dr. Alan Hore & Dr. Roger West



Presented by

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PhD Candidate, Dublin Institute of Technology

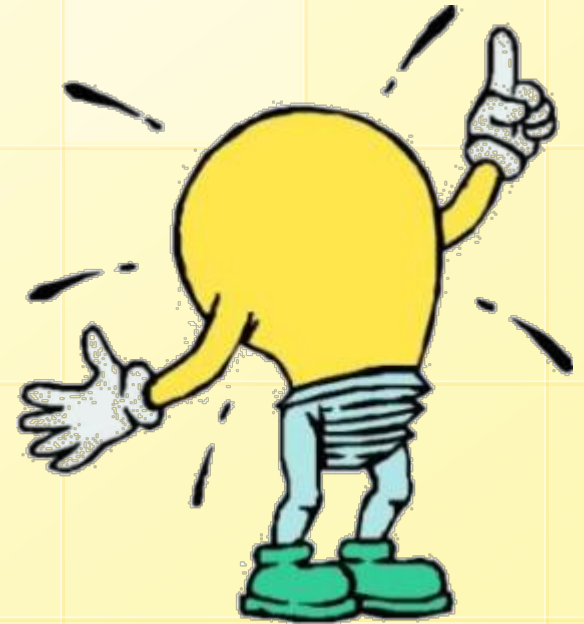
Ireland and the need for change

- Ireland - huge financial losses in the public works
- Reduce greenhouse gas emissions by up to 20%
- public sector must own or rent only buildings with high energy-saving standards and
- promote the conversion of existing buildings to "nearly zero" standards
- UK Low Carbon Construction Innovation and Growth Team Report
- BIM can be utilised on future and present public works projects in Ireland



Lit Review

- ❖ 46 % of the CO² emissions and generates 40 % of all man-made waste (Hallberg and Tarnardi, 2011)
- ❖ 74% of Western European BIM users report a positive perceived return on their overall investment in BIM (McGraw Hill ,2010)
- ❖ Over 25% of the survey participants views BIM as highly applicable for use in green retrofits (The McGraw–Hill Green BIM Report, 2010)
- ❖ BIM has the greatest potential to transform the habits and, eventually, the structure of the industry (UK Government's Construction Client Group BIM Working Party Strategy Paper, 2011)
- ❖ In order for Ireland to create a similar frame work to the UK there are a number of obstacle to be addressed in the form of both legal and technical categories (McAuley et al, 2012)



Methodology - RIAI / CITA BIM Workshop

- Raise awareness and promote a higher level of understanding of BIM
- Demonstrate a more effective way for teams to collaborate
- Assess / demonstrate some of the BIM software tools available
- Validate designs through digital analysis
- Test BIM technologies in responding to low carbon construction demands



RIAI / CITA BIM Workshop

- 2011 RIAI showcase of integrated and collaborative Working



● **3D BIM Model
on Screen**

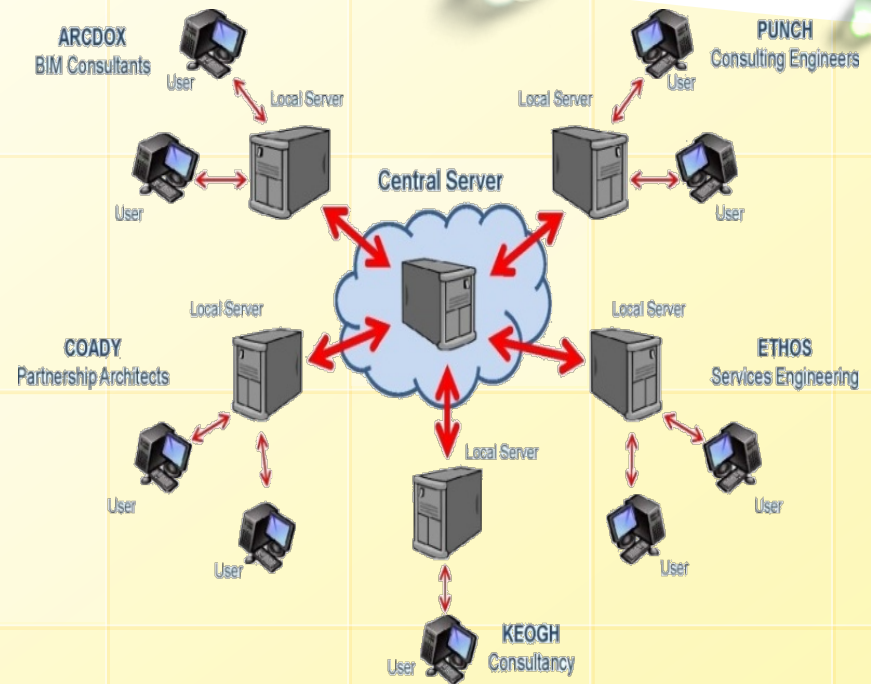
● **Laptops On
Meeting Table
(No Paper)**

