BIM Management Plans

P BIM Management Plans

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Contributors:

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P BIM Management Plans [Version 1 – August 2012]

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PREFACE

Chris Needham (C3 Consulting Solutions)
Chair: BIM Management Plans Working Group

As Building Information Modelling (BIM) is becoming more established, individual practices are mastering the use of BIM software and establishing workflows and management systems within their organisations. It is also more likely that they will be called on to work on projects using BIM collaboratively. This, and non-traditional procurement strategies such as Integrated Project Delivery[1] (IPD), is new territory for many and there is much uncertainty about the most effective way to proceed, particularly as there is not yet a body of established best practice.

The documents developed by this initiative address this uncertainty by answering several key questions:

- What is a BIM Management Plan and why should we use one?
- What should be addressed within a BIM Management Plan?
- How should we prepare and apply a BIM Management Plan?

While there are already several well-written (and detailed) BIM planning guides and templates in circulation, this working group sets out to raise awareness in the local industry of the importance of BIM Management Plans and provide practical introductory guidance on the topic. This will lead to existing resources being used in a more informed way and with much greater confidence.

The BIM Management Plans Working Group is comprised of practitioners from disciplines including architecture, engineering, quantity surveying and construction contracting. Representing public, private and industry organisations, the group was able to draw on its extensive combined experience and a variety of perspectives during the development of this series of documents.

The group's goal was to provide a succinct overview of the topic and to identify some of the practical issues that can be encountered when planning projects in which BIM is employed. The group recognised that the circumstances of construction projects vary enormously (particularly in the early mobilisation phases) and that providing overly prescriptive advice was futile. The group's approach was to try to identify some basic principles and resources that would serve the reader well when faced with the realities of implementing BIM on their projects.

Note: A BIM Management Plan can be referred to by a number of other names and acronyms such as BIM Execution Plan (BEP, BXP) or Project BIM Plan (PBP). Although the content and scope of these documents may vary slightly, their function and purpose is similar. For simplicity, 'BIM Management Plan' will be used throughout these documents – also referred to by its abbreviation: BMP.

1 Integrated Project Delivery: A Guide, American Institute of Architects (AIA) National & California Councils 2007 http://www.aia.org/groups/aia/documents/pdf/aiab083423.pdf.

BIM Management Plans

P1 What is a BIM Management Plan & why should we use one?

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P1 What is a BIM Management Plan & why should we use one? [Version 1 – August 2012]

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WHAT IS A BIM MANAGEMENT PLAN?

A BIM Management Plan sets out who will do what, when, how and why, to achieve the project's goals with respect to BIM-based project delivery. Under most current procurement methods, the BIM Management Plan is prepared after project contributors have been formally appointed. Consequently, the BIM Plan's status as an agreement needs to be made clear from the outset. It should be noted that if it can't be used to hold the project team to account, it's likely that it will be ignored in the face of later project pressures. The Legal and Procurement group discuss this issue further in their document: **L3 – Stakeholders' Responsibilities**.

For example, some of the items that could be grouped under these headings include:

Who Project team, roles and responsibilities, relevant authorities

What Goals and objectives, deliverables

When All project deliverables and activities related to project program

How Tools and tool use, information exchange, digital/ technological infrastructure, standards

Why Contractual requirements, project procurement strategy

A BIM Management Plan is not unlike a screenplay in that it serves as a central collaborative platform for the production, and is critical to its success and acclaim.

HOW DOES A BIM MANAGEMENT PLAN DIFFER FROM, OR FIT WITHIN, A 'REGULAR' PROJECT PLAN?

Planning is crucial for any project of the scale of a construction project, and with the many individuals involved. BIM Management Plans are founded on the same broad principles as existing (generic) project plans:

"Fail to plan, and plan to fail!"[1]

A focus on the end-game is required for the effective delivery of any project. Planning ahead means looking ahead to start with and charting a course back to the present, addressing who, what, why, when and how.

Any BIM Management Plan must connect the strategic objectives of the project with tactics (methodology) designed to achieve them. Establishing and communicating both will help increase understanding and reduce uncertainty within the project team.

Although planning a BIM-based project shares similar challenges to a 'legacy' (non-BIM) project, there are some key differences. BIM-based project delivery enables better use to be made of information throughout the project lifecycle. It recognises the value of information to multiple parties, and the efficiencies that can be gained by exploiting its interdependence. A BIM Management Plan exists in part because various risks accompany this potential and, without adequate preparation, some advantages may never materialise. Indeed, if the project team cannot effectively manage the process, it may turn out to be less efficient overall. The BIM Management Plan is therefore:

- a preparation platform
- a communication tool
- a risk mitigation tool

The following comparison of BIM and legacy processes will help those using BIM Management Plans to understand the differences between their corresponding project plans:

1 This quote (or variants of) is widely attributed to Benjamin Franklin as well as others since, including Winston Churchill.

