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

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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

Barry McAuley MSc, BSc (Hon), Dip.Eng

PhD Candidate, Dublin Institute of Technology

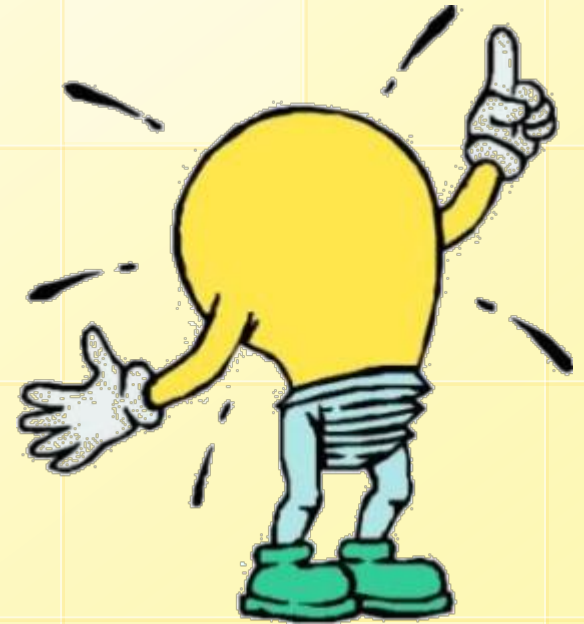
# Ireland and the need for change

- 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 CO<sup>2</sup> 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**

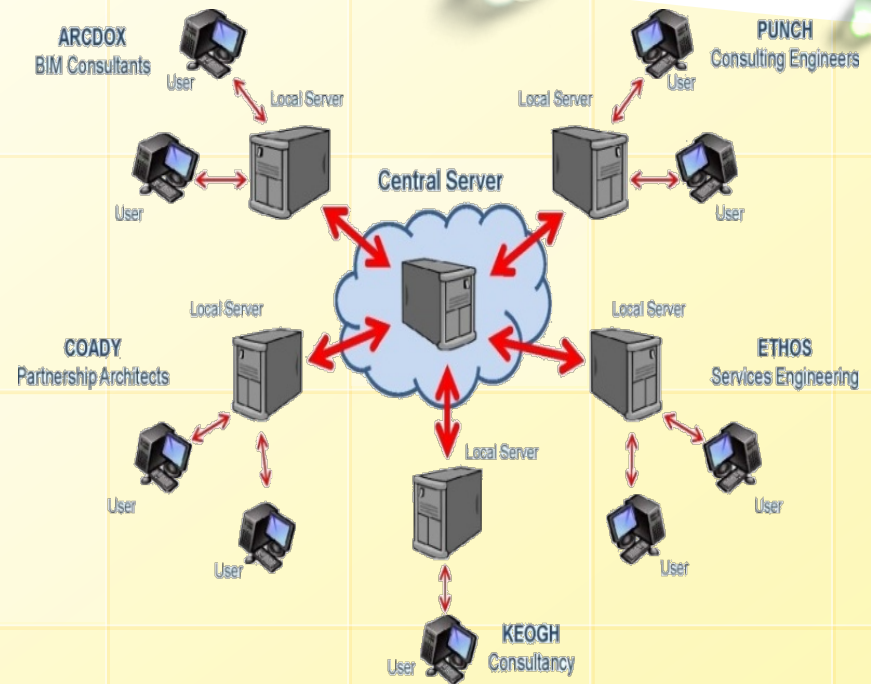
● **Laptops On  
Meeting Table  
(No Paper)**

