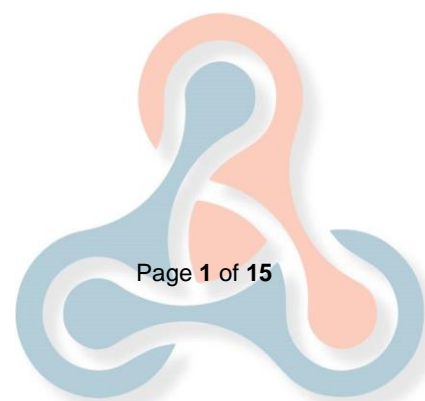




**Submission to Australian Government | Department
of Industry, Innovation and Science**

DIGITAL ECONOMY STRATEGY



ABAB Representatives

Australasian Procurement and Construction Council Inc.
NATSPEC

Standards Australia

Department of Health, New South Wales

Ministry of Business, Employment and Innovation, New Zealand

Victorian Department of Economic Development, Jobs, Transport and Resources

Department of Infrastructure, Local Government and Planning

Infrastructure Australia

University of Sydney

CSIRO, Data 61

GRC Quantity Surveyors

Australian Institute of Quantity Surveyors

Australian Construction Industry Forum

buildingSMART

Government of Western Australia

Northern Territory Government

Department of Defence

Department of Finance, Services and Innovation, New South Wales

Austrroads

Australian Local Government Association

University of Technology Sydney

Clayton Utz

Urban Circus Pty Ltd

Australian Universities Building Education Association



About Us

The Australasian BIM Advisory Board (ABAB) is a first for the Australasian building sector with government, industry and academia partnering to provide leadership to improve productivity and project outcomes by taking a leadership and coordinating role in the consistent adoption of BIM and associated integration and collaborative processes. Refer to Appendix 1 for more information.

Recommendations

For the reasons outlined in this submission, the Australasian BIM Advisory Board (ABAB) recommends that the Federal Government adopt the following points and include them in the Digital Economy Strategy:

- **Acknowledge the significant benefits which will accrue from the widespread adoption of Building Information Modelling (BIM) in the Architecture, Engineering and Construction (AEC) and asset management sectors**
- **Acknowledge the continual improvements in BIM technology being developed by industry nationally and internationally**
- **Support the development of consistent national BIM standards which align with the relevant international standards to provide certainty to industry**
- **Request the use of BIM on all major government infrastructure projects in line with the Productivity Commission recommendation**
- **Support the work of the Australasian BIM Advisory Board (ABAB) and other peak groups seeking to facilitate the adoption of BIM in Australia**
- **Inclusion of the Australasian BIM Advisory Board (ABAB) in discussions with government on the direction of digital transformation in the AEC and asset management sectors**
- **In conjunction with the states and territories provide funding to support the widespread adoption of BIM, including funding for an entity bringing together industry, government and academia to further research, education and training in BIM (in a similar way to the Industry Growth Centre for Mining Equipment, Technology and Services METS).**

Disclaimer

The ABAB is committed to improving productivity and asset outcomes by taking a leadership and coordinating role in the consistent adoption of BIM and associated integration and collaborative processes. While the ABAB has made every reasonable effort to report current and accurate information, the ABAB however accepts no responsibility for the accuracy or completeness of any information contained in this submission and recommends that users exercise their own skill and care with respect to its uses.

We encourage readers to check with the nominated contact person/s if you have any concern about the information herein. In some cases, the information contained may incorporate or summarise views, guidelines or recommendations of third parties. Such material is assembled in good faith, but does not necessarily reflect the considered views of the ABAB, or indicate a commitment to a particular course of action.

Introduction

The Australian construction sector is the largest non-services sector of the Australian economy, accounting for 8.1% of GDP. Construction employs 1.1 million Australians – more than five times as many as the mining industry. A further 100,000 jobs are projected to be added by the sector over the five years to 2022, with employment growth forecast at 10.9% (Source: Digital Foundations Report, StartupAUS).

Building Information Modelling (BIM) is a digital technology that has the potential to revolutionise the Australian construction sector and is transforming the process by which buildings and infrastructure are designed, constructed and maintained. As a significant player in the construction of new assets for public use, the benefits to Government from using BIM in procurement will be dramatic.

