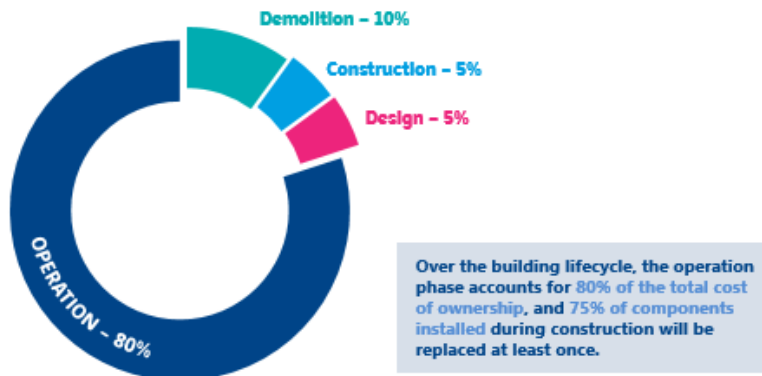


## BIM: improving building performance

*In addition to its role as a tool for 3D visualisation, Building Information Modelling (BIM) is now **an integral part of the VINCI Facilities operations process**: not only improving multi-technical maintenance, but also increasing the services and ways your buildings can be used.*



Although BIM is often used at a building's design phase, for VINCI Facilities it is during the operation phase — which is the longest period of a building lifecycle — that it offers **the biggest return on investment**. This is because, over that lifecycle, **80% of total costs are incurred over the asset management phase**.

With this in mind, we can help you implement BIM FM to improve efficiency and enhance the value-added services offered during the operation phase.

### Using BIM in the operation phase: enhanced building maintenance management

As a collection of the entirety of a building's technical and physical data, the BIM model is **a fully reliable digital representation of your structure that is updated throughout its entire lifecycle**.

VINCI Facilities maintenance teams use this single database to **monitor your technical facilities more easily and effectively**, incorporating data about your asset and its lifecycle. They also supplement the database, which feeds directly into the model, as they carry out their interventions.

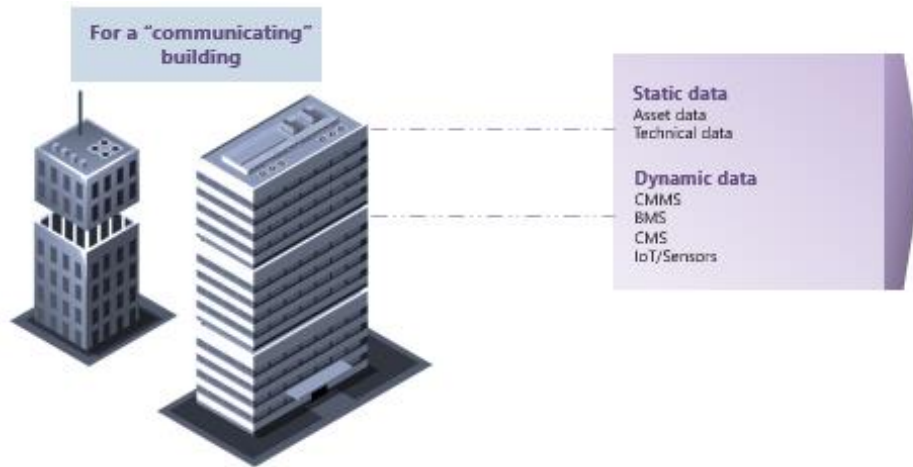
In the field, operational efficiency is optimised in terms of **precision, responsiveness and performance**. BIM models allow them to locate equipment more quickly, determine whether they need to intervene, increase the accuracy of cost estimates for their services, and act remotely when an incident is reported, or ahead of a possible discrepancy. No longer do we need to drill a hole in a wall to find out how and with which materials it was made — BIM visualisation can accurately tell us the materials used, the layout and technical characteristics to within a centimetre.

Using BIM models does not only improve maintenance management — all of a building's users benefit. **Occupants** enjoy greater comfort with reduced wait times for technical interventions; **building owners** can better anticipate and streamline costs and investments for their buildings; and **all site management operatives** can ensure the long-term maintenance of the quality of life for your occupants.

Through its **interoperability with operational tools and entire digital set up**, from connected devices to space management tools, BIM models give us a contextualised view of the usage of and life within a building in real time.

The more this data is pooled together, **the better an understanding we have of how a building is used**. BIM models can now be used for corrective, preventive and predictive maintenance. Our teams can take timely action (for example, regarding temperature, humidity and indoor air quality), optimise or anticipate your property resources, and **adjust our services according to how occupants really use your building**.

