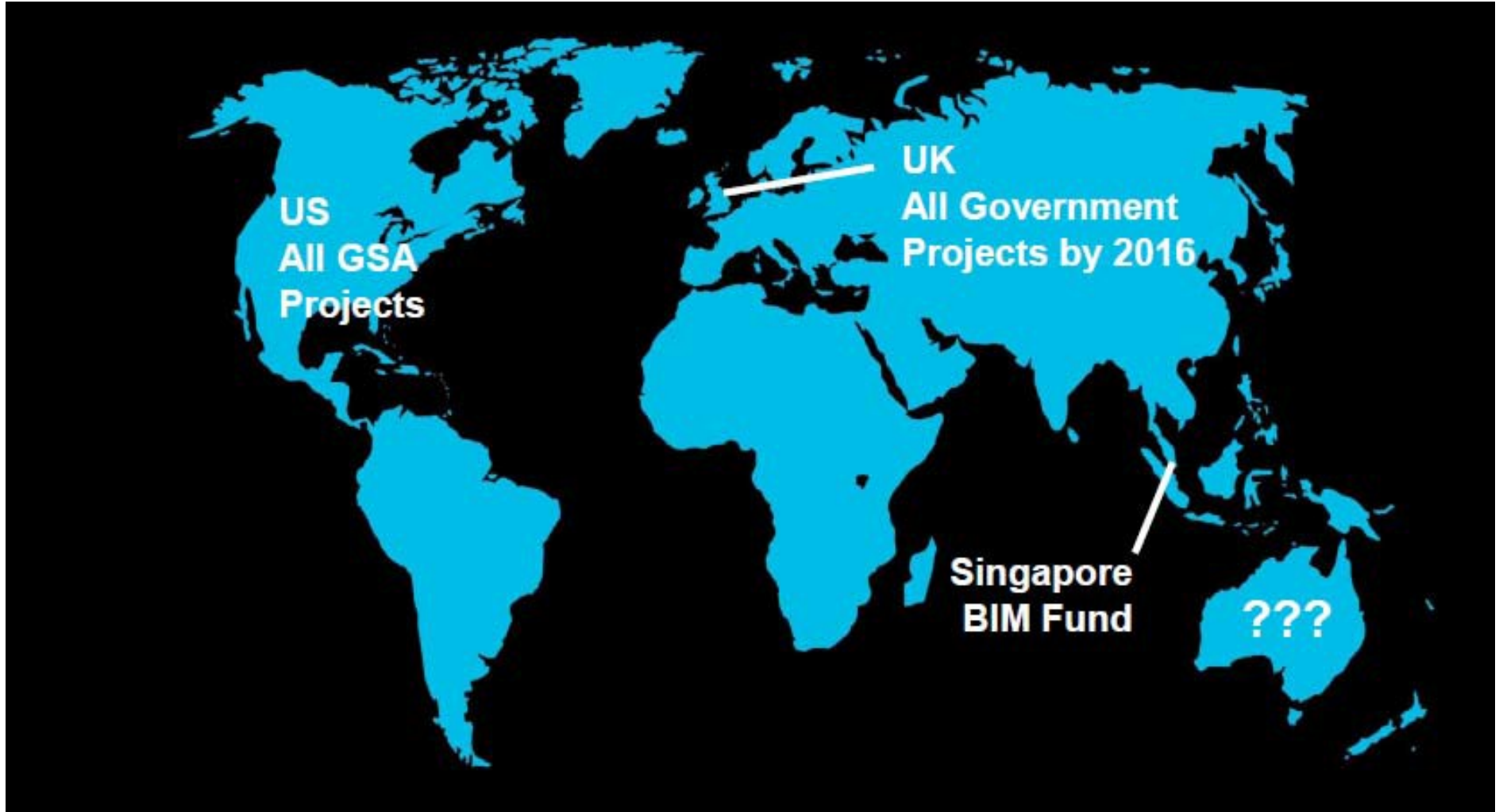


Main Research Streams in Construction Informatics in Australia

- Building Information Modelling (BIM)/ Green BIM
- Internet of Everything
- Big Data

Mandated BIM –The trend has begun



BIM in Australia

- BEIIC (Built Environment Industry Innovation Council) established Digital Modelling Working Group:
 - BIM was identified as key priority area
 - BIM will transform business processes, and is more than enhanced visualisation and automatic scheduling. BIM will improve decision-making at each stage of the construction and operation process.
 - Report “*Productivity in the Building Network : Assessing the impacts of BIM*”.

BIM in Australia

- Governments of the United Kingdom, Singapore, United States of America, Norway, France, Denmark and Finland are driving the use of BIM through government procurement and facility management processes.
- Australian construction sector cannot afford fragmented approach to BIM.
- In order for Australian construction sector for internationalization requires Australian firms to adopt BIM as a new competitive advantage.

Report: “Productivity in the built environment: Assessing the impacts of BIM”

- The first survey report about BIM in Australia

Report: “Productivity in the built environment: Assessing the impacts of BIM”

- Buildings network is a vital and significant part of the economy
- Accounts for around 12% of Australia’s total production (equivalent to around \$355 billion)
- Accounts for around 10-13% of total employment
- Lower productivity growth, compared with the aggregate productivity in Australia

Construction sector labour productivity



Source: Allen Consulting Group analysis based on Productivity Commission 2010.

