Buyers guide

BUILDING OPERATING SYSTEM FOR REAL ESTATES

PropTechOS

Idun

The buyer's guide for a Building Operating System

The real estate industry, just like any other industry, must build its business on data to be able to meet the demands of the future tenants and be able to drive innovation and operational effectiveness. There are a number of areas where digitalization is critical for real estate businesses:

- Adapt the business in line with the fast-changing needs of the tenants.
- Increase focus on being able to drive Environmental, Social and Governance criteria.
- Drive down operational cost.
- Increase the value of your buildings.

To be able to build a business that will become more agile and resilient is key. To do that is not simple and it demands a number of things if it is going to happen. The key to success is to implement an IT infrastructure that will enable the business to develop data-driven applications fast and based on business needs. It is challenging times for IT managers, but the opportunity for IT to deliver future value for the industry is huge.

There is an increasing demand to develop new applications and services based on data from buildings and other critical sources. When the need occurs you must be able to produce solutions fast. To be able to go from a brilliant idea to a working solution fast and then enhance it step by step. This development process must be able to work in close cooperation with the business. The cost for developing and maintaining these applications must be low if the return on investment for new applications is going to pay off for the business.
Another critical success factor is that the real estate owner must be able to sit in the driver's seat themselves for this to happen. You can not rely on specific suppliers' solutions and competence that has got dependencies between each other. That will slow down the process and drive costs.

You have to base the solution on open industry standards and an ecosystem that can drive the development of the industry forward.

To be able to produce new applications more effectively, implement new infrastructure, and new processes is not an easy task for IT managers. There is a lot of legacy and complexity in the real estate industry that you have to overcome. A critical success factor is to find a way that will allow you to get fast returns and try out new ways of working in a data-driven manner.

If you can master this challenge, the experience is that it will start to open up the creativity in the organization when they understand that you can create applications based on data that you never thought was possible. To be able to build this momentum and this new mindset in the organization, that you cost-effectively can drive business value based on data is a game-changer.

We have put together this guide to help you to better understand how to be able to implement this in your organization.

Based on our experiences these are the lowest hanging fruits that you should look for and automate:

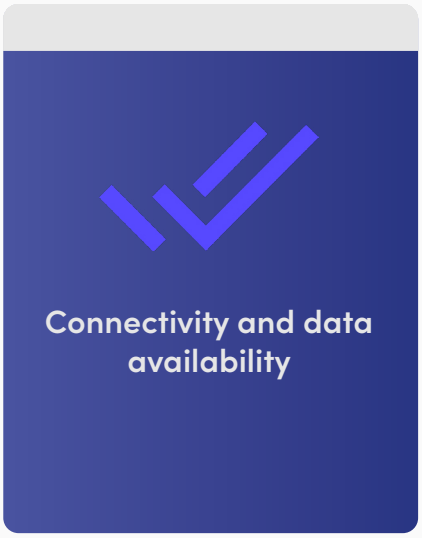
- Facility Management
- ESG compliance: E.g. certifications such as LEED, BREEAM, WELL or the EU Taxonomy
- Tenant satisfaction: IAQ (Indoor Air Quality), Space Utilization, Access to ESG data
- Energy optimization
- Occupancy Analytics for financial analysis and maintenance optimization

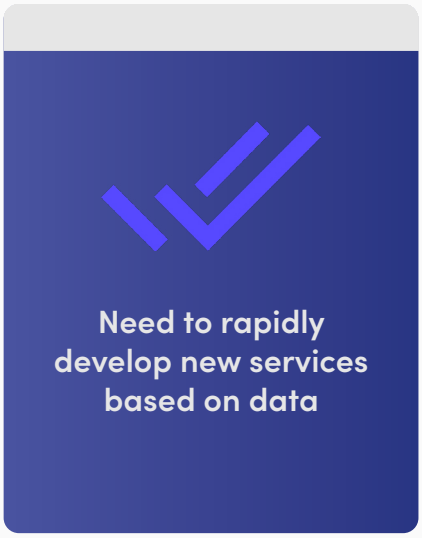
There are already a number of large real estate owners that have implemented this new way of working and have developed applications in the above areas that are delivering significant business value for a low development cost.

