New Zealand BIM Handbook

Appendix D - BIM Uses definitions

July 2014

A guide to enabling BIM on building projects

BRANZ Funded by BRANZ from the Building Research Levy

BUILDING AND CONSTRUCTION PRODUCTIVITY PARTNERSHIP building value

Appendix D - BIM USES DEFINITIONS

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Existing Condition Modelling

Description

A process in which a project team develops a 3D model of the existing conditions for a site, facilities on a site, or a specific area within a facility. This model can be developed in multiple ways: including laser scanning and conventional surveying techniques, depending on what is desired and what is most efficient. Once the model is constructed, it can be queried for information, whether it is for new construction, refurbishment or a modernisation project.

Potential value

- Use as an input to design and construction activities
- Provide documentation of environment for future uses
- Enhance the efficiency and accuracy of existing conditions documentation
- Aid in future modelling and 3D design coordination
- Provide an accurate representation of work that has been put in place
- Real-time quantity verification for accounting purposes
- Use for visualisation purposes
- Provide detailed layout information
- Pre-disaster planning
- Post-disaster record
- Use as a verification process for completed works

Resources required

- Conventional surveying equipment
- 3D laser scanning hardware and software
- Design authoring software
- Laser scanning point cloud manipulation software

Team competencies required

- Ability to manipulate, navigate and review a 3D model
- Knowledge of Building Information Model authoring tools
- Knowledge of 3D laser scanning tools
- Knowledge of conventional surveying tools and equipment
- Ability to sift through mass quantities of data generated by a 3D laser scan
- Ability to determine what level of detail will be required to add “value” to the project
- Ability to generate Building Information Model from 3D laser scan and/or conventional survey data

Cost Estimation (5D Cost Estimation)

Description

A process in which BIM can be used to assist in the generation of accurate quantity take-offs and cost estimates throughout the life cycle of a project. This process allows the project team to see the cost effects of their changes, during all phases of the project, which can help curb excessive budget overruns due to project modifications. Specifically, BIM can provide cost effects of additions and modifications, with potential to save time and money and is most beneficial in the early design stages of a project.

Potential value

- Precisely quantify modelled materials
- Quickly generate quantities to assist in the decision making process
- Generate more cost estimates at a faster rate
- Better visual representation of project and construction elements that must be estimated
- Provide cost information to the owner during the early decision making phase of design and throughout the project life cycle, including changes during construction
- Save estimator's time by reducing quantity take-off time
- Allow estimators to focus on more value adding activities, such as: identifying construction assemblies, generating pricing and factoring risks, which are essential for high quality estimates
- Added to a construction schedule (such as a 4D Model), a BIM developed cost estimate can help track budgets throughout construction
- Easier exploration of different design options and concepts within the owner's budget
- Quickly determine costs of specific objects
- Easier to train new estimators through this highly visual process

Resources required

- Model-based estimating software
- Accurately built design model
- Cost data

Team competencies required

- Ability to define specific design modelling procedures which yield accurate quantity take-off information
- Ability to identify quantities for the appropriate estimating level (e.g., room boundary, NZIQS Elements to objects) upfront
- Ability to manipulate models to acquire quantities usable for estimation
- Ability to adjust a cost plan to suit data available in the model over the duration of design phase

Phase Planning (4D Modelling)

Description

A process in which a 4D model (3D models with the added dimension of time) is utilised to effectively plan the phased occupancy in a renovation, retrofit or addition, or to show the construction sequence and space requirements on a building site. 4D modelling is a powerful visualisation and communication tool that can give a project team, including the owner, a better understanding of project milestones and construction plans.