● **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

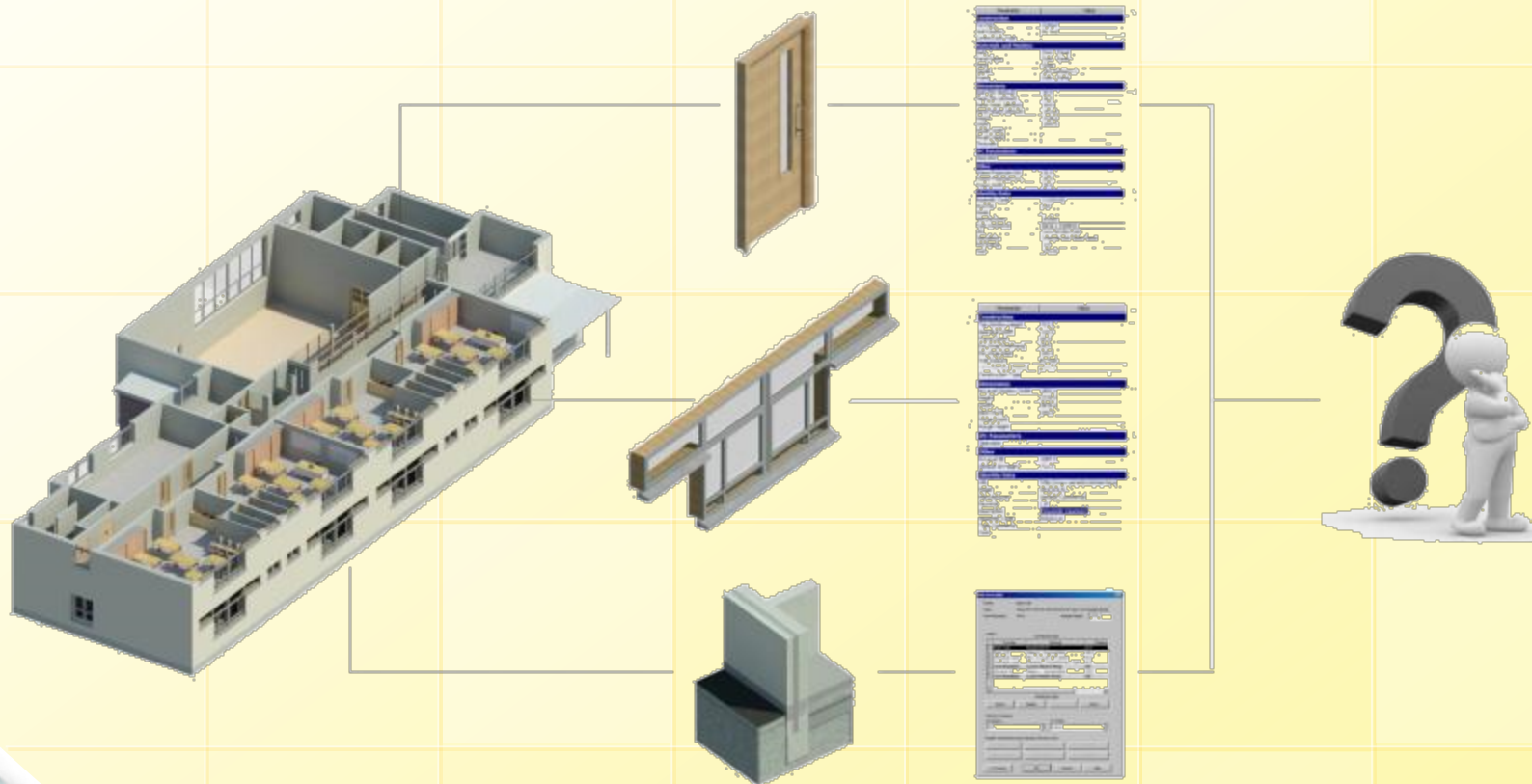


- ❑ Digital brief with the overall goal to design a BIM model of a standard generic DOES school
- ❑ Exploded down to its components
- ❑ Synchronised with a central server