The challenges that you have to master to become a truly data-driven real estate business

A deeper understanding of the challenges that you need to overcome is the foundation for being able to move forward and take the proper steps and investments toward building a long-term solution that can scale efficiently in line with the business needs.

We have divided them into the following areas:





Connectivity and data availability

Without the ability to easily connect and make data available in a cost-effective way you will never succeed.

To be able to connect easily and make data available there is a need for a common language that will make it easier for real estate owners to describe the data of interaction within the buildings that they operate – as well as the management, storage, and sharing of this data. Having the shared language that these data schemas

provide enables property owners to connect their buildings with new services on a large scale, and not have to worry about building- or technology-specific implementation details and formats.

Based on an ontology that is adapted to the industry needs makes it easier to implement a platform that makes it possible to gather data from all types of data sources. This is what we refer to as an industry adapted integration platform or an operating system. The operating system will make it possible to easily connect all data sources[1] from all buildings and integrate the data in one common place where it can be used for the analysis of the development of applications.

A structured agile process for development together with the business

A common approach to modern software development is that you set up cross-functional teams with representatives from the business and the IT side of the organization that works together. The team drives an iterative process where the application will be built and tested in small steps and then enhanced over time depending on new or changing business needs.

To be able to drive the development and innovation process based on this philosophy, access to a platform that makes it possible is needed.

It often takes more time to understand the business needs than developing the functionality when you are up to speed.

With this type of process in place it will be easier to maintain your applications.

[1]IoT devices, BIM, Building Management Systems and business systems.

Need to rapidly develop new services based on data

If you master the challenges just mentioned above you will be able to drive speed and develop new applications cost-effectively but to really master the challenge of speed and cost over time you also need to consider how you can buy standard applications that are adapted to your needs. You should also potentially want to get access to applications from an industry ecosystem that are willing to share data with each other.

You should also be able to reuse your own applications between buildings and existing applications should be able to be used as the foundation for developing new applications.

The myth of open API:s / Ecosystem vs. Egosystem

What you as a property owner want is to be able to easily and cost-effectively connect various data sources and applications. However, to make integrations between different systems means that the property owner ”owns” the integration, i.e. when something is to be updated or changed, the property owner must bear the cost - forever.

Paraphrasing Michael Watkins:

API:s are like toothbrushes: everybody's got one but nobody wants to use anyone else's.

What is needed is to use an ecosystem that has the following features:

- Portability, i.e. that a developer of an application can use it on the same API everywhere and not be forced to do integration work for each new platform.
- SDK (kit with code and guides) for developers
- Community for developers
- Collaborations between industry partners and other standards to gain acceptance and dissemination
- Governance of the development standard and that applications follow the standard.

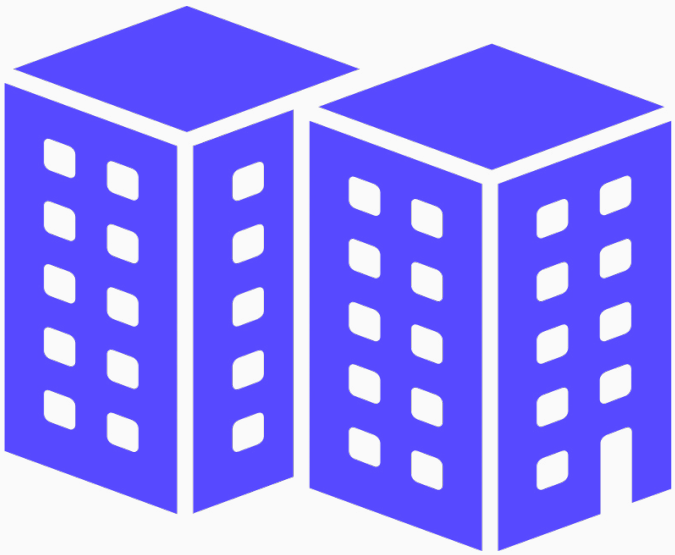
Then we get the recipe for industrial scaling.

