



Productivity in the built environment: Assessing the impacts of BIM

Presentation to the
buildingSMART Australasia
National Conference Series 2011

Mayela Garcia

Sydney, 4 April 2011

Study aims

- Review the current state of play in the construction process
- Assess how BIM may improve construction processes and sustainability
- Identify the costs and benefits of BIM adoption
- Estimate the economy-wide impacts that widespread adoption of BIM would have on the Australian economy and particular industries

The buildings network

➔ Defined in this study as:

Those players and activities that relate to the whole life of a building and who can generate large amounts of data that need to be shared during a building's lifecycle, including architects, engineers, builders and contractors and owners and facility managers.

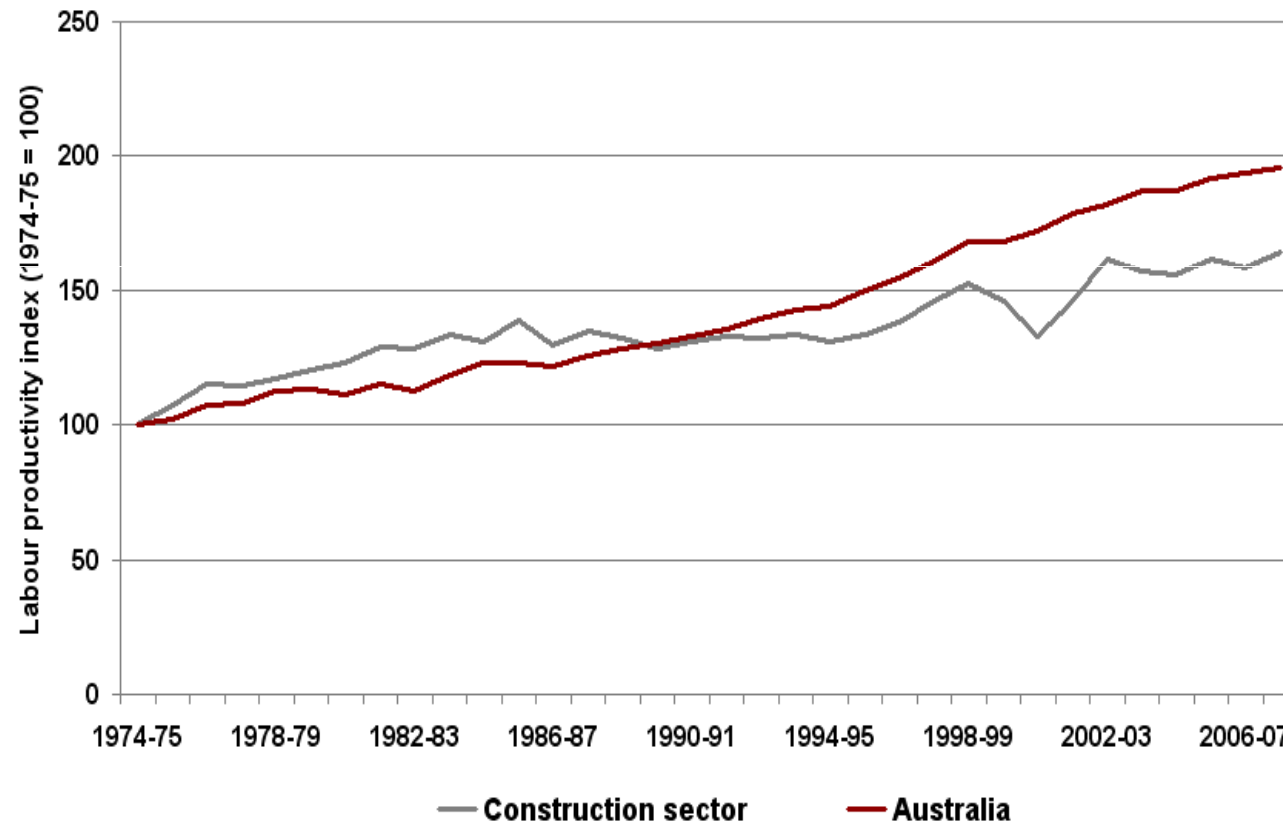
➔ The buildings network is the focus of this study

