Unlocking the value of BIM for asset management

In New Zealand the benefits of using Building Information Modelling (BIM) during the design and construction phases of a building's life cycle are increasingly understood. Less well known is the long-term value that can be delivered by BIM in the operation phase, after the building's handover.

Greater use of BIM and digital information to support asset management (AM) and facilities management (FM) is critical to its greater uptake.

This article explores how BIM can be used to improve the quality and usefulness of the information that is delivered alongside a physical asset to assist its future operation and maintenance. Anchoring BIM to the owner's business drivers is central to its success.

The BIM value chain

Over and above the benefits of BIM to the design phase and construction phase, BIM can add significant value during the operational phase of a built asset's lifecycle. The BIM value chain for asset management can be summarised as follows:

- A ready reservoir of important, reliable information for:
    - asset assessment – actual wear and tear, history of maintenance to better inform replacement decisions and likely expenditure
    - reliable starting point for decision-making
    - operational efficiencies
    - disaster recovery/ business continuity.
- Data efficiency – removing double-handling of information and related frustration by linking databases together: efficient use of asset data fields from the design phase, added at the technical submission phase and checked upon completion. Should owners develop further maturity in this space over the next 3, 5 or 10 years, the 3D model information can be leveraged for their systems and space management.
- Quality control – coordinating models and installation up front reduces the need for site-driven changes so construction-issue installation layouts become the 'As-builts', often requiring zero change, as everything is installed as per the drawings.
- Subtrades provide 2D and 3D asset information (as well as non-graphical data) for an owner's asset management system at handover – this information is an integral part of the modelling process and, therefore, comes at no extra cost.

- Reliable As-built information on completion of a project – 3D scanning can augment the As-built information, if requested, including any areas where there may be future connections, avoiding need for disruptive/destructive surveys to detail connecting elements.

"Until recently, the uptake of BIM has been led by design consultants who use BIM for improving the co-ordination and efficiency of their design and documentation processes, and by larger contractors who use BIM to assist construction co-ordination on complex, large-scale projects," says BIM Acceleration Committee member Andrew Field.

"We see a step change in the use of BIM in New Zealand coming from building owners taking a long-term view of their properties and demanding "better information" as part of their project brief to improve their decisions about asset maintenance and renewal. When the value of BIM is unlocked in this way, we can harness untapped potential."

Solutions of the future

Increasingly, new buildings and refurbishments need to be sustainable and responsive to changing needs. BIM enables this through the creation of digital asset information management (AIM) systems. It is the gateway to the solutions of the future.

A huge amount of information is created on a construction project and it is challenging to get a clear understanding of progress from all of the contractors involved. Also, the information is often produced in multiple places and in multiple formats. AIM provides a one-stop view of key building information, saving time and bringing certainty to all project team members and the building owner. This fully integrated, digital repository of information can be called on endlessly throughout a building's life.

An innovative example

The redevelopment of the Mason Bros. Building in the Wynyard Quarter Innovation Precinct on Auckland's waterfront by Precinct Properties showcases how BIM can enhance asset management. In a ground-breaking first for New Zealand, mobile and cloud based technology was used to capture critical data through the project's design and construction phases and deliver it to the building's operations team's mobile devices to inform ongoing maintenance. To understand the tangible benefits of BIM for asset management, it helps to look at this innovative example in more detail.

Photo: Dawid Wisniewski

Precinct Properties invests in high quality, strategically located city centre real estate. The Mason Bros. Building, a character warehouse on the edge of Waitemata Harbour, had been used as the Southern Spars facility for the 2003 America's Cup. Precinct wanted to transform the 5,500m² warehouse into a dynamic, multi-functional, commercial environment for multiple tenants.

In line with its strategic objective of operational excellence, a particular driver for Precinct Properties was ensuring that the repurposed Mason Bros. Building was highly efficient to run from an operations and maintenance perspective. A critical outcome was the ability to accurately forecast capital expenditure.

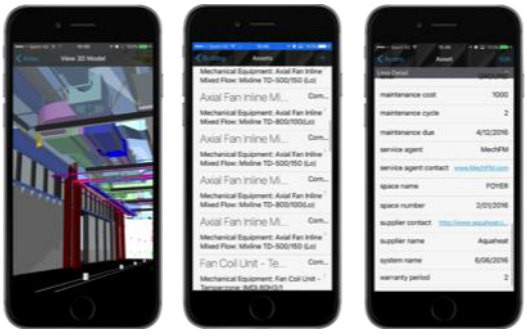
Taking AIM

Precinct engaged Beca to create a customised, digital AIM system for the Mason Bros Building. The evolution of the solution started in the right place…in the future. Beca's Digital Delivery team worked backwards from the end use, defining Precinct's operations team's essential asset information requirements (both graphical and non-graphical). These included:

- plant room and risers
- maintainable equipment
- disaster recovery and business continuity information (e.g., location of valve sets, shut-off procedures for utilities and electrical equipment).

This information needed to be provided in an easily accessible, digital format at the handover of the refurbished building.