# Pilot Analysis

Generic School broken down to its core elements

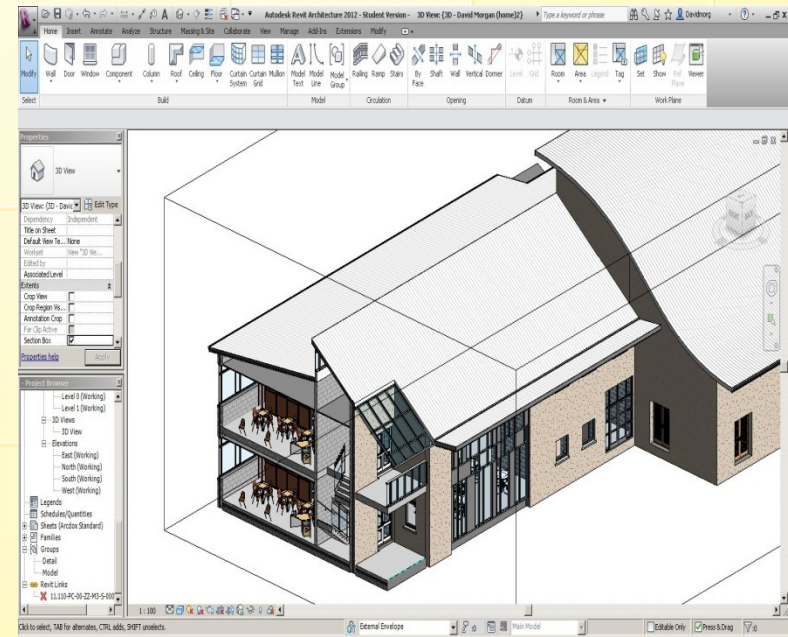
**Build the Base BIM Model** ▶ **“Explode” to Standard Components** ▶ **Prepare a New Design**





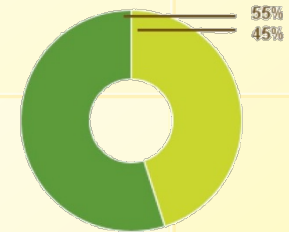
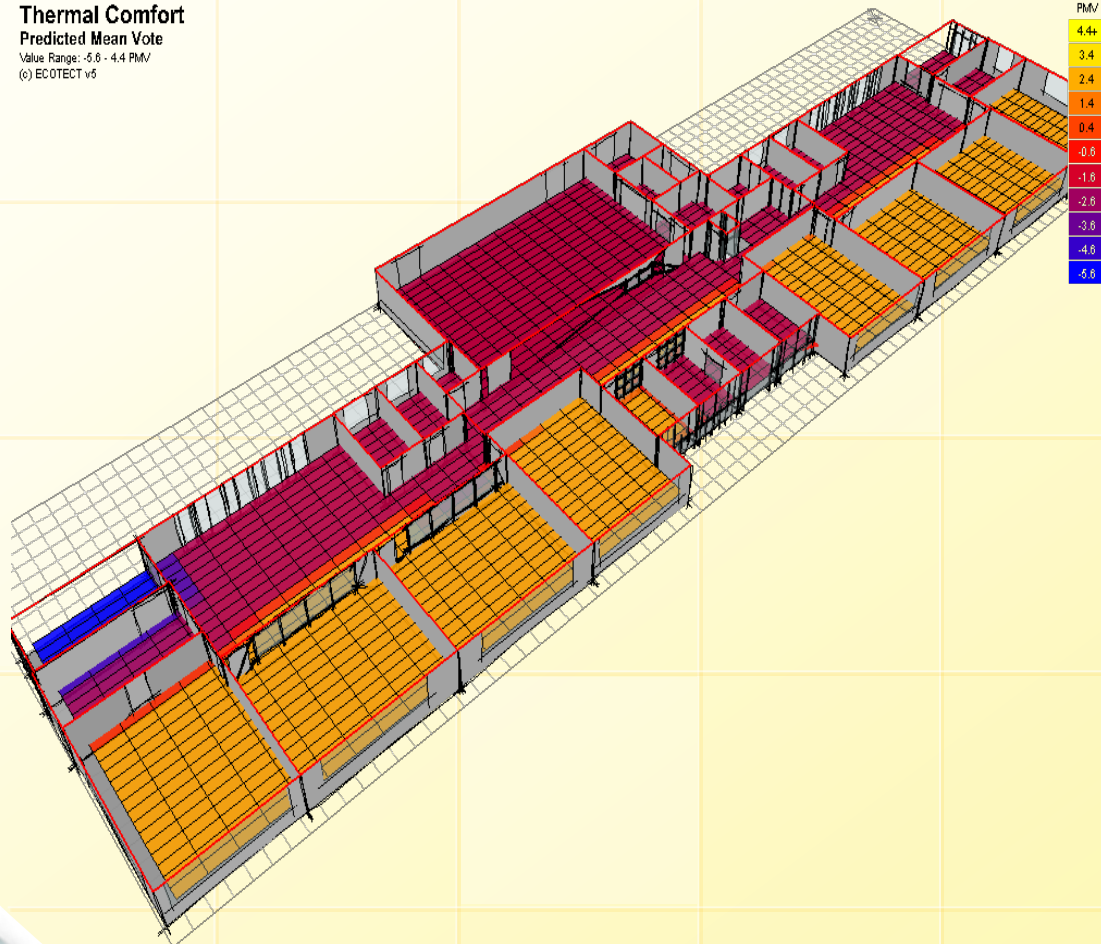
# Pilot Analysis