Potential value

- Better understanding of the phasing sequence by the owner and project participants and showing the critical path of the project
- Monitor actual progress on site against programme and critical path activities
- Identify programme, sequencing or phasing issues
- Dynamic phasing plans of occupancy offering multiple options and solutions to space conflicts
- Integrate planning of human, equipment and material resources with the BIM model to better programme and cost estimate the project
- Identify opportunities for staged handover
- Space and workspace conflicts identified and resolved ahead of the construction process
- Marketing purposes and publicity
- More readily constructible, operable and maintainable project
- Monitor procurement status of project materials
- Increase productivity and decrease waste on job sites
- Convey the spatial complexities of the project, planning information, and support conducting additional analyses

Resources required

- Design authoring software
- Scheduling software
- 4D modelling software

Team competencies required

- Knowledge of construction programming and general construction process (a 4D model is connected to a programme and is therefore only as good as the programme to which it is linked)
- Ability to manipulate, navigate and review a 3D model
- Knowledge of 4D software: import geometry, manage links to programmes, produce and control animations, etc.

Spatial Programming
Description
A process in which a spatial programme is used to efficiently and accurately assess design performance in regard to spatial requirements outlined by the client. The developed BIM allows the project team to analyse space and understand the complexity of space standards and regulations. Critical decisions are made in this phase of design and bring the most value to the project when needs and options are discussed with the client and the best approach is analysed.
Potential value
• Efficient and accurate assessment of design performance in regard to spatial requirements by the owner
Resources required
• Design authoring software
Team competencies required
• Ability to manipulate, navigate and review a 3D model

Site Analysis
Description
A process in which BIM/GIS tools are used to evaluate properties in a given area to determine the most optimal site location for a future project. The site data collected is used to first select the site and then position the building based on other criteria.
Potential value
• Use calculated decision making to determine if potential sites meet the required criteria according to project requirements, technical factors and financial factors • Decrease costs of utility demand and demolition • Increase energy efficiency • Minimise risk of hazardous material • Maximise return on investment
Resources required
• GIS software • Design authoring software
Team competencies required
• Ability to manipulate, navigate and review a 3D model • Knowledge and understanding of local authority's system (GIS, database information)

Design Review

Description

A process in which stakeholders view a 3D model and provide their feedback to validate multiple design aspects. These aspects include evaluating meeting the programme, previewing space aesthetics and layout in a virtual environment, and setting criteria such as layout, sightlines, lighting, security, ergonomics, acoustics, textures and colours, etc. This BIM Use can be done by using computer software only or with special virtual mock-up facilities. Virtual mock-ups can be performed at various levels of detail depending on project needs. An example of this is to create a highly detailed model of a small portion of the building, such as a façade, to quickly analyse design alternatives and solve design and constructability issues.

Potential value

- Easily communicate the design to the owner, construction team and end users
- Get instant feedback on meeting programme requirements, owner's needs and building or space aesthetics
- Greatly increase coordination and communication between different parties, which is more likely to generate better decisions for design
- Eliminate costly and timely traditional construction mock-ups
- Different design options and alternatives may be easily modelled and changed in real-time during design review, based on end user and/or owner feedback
- Create shorter and more efficient design and design review process
- Evaluate effectiveness of design in meeting building programme criteria and owner's needs
- Enhance the health, safety and welfare performance of projects (for instance, BIM can be used to analyse and compare fire-rated egress enclosures, automatic sprinkler system designs, and alternative stair layouts)

Resources required

- Design review software
- Interactive review space
- Hardware which is capable of processing potential large model files

Team competencies required

- Ability to manipulate, navigate and review a 3D model
- Ability to model photos realistically including textures, colours and finishes and easily navigable by using different software or plug-ins
- Strong sense of coordination, including understanding roles and responsibilities of team members
- Strong understanding of how building/facility systems integrate with one another

Design Authoring

Description

A process in which software is used to develop a Building Information Model based on criteria that are important to the building's design. Two groups of applications at the core of a BIM-based design process are design authoring tools and audit and analysis tools.

Design authoring tools are a first step towards BIM and the key is connecting the 3D model to a powerful database of properties, quantities, methodologies, costs and schedules.