Precinct Properties specified the use of BIM in the construction phase to produce validated asset information that would support the building's ongoing operation. The main contractor, NZ Strong, worked with the supply chain to achieve this with the assistance of an external BIM management company, asBUILT. The contracting team, along with asBuilt, input information using mobile devices to capture extra data into the 3D environment. They also used a desktop web interface to capture additional data. Training workshops showed them how to input the required data online. The physical handover of the refurbished building was partnered by a digital handover of essential information, including the 3D models, specified assets and associated data and documentation.



"Beca developed an innovative asset management solution that provides Precinct Properties with detailed, up-to-date, reliable information on the building's plant and equipment. All of the Mason Bros. Building asset information is delivered on mobile devices, taking a tedious paper-based process into the digital space. Precinct's asset management and operations teams can instantly access all of the 3D models and view where the assets are in the building and the data and documents associated with them. It's an ongoing data collection process that can be used throughout the building's life cycle for a variety of different purposes."

PAUL SINGLETON, PRECINCT PROPERTIES OPERATIONS MANAGER – AUCKLAND

The digital AIM solution incorporated a suite of software from Autodesk, providing a link between information generated during the construction phase (BIM 360 Field) and the live asset management database (Building Ops) used by Precinct Properties for the ongoing maintenance of the Mason Bros. Building. This asset database can be integrated with other business management systems, such as accounting or space management systems, to leverage further benefits, but the integrating technologies are still maturing.

A full description of the development process is provided in the BIMinNZ Mason Bros. Commercial Precinct Case Study at www.BIMinNZ.co.nz

"Precinct was willing to innovate, investing time and effort in new ways of managing construction and asset information," says Beca Technical Director Brett Naylor.

"The Mason Bros. Building redevelopment demonstrates how essential information for asset management can be captured digitally and delivered on site through mobile technology – a New Zealand first and potential game changer."

Leveraging the benefits

So what does this mean for Precinct Properties on a day to day basis?

> "Many people talk about the benefits that BIM can deliver to a project in design and construction. Fewer talk about the benefits that BIM can bring to the asset management and operations stages where the most benefit can be achieved."
> PRECINCT PROPERTIES DEVELOPMENT, MANAGER, DAVE LUXTON

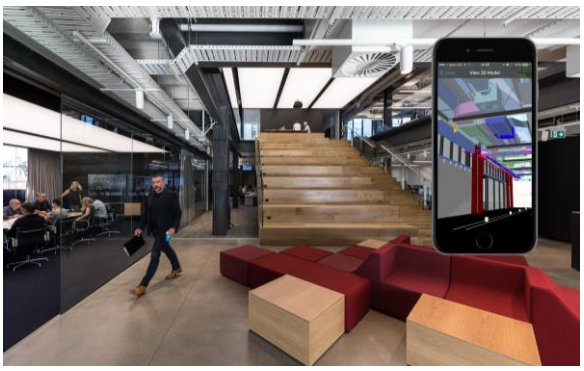
When maintenance work is carried out on any building system, the information is linked to a 3D model and uploaded to the cloud-based database. It provides a record of vital information which is updated through links to hand-held devices when plant is serviced.

This delivers ongoing benefits for Precinct Properties. Paul Singleton, Precinct Properties Operations Manager, Auckland, shares an example of how things are better than before.

"During the defects and liability period of the Mason Bros Building, there were ongoing issues with the domestic hot water system. An independent team met on site to review its design, install and operation. Using the digital AIM system we were able to access the design and As-built documentation via the use of a barcode and mobile device, to deduce the system was not installed as per design. Supplier information was accessed and a call put through to assess the actual capacity of the calorifiers and the heating elements. The control of the system was also interrogated at the time and changes to the functional description of the system could be made to reduce electrical consumption.

All of the above happened within a matter of minutes, in the plant room, without the need for the group (an expensive group!) to head away to start the accumulation of information."

Delivering long-term value



In summary, BIM-driven asset management solutions provide greater efficiencies for:

- scheduling asset maintenance and replacement
- accurately forecasting OPEX and CAPEX
- raising work orders
- energy use and building performance
- delivering enhanced service to building tenants by responding quickly to issues
- managing hazards and disaster recovery
- maintaining and updating records

- better decision making and strategic planning.

Critical success factors

As the Mason Bros. example illustrates, critical success factors for the use of BIM for asset management include:

- understanding the client's desired outputs – what they want out of an As-built model and how they plan to use it – and identifying these in the project brief
- adopting the mantra of "less is more", focusing on capturing the asset data that is most important to their business – the data set needs to be manageable and useful
- partnering with contractors who can manage gaps in digital information knowledge in the supply chain.

The Precinct Properties experience points to the many benefits of applying BIM to asset and facilities management, over and above the benefits BIM brings to building design and construction. In addition to providing reliable As-built information on completion of a project so operations are ready to go from day one, a digital As-built handover provides essential information for the efficient, ongoing management and operation of a building over its lifetime.

There is massive potential to apply BIM as a discipline more widely in this area, starting with a clear focus on the building owner's end use of asset data.

It's time to go back to the future.