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Revit, Forge, ERP – Smart solution for medium sized construction companies

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Learning Objectiv

- Learn how Grimm create a bidirectional link between BIM model and ERP-System
- Learn how Grimm connect 3D model and all company processes
- Get to know a custom software product for mid-sized businesses.
- Learn how to integrate customers via mobile app in this workflow

Description

As a family-owned and managed, medium-sized construction company, Grimm GmbH wanted to digitalize all their running corporate processes. Therefore, they decided to develope a collaboration platform called "Zapper". This online solution, based on Autodesk Forge technology, allows the connection of deep Autodesk Revit knowledge with standardized ERP-Systems like Microsoft Dynamics 365. The Zapper app supports the whole company's infrastructure in a smart way. This solution allows management, project partners, all employees and clients to collaborate simply and with high efficiency. To enhance customer experience, a mobile app for clients was developed as part of the project. Customers can easily access all the current project data, at any time. In this class, you will learn how Grimm use their BIM models for planning, calculating, tendering and visualizing. Grimm contracted the internal start-up Sumoo and the software company ioLabs for the development of the Zapper app.

Speakers

Julius Grimm is 26 years old, a BIM enthusiast and represents the third generation of the family-run, mid-sized construction company Grimm GmbH in Southern Germany. After his bachelor's degree, he was responsible for the company's first BIM project, the turnkey construction of a radiology. This was also part of his bachelor thesis. As a managing director he is responsible for business development, digital transformation and strategy. His focus is on BIM implementation and the development of innovative BIM-Workflows up to digital fabrication In addition, Julius gives guest lectures at the Biberach University of Applied Sciences on the subject of BIM and he is currently completing an MBA in business management in the construction industry at the academy of the University Biberach.

Matthias Fuchs studied project management/construction at the University of Applied Sciences in Biberach. During his master studies he worked as a research assistant on various digitization projects for the construction industry and investigated, among other things, the use of BIM in factory planning at the world market leader KNOLL Maschinenbau at its site in China. After his master's degree in 2019, he joined Grimm GmbH as a digitization and technology expert. His responsibilities include business development, BIM implementation, software development and the optimization and implementation of BIM workflows. Matthias is a technology enthusiast through and through. He is passionate about technology and its ability to empower people to develop new solutions, services and business models.

Martin Loucka is development engineer and managing director of a Swiss software company ioLabs Swiss GmbH. His focus is BIM, digital planning and manufacturing. He and his team is currently focusing on Autodesk Forge based solutions. Before that, he worked for the as a developer and as a research assistant at the University of Stuttgart.

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Company Profiles

Grimm GmbH

GRIMM

Who we are

We are a family-run construction company in south Germany, which plans, supervises and realizes turnkey construction projects for private and commercial customers. It does not matter whether we build new buildings or renovate existing ones, every customer is competently supported and advised by us from the first meeting to the handing over of the keys. Our team, with different skills, works with great commitment and passion on a joint project success.

What we believe in

We believe in our innovative strength, and the common goal of planning, building and renovating the best and most innovative buildings. With new technologies, agile cooperation and a start-up culture, we are already one step ahead in the construction industry. Each of our projects has a digital twin - the BIM model. We pursue the goal of digitizing and optimizing the entire lifecycle through the use of craftsmanship, data and technology. We increase productivity and reduce project costs. Finally, we see it as our responsibility to help shape the economic, ecological and social future of our society - to reduce our ecological footprint. And not only through prefabrication and digital planning, but also through highly efficient structures and building technology.

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Our buisness Units

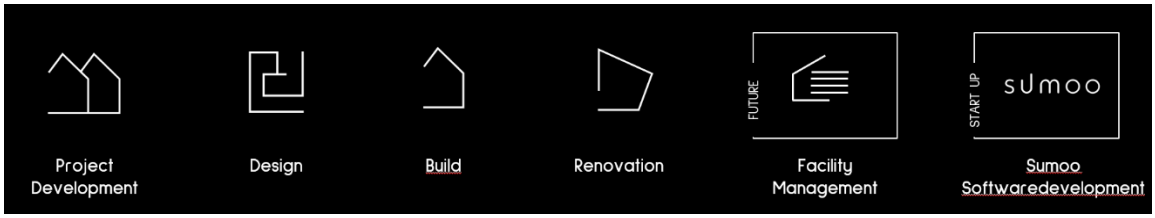

FIGURE 1: BUISNESS UNITS.

ioLabs GmbH

The world is changing faster than ever before. We are on it and we set the pace. We are tracking all these challenges and giving a lead here, too. A team of professionals from various disciplines developing innovative solutions for clients all over the world.