## BIM explanatory note

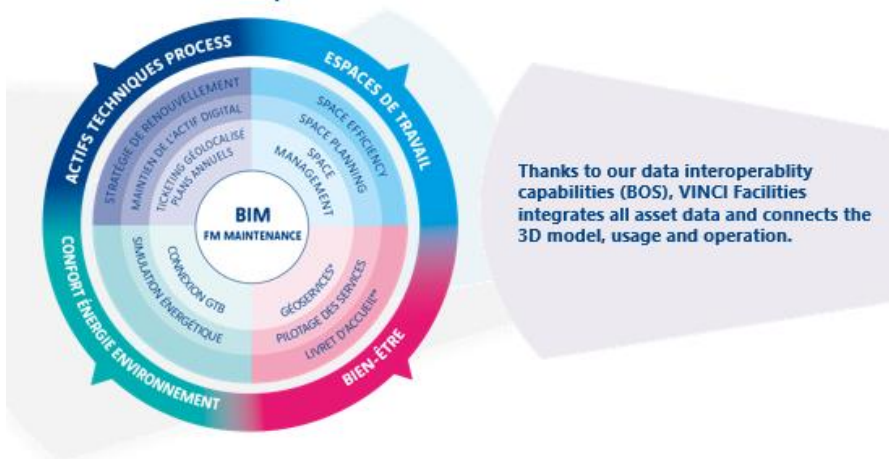


## How VINCI Facilities use BIM in the operation phase: from management to the overall optimisation of your building



We can guide you through the activation of the three levels of BIM maturity according to your short and long-term performance expectations. **The first level involves visualising the digital database** of the building, but no interfacing with our operational tools. **At the second level, our teams carry out dynamic maintenance of your building** by connecting the model to our different operational tools (BMS, CMS, IoT, CMMS). Finally, **the third level involves an overall optimisation in terms of technical performance and services**, based on our detailed analysis of how your building is used.

## BIM explanatory note



Thanks to our data interoperability capabilities (BOS), VINCI Facilities integrates all asset data and connects the 3D model, usage and operation.

At this third level of operation of the model, we can analyse these uses and offer a **wide range of services based on our four main points of optimisation**.

These solutions focus firstly on a **building's overall performance**, from automating work plans that span several years (**technical assets**) to managing energy and heating commitment levels by simulating use (**comfort, energy, environment**).

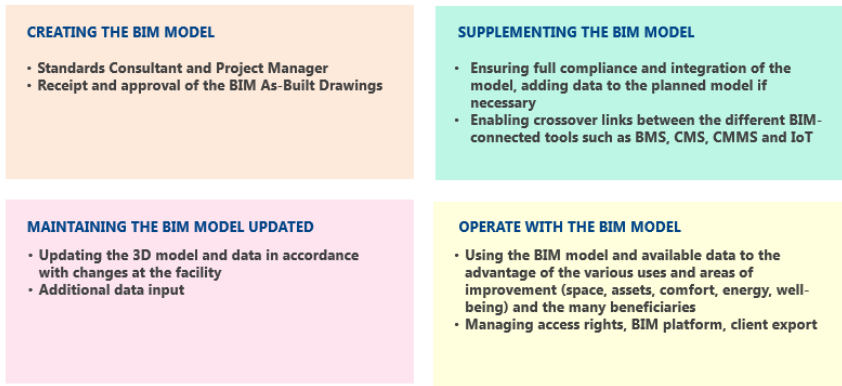
They also focus on **occupants' productivity and quality of life**: adapting working environments with immersive virtual reality

visualisations before design (**workspaces**); activating geoservices such as geotracking and the navigation of the building for occupants; and optimising safety and costs through the use of predictive simulation (pathways/people flow/signage etc.) (**well-being**).

## How VINCI Facilities can guide you through BIM implementation in the operation phase

Your VINCI Facilities site manager is responsible for checking the suitability of the BIM tool for your needs and uses with you in advance in order to approve your BIM implementation plan and its future use by our teams. The main goal of this stage is preparing to set up your future BIM service, and pinpoint how it will be used.

### The BIM FM Manager is responsible for integrating and overseeing the model



### Creating the model

Our BIM FM Manager, who is in charge of **receiving** and **creating** the model, whether the building concerned is new or not, assesses the quality of the available data that you have provided and identifies all information discrepancies between the BIM model and the property "as-built".