Potential value

- Transparency of design for all stakeholders
- Better control and quality control of design, cost and schedule
- Powerful design visualisation
- True collaboration between project stakeholders and BIM users
- Improved quality control and assurance

Resources required

- Design authoring software and / or design analysis software

Team competencies required

- Ability to create and develop a BIM model
- Knowledge of construction methodology
- Design and construction experience

Engineering Analysis (Lighting, Energy, Mechanical, Other)
Description
A process in which analysis software uses BIM to assess the performance of various system options to determine the most effective engineering solution based on owner performance requirements or design codes. Modelled performance data is first compared to physical commissioning results then is the basis for what will be passed on to the owner and/or operator for building systems monitoring or use in the building's operation (e.g., energy analysis, emergency evacuation planning, etc.). These analysis tools and performance simulations can significantly improve the design of the facility and its energy consumption during its life cycle.
Potential value
• Save time and cost by automating analysis • Save time and cost on developing separate analysis models • Improve the quality and reduce the cycle time of the design analyses • Improve commissioning of systems • Achieve optimum, energy-efficient design solution by applying various rigorous analyses • Improve specialised expertise and services offered by the design firm • More efficient building operation by applying post occupancy audit and analysis tools for engineering systems analyses
Resources required
• Design authoring tools • Engineering analysis tools and software
Team competencies required
• Ability to manipulate, navigate and review a 3D model • Ability to assess a model through analysis tools • Knowledge of construction means and methods • Design and construction experience

Structural Analysis

Description

A process in which analytical modelling software utilises the BIM design authoring model to determine the behaviour of a given structural system. Minimum required standards for structural design and analysis are used for optimisation. Based on this analysis, further development and refinement of the structural design takes place to create effective, efficient, and constructible structural systems. The development of this information is the basis for what will be passed onto the digital fabrication and construction system design phases.

This BIM Use does not need to be implemented from the beginning of the design to be beneficial. Often structural analysis is implemented at the connection design level to make fabrication more efficient and for better coordination during construction. This ties into construction system design. Examples include, but are not limited to: erection design, construction-methodology, and staging. The application of this analysis tool allows for performance simulations that can significantly improve the design, performance and safety of the facility over its life cycle.

Potential value

- Save time and cost on creating extra models
- Improve specialised expertise and services offered by the design firm
- Achieve optimum efficient design solutions by applying various rigorous analyses
- Improve the quality and accuracy of the design analyses
- Reduce the iteration time of the design analyses

Resources required

- Design authoring tools
- Structural engineering analysis and design tools and software

Team competencies required

- Ability to create, manipulate, navigate and review a 3D structural model
- Ability to assess a model through engineering analysis tools
- Knowledge of constructability methods
- Knowledge of analytical modelling techniques
- Knowledge of structural behaviour and design
- Design experience
- Integration expertise pertaining to building systems as a whole
- Experience in structural sequencing methods

Facility Energy Analysis
Description
The BIM Use of Facility Energy Analysis is a process in the facility design phase where one or more building energy simulation programmes use a properly adjusted BIM model to conduct energy assessments for the current building design. The core goal of this BIM Use is to inspect building energy standard compatibility and seek opportunities to optimise a proposed design to reduce a structure's life cycle costs.
Potential value
• Save time and costs by obtaining building and system information automatically from BIM model instead of inputting data manually • Improve building energy prediction accuracy by precisely determining building information such as geometries and volumes • Help with Green Star assessment and building energy code verification • Optimise building design for better building performance efficiency and reduce building life cycle cost
Resources required
• Building energy simulation and analysis software • Detailed local weather data • National/local building energy standards
Team competencies required
• Knowledge of basic building energy systems • Knowledge of compatible building energy standards • Knowledge and experience of building system design • Ability to manipulate, navigate and review a 3D model • Ability to assess a model through engineering analysis tools