The Allen Consulting Group

Information Source: Allen Consulting Group

BIM in Australia: BIM survey 2010

- 18%-75% of firms use BIM (across different user groups)
- On average, BIM is used in 36% (engineers) to 59% (architects) of projects
- Most respondents said the costs of BIM are balanced by its benefits
- While loss of productivity during the learning period is cited as a key cost, 72% of respondents said they became productive in using BIM within 2 years

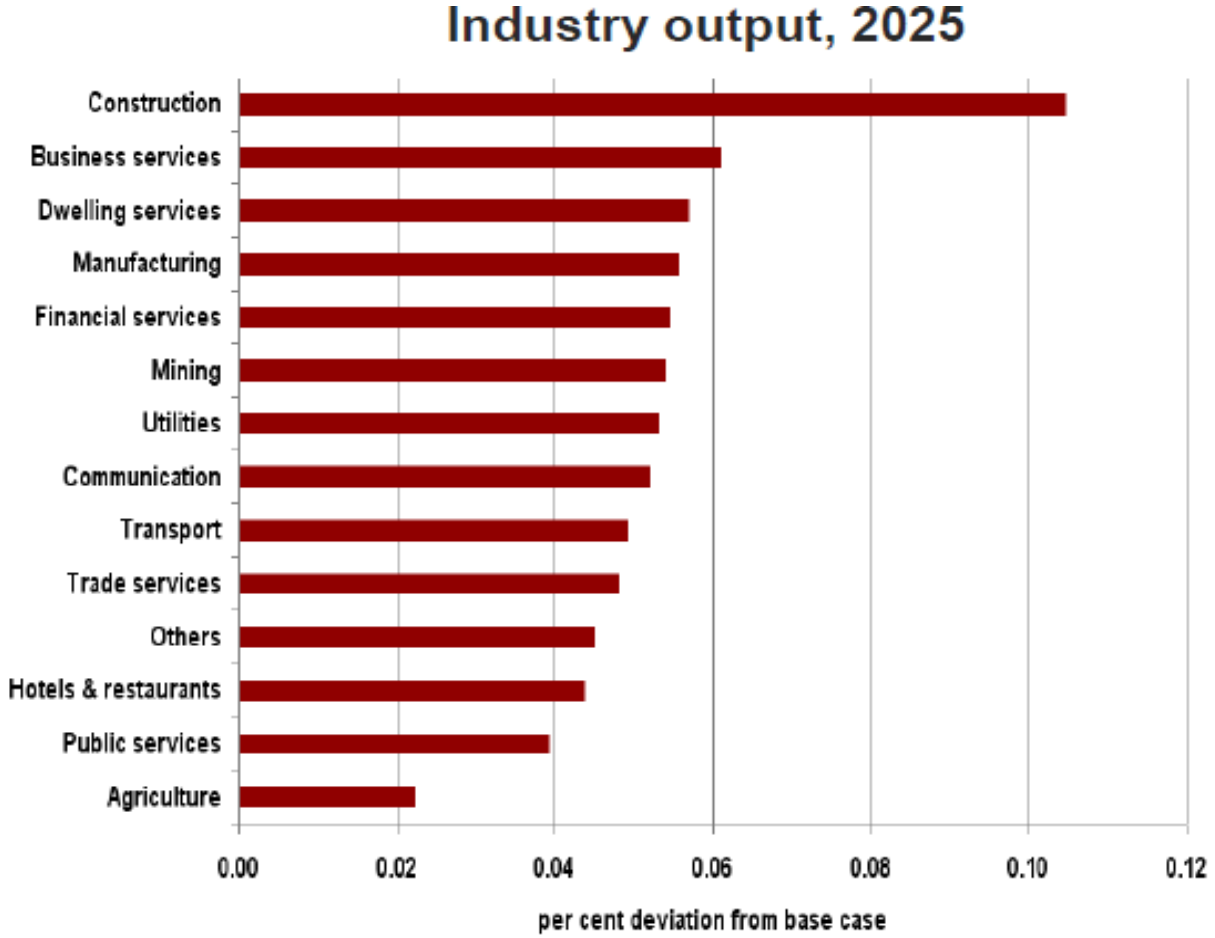
Benefits of change: national impacts

- Widespread BIM adoption would boost national output (GDP), community wellbeing (consumption) and expand the productive capacity of the economy (investment)

<i>Absolute deviations from BAU</i>	In 2025	NPV (2011-2025)
GDP (\$, M)	\$1,005	\$4,794
Private consumption (\$, M)	\$377	\$1,446
Investment (\$, M)	\$497	\$3,022
Employment (jobs)	366 jobs	N/A

Benefits of change: industry impacts

- ➔ Production increases across all industries
- ➔ Biggest gains concentrated in the business services and construction sectors



Benefits of Change: BIM Impacts in Perspectives

- Gains to the economy (GDP impacts)
- BIM (long term): 0.05% p.a.
- Reform of the energy sector: 0.05%p.a.
- Ports infrastructure reforms: 0.02% p.a.
- Steam technology (UK): 0.38% p.a.
- Average labour productivity growth in Australia (last 3 decades): 1.50% p.a.

“Productivity in the Building Network: Assessing the impacts of BIM Report”

Key findings:

- There is a compelling economic case for encouraging greater use of BIM in Australia -widespread adoption would make a significant difference to national economic performance, thus BIM has macroeconomic significance.
- BIM requires new ways of collaborating and interacting in what is historically a very fragmented sector –Integrated Project Delivery.
- There are a number of market failures affecting the uptake of BIM, including split incentives and commercial constraints of IP ownership, security of data and multi-user access.

“Productivity in the Building Network : Assessing the impacts of BIM Report” -

Recommendations

- Develop new contractual frameworks that encourage collaboration when using BIM.
- Develop a national strategy for BIM implementation including plans, targets and guidelines.
- Encourage the development of national standards for BIM.
- Encourage the creation and maintenance of intelligent object libraries that comply with national BIM standards.
- Reduce BIM related skills gaps in the current and future Buildings Network workforce.