Current state of play in the buildings network

- 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

Current state of play in the buildings network

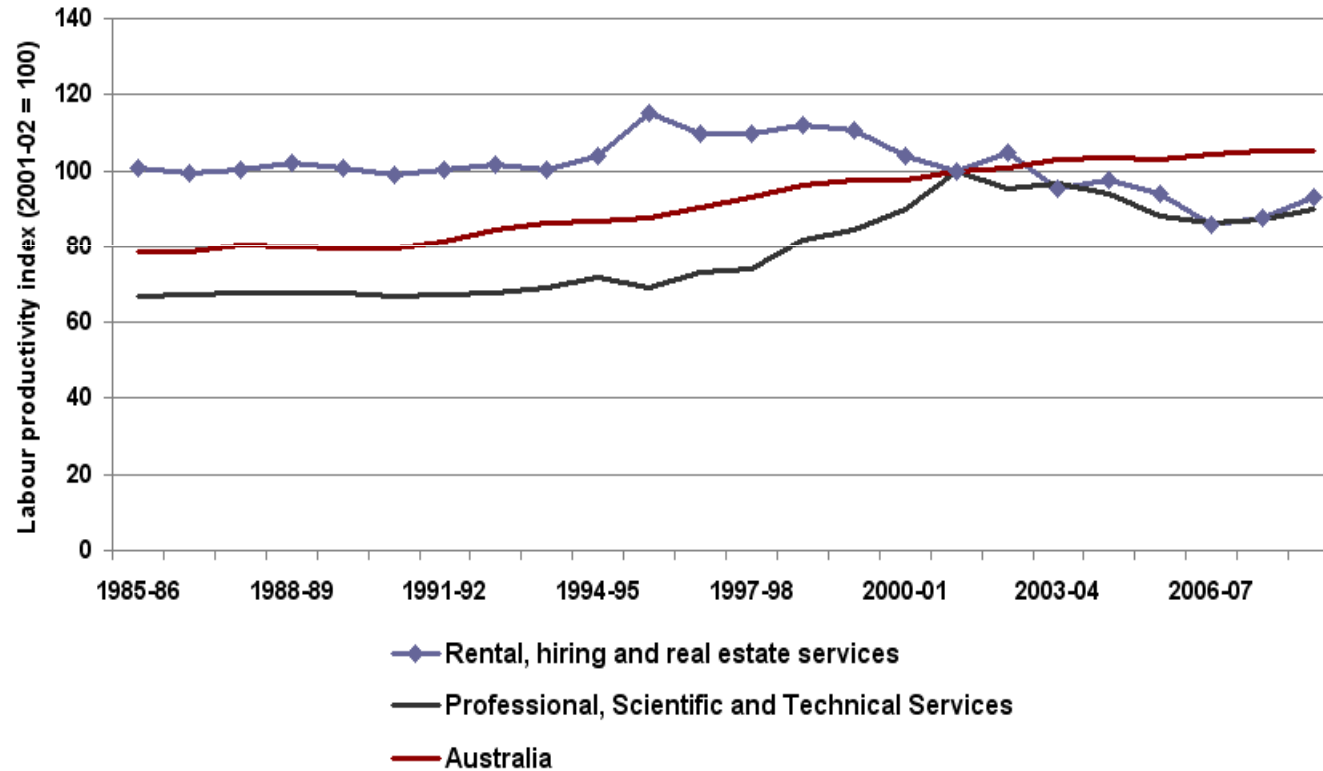
Construction sector labour productivity



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

Current state of play in the buildings network

Labour productivity in selected sectors of the buildings network



Note: The rental, hiring and real estate services sector includes residential and non-residential property owners, while the professional, scientific and technical services sector includes architectural and engineering services.

Source: Allen Consulting Group analysis based on ABS data.