Why are ontologies important?

The ontology is essentially a shared data model for a given domain, like a building structure, IoT systems, a smart city, the energy grid, web content, etc. Ontologies are often used as schemas for knowledge graphs, as they can enable:

- Harmonization of software components, documentation, query libraries, etc.
- Reduced investment in conceptual modeling and system development.
- Easier data interoperability on a semantic level.
- Best practice reuse, no need to make the same mistakes others have already done and learned from.

There is a solution to this called RealEstateCore for the real estate industry. In addition to specifying how the data is structured its meaning (ontology) of it, the APIs are also highly standardized (REST, streaming, and Edge). The development of the standard is controlled by an open organization and takes place as open source by the users.



Possible ways of enabling integration capabilities in your organization

There are a number of ways that organizations can set up the IT infrastructure to make it possible to have access to data for the development of data-driven applications.

The strategy you choose will highly affect the possibilities to master the challenges and get the abilities that we have presented earlier in this document. We have listed the most common approaches that we see in the real estate industry today and the positive and negative implications of each one of them.

DIY – Do it yourself

It is possible to develop the data-driven applications yourself and at the same time solve the integration and data access problems. A prerequisite is of course that you have available resources, basic tools, and technical skills.

The benefits of this approach are:

- You have complete control over the development and do not depend on vendors
- You have the skills to maintain and further enhance the applications that you have build
- You own the applications and they can not be reused by others in your industry for their benefit.

The negative consequences of this approach are:

- You will heavily depend on the employees and consultants that have built your system
- It is costly to develop IT systems from scratch not to mention the cost of maintenance
- It is hard to keep up with the pace of competition developing IT systems yourself - you are spending your resources solving generic problems

Buy from consultants based on RFP

It is possible to develop data-driven applications using consultants and at the same time solve the integration and data access problems. Normally this requires an RFP where you specify your needs and what type of software needs to be developed for what purpose.

The benefits of this approach are:
- You have full control of the specifications
- You own the applications and it can not be reused by others in your industry for their benefit.

The negative consequences of this approach are:
- It is costly to custom-make an IT-system
- You will heavily depend on the consultants that have built it
- You built it - you own the maintenance costs
- Since you have the possibility to change the specifications in mid-flight (due to some in the organization identifying blockers) - it will most certainly happen with delays and increased costs to follow

Build applications based on top of the Building Management Systems (BMS)

BMS solutions are critical for a number of important reasons for buildings. The BMS operates functions and systems such as HVAC, lighting, metering, etc. The main objective of a BMS system is not to make you data-driven and make it possible for you to develop your own applications based on your needs but rather to run the basic functionality in a [modern] building.

The benefits of this approach are:
- You own the applications and they can not be reused by others in your industry for their benefit – you are in control

The negative consequences of this approach are:
- You still need to develop your data-driven applications yourself or you are limited to the BMS-vendor's applications
- You will be dependent on the vendor of the BMS for integrations