BEIIC Recommendations Report 2010

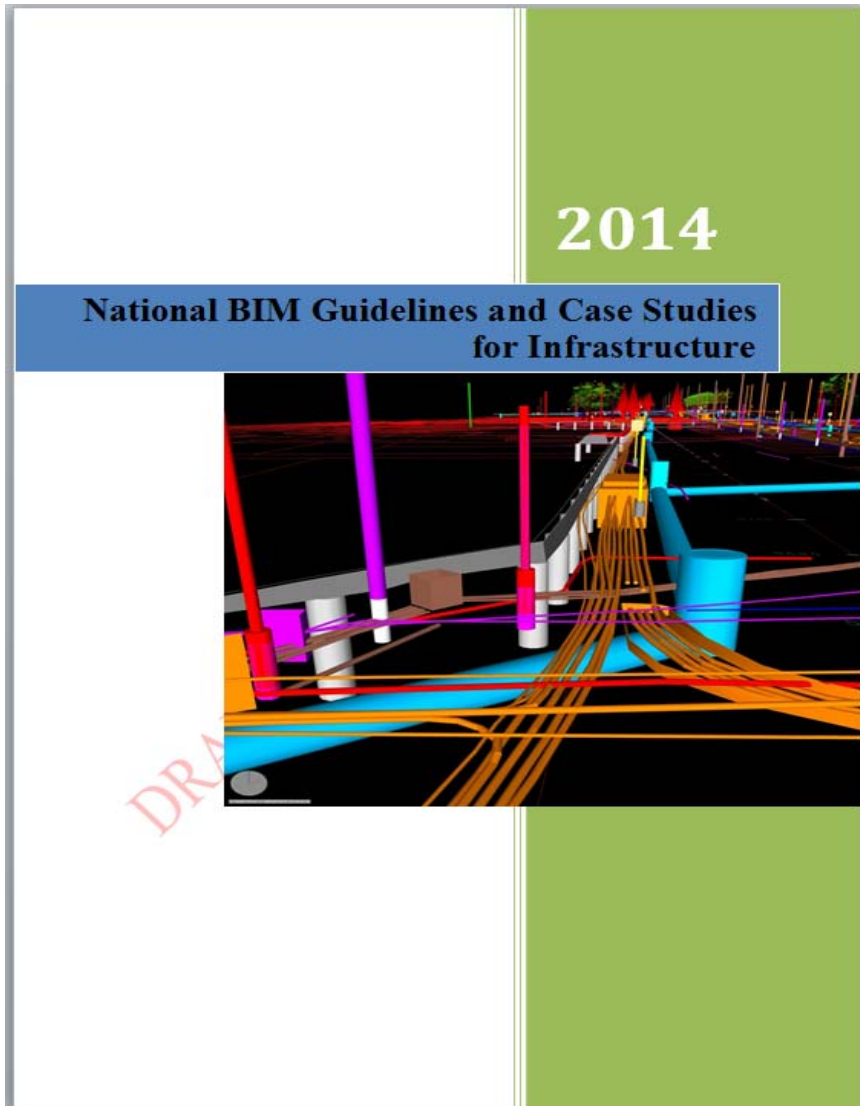
- Outlines ten recommendations across four themes, Better Practice; Cooperative Research, Design Leadership, Enabling Regulation and Procurement.
- Recommendation 2: Encourage industry-wide use of BIM and support pilot projects that demonstrate the benefits of applying new technologies.
- Recommendation 10: Consider BIM as a key part of the Government procurement process.

- Productivity in the Buildings Network: Assessing the Impacts of Building Information Models Report;
- BEIIC 2010 Recommendations Report;
- Report URL: www.innovation.gov.au/beiic

Existing BIM Initiatives in Australia

- NATSPEC has first draft of National BIM Guidelines incorporating the Project BIM Brief and the BIM Reference Schedule. -Air-conditioning and Mechanical Contractors Association BIM MEP AUS program of work for mechanical, electrical and plumbing services sector.
- Australian Procurement and Construction Council and Australian Construction Industry Forum are developing Guidelines for Integrated Project Teams, and developing policies for the involvement of contractors in the design phase.
- Building Smart which is proposing the establishment of a National Technology Implementation Program to implement building information model technology and improved information networks in the construction sector.
- Queensland Dept of Public Works is piloting integrated project delivery with early engagement of specialist trade and services contractors in the

National BIM guidelines and case studies for infrastructure



- Main roads
- Highways
- Bridges
- Tunnels
- Railways



ENGINEERS
AUSTRALIA



National BIM guideline and case studies for Infrastructure



Contents

1	Introduction	9
1.1	What is BIM?	9
1.2	Purpose and Scope	9
1.3	Existing relevant guidelines	9
1.4	Terms and definitions	10
1.4.1	Industry Foundation Class (IFC)	10
1.4.2	City Geography Markup Language (CityGML)	10
1.4.3	Construction Operations Building Information Exchange (COBie)	10
1.4.4	Level of detail (LOD)	11
1.4.5	Interoperability	11
1.4.6	Model element author (MEA)	11
1.4.7	Model element	11
1.4.8	Request for information (RFI)	11
2	BIM uses in infrastructure	13
2.1	BIM uses in design stage	13
2.1.1	Site analysis	13
2.1.2	Design authoring	13
2.1.3	Surface analysis	13
2.1.4	Land survey	13
2.1.5	Performance forecasting	14
2.1.6	Constructability reviews	14
2.1.7	Design reviews	14
2.1.8	Visualisation	14
2.1.9	Design changes	14
2.1.10	Design evaluation	14
2.1.11	Design integration	14
2.1.12	Quantity take-off	14
2.1.13	Cost estimation	14
2.1.14	Code validation	15
2.1.15	Structural analysis	15
2.1.16	Point clouds	15
2.1.17	Signal sighting	15
2.1.18	Traffic simulation	15
2.2	BIM uses in construction stage	16
2.2.1	Field survey	16
2.2.2	Site layout and logistics	16
2.2.3	Virtual scheduling and work planning	16
2.2.4	Construction inspection	16
2.2.5	Material management	16
2.2.6	Progress tracking	16
2.2.7	Quality tracking and reporting	17
2.2.8	Safety planning and control	17
2.2.9	Cost control	17
2.2.10	Equipment management	17
2.2.11	Digital fabrication	17
2.3	BIM uses in operation and maintenance stage	18
2.3.1	Maintenance scheduling	18
2.3.2	System analysis	18
2.3.3	Asset management	18
2.3.4	Disaster planning	18
2.3.5	Record modelling	18
2.3.6	Event planning	18
2.3.7	Road and rail management	19
2.3.8	Transportation management system	19
2.3.9	Traffic volume simulation	19
2.3.10	GIS asset tracking	19
2.3.11	Water mitigation and planning	19

