Future perspectives:
Improving environmental, social and economic performance through Integrated Project Development

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Australia
To be a world-class research and knowledge broker in sustainable infrastructure and building design, construction and management
Program 1 - Greening the Built Environment

Program 2 – People, Processes and Procurement

Program 3 - Productivity through Innovation

» Collaborative research centre with key Australian and international partners
» Industry, government and research partners
» Applied research and industry outreach across integrated themes
Collaborating Partners
Collaborating Partners
History of Creating Innovative Tools

- International Standards Development
- Automated Bill of Quantities
- Automated Scheduling
- Code Checking
- LCADesign (Eco-profiling)
- Indoor Air Quality
- Sydney Opera House
  - FM Exemplar project
Reusing Standard Data

Models prepared by Arup, Johnson Pilton Walker and CRC for *Construction Innovation* researchers
Sydney Opera House Implementation

- Adopting BIM for facilities management
- National Guidelines for Digital Modelling
- Exchanging files with consultants
- Vision of a single integrated model
- Vision of a FM interface as a **one-stop-shop**
CRC for Construction Innovation
National Guidelines Approach

Phase 0 – Briefing/Pre-design
Phase 1 – Conceptual Design
Phase 2 – Schematic Design
Phase 3 – Developed Design
Phase 4 – Contract Documents
Phase 5 – Construction
Phase 6 – Post Construction/FM
Modelling Implementation

TOWARDS INTEGRATION
Taking the Australian construction industry forward

WHERE WE WERE
WHERE WE ARE
NEXT STEP
WHERE WE ARE GOING

0 – 2D
Manual and CAD based (2D or 3D)

1 – MODELLING
Single-disciplinary use of object-based 3D modelling software within one discipline

2 – COLLABORATION
Sharing of object-based models between two or more disciplines

3 – INTEGRATION
Integration of several multi-disciplinary models using model servers of other network-based technologies

Representation
Prototype
Full Information Capture

Business Model

Isolated
Collaborative
Integrated

Legend
Communication type
traditional
digital

UPTAKE

Australian Institute of Architects

CRB Construction Innovation
BUILDING OUR FUTURE
Challenges for BIM Implementation

- Disruption vs evolving implementation
- Model users’ differing views and expectations of models
- Need for Australian object libraries
- Product information and specification
- Emerging building information classification system
- Information database management
- Management of file sizes
- Sharing information
- Legal, insurance and practice impediments
- Slow industry uptake
- Software to address local requirements

Image Courtesy of Architectus and Ingenhoven Architects
Discipline Modelling, Analysis and Simulation

- Project definition, planning and pre-design
- Architectural modelling
- Structural analysis, design and production models
- MEP analysis, design and production models
- Cost planning and quantity take-off
- Construction models
- Facility management

Image Courtesy of Queensland Department of Public Works
Case Studies

• North Lakes Police Station, Queensland
• Queensland State Archives Extension Program
• Joint Contact Centre Zillmere, Queensland
• 1 Bligh Street, Sydney
• Brisbane City Hall
• 8 Chifley Square, Sydney
Integration of Data is Critical

Modern business is concerned with integration of business information to make informed business decisions.

The Integrated Data Model must facilitate this.
Shared Project Model

SHARED PROJECT MODEL

Now

5 year vision

Future

Circa 1999
CASE STUDY OF THE ACTON PENINSULA DEVELOPMENT

Research and Case Study of the Construction of the National Museum of Australia and the Australian Institute of Aboriginal and Torres Strait Islander Studies

FINAL REPORT

for

Commonwealth of Australia
Department of Industry, Science and Resources

Prepared by
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2001 National Museum of Australia Challenge: Development of technological and organisational innovations based on advanced collaborative delivery mechanisms and web-based project management tools
2014 Industry Challenge