● **Instant Access
to Sophisticated
Information and
Analysis**

● **Digitally
Recording
Decisions in
Real-Time**

Pilot Team and Process

- ❑ Leading design professionals from selected firms within the AEC/FM sector
- ❑ Consulting engineers, services engineers, architects, and consultants
- ❑ Additional support from contractors, QS's, technical support, FM support for handover documentation and BIM energy specialists

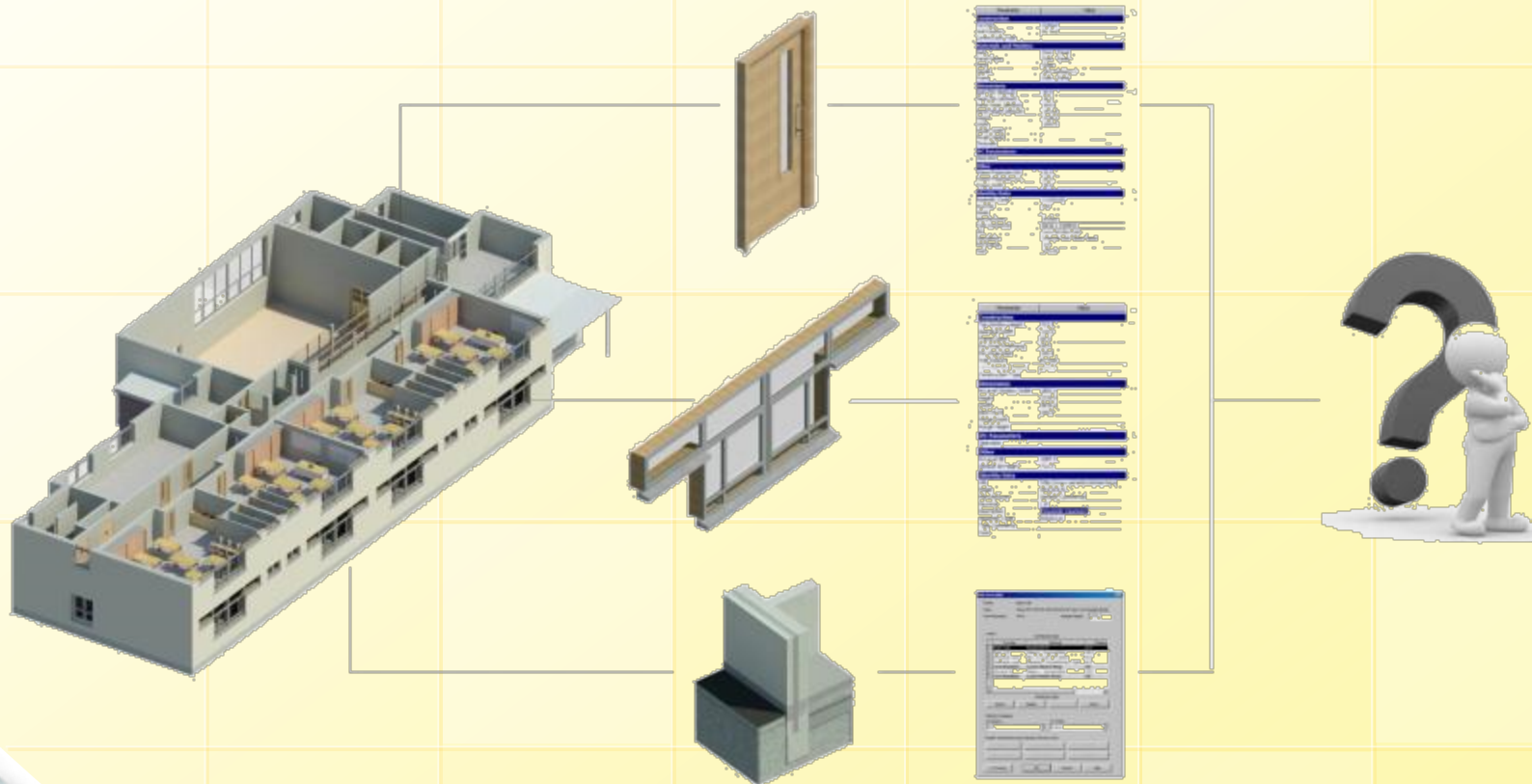


- ❑ Digital brief with the overall goal to design a BIM model of a standard generic DOES school
- ❑ Exploded down to its components
- ❑ Synchronised with a central server

Pilot Analysis

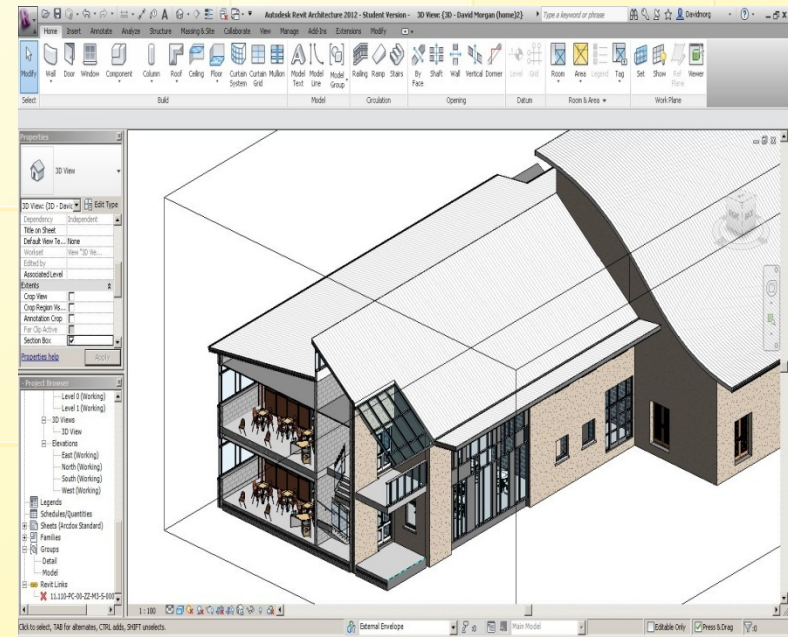
Generic School broken down to its core elements

Build the Base BIM Model ▶ **“Explode” to Standard Components** ▶ **Prepare a New Design**