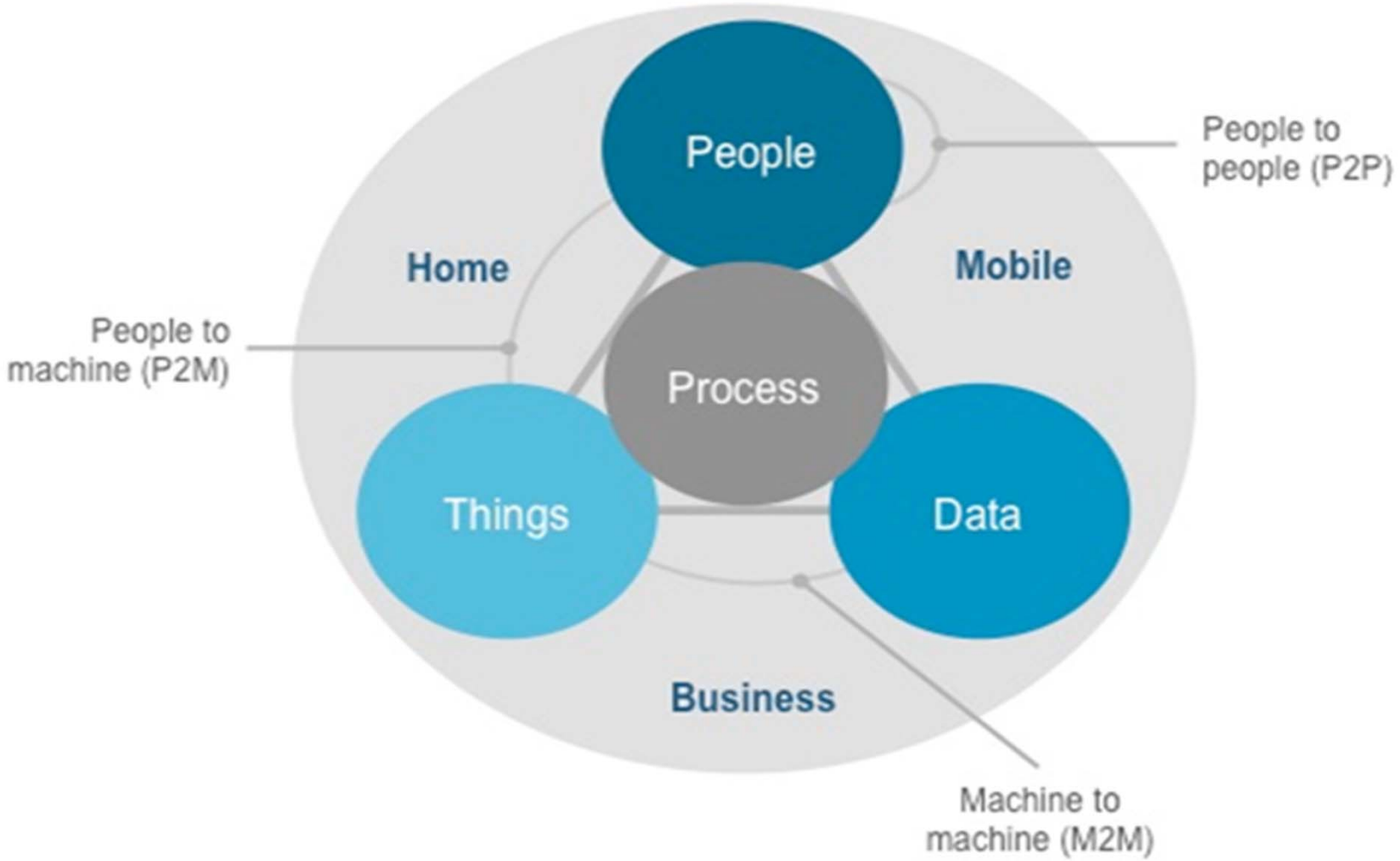
Contents (continued)

3	BIM model development	21
3.1	Transportation (main road, highway and railway)	21
3.2	Bridge model	22
3.3	Tunnel model	22
3.4	LODs and LOD6 development	23
4	BIM model management	27
4.1	Modelling guidelines	27
4.1.1	BIM element modelling	27
4.1.2	Model orientation and site configuration	27
4.1.3	Model division and structure	27
4.1.4	Revision management	27
4.2	BIM model assessment and quality control	27
4.2.1	Model division and structure	30
4.2.2	Model delivery schedule for information exchange	30
4.3	Electronic communication procedures	30
4.4	Interactive workspace	30
4.5	Technology infrastructure needs	30
4.6	Revision management	31
5	BIM collaboration	33
5.1	BIM roles and responsibilities	33
5.1.1	BIM project manager	33
5.1.2	Design BIM manager	33
5.1.3	Construction BIM manager	34
5.1.4	BIM coordinator	34
5.2	Individual discipline modelling	36
5.3	Cross-disciplinary model design	36
6	BIM relevant issues	41
6.1	Different BIM models	41
6.2	Duplication	41
6.3	Ownership	41
6.4	Designer's liability exposure	41
6.5	Professional terms of engagement	41
6.6	Risk profile	42
6.7	Mindset and approach	42
6.8	Information technology	42
6.9	Cost	42
6.10	Owner	42
6.11	Designers	42
6.12	Contractors	42
6.13	Level of detail	42
6.14	Contractual implications	43
6.15	Insurance / bond markets	43
7	Case studies	45
7.1	Case study 1	45
7.2	Case study 2	47
Appendix A – BIM guidelines		51
Appendix B – BIM tools		57
References		63

Internet of Everything (IoE)