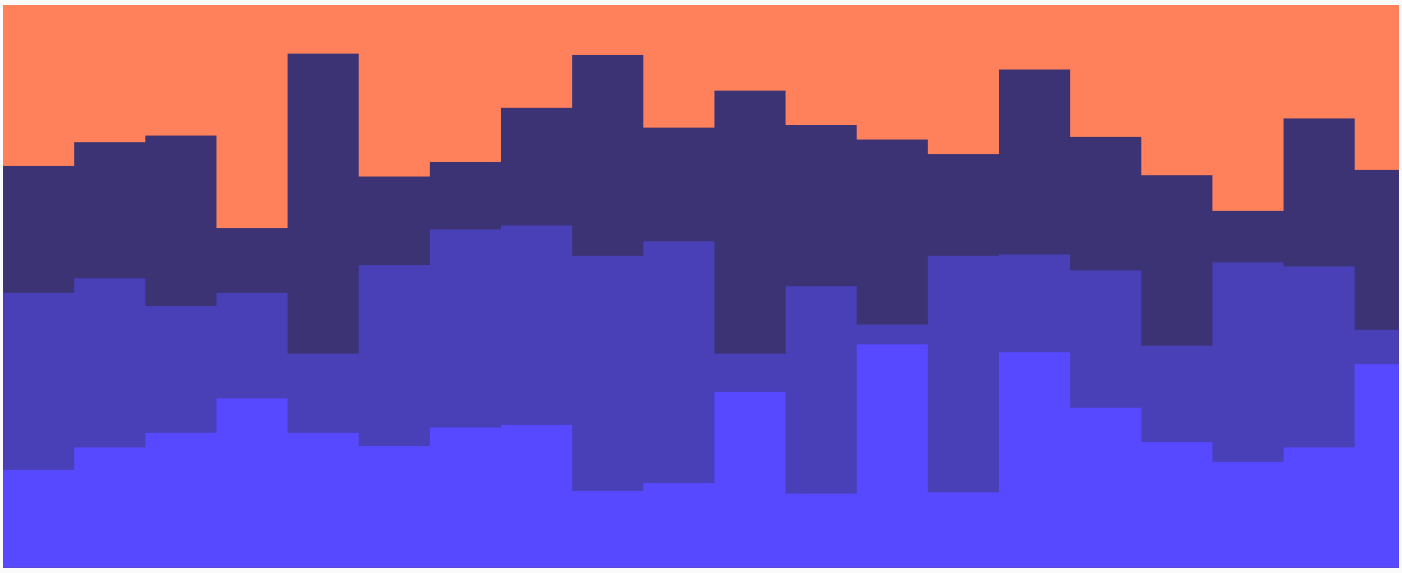
Use the Building Information Management (BIM) solutions

BIM is a concept for creating a digital drawing of the building to support the design, planning, and construction phase of a building. Several systems exist for using the result for daily operation. BIM models rarely include information about the data aspect of a building. This means that BIM cannot be used for archiving the objectives of developing data-driven applications at scale based on business needs without extra cost and labour.

Some of BIM's drawbacks:

- There are several different ways and file formats to create a BIM model this means that it usually a significant work that needs to be done with existing BIM models before they can be re-used in a digital manner.
- Usability is dependent on how the BIM models were originally set up by the architects - did they plan for the integration with technical systems in the building?

BIM is focused on files - not database-oriented. This gives a big problem in integrating the process of maintaining and keeping track of continuous changes that are made in a building - should you always have an architect to update the Revit/Archicad model?



Buy an industry-specific integration platform based on standards – a Building Operating System (BOS)

What we recommend is that instead of the options above, you buy an integration platform (BOS) that is based on an open standard ontology specifically built for the needs of the real estate industry. This platform should also include standard connections with the normal data sources like BMS solutions. The BOS should also make it easy to set up integration with all types of IoT devices and external data sources.

Managing data should be an integrated part of the BOS together with common standard applications for occupancy analytics, compliance certification, and energy optimization. The BOS should have built-in functionality to enable fast and cost-efficient onboarding of legacy BMS and blueprints, creation of service orders and alerts with proper routing to facility management system etc.

The BOS should also allow internal and external application developers to develop standard applications for various business needs.

External application developers should be able to certify standard applications to work with the BOS and make them available for customers to purchase and use with easy installation and configuration.

Specifications for a BOS

For an industry-specific integration platform to work effectively there are a number of critical characteristics that are needed if it is going to be possible to drive fast implementation of applications based on business needs for a low cost. The most important foundation is that the BOS is built on an open standard specifically developed for the industry.