Characteristics of existing processes

- **Familiar**: Because the deliverables and methodology of legacy-approach project delivery have, over many years, become fairly well established, participants generally (but not always) have a tacit understanding of what is expected of them.
- **Inefficient**: Despite being familiar, inefficiencies in legacy processes are rife, with construction industry wastage at unsustainable levels[2].
- **Fragmented**: Information created by each party has to be interpreted and re-entered by the others, often repeatedly. This fragmentation and on-going manual coordination leads to duplication of effort and errors.
- **Isolated**: Project plans tend to exist within organisations, for their own sake.

Characteristics of BIM processes

- **New and rapidly evolving**: Lack of familiarity leads to uncertainty and confusion about what is expected of team members.
- **Integrated**: The digital, multi-dimensional nature of BIM allows information to be readily manipulated, coordinated and consolidated. The integration and ready exchange of information also facilitates collaboration.
- **Fluid**: The speed and ease of change that BIM provides requires greater attention to process management than when using 2D abstract representations of elements and disparate paper-based information. With the enhanced levels of interdependence of information in BIM, the consequences of various actions can be greatly improved, or disastrous.
- **Recognises information as an asset**: The sheer volume of information contained in models can obscure irrelevant or valueless information. This and the need to maintain the interdependence and integrity of information increases the value of information validation – knowing what is reliable, correct or appropriate at any point in time. A BIM Management Plan can address this, acknowledging that it may vary by necessity from one project phase to the next as decisions are made.
- **Recognises value within project lifecycle**: When properly leveraged, BIM can be used to improve processes throughout design, construction and facility management. The 'whole of building lifecycle' view of information associated with BIM tends to expand designers' and contractors' perspectives beyond their traditional preoccupations. Clients increasingly require their project teams to better consider long-term needs and outcomes. While the traditional involvement of designers ceases at completion of construction documentation (articulating 'design intent'), some are now seeing opportunities (and risks) with being involved in the construction and operations phases of the project. The attention is no longer just on getting a project built; it's on getting a great asset built on time, on budget and with minimal wastage (LEAN construction).
- **Relies on greater leveraging of technology**: The complexity and volume of information associated with projects has grown significantly over recent decades, propelled by both client need and advances in technology. Information Technology (IT) has emerged as a powerful enabler, allowing teams to achieve more when used cleverly.
- **Requires collaboration from multiple stakeholders**: Project planning most effectively takes place in multi-party agreement. Integrated project delivery (IPD) embodies this principle, and arguably has more effect on achieving improved project outcomes than the use of technology.

2 Gallaher, M. P., A. C. O'Connor, J. L. Dettbarn Jr., and L. T. Gilday. Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry. Technical Report GCR 04-867: NIST, 2004

WHY IS A BIM MANAGEMENT PLAN NEEDED & WHAT VALUE DOES IT PROVIDE?

As noted, all construction projects require planning, but given BIM's nascent status in the industry, a clear direction on projects using BIM is crucial if BIM is to add value to the process.

> *"If one does not know to which port one is sailing, no wind is favourable."*
>
> – Lucius Annaeus Seneca

The reasons a BIM Management Plan is needed can be summarised into two broad groups:

- **Cultural**: Teams benefit from increased planning. With clearer communication and reducing the unknowns in the implementation process, risks to all parties and the project are lessened.
- **Technical**: The technology underlying BIM software tools permits improved organisation, management and sharing of project information. However, the information needs to be structured and consistently applied between project members to achieve maximum benefit. Disciplined information management yields significant dividends for the project and its stakeholders.

Value of a BIM Management Plan

The *Penn State BIM Project Execution Planning Guide*[3] summarises the need for a BIM Management Plan and its value as follows:

> *To effectively integrate BIM into the project delivery process, it is important for the team to develop a detailed execution plan for BIM implementation. A BIM Project Execution Plan (hereinafter referred to as the 'BIM Plan') outlines the overall vision along with implementation details for the team to follow throughout the project.*
>
> *By developing a BIM Plan, the project and project team members can achieve the following value:*
>
> - *All parties will clearly understand and communicate the strategic goals for implementing BIM on the project*
> - *Organisations will understand their roles and responsibilities in the implementation*
> - *The team will be able to design an execution process which is well suited for each team member's business practices and typical organisational workflows*
> - *The plan will outline additional resources, training, or other competencies necessary to successfully implement BIM for the intended uses*
> - *The plan will provide a benchmark for describing the process to future participants who join the project*
> - *The purchasing divisions will be able to define contract language to ensure that all project participants fulfil their obligations*
> - *The baseline plan will provide a goal for measuring progress throughout the project*

Other values the BIM Management Plan can provide include:

- **Risk mitigation**: through defining project requirements, collaboration methodology, contributor responsibilities and outcomes.
- **Greater efficiencies**: afforded to the project, by having each project participant more aware of others' requirements and offerings.
- **Project record**: comprehensive documentation can record how the project was delivered and can be reviewed and re-used for improving processes on future projects.
- **Educational**: providing greater understanding of BIM and its impact on the project for those involved.
- **Defining project goals**: Comprehending and expressing what's most important to the client (particularly in alliance procurements, where those expressions may be closely linked to project objectives and remuneration).