An industry perspective: benefits of BIM adoption

- BIM offers the potential for many direct and indirect benefits to the buildings network industry
 - improved information sharing
 - time and costs savings that can be directly translated into productivity gains
 - improved quality
 - greater transparency and accountability in decision making
 - increased sustainability
 - labour market improvements

An industry perspective: costs of BIM adoption

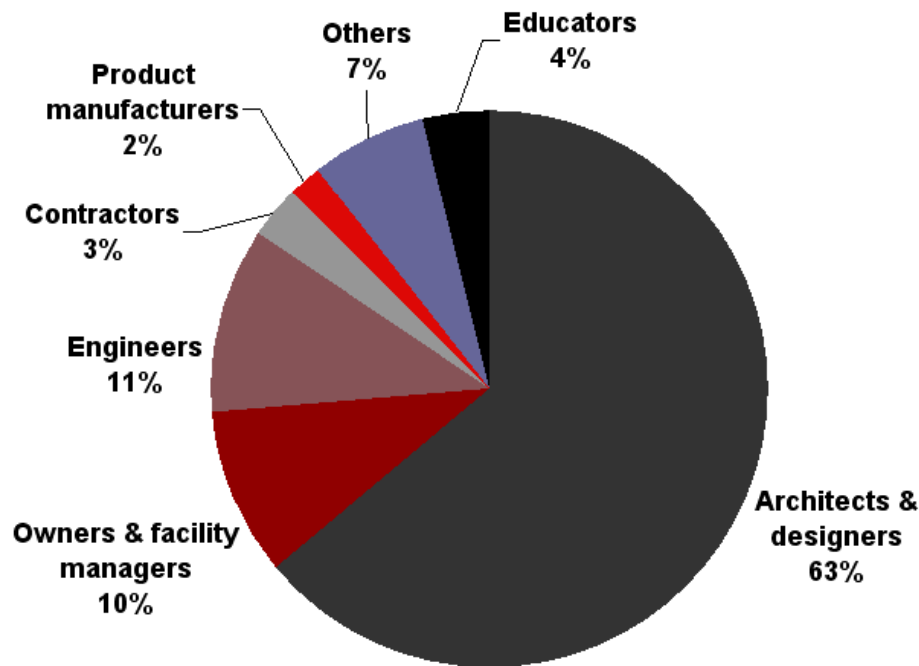
- Perceived costs of adopting BIM technology include:
 - education and training costs
 - administration and start up costs
 - transition and behavioural costs
- These costs are common to the adoption of many new technologies
- Users perceive the benefits to outweigh the costs involved
- Industry stakeholders indicated that the marginal cost of BIM software compared to current 3D CAD is not significant

BIM in Australia: BIM survey 2010

- The first BIM survey in Australia
- Conducted by buildingSMART Australasia, the School of Natural and Built Environment and NATSPEC
- Voluntary, conducted by sending uncontrolled emails via professional organisations
- Limitations of the survey mean that results cannot be treated as representative
- However, it provides useful insights into the costs and benefits of those existing BIM users

BIM in Australia: BIM survey 2010

Survey respondents



- 400 responses received
- Architects and designers made up the majority of respondents
- Next best-represented industries were engineers and owners & facility managers

Source: buildingSMART Australasia et al. 2010

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
- Cost of BIM adoption
 - 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