- 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
- CO<sup>2</sup> 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

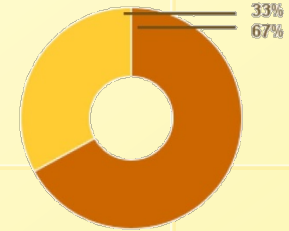


# Pilot Analysis

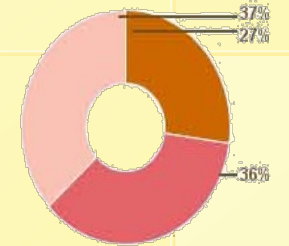
**Thermal Comfort**  
**Predicted Mean Vote**  
 Value Range: -5.6 - 4.4 PMV  
 (c) ECOTECH v5



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	313,848	

# Low Carbon Options

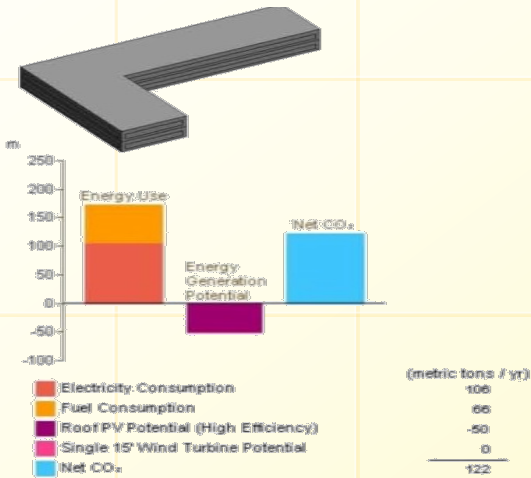


Figure 6: Mass Model 1

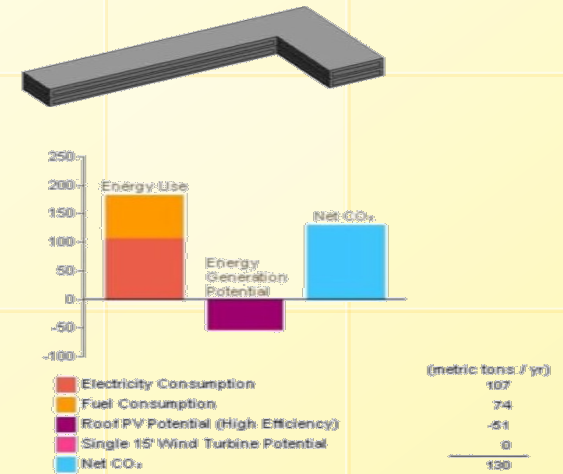


Figure 7: Mass Model 2

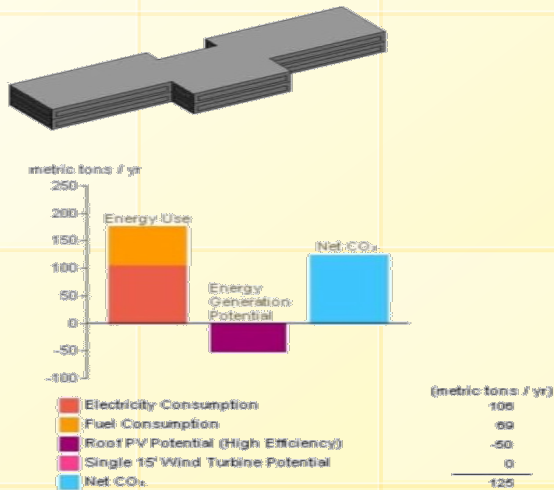


Figure 8: Mass Model 3

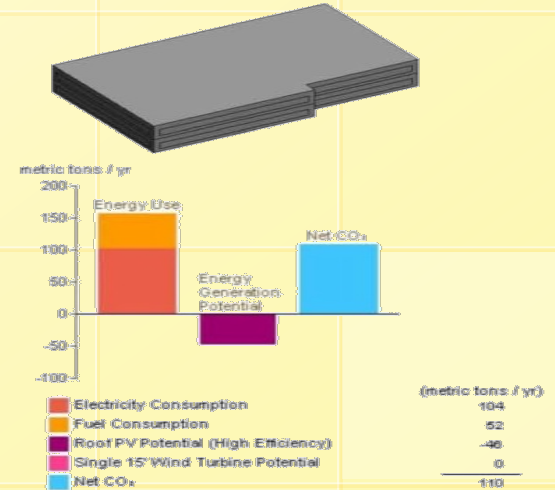
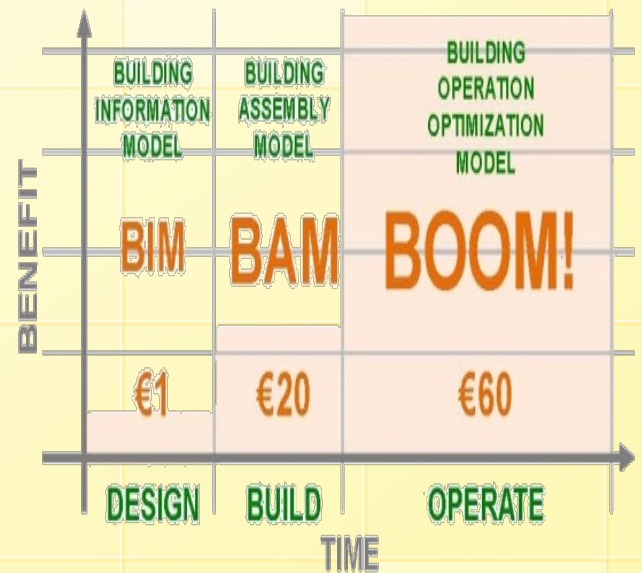


