How to integrate BIM with business processes?

White paper by INTELSYS
INTRODUCTION

Numerous reports and research papers have come to the conclusion that a digital transformation in the EC&O (Engineering, Construction & Operations) industry is imminent. The EU BIM Handbook notes that the digitalization of the construction sector represents a once in a generation opportunity to tackle the low productivity and high complexity challenges facing the construction industry.

The Boston Consulting group finds that full-scale digitization will lead to annual global cost savings of 13% to 21% in the design, engineering and construction phases and 10% to 17% in the operations phase by 2025.

But how to achieve the benefits from digitization? The concept of Building information modelling (BIM) has taken center stage in this discussion. Originally BIM was understood as a way of designing assets collaboratively using one coherent data system of computer models instead of drawings.

Lately BIM has been used to express digital innovation within the whole construction industry as a collection of tools, process and cultural mindset.

In this paper we refer to BIM in the more traditional sense – as the digital representation of physical and functional characteristics of a facility throughout its lifecycle.

We don’t consider BIM as a process itself and the goal of this paper is to show how EC&O companies can improve project delivery by integrating BIM with business processes.

We will explain the reasons why it makes sense to put BIM at the heart of your construction business and how it can be accomplished with INTELSYS.build solution.

In today’s world, the goal of design is no longer just to provide a specification of the desired end result. Increasingly, design is more about providing the necessary details for efficient project execution throughout a building lifecycle.

We hope this paper will make it easier to understand and communicate the benefits of integrating BIM with business processes.

Should you have any questions about this white paper or INTELSYS.build, please contact us at info@intelsys.build.
Constructing a building is not a simple task. There are many stakeholders involved and as projects get more complex it becomes increasingly difficult to manage the entire process. The building lifecycle can be summarized in 3 major stages: **Design**, **Build** and **Manage**. When considering BIM integration with business processes it is crucial to take into account the entire lifecycle because the data you accumulate throughout the process gives added value at every next step.

**PROCESS**

The 3D geometry of the BIM model is created and enriched with material characteristics (parameters, metadata). Co-ordination between design disciplines (AR, STR, MEP) reduces errors and changes during the **Build** phases. An accurate 3D model is validated and used to determine exact quantities for pricing and estimation.

Detailed planning is required to ensure a smooth flow for the **Build** phase. The project is split into sequential activities. Resources required for the execution of each task are assigned to the schedule. Based on the schedule and material characteristics from the BIM model an accurate estimate/budget is created which is later used for controlling and cashflow management. Materials for prefabrication and on-site construction are procured from approved vendors. Field data is collected during construction to monitor progress and make sure the project is completed within time and budget constraints. Required quality checks are documented and linked to the as-built BIM model along with any deviations or changes from the initial design.

Most of the costs related to the lifecycle of a building are incurred during operations. Efficient facility management ensures that the assets are optimally used and the ROI is maximized.
CHALLENGES

Here we take a brief look at the main challenges related to the process of designing, building and managing a facility. We will not discuss general industry challenges like poor productivity, lack of skilled labor, sustainability etc. These are thoroughly covered by other sources like the World Economic Forum White Paper “Shaping the Future of Construction”. In this paper we focus on specific process challenges that every EC&O company faces with the digitalization and industrialization of its business.

The main challenge during the design phase is to make sure you are doing the right thing. You need to optimize within constraints (location, requirements, standards, building codes etc.) and make sure the design delivers the most value to the owner.

Real estate development is a capital intensive business and a small design change can have significant implications on the cost of construction and operations. Therefore it is vital to provide accurate information for quantification, scheduling and costing.

Once the design has been approved and the project moves into the prefabrication and construction phase, the challenge is to do things the right way.

Errors during procurement result in the wrong material arriving at the wrong time. Small delays can wreak havoc on the schedule. Therefore you need to achieve a high level of transparency in external procurement, production and construction for the purpose of project monitoring and material flow tracking.

Facility management needs the data collected during all previous phases to efficiently take care of a building.

The challenge is managing all of the information and providing easy access to BIM data so that maintenance issues can be resolved quickly. With IoT sensors you can automate many tasks and take preventive actions before issues arise. But how do you make enormous amounts of data relevant and easy to understand?

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What we often see in construction companies is a very scattered landscape of software solutions without a clear process or integration between them.

Single-point solutions are a great way to solve specific problems but if you apply this approach to every issue then you quickly lose transparency and cannot track project progress or material flow.

Business processes get complex with tasks split between multiple systems. This makes it increasingly difficult to scale your business and achieve the required level of end-user adoption.

Industrialization of the construction process requires a high level of automation which is nearly impossible to achieve with a heterogeneous software landscape and lack of integration.
How to integrate BIM with business processes?

