The Present and Future of BIM in Ireland

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Roughan & O’Donovan Consulting Engineers

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Overview

- Roughan & O’Donovan
- The UK Implementation of BIM
- BIM in Ireland Today
  - Buildings
  - Civils
  - Geotech
- Developments in the UK and Europe
- CEDR INTERLINK
- The Future of BIM in Ireland
Roughan & O’Donovan

- Multi-disciplinary
- Established in 1974
- Over 120 staff
- Public and private
- ROD-IS
UK Implementation of BIM

• UK BIM Mandate – Level 2 BIM
  – April 2016 for all centrally-procured projects in England, Wales and Northern Ireland
  – April 2017 in Scotland
• BS 1192 Collaborative production of information
• PAS 1192 Information Management
  – Part 2 for capital delivery phase
  – Part 3 for operational phase
• BS 1192-4 COBie
• PAS 1192-5 Security; PAS 1192-6 H&S (pending)
• CIC BIM Protocol (revision due for publication shortly)
• Classification systems, e.g. Uniclass 2015
Employer’s Information Requirements

- Forms part of the appointments for consultants and contractors
- Constitutes
  - Technical – software platforms, levels of detail
  - Management processes
  - Commercial – Data drops, information purposes
Protocols & Execution Plans

• Imperative to have agreed protocols in place prior to project commencement
  – Define deliverables, roles & responsibilities
  – CIC BIM Protocol – for all agreements
  – Appended to contracts
• Execution plan is project specific
  – CPIX, AEC (UK), Penn State, etc.
  – Template for completion by project team at outset
  – Standards, software, level of development, materials, project grid, etc.
Data Exchange – COBie

- UK BIM mandate requires data drops in COBie
- Construction Operations Building Information Exchange
- United States Army Core of Engineers
- Spreadsheet based
- Records equipment lists, product data sheets, warranties, spare parts lists, and preventive maintenance schedules
- Does not record geometry
- For asset management
- Appropriate for infrastructure projects?
Data Exchange – IFC

• Industry Foundation Classes
• Developed by buildingSMART
• Neutral and open specification
• Object-based data model
• Focus on geometry but getting better at information
• ISO 16739
• Some Scandinavian public clients require IFC compatible software to be used
• IFC-Road, Bridge, Rail, Alignment
• Confidence with import/export can only come with experience
The Value of BIM

- Varied reporting on CAPEX savings
  - UK
    - Contractors led the way
    - 20% sought in 2011 Government Construction Strategy
    - 20% reported in pilot project (Cookham Wood Prison)
    - But savings through various means, not just BIM
  - Sweden & Finland = 5% by 2020
  - Norway = 10% (from an industry survey)
- OPEX savings could be more extensive but even more difficult to differentiate
  - 3-7% on Heathrow T31B digital management of assets using BIM processes (reported by Amey/Ferrovial)
BIM in Ireland Today

- Irish companies are employing BIM on 100+ projects in Ireland
- Typically following UK processes
- 2015 Enterprise Ireland / CitA Survey
  - 69% confident in skills and knowledge to deliver BIM
  - 54% supportive of Irish BIM mandate
  - Main barriers to BIM
    - Cost
    - Lack of demand
    - Lack of expertise
- BIM Innovation Capability Programme (CitA / Enterprise Ireland)
“The Construction Industry Council (CIC) in Ireland embraces a BIM enabled world. CIC actively encourages the Irish Construction Sector to continue to take full advantage of current and emerging information and communication technologies to remain at the forefront of the industry in Europe. The CIC views BS 1192, PAS 1192 and BS 8536 as important routes towards standardised BIM implementation.”
“The applicant is required to include a fee proposal to prepare a BIM Model. This fee shall be shown separately and the service may be provided by a sub-consultant to the Consulting Engineer.”

“The use of a full level 2 collaborative BIM process is a requirement of this competition for Design Team Services.”

“A full level 2 collaborative BIM process is required …”

“PAS 1192-2:2013 … will be the standard to be adopted …”
“All design work shall be developed using 3D/BIM techniques. Design Models and Drawings shall be compatible with the latest version of MicroStation.”

“On appointment, the Authority shall issue an EIR to the Consultant, fully describing the Authority's requirements for the use of BIM.”