CONCLUSION

A BIM Management Plan offers clarity, certainty and transparency for the project stakeholders. It should connect objectives with methodology, and allow the team to plan the execution and delivery of the project with particular emphasis on BIM. Without it, misunderstandings and confusion would prohibit the project team from fully understanding their responsibilities and the context in which they work. It would represent a continuation of the inward-focused and fragmented work patterns of years past.

3 BIM Project Execution Planning Guide Version 2, Computer Integrated Construction Research Program (CIC) at the Pennsylvania State University July 2010 http://bim.psu.edu/.

Summary

A BIM Management Plan establishes:

- Who, what, why, when and how with respect to building information on a project.
- It 'sets the scene' and helps orchestrate activities and sequence.
- It acknowledges the value of diligent planning, effective communication and genuine collaboration.
- There is significant value to the project and project team by establishing and employing a BIM Management Plan.

BIM Management Plans

P2 What should be addressed within a BIM Management Plan?

P2

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INTRODUCTION

The BIM Management Plan (BMP) addresses how all the key elements of a project – people, program, tools, processes and protocols – will be organised and managed to achieve the project goals. Even though all projects have these elements in common, a plan should be prepared specifically for each project. The particulars must respond to the client requirements, project needs, team capacity/skill/expertise, procurement method and other project-specific circumstances.

There are various template documents available within the public domain that include the items that should be addressed in a BIM Management Plan. The list below is a good representation of items found in many. These templates are listed in the document **P3: How should you prepare and apply a BIM Management Plan?**

CONTENTS OF A BIM MANAGEMENT PLAN

The listing order and grouping of the following items does not imply a hierarchy of importance or a fixed order of consideration. Many are closely interrelated and addressing one can often entail making decisions about another. Whatever the nature of the project – its size, complexity, duration and the like – tailor the list to suit as appropriate.

1. *Agreement*

The extent to which project participants agree to the BIM Management Plan (regarding its contractual status) should be clearly defined. In addition, the expectations and methods for future amendments of the agreement should be stated. It would be highly unusual for the first iteration of the BIM Management Plan to remain unchanged by the end of the project.

2. *BIM Management Plan overview*

The BMP overview should state the purpose of the document, overview of scope, and expected applicable duration (eg, design only, design/construction).

3. *Project particulars*

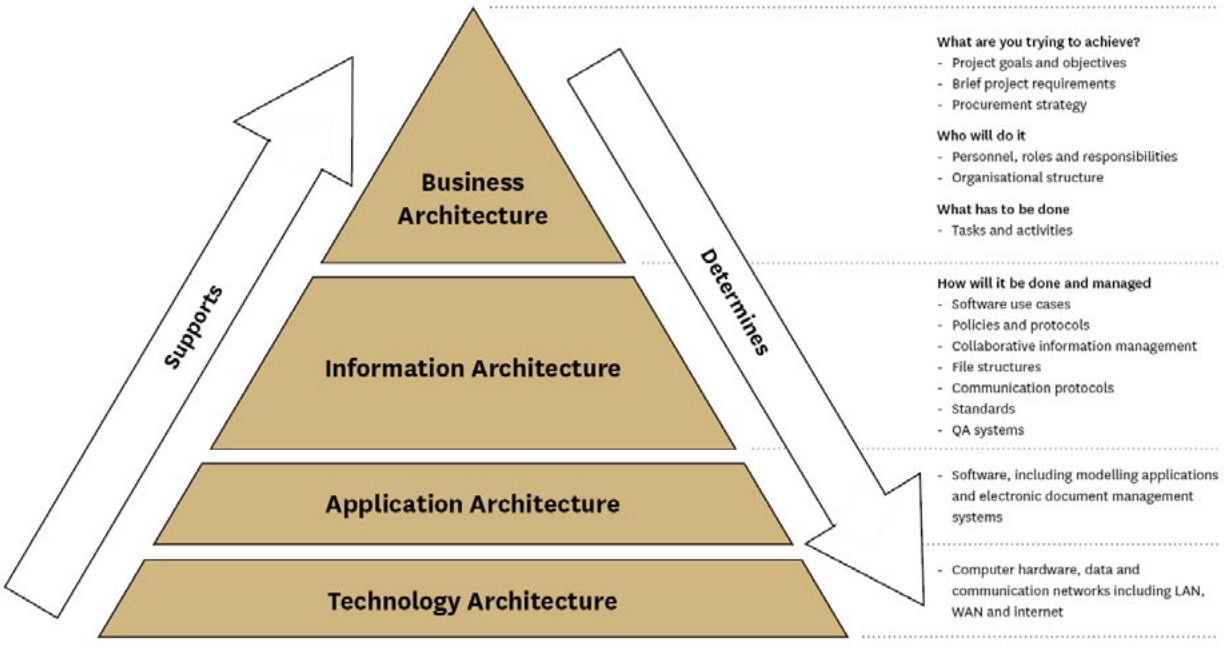
a. Project identification

Project title, description, address, client etc

b. Project team & contacts

Where this information is already recorded in a readily accessible form, such as in an online project collaboration/document management system, it may be more sensible to reference it there rather than replicate it in the BIM Management Plan. This saves maintaining duplicate records and reduces the risk of errors.