Sustainability

Description

A process in which a BIM project is evaluated based on NZGBC Green Star, NABERS NZ or other sustainable criteria. BIM enables more sustainable practices to be adopted at all stages of a facility's life including planning, design, construction and operation. The use of BIM technologies facilitates more sustainable design techniques through the capture and incorporation of key data into the decision making process, thereby enabling the sustainability profiles of different building/system designs to be compared. It also enables complex energy and material usage analysis, facilitates more efficient coordination of supply chains and reduces the need for rework and subsequent wastage. Applying sustainable features to a project in the planning and early design phases is more effective (ability to impact design) and efficient (cost and schedule of decisions). This comprehensive process creates an integrated building design philosophy that aims to include all team players from the very beginning of the project, thus providing valuable insights. This integration may require contractual integration in the planning phase. In addition to achieving sustainable goals, seeking NZGBC certification requires submission of certain calculations, documentation and verification. Energy simulation, calculation, and documentation can be performed within an integrative environment when responsibilities are well defined and clearly shared.

Potential value

- Facilitate interaction, collaboration and coordination of team members early in the project process
- Enable early and reliable evaluation of design alternatives
- Availability of critical information early helps efficient problem resolution, in terms of cost premium and schedule conflicts
- Shorten the design process by facilitating early design decisions, resulting in cost and time savings
- Better project quality
- Reduce documentation load after design and accelerate certification because concurrently prepared calculations can be used for verification
- Reduce operational costs of the facility due to improved energy management resulting from optimised building performance
- Increase the emphasis on environmentally friendly and sustainable design
- Assist project team with potential future revisions throughout the facility's life cycle

Resources required

- Design authoring software

Team competencies required

- Ability to create and review a 3D model
- Knowledge of up-to-date NZGBC Green Star/NABERS NZ credit information
- Ability to organise and manage the database

Code Validation
Description
A process in which code validation software is used to check the model parameters against project specific codes. Code validation is currently in its infant stage of development and is not in widespread use. Code validation should become more prevalent within the design industry in the future.
Potential value
• Validate that building design complies with specific codes • Code validation done early in design reduces the chance of code design errors, omissions or oversights that would be time consuming and more expensive to correct later • Code validation done automatically while design progresses gives continuous feedback on code compliance • Reduce turnaround time for 3D BIM review by local code officials or reduce time that needs to be spent meeting with council inspectors, visiting the site, etc., or fixing code violations during defect or closeout phase • Save time on multiple checking for code compliance and allow for a more efficient design process as mistakes cost time and money
Resources required
• Local (or central) authority with resources (people and systems) to accept, review and manage the approval of consent applications • Local code knowledge • Model checking software • 3D model manipulation
Team competencies required
• Ability to use BIM authoring tool for design and model checking tool for design review • Ability to use code validation software and previous knowledge and experience with checking codes

3D Coordination
Description
A process used throughout the coordination process to determine conflicts of geometry within the BIM model that would result in problems on site. This process can be completed by using clash avoidance software which will automate the process of manually checking for conflicts. The goal of 3D coordination is to eliminate any major system conflicts prior to installation.
Potential value
• Coordinate building project through a model • Reduce and eliminate on site conflict, which reduces RFIs significantly, compared to other methods • Visualise construction • Increase productivity • Reduce construction cost through potentially fewer variations • Reduce rework on site • Decrease construction time • Increase productivity on site • More accurate As-Built drawings
Resources required
• Design authoring software • Model review application • Clash detection software
Team competencies required
• Ability to deal with people and project challenges • Ability to manipulate, navigate and review a 3D model • Ability to run clash detection software • Knowledge of BIM model applications for facility updates • Knowledge of building systems