Figure 8: Mass Model 4

# Findings

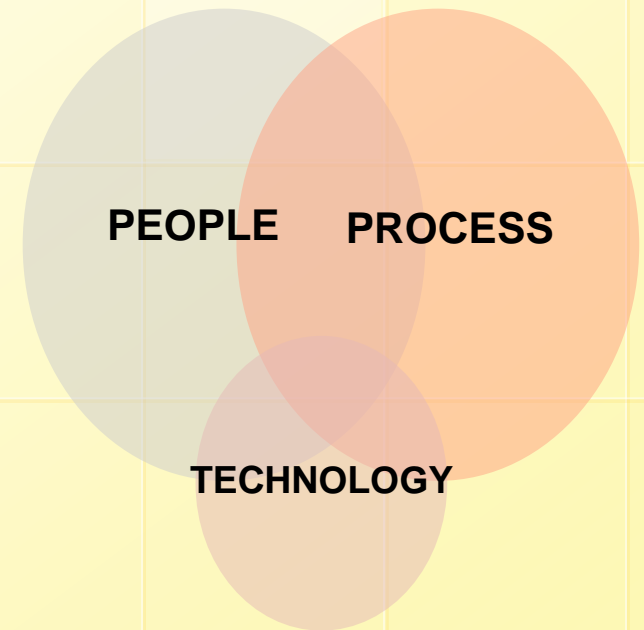
- BIM process permitted a different and more sustainable method of construction to be undertaken
- Design changes best impacted the carbon output of the model
- BIM enabled the designer to have the option to choose a carbon friendly design for the primary school.
- Still requires “an act of faith” for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

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## 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 25<sup>th</sup> June 2012

# Major BIM Activities in Ireland

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## **What** major BIM activities .....