Monitor changes to the project team for their contractual implications. In some instances it will also be appropriate to record changes in an addendum to the contract or renegotiate the contract.



Elements of a BIM Management Plan
(Adopted from the NIST Enterprise Architecture Model)

c. Project roles & responsibilities

Define roles and responsibilities by reference to existing industry documents (and any contracts in force) and adjust the roles/responsibilities or documents to suit the requirements of your project through documented amendments.

Monitor changes to roles and responsibilities for their contractual implications in the same way as noted for changes in project personnel. This may vary from simple edits to names and contact details, to creating induction protocols and providing BIM-related education and/or training.

The NATSPEC BIM Management Plan Template[1] refers these details (and a number of others) to a 'Project BIM Brief' where they have been recorded earlier. It also requires all additional changes to be recorded there so that they are consolidated in a single location.

The role of 'BIM Coordinator' (alternatively known as 'Project BIM Manager') should be defined. Their responsibilities should be clearly articulated. Necessary traits of the BIM Coordinator are leadership skills, good communication ability, and BIM experience[2]. They should be committed to upholding the project's informational integrity, purpose and related processes. In this capacity, they should be able to hold the project participants accountable to what is established within the BIM Management Plan.

d. Project team member BIM capability & maturity statement

Inclusion of this in the BIM Management Plan will be influenced by factors such as prior working relationships between team members and the project's history. Generally, assessment of each team member's BIM capability and maturity should be done as part of the selection process, i.e. before development of the BIM Management Plan begins.

Regardless of contractual appointment a measure of accountability is necessary. If a statement of team member BIM capability and maturity is included here it will be more for purposes such as the following:

- assessing the most appropriate allocation of roles, responsibilities and authorities
- balancing aspirations against available capabilities and capacities
- assigning working relationships so that less experienced team members are teamed with more experienced members for support and mentoring
- identifying training requirements

e. Project procurement strategy

The procurement model to be used has a fundamental influence on the project, the responsibilities of team members, their relationship to one another, whether there will be one or a series of BIM Management Plans and what will be recorded in them.

For traditional design-bid-build project procurement, involvement by contractors does not occur until the design is largely complete, preventing them from making a contribution or setting any expectations. Project design team members may be shooting in the dark if they attempt to anticipate the needs of someone who has yet to be appointed.

For design-and-construct or managing contractor procurement models, the same applies but to a lesser degree. The contractor typically assumes most (if not all) of the responsibility for the design and program. Design and value management decisions are made subject to their agreement, meaning their interests can tend to dominate, rather than a collective pursuit of what's best for the project.

Integrated project delivery (IPD) is an emerging procurement method, intended to avoid the problems of the others mentioned, and provide for better project outcomes.

4. *Project definitions/terminology*

Definitions and terminology can be extremely important at a practical and contractual level, so it is best if key terms are defined clearly at the outset of the project. The Australian Institute of Architects and Consult Australia have published a **Glossary** of definitions as part of the: **'BIM! What is it?'** document that is part of this series. Additional industry definitions can be found in document **P3: How should you prepare and apply a BIM Management Plan?**.

5. *Project objectives*

Start with the end in mind, considering the objectives of all stakeholders involved. Assess how tangible and valuable each objective is, and who it will benefit. Include measures by which the achievement of each of those objectives will be recognised.

Objectives should be selected while taking into account the capabilities of the team as a whole. Identifying priorities among options being considered will also help clarify appropriate objectives.

Examples might be:

- completion of the project by no later than a given date
- provision of a world-class sporting facility with unmatched flexibility (further definition on some objectives may be required for them to have any practical meaning)
- achieving a Six-Star Green Energy Rating
- building to be carbon-neutral and built using local materials and suppliers

1 *NATSPEC National BIM Guide v1.0*, NATSPEC Construction Information Systems, September 2011.

2 *bimM: A practical look at Building Information Model Management*, C3 Consulting Solutions, 2009 http://c3consulting.com.au/newsletter/infocus-october-2009.html.

Note: *The Penn State BIM Project Execution Planning Guide*[3] sets out a method for defining project goals and objectives, and provides tools such as worksheets to help make use of it.

6. Project BIM uses

The client may not know (or care about) BIM uses – this is more about methodology than outcomes. Where a client does stipulate a BIM use as a requirement, it should be included, but also clearly defined. It is important to set clear expectations and determine downstream process/modelling impacts as a result of the BIM uses.

Client level of engagement with regard to BIM uses may vary based on their experience, enthusiasm or other vested interest in BIM applied to the project.

Among many possible BIM uses are: Design visualisation, Structural modelling and analysis, Code checking, Quantity take-off and cost planning, 3D clash detection, 4D construction sequencing etc. Several of the BIM Management Plan template documents (listed at the end of this document) provide detailed lists and explanations for each BIM use.