BIM contributes to significant savings of time and money while increasing project quality and productivity, through significant reduction in variations and associated delays, improved delivery scheduling and more effective construction and life cycle management.

The positive impact that efficiency improvements from the effective use of digital technology can have on the competitiveness of the building and construction industry are considerable. With an estimated construction spend in Australia of \$207 billion in 2016-17 and a typical waste of effort reported at 30%, it is critical that efficient and effective processes are utilised. For example, a conservative 5% productivity improvement (in the 30% waste) driven by BIM would result in a \$3.1 billion savings each year.

BIM as an Agent of Change in the Construction Sector

The Australian construction industry at present is characterised by two exemplary issues dominating national consideration. The first is a result of fires in cladding systems on new buildings locally in Victoria and internationally in London. The issue is building product compliance, that is the quality and performance characteristics of building products that satisfy Australian construction standards, and an issue of major concern for public safety.

The second issue, much larger and more strategic, is the focus of all state governments on updating and expanding infrastructure. Population pressures, lack of asset maintenance and unmet supply, have resulted in an urgent priority to improve particularly transport systems.

Internationally, Western nations have adopted these technologies to address a worldwide reduction in construction industry productivity, as well solve these endemic construction issues. In countries like the UK, they are using their proactive expertise in these fields to sell their services around the world. Australia lags significantly behind and the creation of ABAB is a key action by Industry to ensure a consistent national adoption of digital technologies.

What is BIM?

BIM is a digital process for creating and managing all of the information on a project – before, during and after construction. The output of this process is the Building Information Model, the digital description of every aspect of the built asset.

A building information model is a digital representation of the physical and functional characteristics of a building, piece of physical infrastructure or environment. BIM serves as a shared knowledge resource for information about an asset throughout its lifecycle; supporting decision-making — from strategic appraisal and planning, design and construction to operation, maintenance and renewal. The richness of digital information that BIM provides enables a range of processes such as cost estimation, engineering analysis and project scheduling prior to construction, which aid in de-risking a project and providing greater confidence about on-time delivery.

When using BIM, greater effort is expended prior to construction to refine the design with the aim of achieving the best built outcome and the most efficient construction program by avoiding errors, changes and waste during construction. Identifying design issues or clashes, such as between services and structural elements, during the design phase can avoid the costs and delays due to variations during construction. In essence the asset is built twice, once in a virtual sense and then physically.

In some ways BIM is an evolution of Computer Aided Design (CAD) and 3 Dimensional (3D) visualisation however, it incorporates far more information than just the geometric aspects with links to embedded information on any component of the model.

BIM is also referred to as Asset Information Modelling (AIM), Virtual Design and Construction (VDC) or Digital Engineering (DE). For the purposes of reaching the broadest audience possible, the term BIM is used throughout this submission.

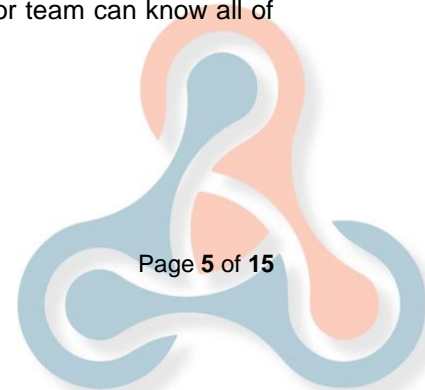
BIM is as much about process as it is about technology. BIM processes emphasise information sharing and the breaking down of information silos between various professions and project stages.

BIM is also associated with lean construction practices and other digital enabling technologies such as geospatial location services and visualisation technologies such as augmented reality.

What is the problem that BIM is addressing?

The need for the use of BIM has arisen due to a range of factors including:

- Complexity of large projects – the need for coordination – no one person or team can know all of the details of the project
- Construction and asset management industries resistant to change
- Inefficient work practices



- High costs incurred through requests for information (RFIs), reworks, clash detection on site during construction and resulting work arounds
- Poor Workplace Health and Safety – few industries accept the level of death and injury which occur in the construction industry
- Silo approach where trades and professions do not communicate and coordinate well
- Issues with loss of information over project life and between stages
- Those responsible for different parts of the process (eg planning, design, construction, operation and maintenance) do not collaborate effectively to achieve the best overall outcome.