Integrated Project Environments and BIM

• Emerging and transformative
• New set of skills required
• Lack of performance measurement across life-cycle
• Full benefits across whole-of-life and industry still to be achieved
BIM can be defined as a **virtual process** that encompasses all aspects, disciplines, and systems of an asset within a **single virtual model**, allowing all to collaborate **more accurately and efficiently** than using traditional processes.
Integrated project environments

... project delivery models and tools that allow and encourage the integration of teams, processes and information across organisations and construction stages to produce improved outcomes.
SBEnrc Research and Collaboration

Research

- Project 2.24 Integrated Project Environments (2013-14)
  - Industry and academia expert interviews
  - Literature and documentation review
- Project 2.34 Driving Whole-of-life Efficiencies through BIM and Procurement
  - Leading national exemplar case studies – design, construction, asset management
  - Literature and documentation review

Design

Construction

Asset Management
National Strategy

National Pilot and Lessons Learned Program

Evidence-based Recommendations

Industry Standards

Coordinated BIM Curriculum

Agreement on National Strategy

2014
- TISQO agrees to National Pilot and Lessons Learned Program
- Australian Productivity Commission recommends mandatory use of BIM for complex infrastructure

2015
- Working Group formed to develop BIM curriculum and lessons learned

2016
- TISQO achieves transport and infrastructure Council agreement on BIM

2017
- Evidence-based recommendations made to TISQO by Working Group

2018
- TISQO achieves transport and infrastructure Council agreement on BIM strategy

2019
- TISQO piloted BIM strategy based on preliminary research and a workshop with government, industry, and policy stakeholders
New Contractual Frameworks

Recommendations for Current Contract Practices
Dissemination Strategy

Recommendations to reduce the skills gap

- Better coordination
- Stronger links between industry and academia
- Support systems for capability development
Outcomes

Knowledge

Collaboration

A Framework for the Adoption of Project Team Integration and Building Information Modelling

Aalto University

Fletcher

Sustainable Built Environment National Research Centre

BuildingSMART Australasia

New Zealand Contractors' Federation

Curtin University

Griffith University

John Holland

NSW Government

Queensland Government

Government of Western Australia

BuildingSMART

NATSPEC

Transport Roads & Maritime Services

Sustainable Built Environment National Research Centre

Sustainability

New Zealand Contractors' Federation

Aalto University

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Sustainable Built Environment National Research Centre
Project 2.34 Driving Whole-of-life Efficiencies through BIM and Procurement

- Leading comparators to assess the value of BIM across the life-cycle of infrastructure and buildings
- Framework to assess the actual benefits of implementing BIM in Australian asset delivery and management
- Benefits from transitioning from 2D asset management systems to 3D integrated digital built environment
Relevant to the Development of National Strategy for IPD Uptake

(i) Lead agent role
(ii) Client role
(iii) Mandates
(iv) Pilot projects
(v) Metrics
(vi) Standards
Indicative Benefits

- Improved coordination
- Improved communication
- Improved data management
- More accurate quantity take-off
- More accurate cost accounting
- Better scenario analysis
- Lower operational cost
- Lower construction cost
- Lower design cost
- Better use of supply chain knowledge
- Improved productivity
- Optimisation of construction sequence
- Better programming
- Less rework
Coming soon

Delivering Value with BIM – A Whole-of-life Approach

- Industry briefing reports
- Online tool
- Book to be published by international publisher
- Case study reports & academic publications
Delivering Value with BIM – A Whole-of-life Approach

Context
- BIM
- Strategy
- Case studies
- Capabilities
- Other considerations

Framework
- Detailed Methodology
- Step-by-step guide

Dictionaries
- Benefits
- Enablers
- Metrics
Global Collaborations

Leveraging Global Innovation Networks

Global network for exchange and cooperation in research and innovation for the construction industry
Global Collaborations

TG90: Information Integration in Construction (IIICON)

• Efficient knowledge creation, preservation and integration across life-cycle of constructed assets

• Monitoring and feedback from end-users into design, construction and asset management of buildings and infrastructure

• Creating more effective and reflective industry and deliver benefits to public and private asset owners
Committed to building a more productive industry

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