7. Project deliverables

Examples might be:

- hard-copy or digital drawings
- model-based schedules and quantity take-offs
- model-based fabrication files
- room data sheets
- data-rich as-built models

These may change as the project progresses.

8. Project procedures & protocols

- Project schedules (programs)

  Define project stages/milestones, and how they impact on BIM and vice versa. Note that contrary to popular misconception, Levels of Development (LODs) are not project stages.

  A variety of meetings and workshops may be required for project kick-off, project inductions, model coordination and resolution, model exchange, software testing/review, site inductions etc. Ideally, any schedule for a particular meeting type should also be incorporated in the overall project program so that they can be seen in context.

- Information exchange

  i. Informational requirements

     Modelling scope: The relationship between the model and the drawings should be established to set common expectations within the project team around issues such as how much will be modelled, where and to what extent detail should be addressed, will particular areas be modelled ahead of others (based on project conditions, anticipated construction sequence, or because they are typical)?

     Data requirements: (usually focused on Operations and Maintenance – O&M) should be identified, as well as who they're required by and when. COBie[4] (Construction Operations Building information exchange) or SPie[5] (Specifier's Properties information exchange) are two information standards that may be useful for reference here.

     Any data added to the models over and above what is documented in the BMP is theoretically unnecessary – therefore potentially abortive – given the challenges in 'guessing' the data requirements of others. It is better to accommodate their requirements via amendments to the BMP after they have been formally established.

  ii. Information exchange matrix

     Who will provide what to whom, when and in what format?

     Issues to be addressed include file preparation (prior to issue/sharing), distribution methods and timing, terms of use and receipt and quality control.

     An informational exchange matrix can be used to map out what formats are required to be shared when and between which project participants.

  iii. Collaboration procedures

     BS 1192[6] and BIP 2207[7] (a related guide) document recommends practices for the collaborative production and management of information. These could be adapted to suit project needs where necessary.

- Information generation

  i. **Model element authoring** (including levels of development)

     It is necessary to establish who is responsible for what elements in the overall aggregated model. Agreeing and documenting modelling methodology is important for a cohesive collaborative team effort. Various documents assist in mapping this out – chiefly the AIA E202 BIM Protocol Exhibit[8]. It establishes a metric that "describes the level of completeness to which a Model Element is developed", called a *Level of Development* (LoD), of which there are five levels identified: LOD 100, 200,

3 *BIM Project Execution Planning Guide Version 2*, Computer Integrated Construction Research Program (CIC) at the Pennsylvania State University, July 2010 http://bim.psu.edu/.

4 Construction Operations Building information exchange (COBIE), Dr E William East, PE, PhD, http://www.wbdg.org/resources/cobie.php.

5 http://www.buildingsmartalliance.org/index.php/projects/activeprojects/32.

6 BS 1192:2007 *Collaborative production of architectural, engineering and construction information – Code of practice*, British Standards Institution, 2007.

7 BIP 2207 *Building Information management – A Standard Framework and guide to BS 1192*, British Standards Institution, 2010.

8 *AIA Document E202 – 2008 Building Information Modelling protocol Exhibit*, American Institute of Architects 2008.

300, 400 and 500 (refer to AIA E202 for a definition of each). They should be defined very clearly for each element category. Even subtle ambiguities can easily lead to misunderstandings and disputes.

Note: Initiatives are under way[9] to address the confusion around the application of LODs and to provide more detail on the requirements for each element category, with respect to model, cost and time requirements.

A record of these variables is also known as a Model Progression Specification (MPS) or a Model Collaboration Matrix. Questions that will assist in establishing this include:

Who authors what information and when? Responsibilities for particular items within the model(s) may be exclusive or shared, temporary or permanent. Some items may not be modelled until a particular stage is reached (eg, hand-drawn sketches or modelled 'placeholder objects' may suffice for a time).

Who takes custody of that information, when and why? Some elements may change hands at particular times – perhaps multiple times. For example, a ceiling might be the responsibility of the architect, but not the elements that affix to the ceiling. (How) are those elements added to the ceiling, when and by whom? Does the architect provide the ceiling to that party for that purpose? If so, does the recipient become responsible for the ceiling? The same issue applies for floor slabs or walls – the architect might model them first, but if it's structural, should it be passed to the structural engineer for continued development, and if so, at what stage?

ii. Model-independent information (data)

How will data be added to the model? There may be a need for project participants other than model element authors to contribute information to the project, such as equipment datasheets, warranties, service agreements etc. (How) does this information get added to the model, and if so, by whom and when?

Standards such as COBie describe how information can be formatted and recorded throughout the planning and construction processes, in order to provide useful data managing the entire building lifecycle.

iii. Model-independent information (drafting/detailing)

This relates to what is to be detailed (created in two dimensions – 2D only – rather than modelled in three).

Not everything graphical may need to be modelled. It is entirely valid to ask the question: "What (areas, elements or categories) will we draft and not model?". This may vary by project stage.