“The Consultant shall provide all design information in an open format (IFC or similar), containing all associated attribute data at the end of this contract and on request by the Authority as needed.”
Public Client Requirements—PULL

• “The Base Model be delivered in Autodesk Navisworks format or similar….. and shall include:
  – Borehole locations, references and strikes;
  – Slit trench locations and references;
  – Rock strata (triangulated surfaces)
  – Ground water surface
  – High risk utilities
  – Triangulated surface of existing terrain ……”

• “…. ensure interoperability with …. GIS system …. For communicating environmental, socio-economic, heritage, planning. …. Within the BIM model.”
Building Design Case Study

(Image from www.newchildrenshospital.ie)
Architectural Model

(Image from www.newchildrenshospital.ie)
Structural Model
Analysis Model
Reinforcement Design

As req. Bottom XX (mm²/m²) - Bending Min.
RC Drawing / Schedule
BIM in Civil Design

• Complex linear assets that require extensive maintenance programmes
  – Road works, structures, geotech, services, etc.
• 3D used for many years but BIM processes not as well established as in buildings
• UK mandate applies to infrastructure projects
• Cross-over between BIM and GIS
• Smart Cities
• Intelligent Transport Systems
BIM for Geotech

• 3D modelling of subsurfaces
  – AGS input
  – Interpolation
  – User interpretation, e.g. GIR output
  – Not standardised

• AGS
  – ‘Factual’ data
  – Standardised data exchange format
  – Text file
  – Software vendor neutral
  – No data validation
BIM for Geotech

• National repositories
  – Geological Survey of Ireland
  – Highways Agency Geotechnical Data Management System (uses AGS as input)
  – British Geological Survey
    • BIM for Subsurface

• Data quality?
  – Integrity, completion, originator
  – Context for a exploratory hole
  – Interpretation, GIR
BIM Developments in UK and Europe

• UK BIM Task Group – Level 3 BIM
• UK BIM Alliance – Level 2 BIM
• Ability of software to create and read compliant data?
• Will COBie persist?
• Handover remains a problem
  – Significant amounts of data
  – Asset operators not always consulted
  – The value of the data (i.e. The business case for the data) is not explicit in each instance
BIM Developments in UK and Europe

• CEN Technical Committee
  – Adopt existing ISOs as European Standards
  – EFCA / NSAI
  – ISO 12006-3 Object-oriented information
  – ISO 16739 IFC4
  – ISO 29481-2 Information delivery manual – Interaction framework

• EU BIM Task Group

• Various research projects
The Value of BIM

- Optimum value for clients when data requirements established from early stage
  - Requires input from operators
- Optimum value for project participants when all team members are exchanging information effectively
  - Requires formalised, tested processes

Value derived from access to the right information at the right time to improve decision making and minimise risk
Input from End User and Operator

(Courtesy of Clancy Construction)
CEDR INTERLINK

- CEDR = 26 NRA members
- 2015 BIM Call
  - Improve interoperability within NRAs and their stakeholders
  - Open standards
  - BIM for construction and asset management
- European Road Object Type Library
Multi-Faceted

European Road OTL Initiative

exchange and share

existing open IM standards

reliable data

Technical Specification

Standardisation Body

Acceptance in Practice

proper data structure
**Linked Data**

- Representation of assets as semantically enhanced Linked Data
- Hierarchy of OTLs
- No ‘mother of all standards’

Luiten at al. (2016)
Research

- Business perspective
- Information / data perspective
- Consideration of gaps and differences between:
  - Asset types, life-cycle stages, countries, user perspective (asset manager, project manager, designer, contractor), form of contract
- Interviews, surveys
- AS IS and TO BE
The Future of BIM in Ireland

- Greater focus on data quality, structure and exchange standards
- Will PUSH or PULL dominate?
- National BIM mandate?
- Industry best practice and guidance
- EU BIM standards
- Procurement models
  - PPP / ECI / D&B
- Who will benefit, if anyone?
- UK or European approach?
- Or will there be convergence?
The Future of BIM for Geotech

- Can a 3D BIM model with soil parameters be used to automatically create an analysis model?
- GIS and BIM
- Developments in AGS format
- Standardised record of interpretation
  - Object and attribute based
Summary

• Valuable data is lost and recreated at multiple points in the life-cycle of assets
• Value can be derived from BIM processes during construction and operation
• BIM is well established in Ireland but we are behind UK and well behind Scandinavia
• Implementation is not centrally led
• Developments must move from document focus to object and attribute focus
• Exciting opportunities
• Need to learn from the lessons in other countries
Question

• Are we using BIM to make existing inefficient business processes more efficient?

or

• Are we using BIM to facilitate redesigned business processes which offer real value?
Thank You

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