Flyvbjerg and others have documented the particular failings in the delivery of large complex 'megaprojects' across the world and the associated cost overruns and time delays (Source: *Bent Flyvbjerg, 2014, "What You Should Know about Megaprojects and Why: An Overview," Project Management Journal, vol. 45, no. 2, April-May, pp. 6-19, DOI:10.1002/pmj.21409*).

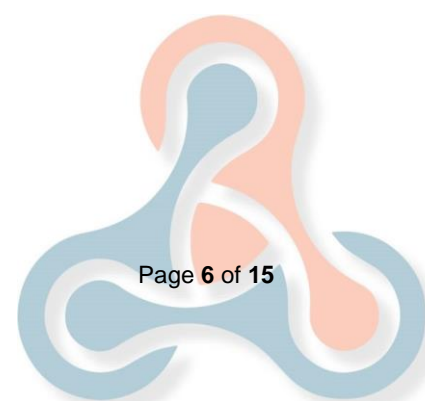
While cost overruns on an individual project may not result in a direct cost to the taxpayer (depending on contract arrangements) it is likely that such overruns and losses will result in higher contingencies in future projects and therefore greater cost in the long run.

The poor relative efficiency and productivity in the construction industry and the frequency of cost overruns and time delays in major projects is a significant issue for the economy. A global study by McKinsey found that between 1995 and 2011 productivity per worker in manufacturing nearly doubled while in the construction industry productivity has remained flat (Source: Digital Australia – Seizing opportunities from the Fourth Industrial Revolution, McKinsey, 2017). The discussion paper refers to a more recent McKinsey report on digitisation of Australian industries and the low level of digitisation in the construction industry.

What does BIM do?

BIM acts as a single point of truth. The information contained in BIM and the three dimensional visualisation enabled by BIM improves coordination and communication to:

- Allow for better design
- Aid decision making
- Improve clash detection
- Improve coordination between trades/professions
- Improve speed and responsiveness of changes, and
- Proactively identify safety issues



Benefits

The collaborative and digital aspects of BIM unlock greater efficiencies and productivity. Other key benefits of BIM include: more efficient and on-time project delivery; increased accuracy in cost estimation; reduced project risk; improved safety; improved built outcomes; improved asset management; and reduced construction and operational costs.

Evidence of cost savings from the use of BIM has been growing steadily internationally. While much of the information on the exact savings from the use of BIM processes is often considered commercial in confidence, some specific quantitative information has been published. Some of the best information of cost reductions comes from the United Kingdom (UK) where government agencies have achieved construction cost savings of 12-20 per cent from the use of BIM and other complementary strategies to improve productivity.

BIM in Australia

Allen Consulting Australia 2010

In 2010 Allen Consulting Group published the results of its industry sponsored study into the impacts of BIM on productivity. The study's findings reported that the accelerated and widespread adoption of BIM on the Australian economy was likely to increase GDP by 0.2 basis points in 2011. Whilst this may not seem much, the study also noted the likelihood of a cumulative effect given the likely increase in the pace of adoption by 2025. This would mean an increase of 5 basis points in comparison to what they describe as a "business as usual" scenario.

Productivity Commission Report into Public Infrastructure 2014

The Productivity Commission Report into Public Infrastructure 2014 recommended (Recommendation 12.5) that government clients should use BIM to help lower costs for complex infrastructure projects. To facilitate the consistent use of BIM by public sector procurers, Australian, state and territory governments should:

- facilitate the development of a common set of standards and protocols in close consultation with industry, including private sector bodies that undertake similar types of procurement
- include in their procurement guidelines detailed advice to agencies on the efficient use of BIM.