It is important to consider the impact of not modelling such items on 'downstream' use of the information – hence the need to be clear on what BIM uses are applicable and when.

iv. Model assembly/file structure

The proposed assembly needs to accommodate additional project participants' models over time. It should explain what files are created (and their primary contents), by whom, and their relationship to other models within the project. Do they constitute part of the overall project model (also known as the federated model or aggregated model), and at what stage? Are they a means to an end (eg, design intent model), or an end in themselves (eg, as-built model)?

v. Project coordinates

Achieving a common series of coordinates is important to ensure that project models link into each other as seamlessly as possible. This is typically established by (or with the assistance of) a civil engineer or surveyor. Reconciling inconsistent project coordinates after model generation and sharing has occurred can be problematic for some.

9. *Project policies & standards*

– Modelling standards

As a general rule, use existing standards (preferably industry-recognised ones) rather than trying to formulate them from scratch. Modify them to suit the requirements of the project if necessary. At the very least, industry standards will provide a framework for discussion.

Rather than prescribing something for the entire project team, it may be sufficient to run the project allowing multiple standards, so long as those standards are consistently applied, and clearly communicated to others within the project team. That said, each should be assessed for potential conflicts and adjustments implemented accordingly.

Note: there may be other types of modelling standards that are not mentioned here, but two main items to consider are:

i. Modelling nomenclature

Establishing naming/numbering conventions introduces a consistent approach which greatly assists the exchange and interpretation of models. This may apply to models (files), elements (components), views, materials, properties/parameters, rooms/spaces, work-sharing/team-sharing assignments etc.

9 http://www.vicosoftware.com/mps-history-and-evolution/tabid/297475/Default.aspx.

ii. Object/component standards

This may determine what criteria must be met by objects/components before they are permitted for use within the project. ANZRS (www.anzrs.org) has been developed toward this, and other related organisations such as BIM-MEP^{AUS} (www.bimmepaus.com.au) may provide standard content for project use.

- Quality control

  Principally this is about validating information: how information revisions are managed, how the model is coordinated, quantities verified, information exchange transmittals, model audits etc.

- Documentation standards

  Line styles, line patterns, line weights, fill/hatch patterns, colour assignments and other display representation that is based on hard-copy printed output.

- Intellectual property and warranty of use of information

  This should define what constitutes IP, and how it is to be treated. Any restrictions on its use should be clearly stated.

  The extent to which the model may be warranted for particular uses (and constitute a contract document) should be determined. Also the contractual precedence of the drawings, schedules and the model should be determined to help resolve any potential conflicts. Theoretically, the drawings (and schedules) may be a direct derivative from the model, but this does not mean they are *guaranteed* to be the same.

  Ideally, this should be established prior to any model exchange within the project team, and most certainly should be established early so as to guard against mismatched expectations concerning deliverables and permitted uses of them by others.

  Please refer to **L1 - Intellectual Property** paper for more information.

10. Technology infrastructure

- Software, hardware and network environments

  Options include: project website, FTP (file transfer protocol)/EDM (electronic document management), project server/domain and cloud-based services. Hardware requirements such as laptops, desktops, tablets, smartphones, smartboards, television displays and projectors should be identified.

- Communications

  The method of communication should be established. Methods may include face-to-face meetings, phone, instant messaging programs and teleconferencing (audio and/or visual). The technological and environmental capacities of each project participant should be considered. For example: Can teleconference participants 'remote in' (if necessary), or do they need to be in an office to participate?

- Data storage (including archiving) & information access

  Many projects today have project websites or similar (electronic document management systems), such as Aconex, ProjectCentre etc.

  How will archiving of data occur? Who will be responsible? Who manages provision of access to the project team? Will the models be stored on this system, or does it pertain only to documents? Can the models be accessed directly, or only uploaded/downloaded?

CONCLUSIONS

There is a great deal of information generated over the life of a project. The BIM Management Plan seeks to identify from that information what is most important to achieving the project objectives. The document itself should be well structured, clear, and respond to the needs of the project and project team. Although even the contents list of a BIM Management Plan might appear overwhelming, not every item needs to be addressed from the outset. This is discussed in more detail in document **P3: How should you prepare and apply a BIM Management Plan?**.

Summary

A good BIM Management Plan should address:

- Who and what the document is for?
- Who is involved, and in what capacity?
- What is sought for the project (objectives)?
- What approach will be taken (both generally and specifically)?
- How will the project be designed/built/managed?
- How will the project information be developed, exchanged, validated, used and re-used and over what period?
- What tools (software) and processes (BIM uses) will be used toward this purpose?
- How will those tools/processes be employed, by whom and when?

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P3 How should you prepare & apply a BIM Management Plan? [Version 1 – August 2012]

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INTRODUCTION

The process of preparing and applying a BIM Management Plan is as important as the plan itself. No one person can single-handedly know all the needs of the project for its entire lifecycle. Neither can they determine all of the appropriate measures to meet them. A collaborative and iterative approach is necessary.