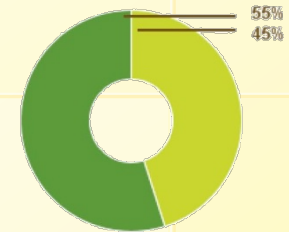
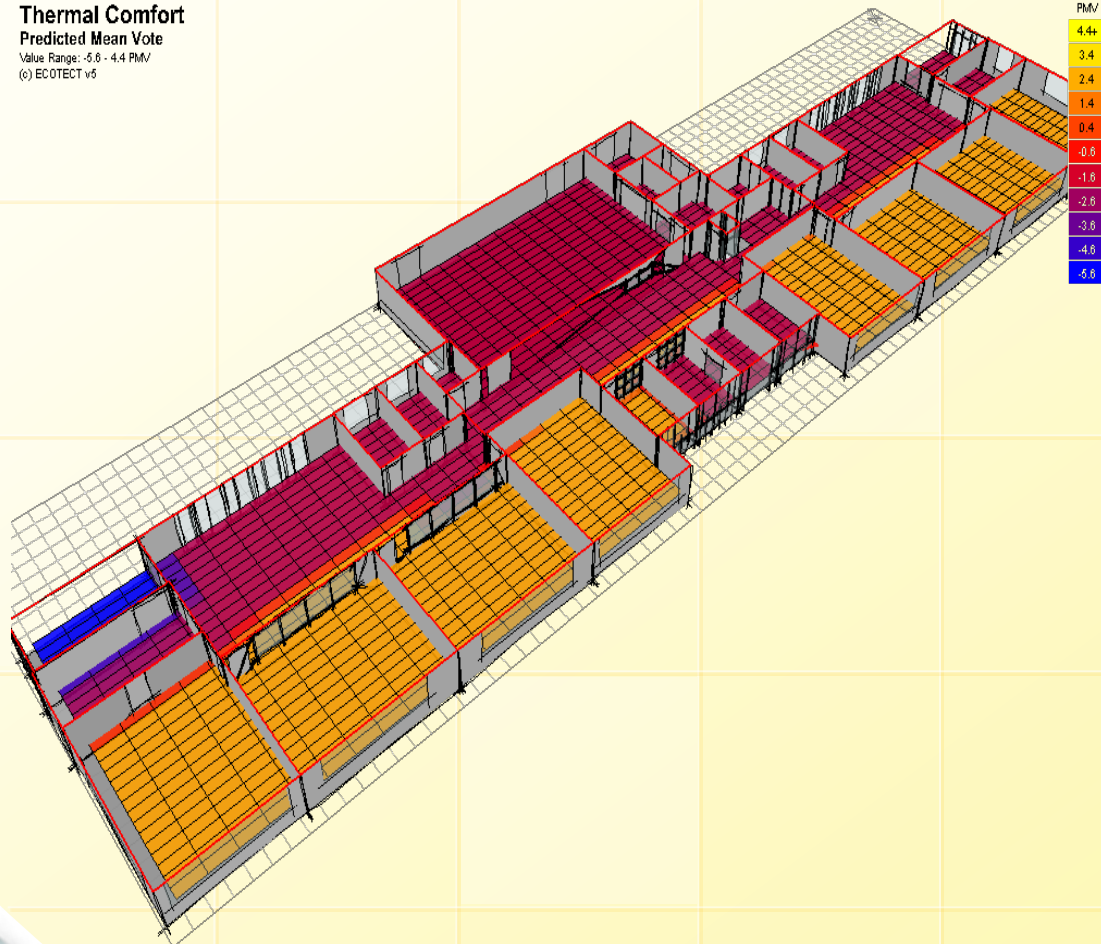
Pilot Analysis

- Designers to create four mass models at different orientations and to perform exercises in concept energy analysis
- Calculate the energy usage for the year and so, therefore, assuming discounts rates, a life-cycle energy usage / cost could be generated
- CO₂ emissions from electricity and fuel consumption for the analysed model, minus the renewable energy potential
- The energy analysis enabled a relatively easy calculation to be performed with regard to whole-life energy usage for all four design iterations

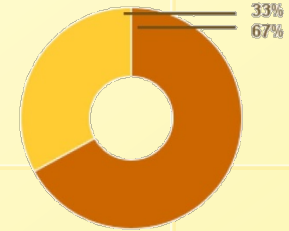


Pilot Analysis

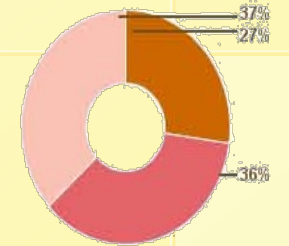
Thermal Comfort
Predicted Mean Vote
 Value Range: -5.6 - 4.4 PMV
 (c) ECOTECH v5



| | | | | |
|-------------|-----|----------|-----------|-----|
| Electricity | 45% | \$63,402 | 316,991 | kWh |
| Fuel | 55% | \$16,002 | 1,385,766 | MJ |
| | | \$69,405 | | |



| | | | | |
|--------------------|-----|----------|-----------|------|
| HVAC | 67% | \$10,725 | 928,854 | (MJ) |
| Domestic Hot Water | 33% | \$5,276 | 456,912 | |
| | | \$16,001 | 1,385,766 | |



| | | | | |
|-----------------|-----|----------|---------|-------|
| HVAC | 27% | \$14,425 | 86,360 | (kWh) |
| Lighting | 36% | \$19,088 | 112,962 | |
| Misc. Equipment | 37% | \$19,825 | 115,536 | |
| | | \$63,039 | 313,849 | |