Australian Infrastructure Plan (AIP)

In the Australian Infrastructure Plan (AIP), Infrastructure Australia made the following recommendation

Recommendation 10.4:

Governments should make the use of Building Information Modelling (BIM) mandatory for the design of large-scale complex infrastructure projects. In support of a mandatory rollout, the

Australian Government should commission the Australasian Procurement and Construction Council, working with industry, to develop:

- *Appropriate guidance around the adoption and use of BIM; and*
- *Common standards and protocols to be applied when using BIM.*

Federal Government

One of the leading proponents of BIM in Australia is the Department of Defence which has been using BIM for infrastructure projects for a number of years and is an active participant in industry groups supporting the use of BIM.

National Working Groups

National action is underway to progress a harmonised government approach to the use of BIM on linear infrastructure (e.g. roads and railways). The National Digital Engineering Working Group (NDEWG, a sub-group of the Council of Australian Governments (COAG) Infrastructure Working Group) has been established in response to concerns from industry about divergent BIM approaches developing between jurisdictions, particularly in relation to linear transport infrastructure.

The COAG Transport and Infrastructure Council has endorsed and publicly released the National BIM Policy Principles developed by the NDEWG.

The Australasian Procurement and Construction Council has also established the Australasian BIM Advisory Board (ABAB). In line with AIP recommendation 10.4, the ABAB is taking a whole of construction industry approach to the national adoption of BIM, whereas the NDEWG is focussed on BIM for transport projects. (See Appendix 1 for further information on ABAB and its work).

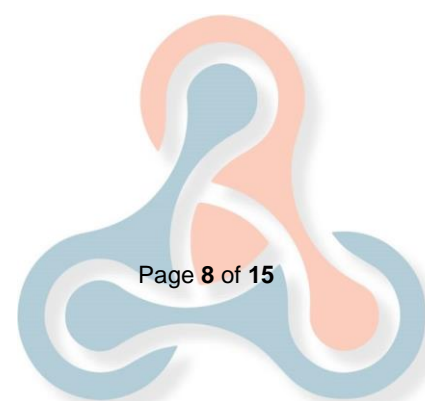
States and Territories

Most states and territories have begun adoption of BIM on a project by project basis, resulting in bespoke approaches which favour the provider rather than a consistent whole of government approach. New South Wales (NSW), Queensland (QLD), South Australia (SA), Victoria (VIC), and Western Australia (WA) have used BIM on significant infrastructure projects, particularly hospitals, but typically only in the design and construction phases. The use of BIM is now progressing to the asset management phases of some projects (such as the Perth Children's Hospital and New Royal Adelaide Hospital) and also to linear transport infrastructure projects (such as roads and railways).

In its State Infrastructure Plan released in March 2016 Queensland committed to the use of BIM on all major infrastructure projects by 2023.

Examples of the use of BIM across the states and territories include:

- NSW Health Infrastructure since 2013



- Roads and Maritime Services – Central Business District (CBD) and South East Light Rail projects and the Woolgoolga to Ballina, Pacific Highway upgrade (NSW)
- Perth Stadium and Perth Children’s Hospital (WA)
- Joan Kirner Women’s and Children’s Hospital and Melbourne Metro (VIC)
- Adelaide CBD High School and Port Augusta Prison Accommodation expansion (SA)
- Palmerston Regional Hospital and Alice Springs Hospital upgrades (NT).
- Ipswich Motorway (Rocklea to Darra) Upgrade (QLD)

BIM internationally

BIM is increasingly used around the world and has been mandated in a range of countries including Finland, Norway, Singapore, Netherlands, South Korea, Denmark and, most notably, the UK. As part of its 2011 Construction Strategy, the UK Government mandated ‘Fully Collaborative 3D BIM’ (with all project and asset information, documentation and data being electronic) as a minimum by 1 April 2016 on all publicly procured projects. A critical part of delivering this objective and realising the full benefits of BIM, was working to align the interests of those who design and construct an asset using BIM with those who subsequently manage it using the same model.