Based on standards

- Open APIs based on industry standards such as RealEstateCore, Brick Schema, Building Topology Ontology, Haystack Project
- Vast access to integration providers
- Based on industry frameworks and programming languages

Performance and scalability

- High and cost efficient scalability with sufficient performance
- Resilience (being able to operate in case of disturbances in network connectivity)

Edge and Cloud capabilities

- Support applications on the Edge (in the buildings) in combination with applications in the Cloud
- Support safe actuation - controlling a system in a building from the Cloud needs to be done with back-up in case of connectivity failure
- Streamlined and integrated control and maintenance of Edge devices (systems in the building)

Efficient and easy administration of the platform

- Robust and easy managed access matrix
- Single sign-on and two factor authentication (2FA)
- Federation with e.g. Active Directory

Compliancy fulfillment

- IT security and data encryption
- GDPR compliance

Support for legacy systems onboarding

The BOS needs to support a cost efficient onboarding process for the real estate owner's portfolio of systems such as:

- IoT devices
- Building management systems
- BIM systems
- Business systems

BOS based on standards

One of the most widely adopted standard ontologies is RealEstateCore that complements and works in conjunction with other prominent standards such as Brick Schema, Building Topology Ontology, Haystack Project etc. RealEstateCore has been developed since 2016 and has recently been adopted by Microsoft as the standard ontology in the Azure Digital Twins platform.

Property owners can use RealEstateCore to describe the data of interaction within the buildings that they operate – as well as the management, storage, and sharing of this data. RealEstateCore is a modular ontology, that is, a collection of data schemas that describe concepts and relations that can occur in data that is generated to model buildings and building systems, or that is sourced from such systems.
Integration interfaces for the BOS
It is also important that it is easy to connect to various data sources. To achieve this the BOS integration layer must follow a standardized API such as RealEstateCore.

Application development on top of the BOS

To be able to efficiently develop applications for a BOS, it is important the platform uses standardized APIs and has access to extensive development guides and examples (SDK) as well as a vibrant community of developers.

Ecosystem of ready-made applications

For the real estate owner it is a huge benefit if it is possible to buy standard applications as add ons that solve different types of business needs. For these types of third-party applications to be possible to use there should be specific technical certification programs that ccosystem partners can use to certify applications for the platform.

Pay based on usage

Business is getting more and more used to being able to pay for software based on usage and the value that the software delivers for the organization. This is especially interesting for an BOS if it is going to be possible to implement applications in the organization that deliver a fast return on investment.

When new applications need to be developed, it should be possible to calculate the ROI and include the cost for the BOS in that business case based on the usage of the BOS IIP.

The questions that you want to have answers to before you start

Before you can start the implementation of a BOS solution you need to clearly define what do you want to achieve. What is the problem you need to solve? Start by defining the problem(s) and the savings or increased revenue in a couple of simple business cases. By setting up the business cases, you can then formulate success criterias for the pilot.

Second, do I have the data needed in some system in order to meet the success criterias? Some data might be costlier to get access to than others. Start with the easiest combination of business case and data availability and then increase the data gathering as you move on.

You need to define the first app to implement to prove ROI and this way of working.Our experience is that many organizations can easily implement energy saving.

To be able to do that do the following:

An example of energy optimization vs. IAQ (indoor air quality):

- Energy consumptions from meters - can you get the data from the utility providers instead of integrating with every single building? That will give you a high value of the business case if you can take large parts of your portfolio at the same time.
- IAQ data for your building(s) - can you integrate to a centralized BMS or IoT system and get several buildings on 1 integration?

This kind of “short cuts” when you are using a data source that has been an isolated island to solve 1 particular task and reusing it for a complete other business case is an example of the core purpose of using a BOS.

How do you take the next step?

If you are interested in taking the next step towards becoming a truly data driven real estate business we recommend that you take the first step by studying a custom demonstration of a Building Operating System like Proptech OS from Idun.

During this demonstration you will learn:

1. How to navigate and explore your buildings' digitial twins
2. How to onboard blueprints and BMS or IoT system
3. Which tags to select from the BMS or IoT system for onboarding
4. How to onboard an App and start to use it to get value

You can book a demonstration on
www.proptechos.com/schedule-a-demo/

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