### Supplementing the model

In order to confirm the accuracy of the data and technical characteristics that

have been provided, the BIM FM Manager **adds data to** the planned model if necessary, ensuring full compliance (in terms of equipment properties and assembly of technical work packages) so that BIM operation can be implemented. They are also responsible for enabling crossover links between the different BIM-connected tools such as BMS, CMS, CMMS and IoT. Once these connections have been established, the BIM FM Manager finalises the links on the BIM interface and carries out compatibility and functionality testing.

A "light" model is available for **moderate BIM use**, containing the architecture and equipment to be managed along with other basic essential information such as model type, manufacturer, addressing).

This model makes entry level geolocated maintenance possible through its Geographic Information System (GIS).

## BIM explanatory note

### Maintaining the model

The BIM FM Manager is responsible for maintaining the integrity of the data in the model and carrying out regular updates so that it can be used effectively during the operation phase.

- The BIM infrastructure is based on:
  - Connectors, which can be used to retrieve data related to the building or professional applications (BMS and CMMS connectors)
  - A centralised database, which organises the information

This architecture manages the data with its own infrastructure that can collect, pool, contextualise, analyse and display all of the data related to the building. Each site must have a server and a database in order for BIM to function. The data is then saved and directly hosted in the location of your choice: either on-premises, or a public or private cloud-based virtual machine.

The connectors enable interfacing with the central information system. The reference documents and standards to be followed at each site in order to allow dialogue between the building's system and the central information system must be defined in advance.

### Using the model

You have access to a VINCI Facilities operational interface that will allow you, like the operating teams, to visualise all data in the BIM context. You will not, however, have the tools necessary for modification. You will also be able to access and use data through Wayin', Hypervision and our dynamic analysis platform if you ordered these tools and services.

You will be able to extract CMMS data in Excel format on request via the task interface.

You will also be able to extract BMS data in SQL format on request. A one-month BMS record is stored on the server. If you require a more long-term record, you will be charged for the additional storage.

### Allocation of ownership of the model

Ownership of the model is usually allocated in the following way:

#### Owner:

The owner of the asset is the only one who owns the models and the information about the main elements of the building that are not related to adjustments carried out by occupants with no impact on the technical work packages for which the owner is responsible. (Allocation of responsibility for work packages for both private and communal elements is set out in the rental agreement).

This includes 3D models and the entire record of maintenance and interventions (corrective, preventive and regulatory) associated with the different assets of the building. The owner, then, can access the level of technological development of the building and records at all times, independently of any company involved.

As an optional extra, the record of alerts and failures of the BMS and building energy performance monitoring can also be included, the site's IT structure permitting.

#### Tenant/occupant:

The tenant owns all information resulting from their works and data on the life and use of the building.

This includes development modelling, production tool modelling and living space modelling, as well as data generated by workspace management systems. Relevant directories, occupation data for indoor geolocation or IoT and data on comfort settings and access control are all also included.

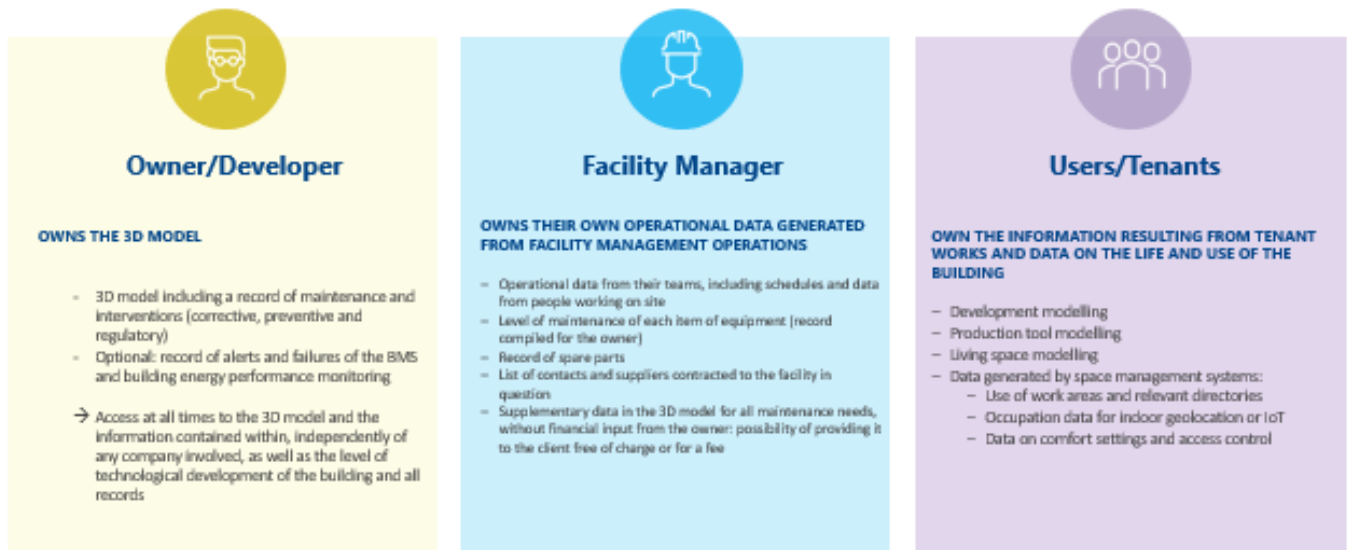
### Facility Manager:

The Facility Manager owns their own data generated from the operational organisation of their teams and the optimised level of maintenance resulting from their professional expertise. This includes the level of maintenance of each item of equipment (record compiled for the owner), schedules and management of people working on site, records of spare parts, lists of contacts and suppliers contracted to the facility in question.

If supplementary data in the 3D model has been produced for maintenance needs without financial input from the operator, the Facility Manager is free to decide whether to provide it to the client free of charge or for a fee.

The above is based on general property rules regarding access and usage of data which are negotiated for each contract according to the features and uses needed at each site. For example, if you would like to control the lighting in a meeting room according to whether or not it has been reserved in the management tool, different levels of access need to be agreed in order to do so.

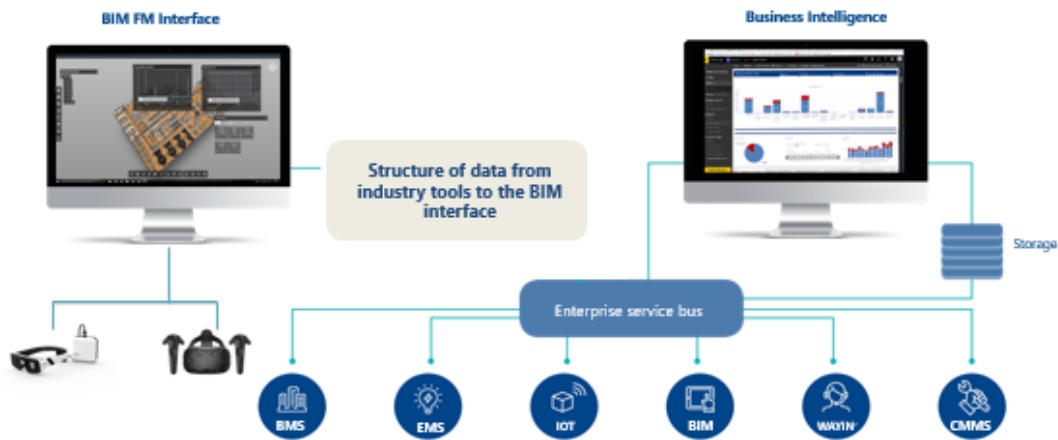
Such large amounts of information require the implementation of a database that is centralised, maintained and managed. According to experience, this management is put in place and carried out by the operator as part of the multi-technical and FM contract, or by the owner as part of a mono-technical contract. Indeed, the operator of one package would find it difficult to maintain and manage the information and updates for a third party package. If the owner is responsible for the management, they must have the necessary IT and technical skills.



## BIM explanatory note

All data is accessible to authorised persons as part of the multi-party contract via a secure personnel identification system that can be synchronised with the client's other internal systems.

As BIM Manager/Operators, we ensure the integrity of data archiving and sharing on our platforms. (The client bears all responsibility for extracted information that they decide to share).



*Given the increasingly technical nature of buildings, as well as more stringent regulatory, energy and safety requirements, investing in the BIM data management and analysis tool will allow VINCI Facilities to **improve the understanding of your asset in real time.***

*With this reliable, precise and interoperable bedrock of data, our teams are able to appropriately adapt the operational services offered to you according to the changing needs of your building and the occupants' uses as identified by the entire digital set up.*

*In addition to maintaining your building efficiently, all of our efforts now go to increasing the savings we generate for you by, for example, removing the need for building compliance audits or drawing recreations in the case of a change of tenant or reconstruction, better foresight of studies and audits ahead of new rental agreements, shorter timeframes for handling new tenants and reduced risks in managing your building.*

*By improving the knowledge of your asset in real time, the BIM model guarantees the interoperability of your asset data and particularly that **operations will be adapted appropriately according to the changing needs of your buildings and their occupants' uses.***