

# Integrating infrastructure information for efficient whole

## Introduction

Recognition of the critical importance of information management, processes and strategies is gaining momentum within the wider construction industry. As Building Information Modelling (BIM) adoption, implementation and development becomes more prolific in industry, asset owners are seeking to use the newly found information to improve decision making and achieve whole-lifecycle performance efficiencies from their physical assets. Information is no longer created and used for a single purpose; it can be transferred and used within different life-cycles, e.g. the same data sets used in the construction phase can be used within the operational phase, allowing for new and innovative ways to apply the data. This is being guided by novel and emerging technologies, supported by industry standards solely focused within BIM and asset management.

CSIC researchers are engaged in projects to develop generally applicable tools and guidelines for asset information management and retention for the whole life of infrastructure assets. This includes identifying data requirements for asset management, defining asset information models (AIM – the collated set of information gathered from all sources that supports the ongoing management of an asset or group of assets) and integrating such data with the BIM models, assessing BIM maturity, and helping organisations understand their information retention risks and requirements. Longer-term this activity will support the Centre for Digital Built Britain's agenda.

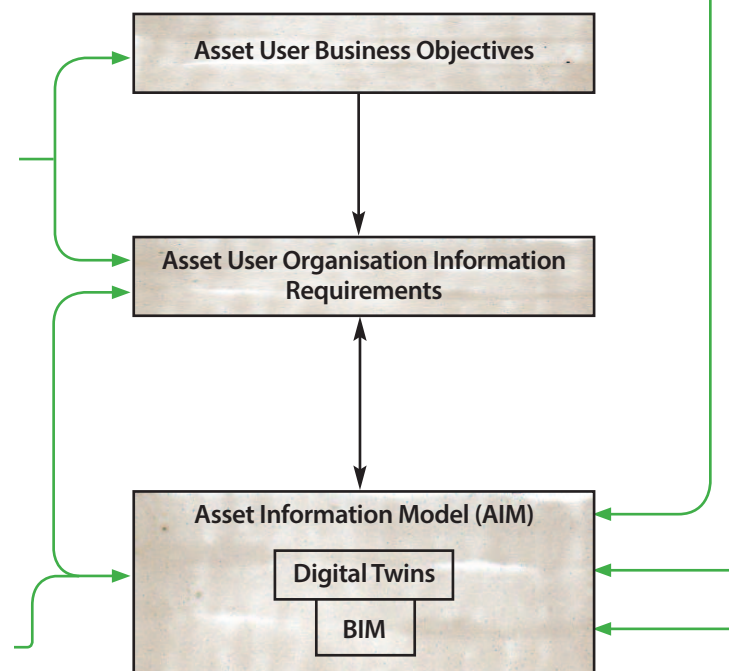
## Data-driven asset management – a framework for linking ISO and BIM standards for whole-life value

BIM is being implemented for design and construction, but its use for asset management and maintenance is only beginning to be considered. Design data and asset information which would enable efficient management of built assets, although available, is not currently passed on to asset managers in a way that can be easily utilised. The aim of this project, in partnership with Costain, is to create a model based framework approach to aid in the development of whole-life asset information requirements (AIR) linking the PAS 1192 (BIM Level 2) standards with the ISO 55000 (Asset management) standards while validating the information model against the asset users' organisational requirements and objectives. A tool will be built that can automatically link AIR to Uniclass 2015 – a unified classification system for the construction industry. Uniclass 2015 contains consistent tables classifying items of all scales from a facility such as a railway through to products such as a CCTV camera in a railway station. Detailed industry case studies are being developed with English Heritage and University of Cambridge Estate Management to demonstrate the methodologies developed in this research.

## Connecting information requirements to the information model

Infrastructure asset data sets are commonly held in disparate and incoherent platforms. Such data sets are generated with multiple enterprise software applications using an array of standards and format types. As a result, the optimum value from the information is often not fully realised.

The focus of this research is on developing tools for integrating different data sources to support whole-life asset management of infrastructure assets and systems. This project aims to develop multi-layered information platforms to integrate heterogeneous data sources, support intelligent data querying, and provide smarter decision-making processes in asset operations and maintenance.



### Asset information futureproofing for whole-life value

The amount of information created and used in the infrastructure and construction sectors is vast and diverse by nature. In addition, the assets themselves are long-lived, and hence large amounts of information are generated during an asset's lifetime. Organisations need to understand the need for specific requirements for efficient information retention and management throughout the lifecycle of an asset. CSIC has developed a three-stage approach that helps organisations:

- understand their information retention requirements
- identify and assess risks of information losses in the long term
- identify and provide guidance on information futureproofing solutions to mitigate the risks of information loss.

The information futureproofing approach helps facilitate the process to select or identify technologies and services that would enable long term storage and retrieval of infrastructure information. To date the methodology has been successfully applied with two industry partners.

### Investigating the role of the digital twin in optimising asset value

CSIC researchers at the Institute for Manufacturing (IfM) are collaborating on the flagship research project of the Centre for Digital Built Britain (CDBB) at the University of Cambridge with joint CSIC-CDBB industry partners, to develop a dynamic digital twin of the West Cambridge Site. The aim of the project is to demonstrate the impact of the digital twin on facilities management, wider productivity and wellbeing of the building users. A digital twin refers to a digital replica of physical assets, processes and systems. The long-term goals of this work are to demonstrate the impact of digital modelling and the analysis of infrastructure performance and use on organisational productivity. This will provide the foundation for integrating city-scale data to optimise city services such as power, waste and transport, and to understand the impact on wider social and economic outcomes. Additionally, CSIC researchers together with CDBB aim to establish a 'research capability platform' for researchers to understand and address the major challenges in implementing digital technologies across a range of scales and foster a research and development community interested in developing novel applications to improve the management and use of infrastructure systems. This project is funded by the Centre for Digital Built Britain at the University of Cambridge. (See case study on page 24)

### BIM maturity assessment

Since 2016, all UK government-procured projects mandate Level 2 BIM. CSIC's BIM Maturity Assessment Tool (BMAT) is designed to support an organisation's implementation of BIM and delivers two significant areas of information – measurement of the organisation's BIM development maturity and measurement of the supporting processes. The tool provides a separate assessment of the different stakeholders (contractor, designer and employer), and is designed to be used as a continuous performance measurement tool that can be employed to track the evolution of BIM maturity throughout the construction phase through to handover. The Excel-based tool is designed to be user-friendly and adaptable to the needs of individual organisations and projects. (See case study on page 28)

### Where will this lead?

This research will help industry in its journey to digitalisation through developing, and enabling adoption of, approaches to data curation and information management throughout the lifecycle of built assets. This includes frameworks for developing information models and assessing organisational maturity in the adoption of these approaches.

“ Research in this area is paving the way to releasing the true value of information across the whole lifecycle of infrastructure.

Mark Enzer, Chief Technical Officer, Mott MacDonald

#### Benefit to

Asset managers, infrastructure owners and operators

#### Impact and value

- new approaches to data curation and information management to enable better decision making

#### Project contact

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