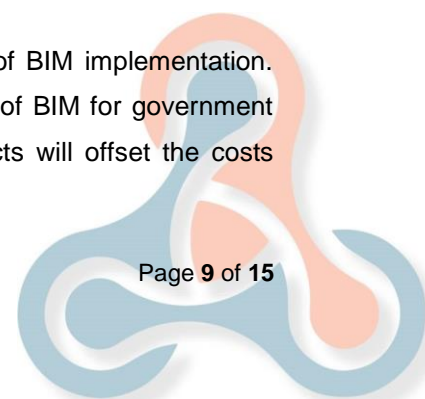
Take up of BIM

A number of major companies have invested in BIM capability for design and construction as they see this as both a competitive advantage and a significant cost and time saving, reducing rework and establishing a single point of truth. However, industry representatives have indicated that without leadership from government to establish a consistent approach, the adoption of BIM has been limited and risks divergent approaches to BIM both between sectors and between states.

There has been limited government demand for the use of BIM and as a result its use for operations, maintenance and asset management has been extremely limited. A number of reasons for this limited demand have been noted:

- lack of awareness
- reluctance to embrace change
- uncertainty around the level of benefit
- need to make an initial investment in building capability and capacity to realise long term benefits, and
- lack of experience in applying BIM.

Experience has shown that it can take some time to realise the full benefits of BIM implementation. There are likely to be establishment costs associated with the implementation of BIM for government and industry. As adoption becomes widespread, savings on individual projects will offset the costs associated with implementation for government.



Next Steps – What do we want government to be doing?

The challenges to increase the rate of digitisation in the AEC and asset management sectors are clear and the benefits of doing so will be significant for both governments and the broader economy.

ABAB and a variety of organisations and individuals have been working to progress the use of BIM in Australia. Progress has been made. However the rate of adoption for digital technologies in the AEC and asset management sectors is lagging behind other parts of the world. Australia risks being at a competitive disadvantage locally and on the global stage if this is not addressed.

ABAB recommends that the Federal Government include an acknowledgement of the clear benefits of increased digitisation and the adoption of BIM in the AEC and asset management sectors in the Digital Economy Strategy.

Governments at all levels fund infrastructure and services and therefore, there is a significant benefit to be gained through better outcomes and more efficient infrastructure delivery and operation. The broader benefits to the whole economy of widespread adoption will be felt through improved productivity and efficiency. This is particularly true of the Construction industry as a major contributor of the economy through employment and other means.

Unless large clients such as governments require the use of BIM on projects then private sector contractors will continue to use BIM for their own limited purposes during design and construction. This will not provide the benefits that are available from the full implementation of BIM throughout the asset lifecycle.

ABAB recommends that the Federal Government include a request for the use of BIM on all major infrastructure projects to encourage the spread of BIM throughout the AEC industry. In the absence of a clear signal to the AEC sector, the adoption of BIM has been slow and varied. There is a risk of divergent approaches and duplication of effort through the current fragmented approach.

ABAB recommends that the Federal Government provide funding and support for the development of consistent BIM national standards which align with the relevant international standards. ABAB also recommends that the Federal Government support the work already underway through the Australasian BIM Advisory Board (ABAB) and other peak groups (such as NATSPEC and buildingSMART) to facilitate the adoption of BIM in Australia.

There is significant work to be done to maximise the benefits from the implementation of BIM in Australia. For this reason, ABAB recommends that the Federal Government work together with the states and territories to provide funding for an entity bringing together industry, government and academia to further practice, research, education and training in BIM (in a similar way to the Industry Growth Centre for Mining Equipment, Technology and Services (METS)).

ABAB is a significant collaboration of peak bodies in the sector and as such would welcome the opportunity to further engage with the Federal Government on the development of its Digital Economy Strategy and the inclusion of BIM as a significant element in the future of the Australian economy.

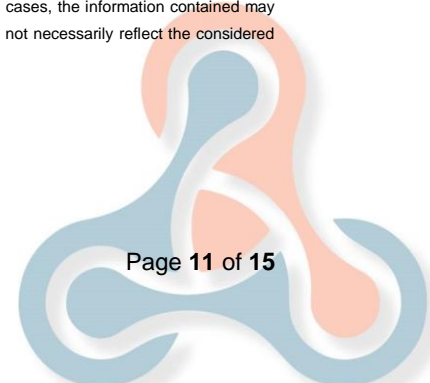
For the reasons outlined in this submission the Australasian BIM Advisory Board (ABAB) recommends that the Federal Government adopt the following points and include them in the Digital Economy Strategy:

- **Acknowledge the significant benefits which will accrue from the widespread adoption of Building Information Modelling (BIM) in the Architecture, Engineering and Construction (AEC) and asset management sectors**
- **Acknowledge the continual improvements in BIM technology being developed by industry nationally and internationally**
- **Support the development of consistent national BIM standards which align with the relevant international standards to provide certainty to industry**
- **Request the use of BIM on all major government infrastructure projects in line with the Productivity Commission recommendation**
- **Support the work of the Australasian BIM Advisory Board (ABAB) and other peak groups seeking to facilitate the adoption of BIM in Australia**
- **Inclusion of the Australasian BIM Advisory Board (ABAB) in discussions with government on the direction of digital transformation in the Architecture, Engineering and Construction (AEC) and asset management sectors**
- **In conjunction with the states and territories provide funding to support the widespread adoption of BIM, including funding for an entity bringing together industry, government and academia to further research, education and training in BIM (in a similar way to the Industry Growth Centre for Mining Equipment, Technology and Services METS)**

Disclaimer

The ABAB is committed to improving productivity and asset outcomes by taking a leadership and coordinating role in the consistent adoption of BIM and associated integration and collaborative processes. While the ABAB has made every reasonable effort to report current and accurate information, the ABAB however accepts no responsibility for the accuracy or completeness of any information contained in this submission and recommends that users exercise their own skill and care with respect to its uses.

We encourage readers to check with the nominated contact person/s if you have any concern about the information herein. In some cases, the information contained may incorporate or summarise views, guidelines or recommendations of third parties. Such material is assembled in good faith, but does not necessarily reflect the considered views of the ABAB, or indicate a commitment to a particular course of action.



Appendix 1: Australasian BIM Advisory Board



Vision: Improved productivity and asset outcomes

Strategy: To take a leadership and coordinating role in the consistent adoption of BIM and associated integration and collaborative processes.

In May 2017, the ABAB was established by and consists of the Australasian Procurement and Construction Council (APCC) and Australian Construction Industry Forum (ACIF), NATSPEC, buildingSMART and Standards Australia. This partnership of National policy and key standard setting bodies represents a common-sense approach because of the synergies that exist in and between each of the organisations areas of responsibility in the built environment. It will also support a more consistent approach to the adoption of BIM across jurisdictional boundaries.

The ABAB is a first for the Australasian building sector with government, industry and academia partnering to provide leadership to improve productivity and project outcomes through the adoption of Project Team Integration (PTI) and Building Information Modelling (BIM).

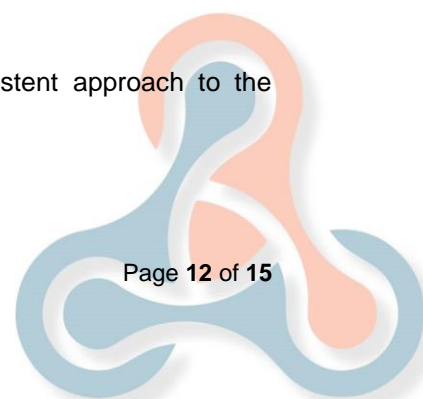
The ABAB is acutely aware of the need for optimal delivery of outcomes that eliminate waste, maximise end user benefits and increase the productivity of the Australasian economies. The Board has evolved from a previous APCC–ACIF collaboration established in 2015 on a BIM Summit. This Summit produced a number of resources to support the adoption of BIM – refer to www.apcc.gov.au for copies.

The members of the ABAB recognise that without central principal co-ordination there is a significant risk that fragmented development of protocols, guidelines and approaches will lead to wasted and duplicated effort, inefficiency, including unnecessary costs and reduced competitiveness across the built environment.

The consistent adoption of BIM across Australasia provides an important opportunity within a broad and dynamic digital economy for the built environment, where good advice provided at the right time can positively shape and influence quality private sector and Government community outcomes. Positioning Australasia as BIM leaders in the region will make us more competitive in the global infrastructure market place.