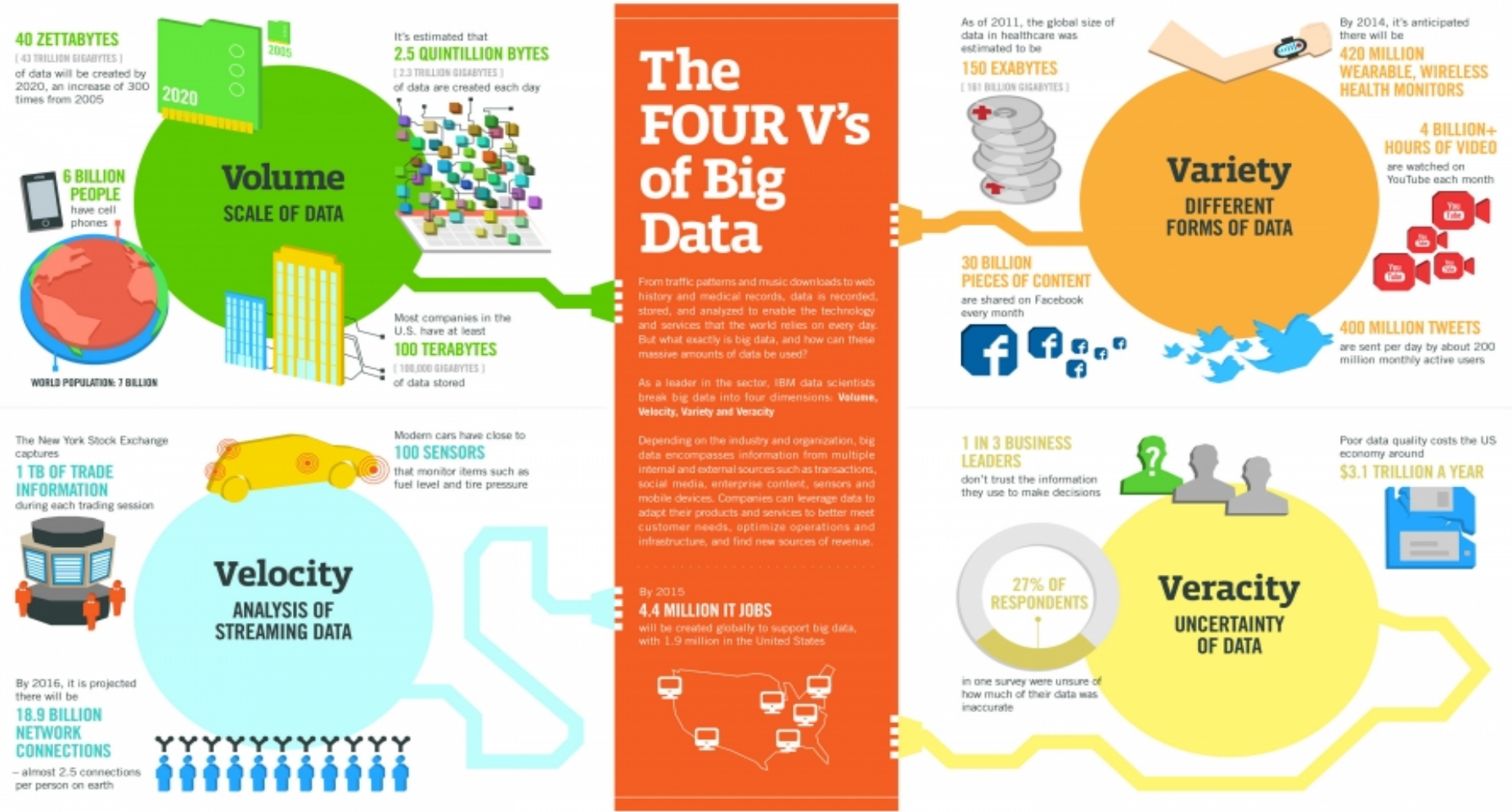


Internet of Everything



Big Data

Big Data becomes a key basis of competition, underpinning new waves of productivity growth and innovation



Sources: McKinsey Global Institute, Twitter, Cisco, Gartner, EMC, SAS, IBM, MEPTEC, GIG





Curtin University

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CONTACT

Please direct all enquiries and Expressions of Interest to:

Martijn Truijens
Lean Construction Technology Advisor
Woodside Energy Ltd

Adjunct Professor
Curtin University

Chair, Lean Construction Institute WA

Tel: +61 8 9348 7036
Fax: +61 8 9214 2717
Email: martijn.truijens@woodside.com.au