BIM in Australia: BIM survey 2010

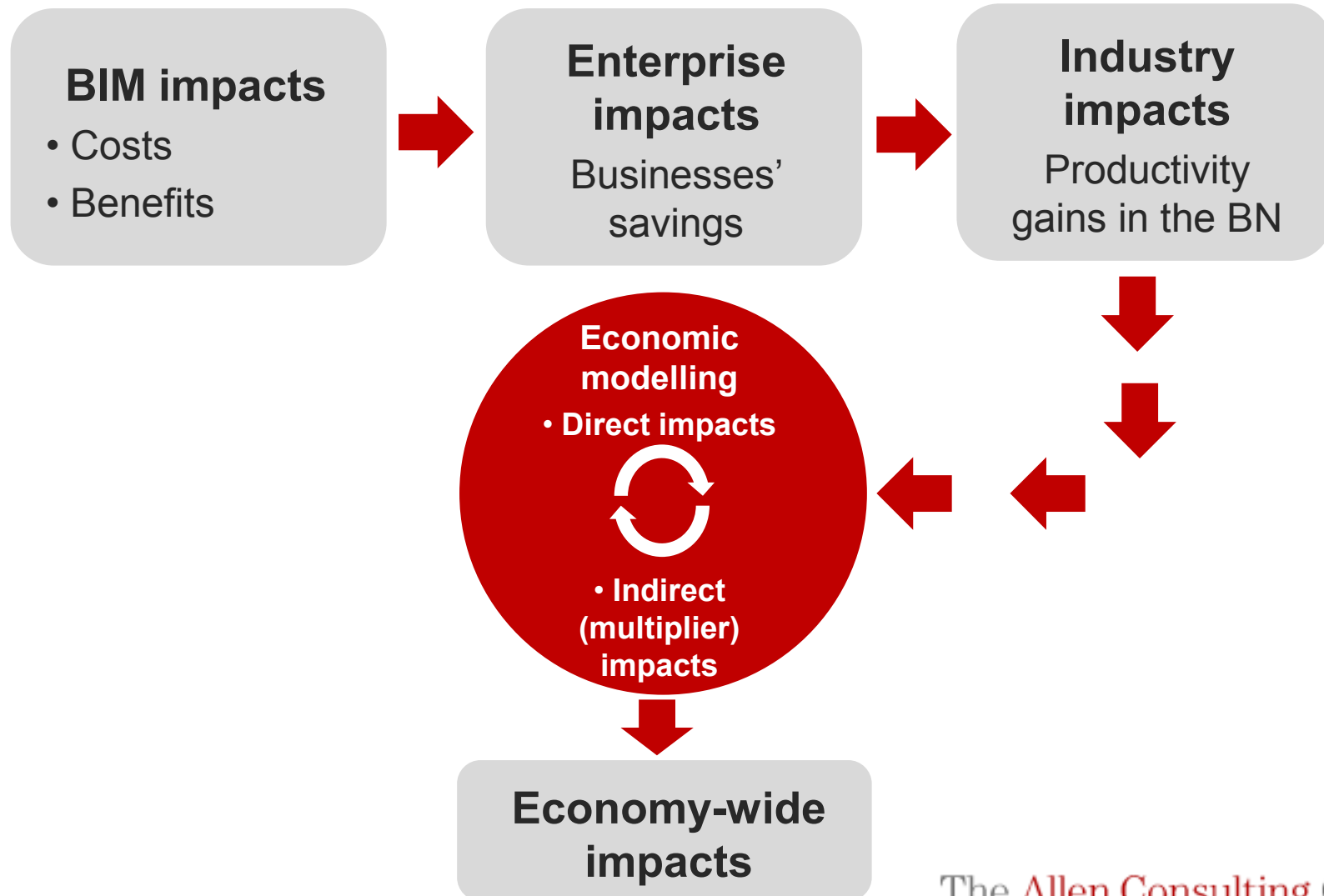
➤ Benefits of BIM adoption

- Overall, more than 50% of respondents reported that they have experienced some cost reduction
- Reduction in repetitions and time spent in non-value tasks are the two most prominent benefits of BIM

	Reduce delivery timeframe	Reduce variations	Reduce man-hours	Reduce repetitions	Reduce non-value tasks
No	21%	21%	30%	14%	14%
Don't Know	26%	35%	17%	13%	9%
Yes, up to 10% saving	14%	17%	16%	18%	22%
Yes, 10-15% saving	16%	10%	15%	22%	24%
15-30% saving	15%	10%	14%	28%	26%
Other (>30% saving)	7%	7%	8%	6%	5%

Source: Allen Consulting Group analysis based on buildingSMART Australasia et al. 2010