BIM should be at the core of project-centric business processes. “The digital twin” links all project information and provides a clear visual user interface for the single source of truth. Using BIM as the common denominator makes the whole process more transparent.

Construction specific processes from design, build and manage need to be tightly integrated with BIM. It enables the detection and elimination of design risks, procurement of the right products and materials, and definition of installation strategies and method statements.

Integration of BIM enables better collaboration between internal business functions. This means more efficient communication between employees as both project design and execution information is accessible by everybody.

Information sharing and better collaboration with external stakeholders reduces conflicts and changes during the building lifecycle. This is becoming increasingly more important with the adoption of new project management and contract frameworks, such as Integrated Project Delivery (IPD) and Public Private Partnership (PPP).
Putting BIM at the heart of your business processes holds the key to solving many of the challenges facing EC&O companies. The evolution of BIM and ERP technologies has now reached a point where it is possible to integrate the two without any additional middleware. This creates simple processes in a unified IT landscape.

ERP systems generally don’t support BIM workflows. Therefore a BIM platform is required that enables quick visualization of the 3D geometrical model and access to the metadata embedded in the model. We are using the Autodesk Forge cloud platform for storing, accessing and visualizing the model. This also enables us to integrate with Autodesk BIM 360 tools and workflows.

First you need a comprehensive software platform that can run all of your project centric business processes. In our case we use SAP S/4HANA Enterprise Management which is a modern ERP system that provides all the necessary functionality to run your business processes in finance, sales, supply chain, procurement, production and project management.

The user interface of both SAP S/4HANA (Fiori) and Autodesk Forge is based on industry standard technologies like JavaScript and HTML5. This enables us to integrate the BIM viewer directly in SAP applications to create a unified interface for the end-user.

By creating a link between the BIM objects and business master data objects, we can use the model to visualize business processes in SAP and link relevant documents like purchase and production orders, invoices, RFI’s, etc. to the BIM model. This makes finding information quick and easy.

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BENEFITS

Reports and case studies from around the world have shown that BIM tools and workflows increase efficiency and reduce operating costs across all phases of a construction project. Yet the direct integration of BIM with ERP is still a relatively new approach in the construction industry. However, some early research shows that BIM and ERP integration can increase the level of transparency and consequently the level of interoperability among partners in industrialized construction projects. Consequently, improving project progress monitoring, detailed planning and tracking of material flow.

“*It is expected that the BIM-ERP integration will reduce errors and decision latency and increase the visibility and traceability of information*”.

According to a research paper from Australia, “the organizations within the construction industry who innovate with a strong focus on supply-chain integration, pre-fabrication, rapid manufacture and assembly, have most to gain by embracing the possibilities for tight links between BIM, PLM and ERP.”

The BIM model contains the layout, mark number, size, volume and the bill of material items for each piece. BIM provides the quantities of raw materials, ERP figures out the costs and plans the production based on the time it takes to produce each subassembly and construction element. ERP manages the production and delivery process, inventory, project invoicing, and all financial reporting for the project and the company.

How does this translate to business benefits? Take for example a small UK construction company that managed to double their revenue thanks to a custom-built solution for BIM and business process integration.

But you don’t need to develop custom solutions to reap the benefits of BIM integration with business processes. INTELSYS.build provides full integration out-of-the-box. Using industry leading ERP and BIM platforms you can reduce risk and rest assured that you are investing wisely.

“The construction companies that place the right bets now will probably be the industry leaders in the next ten to 15 years if they match their greater investment in technology with a company-wide commitment to change.”

INTELSYS was founded in 2005 and soon established itself as one of the leading SAP® consulting firms in Estonia, serving both local and international companies as well as state institutions. In 2013 the company started developing innovative solutions for SAP clients in the EC&O (Engineering, Construction & Operations) industry and ever since has focused its efforts on BIM and SAP integrations.

We are committed to helping construction companies embrace digital transformation by implementing a more lean and efficient way of doing things. Less waste and better quality – this is what value means to us in business and this is what we provide for our clients.

INTELSYS is an SAP® partner and authorized value-added reseller of SAP® solutions.

INTELSYS.build is an end-to-end cloud solution for EC&O (Engineering, Construction and Operations) companies developed by INTELSYS.

Our project centric solution enables you to manage all of your business processes related to design, prefabrication, construction and operations in one single system. By combining BIM data directly with business processes (ERP) we provide an unprecedented level of integration for construction companies.

INTELSYS.build is based on two industry leading software platforms:

- SAP S/4HANA Enterprise Management with pre-configured business processes for the construction industry
- Autodesk BIM 360 cloud solutions for design collaboration and visualization

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