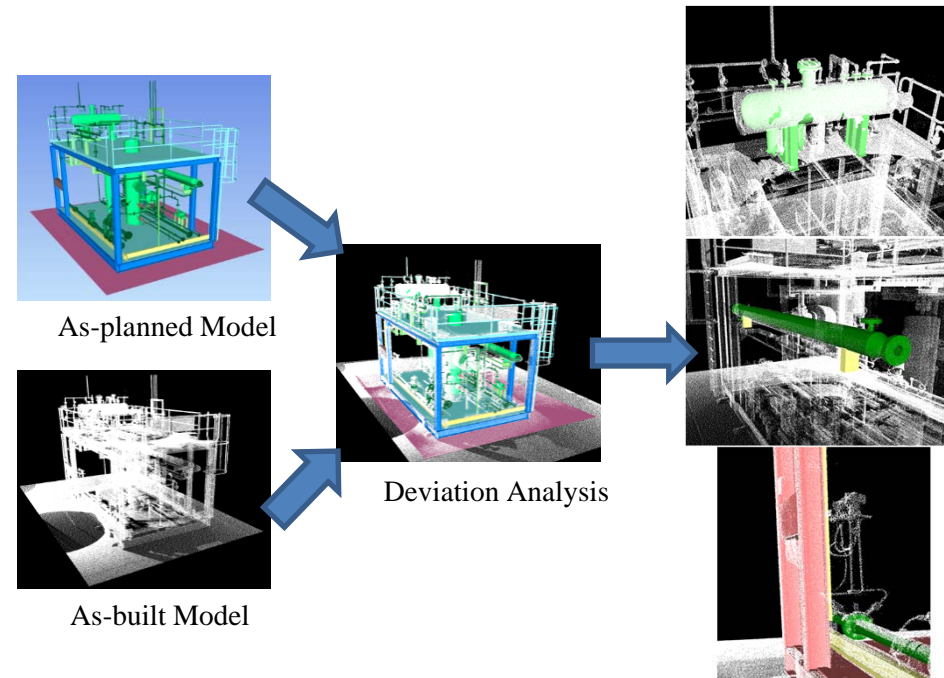
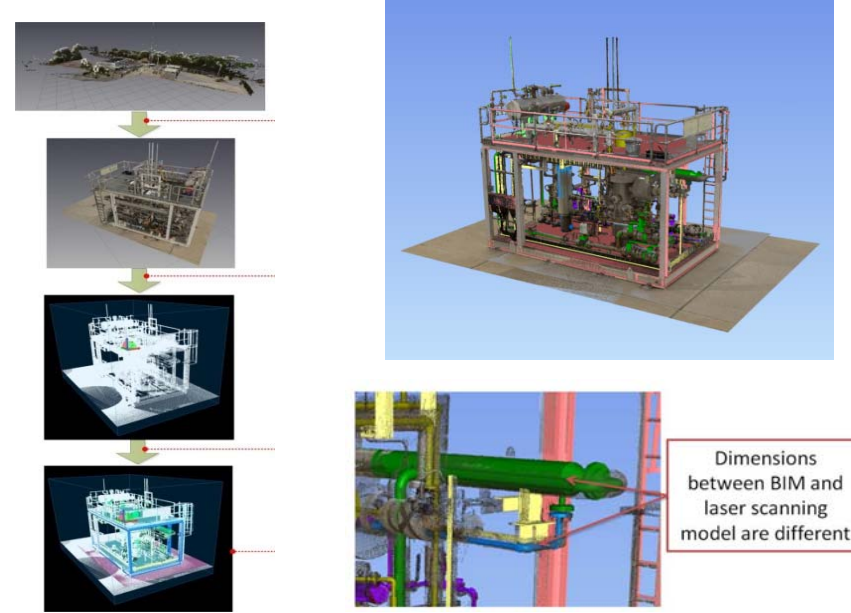
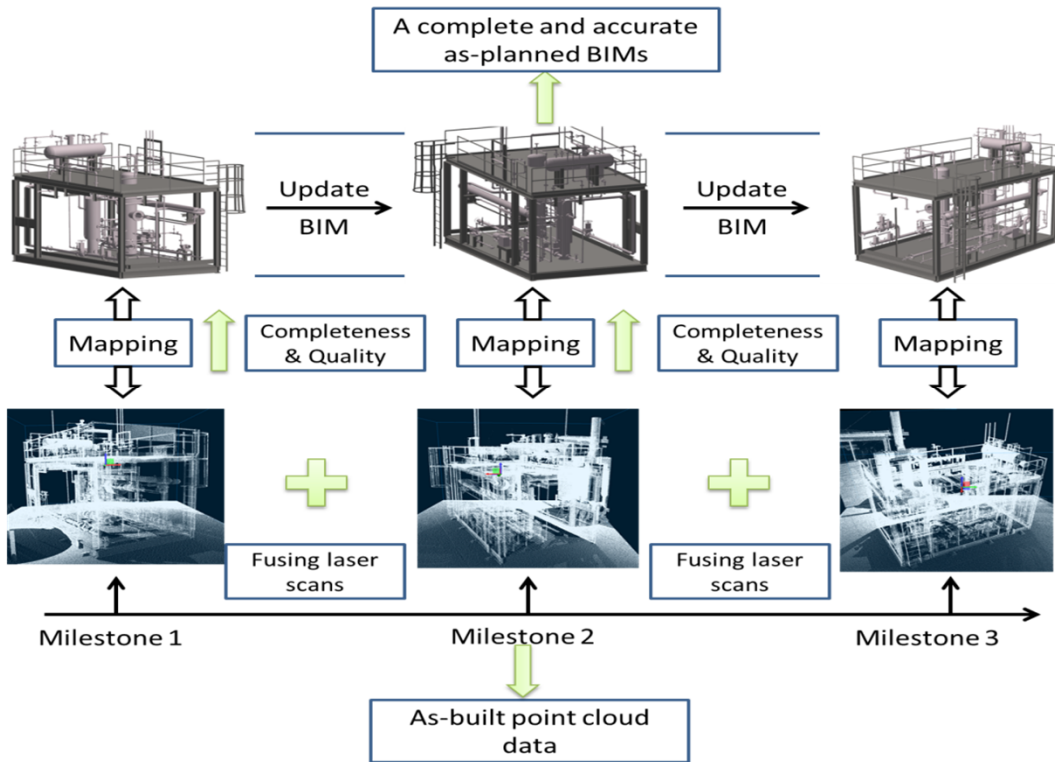
PROJECT ECHO LEAN CONSTRUCTION RESEARCH

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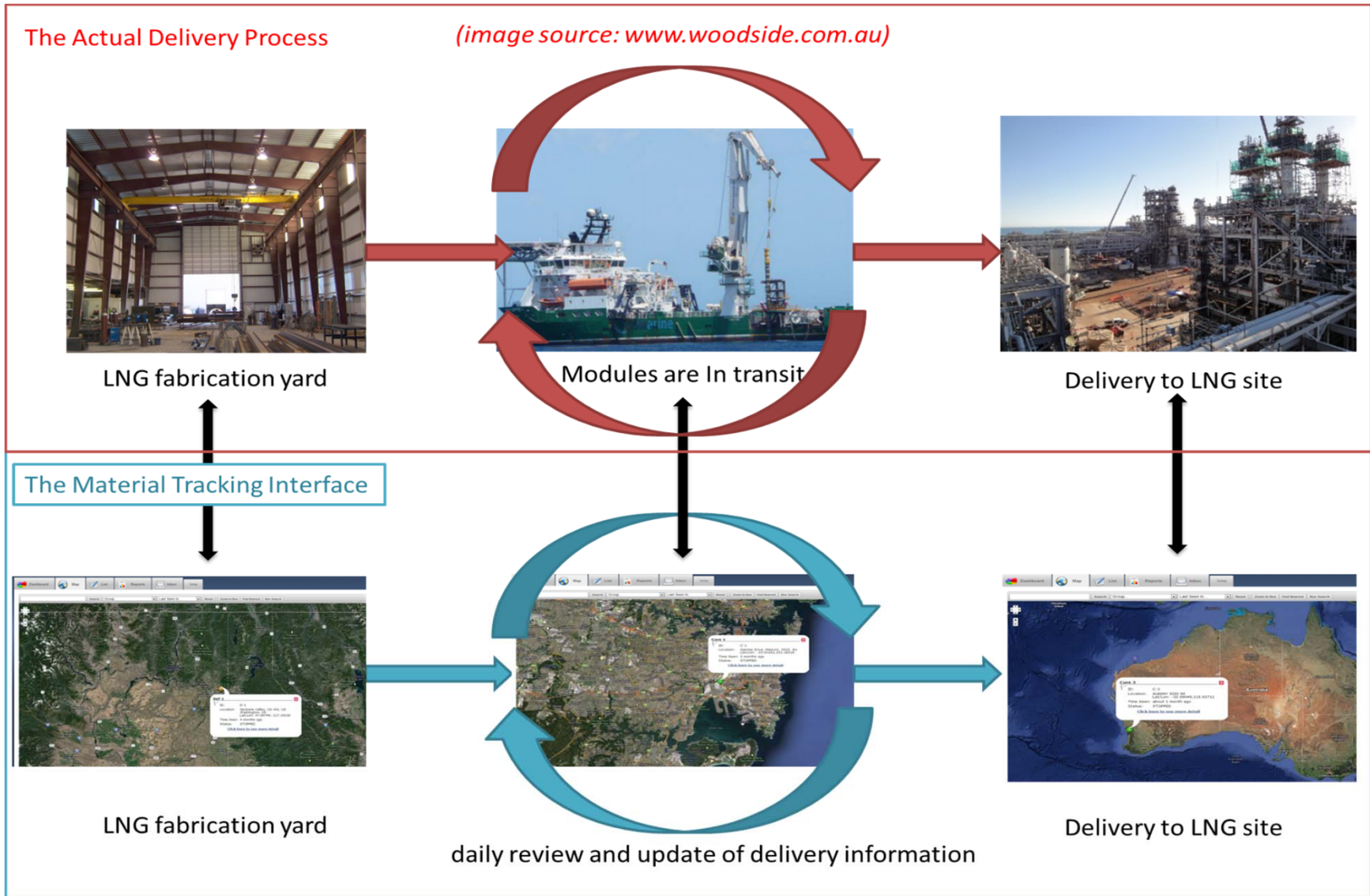
Make tomorrow better.



