



**CRC Construction Innovation**  
BUILDING OUR FUTURE



# FM as a business enabler

Solutions for managing the built environment

## Executive summary

With a design life of 250 years as a performing arts centre, Sydney Opera House is acknowledged as an icon that is an architectural masterpiece and an asset of national significance. The facility comprises 7 theatres, 37 plant rooms, 12 lifts and over 1000 rooms. Sydney Opera House employs 300 full-time staff and a further 300 part-time staff, delivering over 2500 performances per annum.

Arguably one of the most unique facilities in the world, it provides a range of facilities management (FM) challenges, and presents a very public opportunity to research and create innovative FM strategies and models to benefit the Australian FM industry and the economy as a whole.

The Cooperative Research Centre (CRC) for *Construction Innovation* and the Australian Government's FM Action Agenda chose Sydney Opera House as the focus of its FM Exemplar Project to develop innovative strategies across three research themes. The findings have been integrated into an FM solution beyond its component parts to demonstrate the role of FM as a business enabler.



## FM as a business enabler

As a functioning performing arts centre, commercial enterprise, tourist attraction and major national asset, Sydney Opera House must continue to demonstrate the optimal use and effectiveness of its maintenance budget to provide value for its stakeholders. To better achieve this, the CRC for *Construction Innovation* focussed on the following three themes for investigation:

- *digital modelling* — developed a model capable of integrating information from disparate software systems and combining this with a spatial 3D Geographic Information System (GIS) element. This model is capable of working collaboratively between parties to further FM objectives such as maintenance more efficiently and effectively.
- *services procurement* — developed a multi-criteria performance-based procurement framework for FM service delivery
- *performance benchmarking* — developed an FM benchmarking framework that enables facilities/ organisations to identify best practice and improvement strategies.

Sydney Opera House is managed by the Sydney Opera House Trust on behalf of the Government of the state of New South Wales. Within the framework of the Total Asset Management (TAM) Plan, these three themes provide an integrated FM solution capable of supporting Sydney Opera House's business objectives and functional requirements. *FM as a business enabler* showcases innovative methods to improve FM performance, a better alignment of service and performance objectives and provides a best-practice model to support the business enterprise.



## Digital modelling

The digital modelling theme has demonstrated significant benefits in digitising design documentation such as drawings and operational manuals, using standardised and re-usable digital models for FM purposes.

The key to useful digital modelling has been the use of industry foundation classes (IFC) — an open data exchange standard for construction — that can be read and manipulated by any compliant software. IFCs provide comprehensive support for FM functions, and offer new management, collaboration and procurement relationships based on cross-industry and cross-platform sharing of data.

The showcase of a new digital model for Sydney Opera House has demonstrated that IFC-based exchange is possible. The data exchanged has been reasonably geometrically accurate, considering the complexity of Sydney Opera House's structure, and that the building elements support rich information describing the types of objects, with their properties and relationships.

Facilities performance, condition and presentation reporting data have been inserted and correlated with the 3D model, offering functionality to query and to obtain visual presentation of this data. The IFC model can be extended to incorporate many organisation specific requirements, including such applications as energy and condition modelling and monitoring.

## Services procurement

Services procurement has focussed on defining the performance levels of building maintenance and cleaning services, and their alignment with business objectives, identifying procurement routes, and deciding best-value selection.

Multiple criteria were used in assessing service providers and weighting strategies applied in building maintenance and cleaning services.

The procurement process emphasises the following factors in alignment with the business objectives of Sydney Opera House:

- good understanding of the enterprise
- strong culture fit
- ability to contribute to ongoing success
- value for money
- innovative technology
- use of Building Condition Indices (BCI).

BCIs have been developed by Sydney Opera House to monitor asset performance standards for building fabric maintenance and cleaning services. The BCIs use a percentage scale wherein 100% equates to "as new", against which current condition is measured using a descriptive system.

# Performance benchmarking

The performance benchmarking theme involved a two-stage international survey of iconic facilities and formulated a range of prioritised KPIs. The survey has demonstrated a degree of commonality across the respondents, forming the basis for an FM benchmarking framework.

Analysis of the benchmarking data from the survey has identified from a pre-determined list that the following items should be considered core to an FM benchmarking framework:

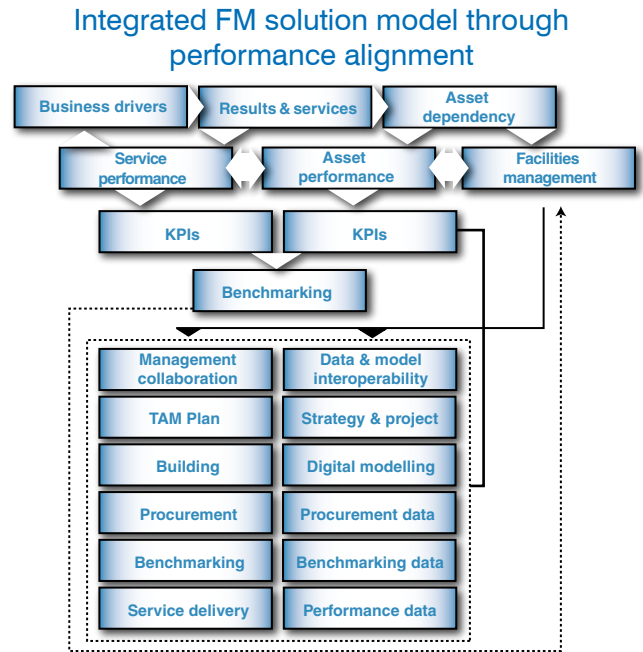
- condition — building structure and services, public spaces, internal fittings and finishes
- energy management — rate of consumption and management
- accessibility — security provision and information for visitors
- contractor’s performance — quality of service, safety, timeliness and compliance.

High-level status drivers surveyed for iconic facilities included functionality, landmark status, operational efficiency and cultural heritage.

Further research needs to be undertaken in order to refine comparable benchmarks.

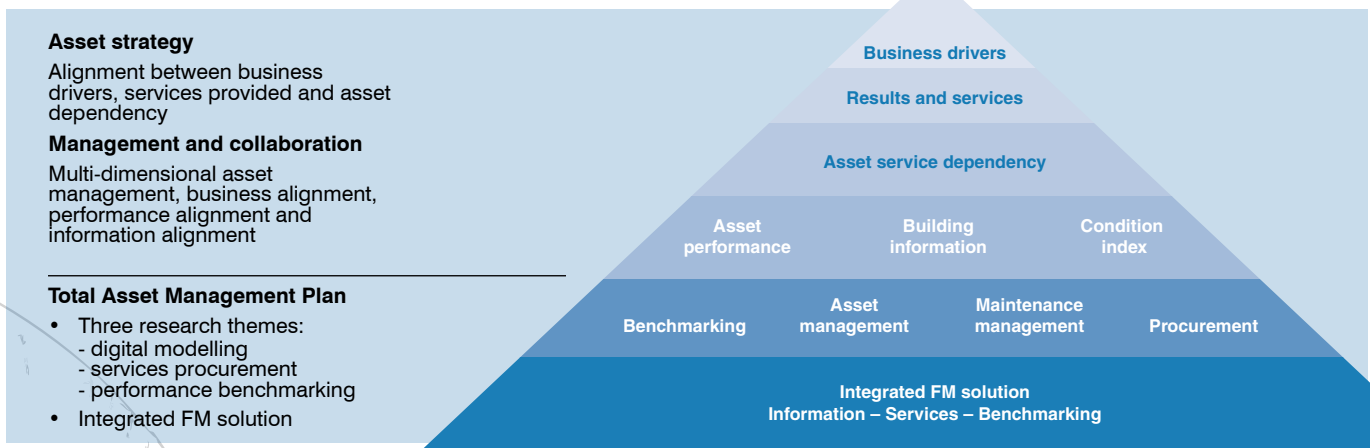
# Integrated FM solution

The digital modelling, services procurement and performance benchmarking themes present different dimensions of the FM equation, which when integrated, improve the performance of FM and its ability to support organisational objectives. The integrated FM solution developed supports the Sydney Opera House’s TAM Plan using information, service, performance and business alignment, depicted in the case of performance alignment, as follows:



*FM as a business enabler* concentrates on developing the integration strategy of all themes into an overall business framework to provide a generic model that can be applied to the FM industry at large, as follows:

## Development of an integrated FM solution



This project provides a broad range of practical input from client, consultants and service providers. The project’s outcomes will in turn support the industry’s FM Action Agenda. The innovative methods delivered by this project should be implemented across the FM industry at the strategic, management and operational levels. Further research on the FM Exemplar Project outputs would assist in developing a broader application of the integrated FM solutions to other facility types and benefit the FM industry and the community at large.

*FM as a business enabler* will be available for download or purchase from

[www.construction-innovation.info](http://www.construction-innovation.info)



**Australian Government**

**Department of Industry,  
Tourism and Resources**

*Construction Innovation* gratefully acknowledges the financial support it has received for this project from the Department of Industry, Tourism and Resources.

“The FM Exemplar Project has benefited from having an excellent mix of high quality, committed industry and research professionals from the CRC for Construction Innovation. They are to be congratulated for their generosity and willingness to work collaboratively to achieve these outcomes with benefits to Sydney Opera House, the FM industry and the community at large. I commend FM as a business enabler to you.”

**The Hon Bob Baldwin MP**

*Parliamentary Secretary to the Minister for Industry, Tourism and Resources*

## Project partners

### Industry



**Rider Hunt**

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### Government



### Research



The CRC for *Construction Innovation* is a national research, development and implementation centre focussed on the needs of the property, design, construction and facility management sectors.

Through its active industry diffusion program of targeted industry seminars and publications, *Construction Innovation* is bringing the outcomes of our applied research into industry practice.

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