Low Carbon Options

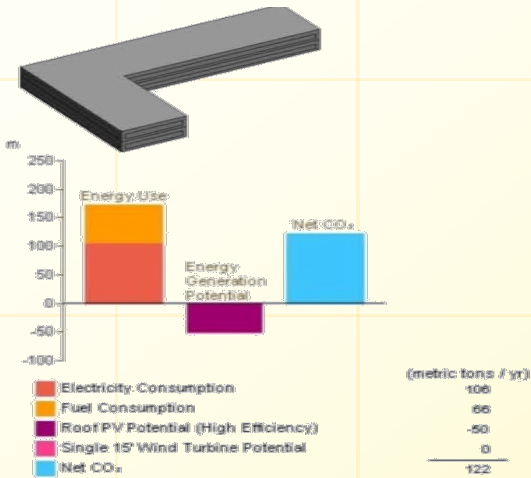


Figure 6: Mass Model 1

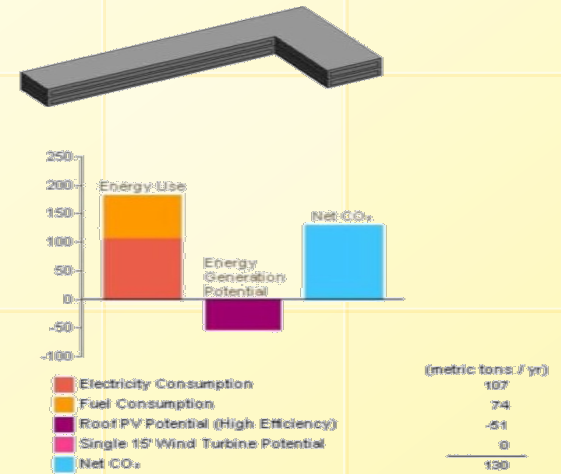


Figure 7: Mass Model 2

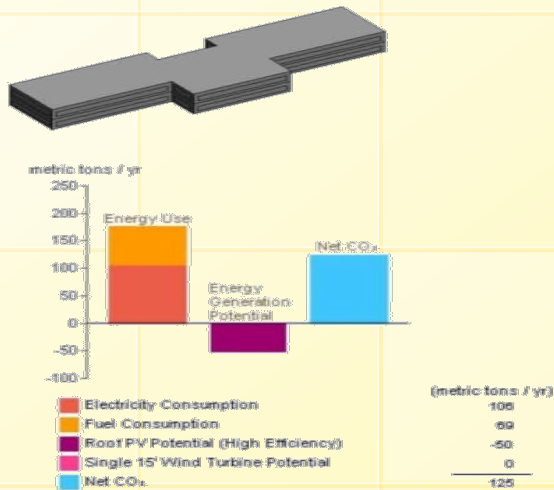


Figure 8: Mass Model 3

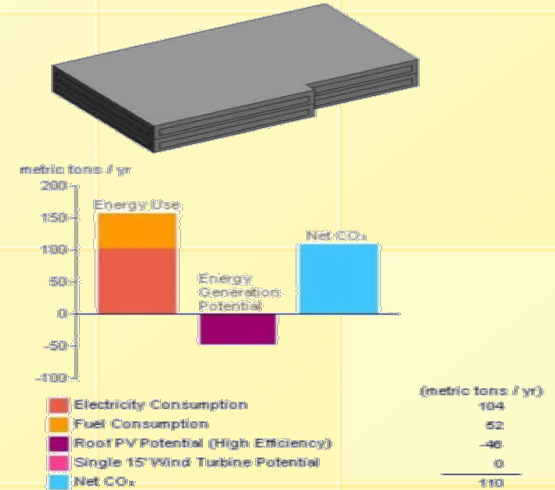
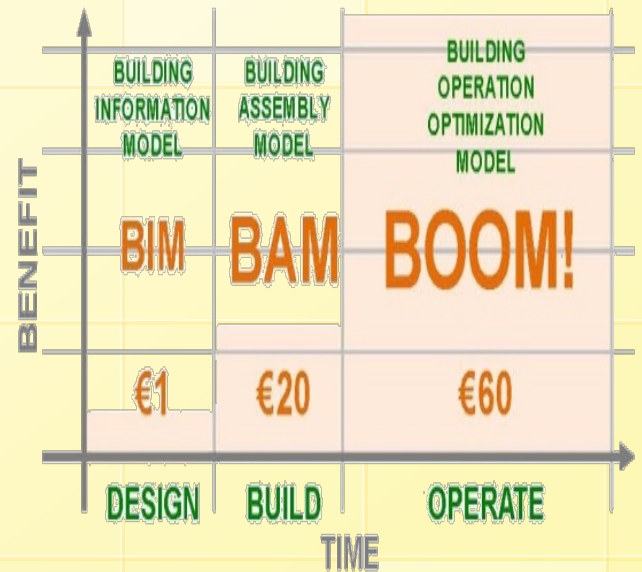