**CITA | Construction IT Alliance**

**BIM | Building Information Modelling | Ireland's Opportunity**

**Presentation To**

**GCCC | Government Construction Contracts Committee**

**Wednesday 2<sup>nd</sup> May 2012**

**Presentation by:**

**Dr. Alan V Hore**  
Executive Director, Construction IT Alliance

**Ralph Montague**  
Director, Arcdox  
Co-Ordinator CITA LinkedIn Group

**Accompanied by:**

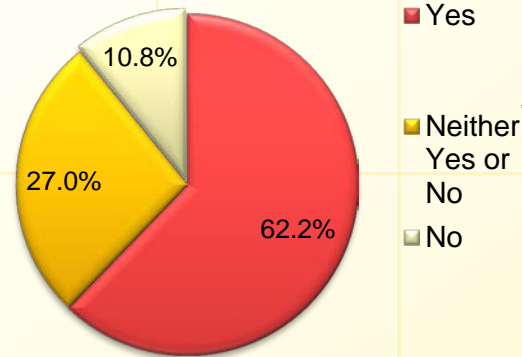
**John McGowan**  
Director, Construction IT Alliance

**Barry McAuley**  
Phd Student  
Dit Bolton Street

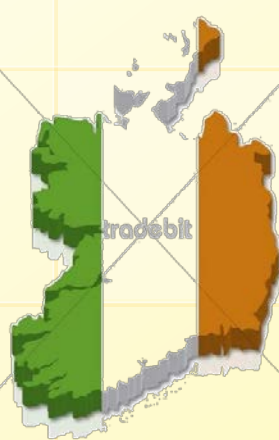
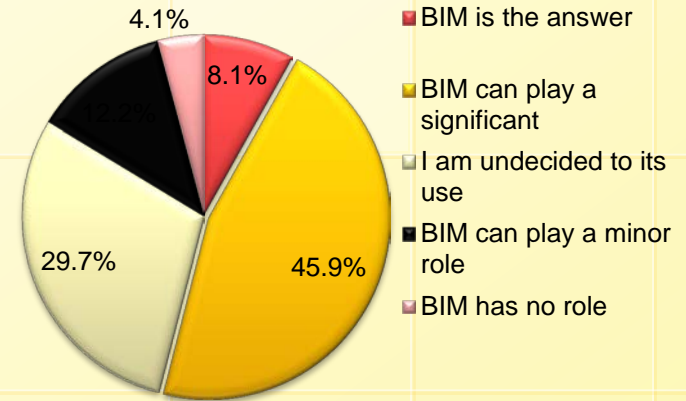
Monday 25<sup>th</sup> June 2012

# CITA BIM Survey 2012

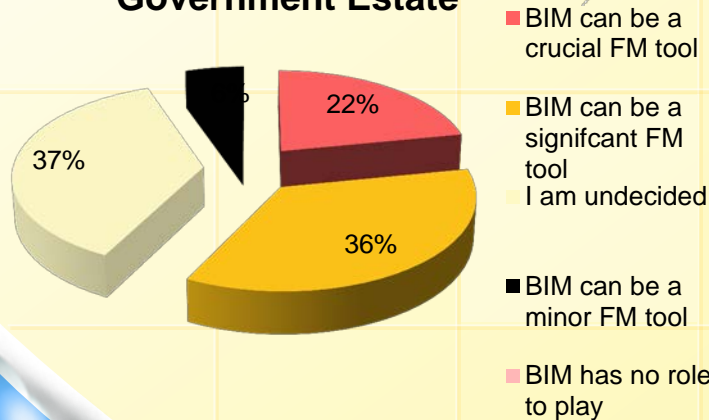
## Should Ireland follow the UK in mandating BIM



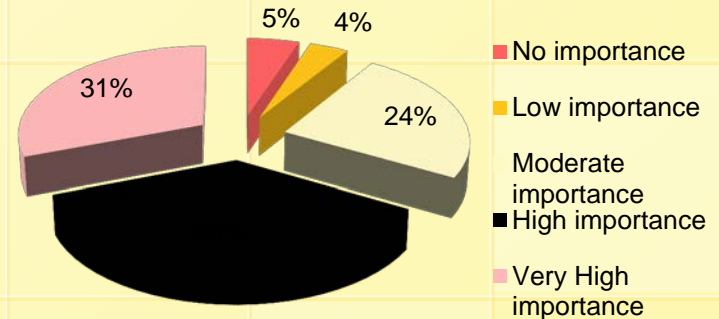
## Can BIM help Ireland reaches its Carbon Targets



## BIM as FM Tool in Managing the Government Estate



## BIM Importance in 5 years Time





**Thank You!**