Measuring the impacts of BIM: modelling approach



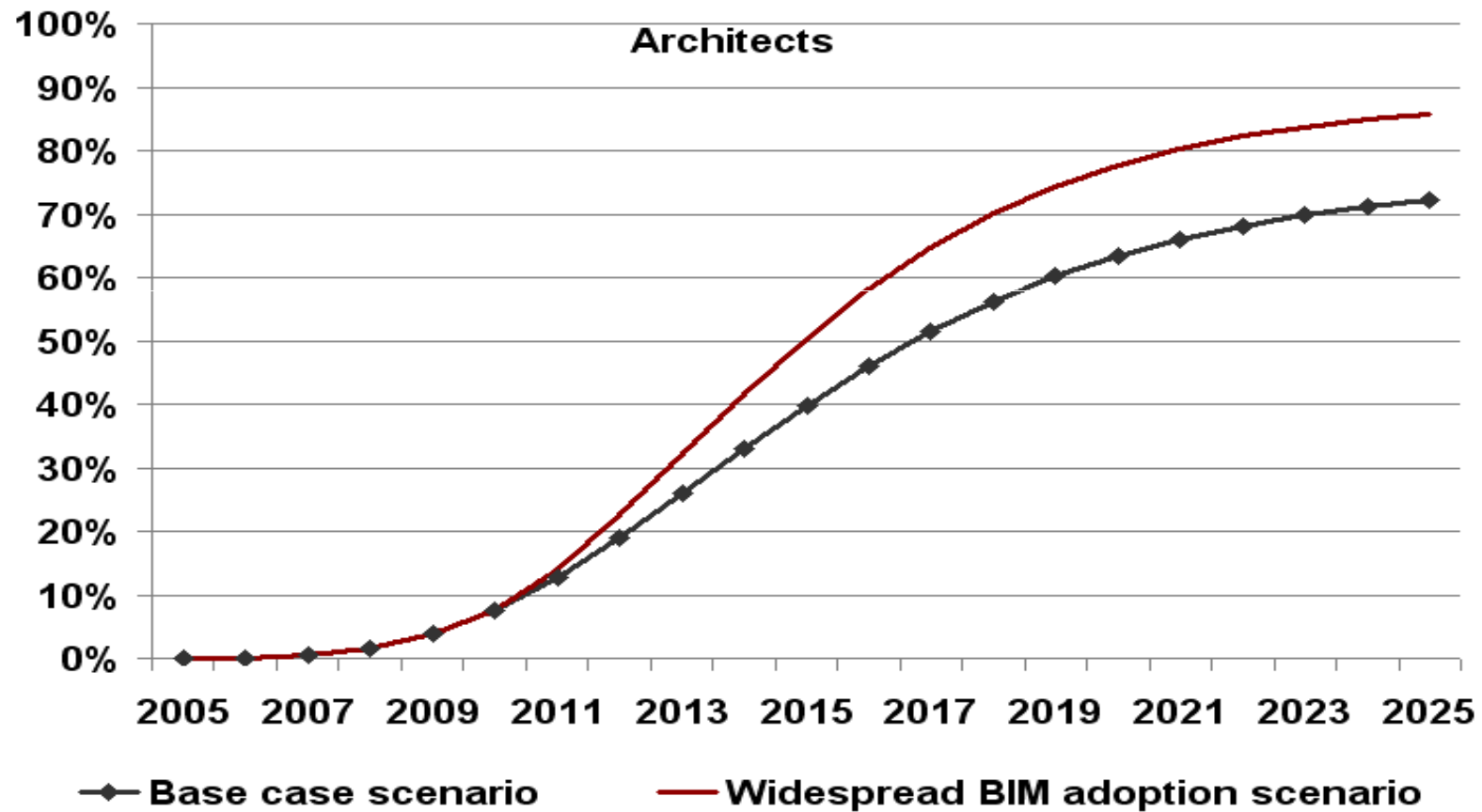
Measuring the impacts of BIM: modelling approach

1. Define scenarios

- 'Business as usual' (BAU) scenario
 - current BIM market settings, no major changes in industry
 - a future background level of adoption of BIM
- Widespread BIM adoption scenario
 - there is accelerated widespread adoption of BIM

Measuring the impacts of BIM: modelling approach

Gompertz adoption curves



Measuring the impacts of BIM: modelling approach

2. Calculate modelling inputs

- Productivity gain in each sector

2. Undertake economy-wide modelling

- Using a model that provides a high level representation of the Australian economy
- Enables measurement of the wider effects of changes in economic activity in key industries
- Widely known and used by the PC, Treasury and other government agencies