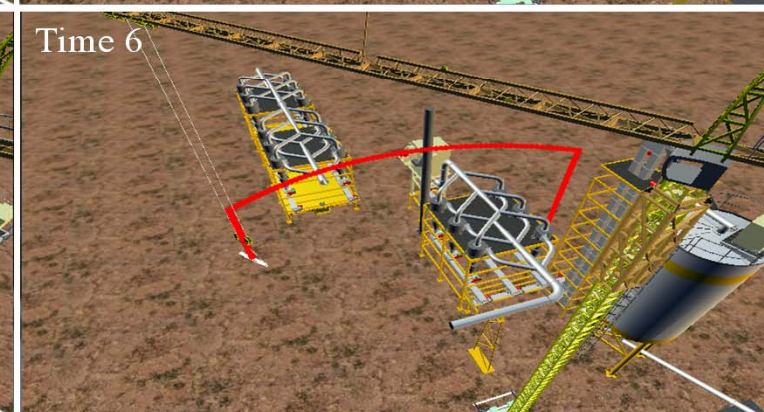
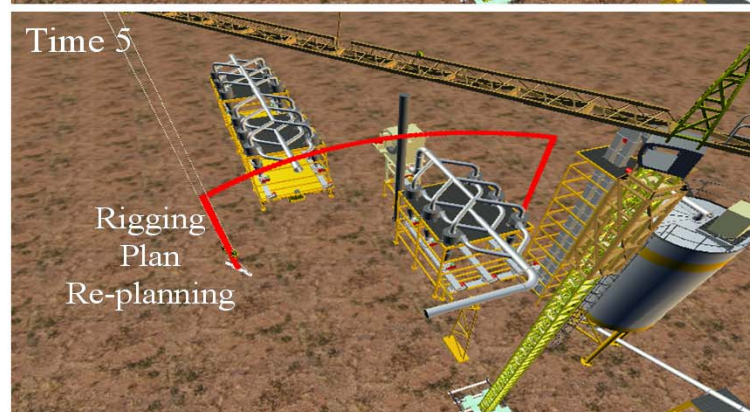
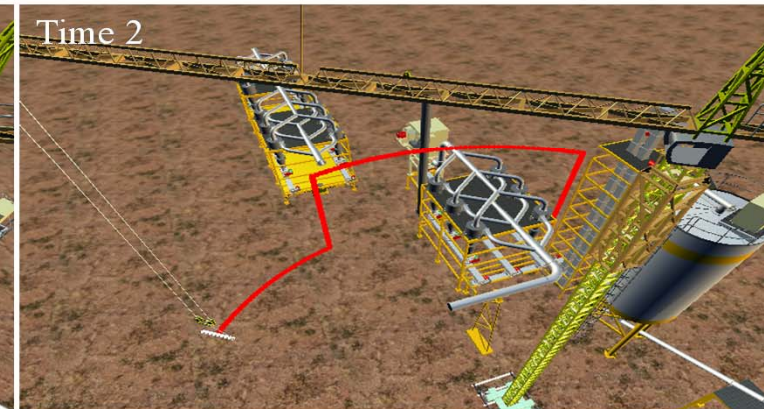
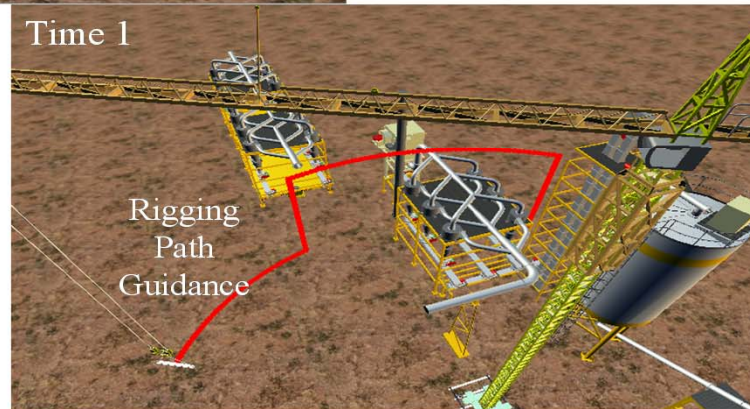
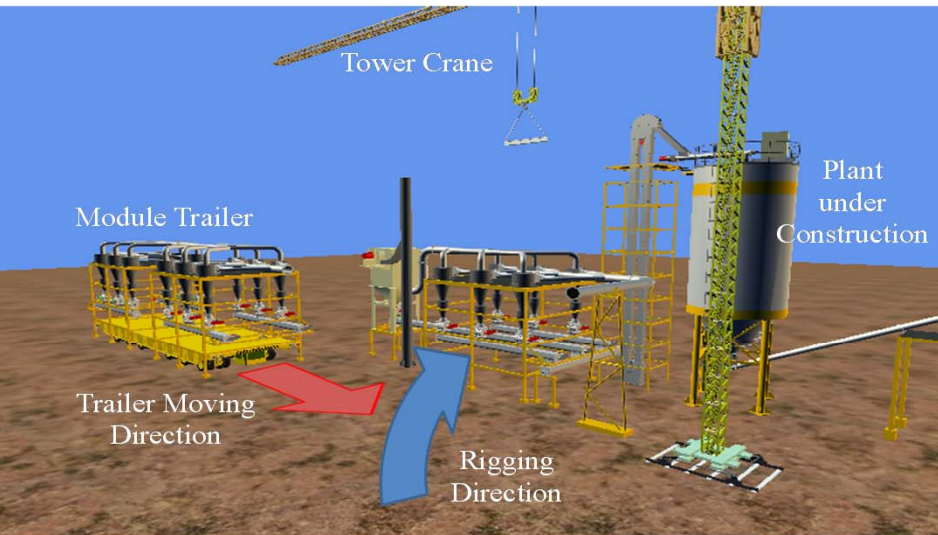
Quality and Progress Checking (Laser Scanning + BIM)