Figure 8: Mass Model 4

Findings

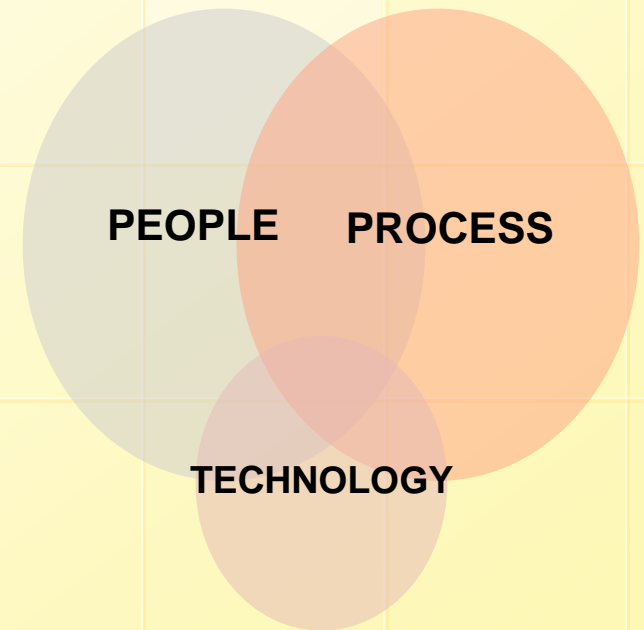
- BIM process permitted a different and more sustainable method of construction to be undertaken
- Design changes best impacted the carbon output of the model
- BIM enabled the designer to have the option to choose a carbon friendly design for the primary school.
- Still requires “an act of faith” for the Irish Government to fully embrace it.
- Reluctance to incorporate more change



Source: Patrick MacLeamy – HOK

Ireland's challenges.....

- ▶ Getting people up to speed and training is key
- ▶ Getting people to change mindset
- ▶ Irish Government to step up to the challenge
- ▶ Investment is needed by AEC businesses
- ▶ Need to utilise BIM champions with your organisation
- ▶ Interoperability of BIM products to be addressed



Major BIM Activities in Ireland

9

What major BIM activities

- Collaborative networking effort
- Gaining international interest
- Discussion on Key Topics/Obstacles
- Expert Opinion and Table Discussions
- Record & distributed outcomes back to Industry
- Promote/Communicate Industry Consensus & Joined-up Thinking



Construction IT Alliance BIM WORKSHOP SERIES 2012

A series of workshop events designed to facilitate a high level discussion of the key stakeholders on the immediate obstacles to the implementation of building information modelling in Ireland.

Specifically the workshops are designed to assist in:

- Fast tracking the general adoption of BIM in Ireland.
- Disseminating best practice and application of BIM in a variety of direct and indirect construction related work processes.
- Facilitating a consistent and co-ordinated message back to industry in how to best implement building information modelling in Ireland.