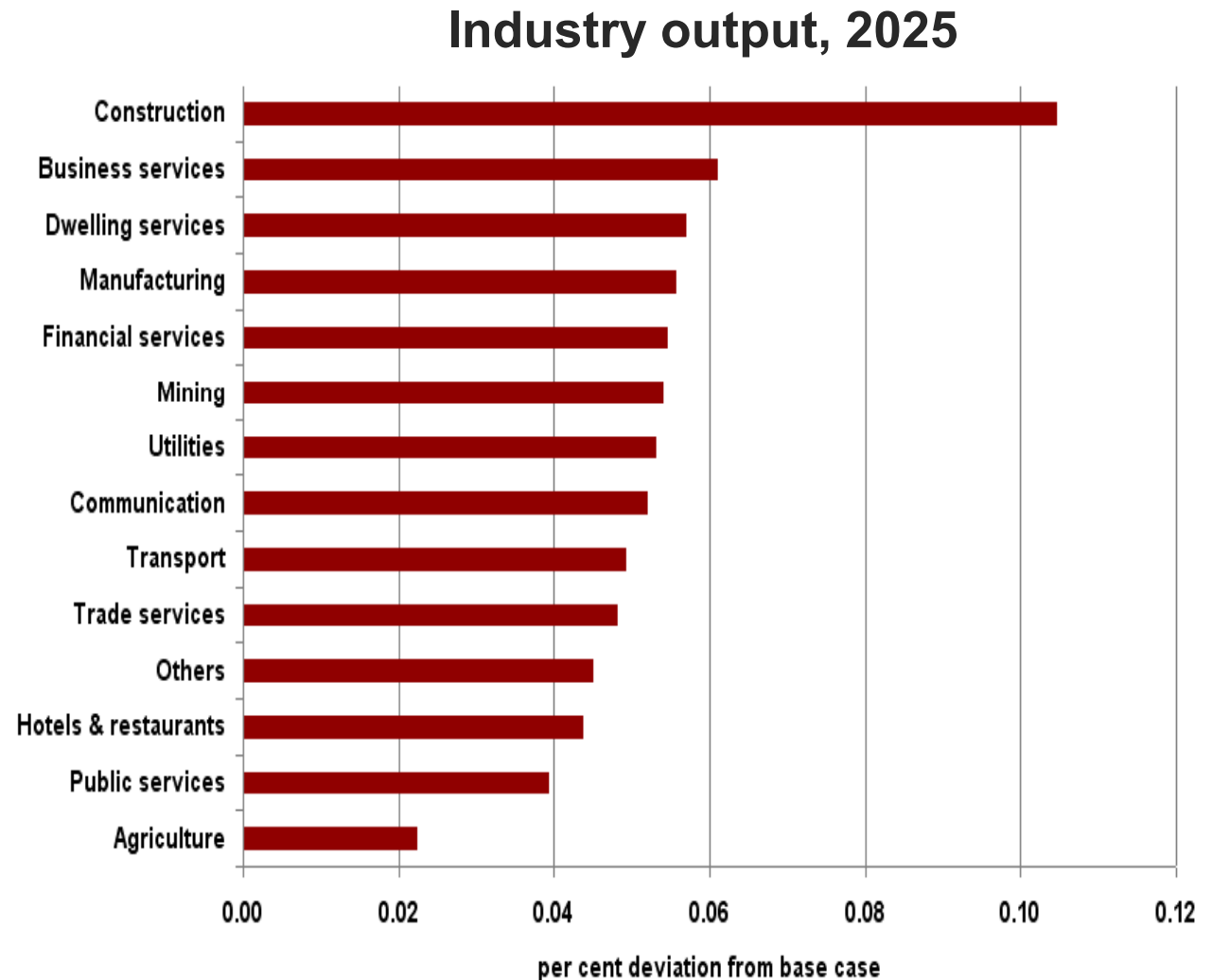
Benefits of change: national impacts

- ➔ 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

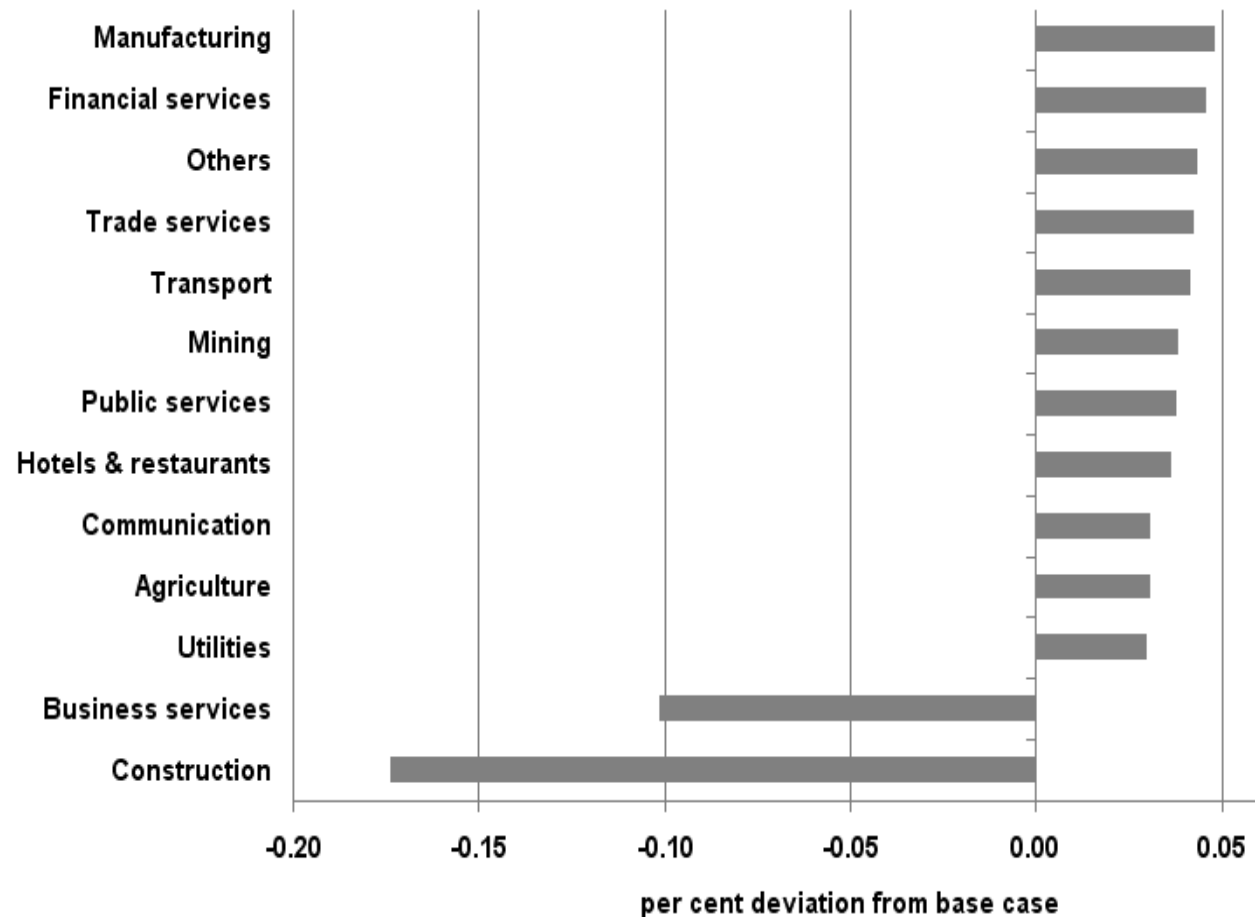


Source: Allen Consulting Group, 2010.

Benefits of change: industry impacts

- Productivity improvements = same output with less labour
- Number of jobs in the buildings network would be lower
- Labour is re-distributed to other sectors of the economy

Industry employment, 2025



Source: Allen Consulting Group, 2010.