Site Utilisation Planning
Description
A process in which BIM is used to graphically represent both permanent and temporary facilities on site during multiple phases of the construction process. It may also be linked with the construction programme to convey space and sequencing requirements. Additional information incorporated into the model can include labour resources, materials with associated deliveries, and equipment location. Because the 3D model components can be directly linked to the programme, site management functions such as visualised planning, short-term re-planning and resource analysis can be analysed over different spatial and temporal data.
Potential value
• Efficiently generate site usage layout for temporary facilities, assembly areas and material deliveries for all phases of construction • Quickly identify potential and critical space and time conflicts • Accurately evaluate site layout for safety concerns • Select a feasible construction scheme • Effectively communicate construction sequence and layout to all interested parties • Easily update site organisation and space usage as construction progresses • Minimise the amount of time spent performing site utilisation planning
Resources required
• Design authoring software • Scheduling software • Model integration software • Detailed existing conditions site plan
Team competencies required
• Ability to create, manipulate, navigate and review a 3D model • Ability to manipulate and assess construction programme with a 3D model • Ability to understand typical construction methods • Ability to translate site knowledge to a technological process

Construction System Design (Virtual Mockup)
Description
A process in which 3D system design software is used to design and analyse the construction of a complex building system (e.g., form work, glazing, tie-backs, etc.) in order to increase planning.
Potential value
• Increase constructability of a complex building system • Increase construction productivity • Communicate understanding of complex construction sequences • Decrease language barriers • Increase safety awareness of a complex building system
Resources required
• Design authoring software
Team competencies required
• Ability to manipulate, navigate and review a 3D model • Ability to make appropriate construction decisions using 3D system design software • Knowledge of typical and appropriate construction practices for each component

Digital Fabrication
Description
A process that uses digitised information to facilitate the fabrication of construction materials or assemblies. Some uses of digital fabrication can be seen in sheet metal fabrication, structural steel fabrication, pipe cutting, prototyping for design intent reviews, etc. It assists in ensuring that the downstream phase of manufacturing has minimum ambiguity and enough information to fabricate with minimal waste. An information model could also be used with suitable technologies to assemble the fabricated parts into the final assembly.
Potential value
• Save time and cost on creating extra models • Ensure quality of information • Minimise tolerances through machine fabrication • Increase fabrication productivity and safety • Reduce lead times • Reduce dependency on 2D paper drawings
Resources required
• Design authoring software • Machine readable data for fabrication • Fabrication methods
Team competencies required
• Ability to understand and create fabrication models • Ability to manipulate, navigate and review a 3D model • Ability to extract digital information for fabrication from 3D models • Ability to manufacture building components using digital information • Ability to understand typical fabrication methods

3D Control and Planning (Digital Layout)
Description
A process that utilises an information model to layout facility assemblies or automate control of equipment's movement and location. The information model is used to create detailed control points to aid in assembly layout. An example of this is layout of walls using a total station with points preloaded and/or using GPS coordinates to determine if proper excavation depth is reached.
Potential value
• Decrease layout errors by linking model with real world coordinates • Increase efficiency and productivity by decreasing time spent surveying in the field • Reduce rework because control points are received directly from the model • Decrease/eliminate language barriers
Resources required
• Machinery with GPS capabilities • Digital layout equipment • Model transition software (software that takes a model and converts it to usable information)
Team competencies required
• Ability to create, manipulate, navigate and review a 3D model • Ability to interpret if model data is appropriate for layout and equipment control

Record Modelling

Description

Record Modelling is the process used to depict an accurate representation of the physical conditions, environment and assets of a facility. The Record Model should, at a minimum, contain information relating to the main architectural, structural, and MEP elements. It has the ability to be the culmination of all the BIM throughout the project, including linking operation, maintenance and asset data to the As-Built model (created from the design, construction, 4D coordination models and subcontractor fabrication models) to deliver a Record Model to the owner or facility manager. Additional information, including equipment and space planning systems, may be necessary if the owner intends to use the information in the future.