The following excerpt from the *Penn State BIM Project Execution Planning Guide*[1] summarises its approach to preparing a BIM Management Plan:

The BIM Plan should be developed in the early stages of a project; continually developed as additional participants are added to the project; and monitored, updated and revised as needed throughout the implementation phase of the project. The plan should define the scope of BIM implementation on the project, identify the process flow for BIM tasks, define the information exchanges between parties, and describe the required project and company infrastructure needed to support the implementation.

Some of the principles that should be adopted during the preparation of a BIM Management Plan are described below:

Approach as a collaborative effort

Some BIM guides like the NATSPEC National BIM Management Plan Template describe the roles and responsibilities of each team member with regard to the development of the BIM Management Plan. It is important that the input of those with technical expertise in BIM is balanced by input from those with project management experience. The contents should reflect the input and consultation with the project participants, in accordance with their abilities and expertise. As such, it is a record of agreement rather than a set of instructions from one party to another. This is why BIM project planning workshops are an appropriate means of formulating the particulars of BIM Management Plans.

Establish overarching project requirements before working on the details

Practitioners should first clearly establish some basic information, such as procurement strategy, objectives, challenges and opportunities, and ensure the case is made that BIM-based project delivery can provide what the project needs.

Use a structured process

Refer to resources like the *Penn State BIM Project Execution Planning Guide* for suggested methodologies.

Use a template

Using a BIM Management Plan template will avoid starting from scratch and help overcome some of the inertia that can be experienced at the beginning of the planning process. It will provide an initial checklist of items that need to be addressed

1 *BIM Project Execution Planning Guide Version 2*, Computer Integrated Construction Research Program (CIC) at the Pennsylvania State University, July 2010 http://bim.psu.edu/.

BIM Management Planning Resources

VETERANS' AFFAIRS (VA) BIM GUIDE

Developed for the US Department of Veterans' Affairs, this may not be directly as appropriate for Australian (and non-health) projects as what the NATSPEC National BIM Management Plan is, which was tailored for this specific purpose.

http://www.cfm.va.gov/til/bim/BIMGuide/lifecycle.htm

PENN STATE BIM PROJECT EXECUTION PLANNING GUIDE V2.0

Required reading for anyone drafting a BMP because it clearly sets out a methodology and provides tools such as worksheets and templates to help implement it. NATSPEC NBG Section 7 'Requirements for Using BIM' and NATSPEC BMP Template Section 6 'Specific Uses of BIM' are both based on the BIM use Descriptions found in Appendix B of this Guide. The NATSPEC BMP Template provides cross references to the relevant sections.

http://bim.psu.edu/Project/resources/default.aspx

PENN STATE OWNER BIM EXECUTION PLANNING RESOURCES V1.0

http://bim.psu.edu/Owner/Resources/default.aspx

NATSPEC NATIONAL BIM GUIDE (NBG)

Originally based on the VA BIM Guide, but tailored to suit Australian projects and those of other market sectors, this document has had contribution from a broad group of industry participants.

Download NBG Set: http://bim.natspec.org/images/stories/BIM/NATSPEC_National_BIM_Guide_Document_Set.zip

Download BIM Object/Element Matrix:

http://bim.natspec.org/images/stories/natspec_bim_object-element_matrix_draft_110809.zip

NATSPEC BIM MANAGEMENT PLAN (BMP) TEMPLATE

Companion document to the NATSPEC National BIM Guide. Other documents also accompany this, such as the Project BIM Brief and BIM Reference Schedule.

Download Word format document: http://bim.natspec.org/images/stories/BIM/BIM_Management_Plan_Template_v1.0.docx

Download PDF version:

http://bim.natspec.org/images/stories/BIM/BIM_Management_Plan_Template_v1.0.pdf

INDIANA UNIVERSITY BIM EXECUTION PLAN TEMPLATE

http://www.indiana.edu/~uao/IU%20BIM%20Execution%20Plan%20Template.doc

and a framework for discussion.

Use one of the several template documents available in the public domain and do not hesitate to customise it to suit your project needs. The table adjacent lists some useful resources. The list is not exhaustive.

Start early and develop progressively – don't try to do it all at once

The development of a BIM Management Plan mirrors the design process – it starts with a general outline which is progressively refined as more information becomes available and decisions are made. You can no more formulate a detailed, definitive BIM Management Plan in the first week of the project than produce a set of working drawings before doing a sketch plan.

Development must also accommodate the reality of project establishment that not all parties are engaged from day one. All of this suggests that the most sensible approach is to plan for a series of BIM Management Plans which represent progressive iterations of the initial plan.

While it would be ideal to have the BIM Management Plan complete before any modelling work commences, this is not always practical or possible, given all the variables that may be at play. However consideration should be given by the project team to the consequences of various modelling activities commencing without certain information being established (fees, rework, delay, information reliability etc).

Where insufficient information is available in the early stages of a project to make firm decisions about an item, it can be noted for review and action in following editions of the BIM Management Plan. Likewise, assumptions can be documented so that the information required to support (or dismiss) them can be identified and incorporated in following editions.