Real Time Materials Tracking (GPS+GIS+BIM+RFID+Barcoding)



Real-time Path Re-planning of Operations in Construction



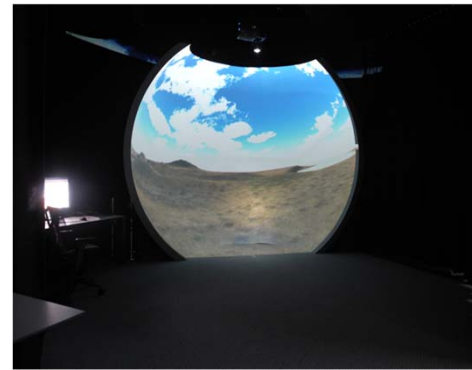
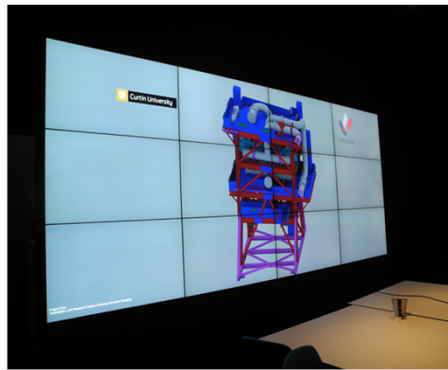
The Australasian Joint Research Centre for BIM



The **Australasian Joint Research Centre for BIM** at Curtin University is the first and strongest university-based BIM centre in Australia. It consists of a physical BIM research suite/lab, an advisory board and large research team.

The BIM Centre also has privileged access to the **Hub for Immersive Visualisation and eResearch**

The BIM Research Centre at Curtin



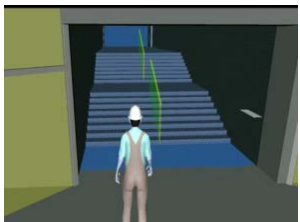
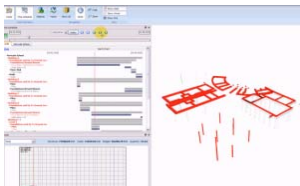
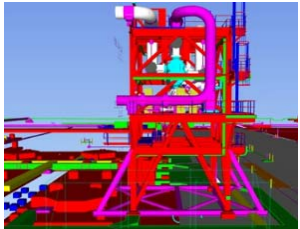
Hub for Immersive Visualisation and eResearch

Key Facts of the BIM Centre

- **40 full time academic positions**
- **AUD \$6 million research funding for three years, including two ARC linkages**
- **200 technical journal articles over the past five years**
- **Connections with over 50 overseas universities**
- **30 industry partners**
- **Industrial test beds at various scales**

Australasian Joint Research Centre for Building Information Modeling (BIM)

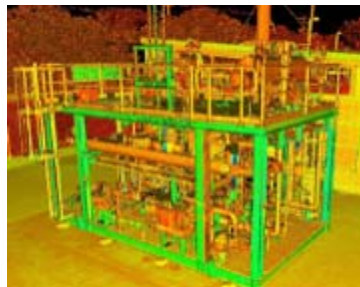
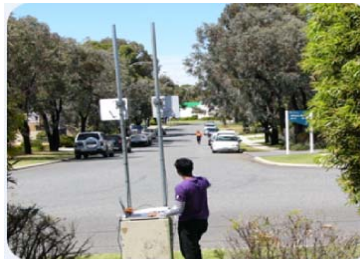
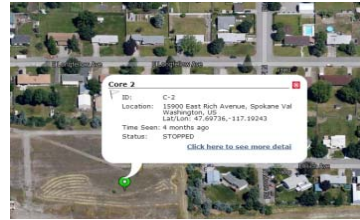
Group 1: BIM



Group 2: Visualization and Interaction



Group 3: Sensing and Tracking



Group 4: Innovation Management

Construction Contract

This agreement made this (1) day of (2) 19 (3), by and between (4) of (5) herein referred to as "owner", and (6) of (7) herein referred to as "contractor". Owner and contractor in consideration of the mutual covenants hereinafter set forth agree as follows:

SECTION ONE: STRUCTURE AND SITE
Contractor shall furnish all labor and materials necessary to construct a (8) upon the following described property, which owner warrants he owns, free and clear of liens and encumbrances: (9)

SECTION TWO: PLANS
Contractor shall construct the structure in conformance with the plans, specifications, and breakdown and binder receipt signed by contractor and owner, and will do so in a workmanlike manner. Contractor is not responsible for furnishing any improvements other than the structure, such as landscaping, grading, walkways, painting, sewer or water systems, steps, driveways, patios and aprons, etc., unless they are specifically stated in the breakdown.

SECTION THREE: PAYMENT
Owner shall pay contractor the sum of (10) Dollars (\$) in installments.



Group 5: Operation Study



CPM	Spent	Reach
Auto	\$72.70	55,657
Auto	\$43.48	24,937
Auto	\$40.98	35,963
Auto	\$35.33	0
Auto	\$31.80	33,850
Auto	\$27.54	12,934
Auto	\$27.46	32,029
Auto	\$20.60	19,311
Auto	\$20.52	0
Auto	\$17.51	0
Auto	\$16.85	0



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Prof. Xiangyu Wang

Email: xiangyu.wang@curtin.edu.au

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