Potential value

- Aid in future modelling and 3D design coordination for renovation
- Improve documentation of environment for future uses, e.g., renovation or historical documentation
- Aid in the consenting process (e.g., continuous change vs. specified code)
- Minimise facility handover disputes (e.g., link to contract with historical data highlights expectations and comparisons drawn to final product)
- Ability for embedding future data based upon renovation or equipment replacement
- Provide owner with accurate model of building, equipment and spaces within a building to create possible synergies with other BIM Uses
- Minimise building handover information and required storage space for this information
- Better accommodate owner's needs and wants to help foster a stronger relationship and promote repeat business
- Easily assess client requirement data, such as room areas or environmental performance, to as-designed, As-Built or as-performing data

Resources required

- 3D model manipulation tools
- Compliant model authoring tools to accommodate required deliverables
- Access to essential information in electronic format
- Database of assets and equipment with metadata (based on owner’s capabilities)

Team competencies required

- Ability to manipulate, navigate and review a 3D model
- Ability to use BIM application for building updates
- Ability to thoroughly understand facility operations processes to ensure correct input of information
- Ability to effectively communicate between the design, construction and Facilities Management teams

Asset Management

Description

A process in which an organised management system is bi-directionally linked to a Record Model to efficiently aid in the maintenance and operation of a facility and its assets. These assets, consisting of the physical building, systems, surrounding environment, and equipment, must be maintained, upgraded and operated at a level of efficiency which will satisfy both the owner and users in the most cost effective manner. It assists in financial decision making, short-term and long-term planning, and generating scheduled work orders.

Asset Management uses the data contained in a Record Model to populate an asset management system which is then used to determine the cost implications of changing or upgrading building assets. The bi-directional link also allows users to visualise the asset in the model before servicing it, potentially reducing service time.

Potential value

- Store operations, maintenance owner user manuals and equipment specifications for faster access
- Perform and analyse facility and equipment condition assessments
- Increase the opportunity for measurement, tuning and verification of systems during building occupation (optimise building efficiency)
- Maintain up-to-date facility and equipment data, including but not limited to, maintenance schedules, warranties, cost data, upgrades, replacements, damages/deterioration, maintenance records, manufacturer's data and equipment functionality
- Provide one comprehensive source for tracking the use, performance, and maintenance of a building's assets for the owner, maintenance team and financial department
- Produce accurate quantity take-offs of current company assets which aid in financial reporting, bidding and estimating the future cost implications of upgrades or replacements of a particular asset
- Allow for future updates of Record Model to show current building asset information after upgrades, replacements or maintenance by tracking changes and importing new information into model
- Aid financial department in efficiently analysing different types of assets through an increased level of visualisation
- Automatically generate scheduled work orders for maintenance staff

Resources required

- Asset management system
- Ability to bi-directionally link facilities Record Model and asset management system

Team competencies required

- Ability to manipulate, navigate and review a 3D model (preferred but not required)
- Ability to manipulate an asset management system
- Knowledge of construction and the operation of a building (replacements, upgrades, etc.)
- Pre-design knowledge of which assets are worth tracking, whether a building is dynamic vs. static, and the end needs of the building to satisfy the owner
- Knowledge of related financial software

Building (Preventative) Maintenance Scheduling
Description
A process in which the functionality of the building structure (walls, floors, roof, etc.) and equipment serving the building (mechanical, electrical, plumbing, etc.) are maintained over the operational life of a facility. A successful maintenance programme will improve building performance, reduce repairs and reduce overall maintenance costs.
Potential value
• Plan maintenance activities proactively and appropriately allocate maintenance staff • Track maintenance history • Reduce corrective maintenance and emergency maintenance repairs • Increase productivity of maintenance staff because the physical location of equipment/system is clearly understood • Evaluate different maintenance approaches based on cost • Maintenance approaches based on cost • Allow facility managers to justify the need and cost of establishing a reliability-centred maintenance programme
Resources required
• Design review software to view Record Model and components • Building Management System (BMS) linked to Record Model • Computerised Maintenance Management System (CMMS) linked to Record Model
Team competencies required
• Ability to understand and manipulate CMMS and building control systems with Record Model • Ability to understand typical equipment operation and maintenance practices • Ability to manipulate, navigate and review a 3D model