Benefits of change: **sensitivity analysis**

- Economic impacts vary in magnitude depending on the productivity estimates used
- Widespread BIM adoption consistently translates into higher economic output, higher living standards and higher investment

	Lower	Average	Upper
GDP (\$, Bn)	\$1.04	\$4.79	\$7.63
Consumption (\$, Bn)	\$0.33	\$1.44	\$2.28
Investment (\$, Bn)	\$0.64	\$3.02	\$4.83

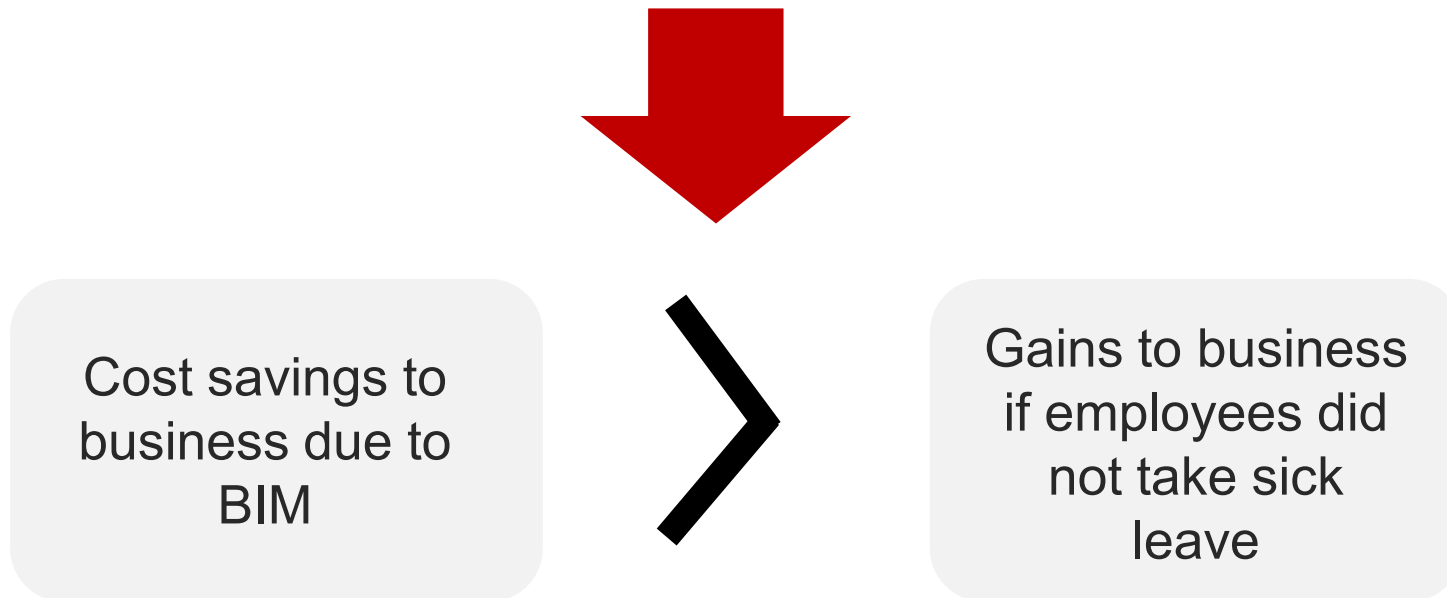
Source: Allen Consulting Group, 2010.

Benefits of change: **BIM impacts in perspective**

➤ Cost-savings to businesses

➤ BIM: 5.5% - 9.6%

➤ Healthy workplace (no sick leave): 4.3%



Benefits of change: **BIM impacts in perspective**

- 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.

Conclusions

- BIM has macroeconomic significance
- Achieving accelerated widespread adoption of BIM:
 - would be an important stepping-stone towards raising the overall productivity of the economy
 - would make a significant difference to national economic performance
 - would raise economic wellbeing of the Australian community
- There is a compelling case for encouraging greater use of BIM in Australia
- However, there are many factors that currently impede accelerated widespread adoption of BIM in Australia

Mayela Garcia, Principal Consultant

mgarcia@allenconsult.com.au

Level 1, 50 Pitt Street

Sydney, NSW 2000

Tel: +61 2 8272 5100

Fax: + 61 2 9247 2455

www.allenconsult.com.au