Monday 25th June 2012

Major BIM Activities in Ireland

11

What major BIM activities

CITA | Construction IT Alliance

BIM | Building Information Modelling | Ireland's Opportunity

Presentation To

GCCC | Government Construction Contracts Committee

Wednesday 2nd May 2012

Presentation by:

Dr. Alan V Hore
Executive Director, Construction IT Alliance

Ralph Montague
Director, Arcdox
Co-Ordinator CITA LinkedIn Group

Accompanied by:

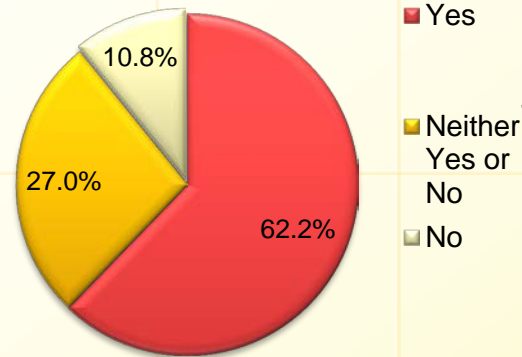
John McGowan
Director, Construction IT Alliance

Barry McAuley
Phd Student
Dit Bolton Street

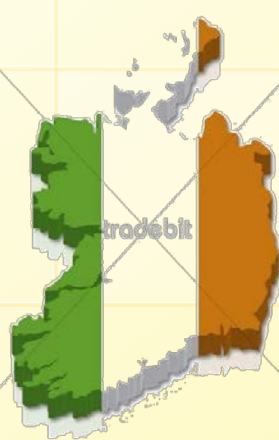
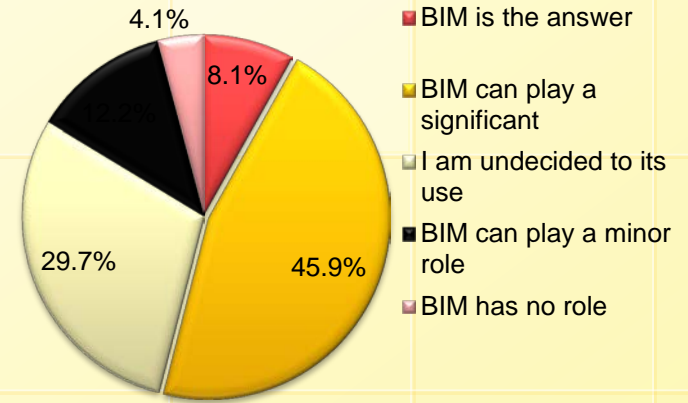
Monday 25th June 2012

CITA BIM Survey 2012

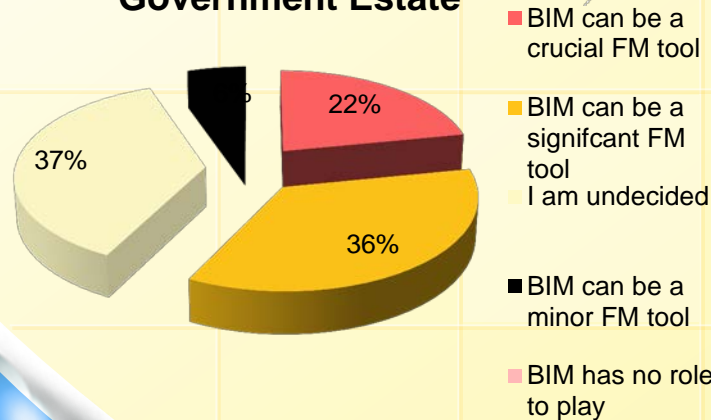
Should Ireland follow the UK in mandating BIM



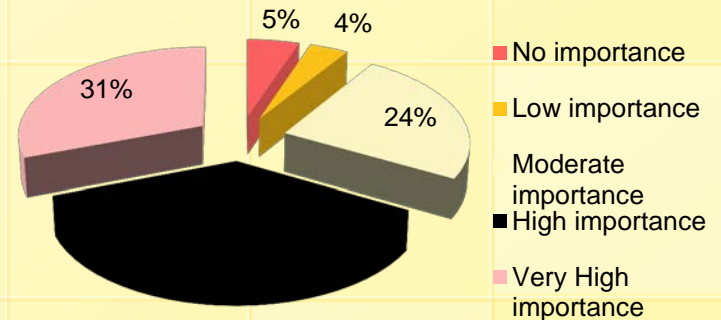
Can BIM help Ireland reaches its Carbon Targets



BIM as FM Tool in Managing the Government Estate



BIM Importance in 5 years Time



Thank You!