The contingent nature of each BIM Management Plan should be made clear to project participants so that they are not perceived to be overly prescriptive or restrictive.

The iterations outlined below illustrate how a BIM Management Plan could be progressively developed:

- **Iteration 1**: Possibly prepared by one party (eg, lead consultant) with the client in isolation from others – who may not yet be formally appointed. The focus is on broad strategic considerations such as project goals and objectives, required completion dates and the most appropriate project procurement strategies.
- **Iteration 2**: Prepared when the project team has largely been assembled and the need for organised collaboration is established. Knowledge of each other's requirements and abilities will assist in active collaboration. The focus is on the 'who, what and when' of the project – the roles of team members and their broad responsibilities and authority, the deliverables required, and the uses of BIM necessary to achieve the project goals and objectives.
- **Iteration 3**: After the general project management framework has been established, the 'nuts and bolts' details that allow project team members to share information and collaborate effectively need to be agreed. The focus is more on the 'how'

Ref	Item	i1	i2	i3
1	Agreement	●	●	●
2	BIM Plan overview	~	~	~
3	Project particulars	●	●	●
a	Project identification	●	●	●
b	Project team and contacts	●	●	●
c	Project roles and responsibilities	●	●	●
d	Project team member BIM capability and maturity statement	~	~	~
e	Project procurement strategy	○	~	~
4	Project definitions/terminology	~	~	~
5	Project objectives	●	●	●
6	Project BIM uses	○	●	●
7	Project deliverables	●	●	●
8	Project procedures and protocols		●	●
a	Project schedules (programs)		~	~
b	Information exchange		~	~
i	Informational requirements		~	~
ii	Information exchange matrix		●	●
iii	Collaboration procedures		●	●
c	Information generation		●	●
i	Model element authoring (including LODs)		○	~
ii	Model-independent information (data)		○	~
iii	Model-independent information (drafting/ detailing)		○	●
iv	Model assembly/file structure		○	●
v	Project coordinates		●	●
9	Project policies and standards		○	~
a	Modelling standards		○	●
i	Modelling nomenclature (naming/numbering)		○	~
ii	Object/component standards		○	~
b	Quality Control		○	~
c	Documentation standards		○	~
d	Intellectual Property and warranty of use of information		○	~
10	Technology Infrastructure		~	~
a	Software, hardware and network environments		○	~
b	Communications		○	●
c	Data storage (including archiving) and information access			~

Table 1. indicates what aspects of planning are appropriate for each Iteration. Refer to document **P2: What should be addressed in a BIM Management Plan?** for a fuller description of each item.

of the project – processes, protocols, and the tools and infrastructure required to support them. It would give any new team members joining the project at this time a clear picture of its organisation.

Beyond this, scheduled reviews and updates of the BIM Management Plan will ensure its continued relevance and usefulness. They can be held at regular intervals – eg, monthly – or linked to nominated project stages or milestones. They can be separate from, or part of, regular project meetings. The latter will help the process become part of established project processes and amendments can be made in response to issues as they arise.

There are also unscheduled events that can prompt changes to a BIM Management Plan including:

- a project participant providing feedback about a need to make change, with protocols provided for in the initial BIM Management Plan
- significant changes to the project team
- changes to the project scope or program
- changes to the project procurement strategy or contractual arrangements

It is important that those in executive roles, eg, BIM Manager, Project Manager, be cognisant of any changes having contractual implications and the need to address these in the appropriate place. That is, some changes may need to be addressed by changes to the contract rather than the BIM Management Plan alone. More frequent or trivial changes that do not warrant a new edition, such as changes to contact details should be made clear in the first iteration of the BIM Management Plan.

CONCLUSIONS

Establishing future needs and related information early on is rarely easy, and sometimes impossible. Key stakeholders who would provide information may not be appointed until much later in the project. Ultimately, only the client can change this, so in such circumstances, project teams should do the best they can with what they have.

The BIM Management Plan doesn't have to be *perfect* the first time in order to achieve a good (improved) outcome. The pursuit of excellence, good communication and a project-first attitude are attributes that will underpin any project team's success. A good BIM Management Plan can capture and demonstrate each of these.

Project teams should also be aware that human nature suggests that under project pressures, people tend to want to retreat from the new and revert to the old. Explicit commitment is required if the proverbial 'bail-out' by some project participants is to be avoided.

The preparation of a BIM Management Plan should be a collaborative, strategic, structured, iterative process, geared around providing certainty and transparency for all project participants.

In this sense, the focus is not (BIM as) Building Information *Modelling*, but (project-centric) Building Information *Management*.

As BIM matures within the AEC industry, including owners and facility managers, it will be integrated to the point of being 'just the way we do things' – not requiring special attention. Eventually there will be no BIM Management Plans – just project plans – having benefited from enhanced information management processes, policies and tools.

Summary

For best results in preparing a BIM Management Plan:

- be iterative
- be collaborative
- be structured
- prioritise
- start with a template
- get buy-in
- get expert assistance