Building Systems Analysis
Description
A process that measures how a building's performance compares to the specified design. This includes how the mechanical system operates and how much energy a building uses. Other aspects of this analysis include, but are not limited to, ventilated facade studies, lighting analysis, internal and external CFD airflow and solar analysis.
Potential value
• Ensure building is operating to specified design and sustainable standards • Identify opportunities to modify system operations to improve performance • Create "what if" scenarios and change different materials throughout the building to show better or worse performance conditions
Resources required
• Building systems analysis software (energy, lighting, mechanical, other)
Team competencies required
• Ability to understand and manipulate CMMS and building control systems with Record Model • Ability to understand typical equipment operation and maintenance practices • Ability to manipulate, navigate and review a 3D model

Space Management and Tracking

Description

A process in which BIM is used to effectively distribute, manage and track appropriate spaces and related resources within a facility. A facility building information model allows the facility management team to analyse the existing use of the space and effectively apply transition planning management towards any applicable changes. Such applications are particularly useful during a project's renovation where building areas are to remain occupied. Space management and tracking ensures the appropriate allocation of spatial resources throughout the life of the facility. This BIM Use benefits from the utilisation of the Record Model. This application often requires integration with spatial tracking software.

Potential value

- More easily identify and allocate space for appropriate building use
- Increase the efficiency of transition planning and management
- Proficiently track the use of current space and resources
- Assist in planning future space needs for the facility

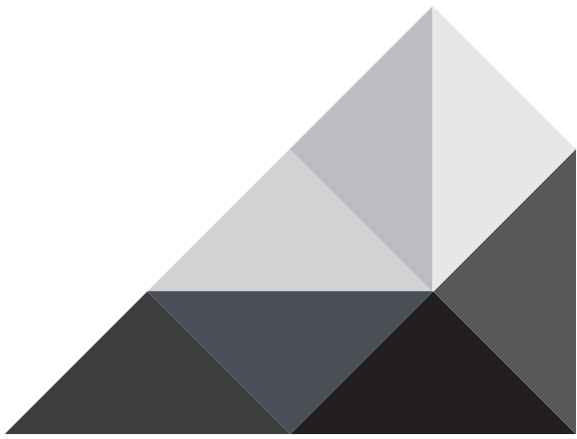
Resources required

- Bi-directional 3D model manipulation; software and Record Model integration
- Space mapping and management input application (Mapguide, Maximo, etc.)

Team competencies required

- Ability to manipulate, navigate, and review Record Model
- Ability to assess current space and assets and manage appropriately for future needs
- Knowledge of Facilities Management applications
- Ability to effectively integrate the Record Model with Facilities Management applications and appropriate software associated with the client's needs

Disaster Planning
Description
A process in which emergency responders have access to critical building information in the form of a model and information system. The BIM model provides critical building information to the responders that improves the efficiency of the response and minimises safety risks. The dynamic building information is provided by a building management system (BMS), while the static building information, such as floor plans and equipment schematics, resides in the BIM model. These two systems are integrated via a wireless connection and emergency responders are linked to an overall system. The BIM model coupled with the BMS can clearly display where the emergency is located within the building, possible routes to the area, and any other harmful locations within the building.
Potential value
• Provide police, fire, public safety officials, and other emergency services access to critical building information in real-time • Improve the effectiveness of emergency response • Minimise risks to responders
Resources required
• Design review software to view Record Model and components • Building Automation System (BAS) linked to Record Model • Computerised Maintenance Management System (CMMS) linked to Record Model
Team competencies required
• Ability to manipulate, navigate and review a BIM model for facility updates • Ability to understand dynamic building information through BMS • Ability to make appropriate decisions during an emergency



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