BIM resources to support construction projects

The ABAB is focusing on three priority projects to further support the consistent approach to the adoption of BIM across jurisdictional boundaries:



- *Exchange Information Requirements* (client specifications) - will provide an essential foundation to assist the Australasian construction industry by creating a common framework and language for everyone involved in the construction process.
- *Intellectual Property Framework* - will assist with education and collaboration across Australia; it will demystify and simplify what is required by providing a national framework.
- *BIM Process Consistency* - will identify and promote which BIM elements should be consistent across Australasia to ensure the optimisation of BIM benefits and therefore eliminate waste in construction practices.

A number of other projects are planned, including a common set of principles for BIM strategies across Government, and clarifying BIM roles and responsibilities. The outputs from these projects will help the construction industry navigate through the new technologies and systems, to ensure that the benefits of BIM are realised in construction projects. Refer to NATSPEC website (<http://bim.natspec.org/>) for a considerable list of completed projects by partnering organisations that support the development and adoption of BIM in the built environment in Australasia.

Exchange Information Requirements Project

The goal of the ABAB Exchange Information Requirements (EIR) Project is to provide guidance for clients, their agents and lead consultants on formulating and defining their information requirements for building and infrastructure projects they are planning.

Clearly defined information requirements are an essential prerequisite for clients to receive the information they need to make key business decisions about the project, and manage the asset when complete. They allow consultants and contractors to define their scope of services more accurately and with greater certainty, resulting in fee proposals or quotations with lower built-in contingency costs. Clearly defined EIRs can also be used to validate the information delivered.

While EIRs can relate to many aspects of a project, the proposed Guide will focus on defining deliverables relevant to asset management and facility management (AM/FM) activities; in particular: on as-built models and digital asset data. The Guide will outline key concepts and principles applicable to defining EIRs, and provide information to support decision making and priority setting during the process.

Intellectual Property Framework Project

The goal of the ABAB Intellectual Property (IP) Framework Project is to develop and provide a National Framework for Intellectual Property for BIM that will assist with education and collaboration across Australia. The Project aims to deliver a one-page education piece/tool for all parties and a framework/IP template. The Project aligns with the objectives with ABAB striving for a consistent approach for all parts of government and industry, and assisting in the awareness and educational process.

BIM Process Consistency Project

The goal of the ABAB BIM Process Consistency is to identify and document which client BIM-related elements should be consistent across Australasia. Sharing of practices and templates will drive consistency and create standard practices. Other objectives include identifying what can and cannot be consistent across Australian State Agencies, and consider scalability to accommodate different size projects.

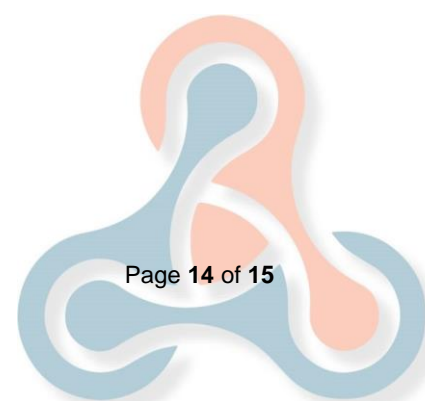
The focus is on information requirements and contract documentation; a survey and analysis of the contents and scope of existing BIM Standards defined by participating State Agencies would enable the identification of a framework of BIM process, technology and policy items.

Potential for Growth through Funding

While the ABAB is successfully delivering on its objectives, the speed of progress is limited to the in-kind support and contributions of its members. Government funding is desirable to ensure the timely development of the necessary protocols, standards and tools for optimisation of the benefits of BIM.

All Australian Governments are faced with challenging fiscal environments. BIM is a process that will reduce risk, reduce project contingencies, drive productivity and make Australian businesses more efficient and competitive. BIM on Government projects has the potential to deliver substantial productivity dividends and savings that can be redirected by Governments to frontline services.

The Federal Government is not yet a member of the ABAB. It is a situation that members of the ABAB wish to change by welcoming the involvement of the Department of Industry, Innovation and Science.



Contact Us

Teresa Scott

Executive Director, Australasian Procurement and Construction Council (APCC)

Email: tscott@apcc.gov.au

James Cameron

Executive Director, Australian Construction Industry Forum

Email: james@acif.com.au