Input/output laboratories – ioLabs. We program and develop unique products and services that simplify processes in many industries. We write effective clean code specially tailored to our clients - without any extra lines. We are the pioneers of digitization and our strengths include complex geometry, digital planning and production, Big Data and IoT. We help investors, engineers and managers to increase project efficiency and open up new horizons.

We are a proud international company that invents and delivers reliable and intelligent solutions. We will continue to choose and create projects that make sense and bring special added value; we don't need projects to choose us.

The idea of Zapper

Zapper in the context of the complete system

Zapper, illustrated in the center, connects the future ERP system with Autodesk products. The technological basis on which **zapper** is developed is Autodesk Forge. This graphic shows the complete system of the conception:

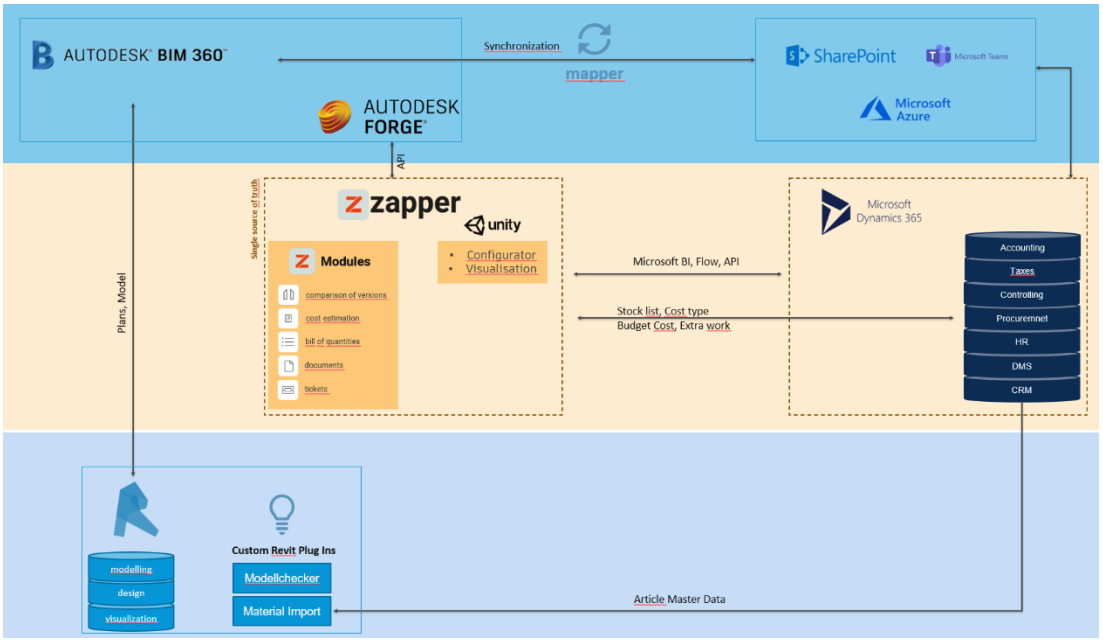

FIGURE 2: THE CONCEPT

The ERP-System is implemented in standard with all its necessary modules. To use the the data and informations out of the ERP-System in Autodesk Revit, custom Plugins for Revit were developed. In Revit itself our buildings are modeled and storde in Autodesk BIM 360 Cloud. BIM 360 was also developed on the basis of Autodesk Forge Platform. We can access this stored data and information with **zapper** via API interfaces and use this data for further construction specific processes just like the calculation or the submission. For this porpuse we need also data from the ERP- system, which we get via API-interfaces. For the visualization we use unity to make high-end real-time renderings.

Since we use Microsoft Teams and Shaerpoint for general file storage and BIM 360 Docs for project-specific file storage we have developed our own synchronization tool called **mapper.** Mapper enables data from both cloud systems to be synchronized live so that the principle of the single source of truth is given.

Why doing software development?

Requirements

We were looking for a modern, innovative construction software solution that supports our entire process chain and picks up the user of today.

The Market

We examined existing construction software solutions on the market but have not found a suitable solution with regard to our requirements. Nevertheless we want a solution that meets our expectations.

Isolated Applications

We have looked for an alternative and there was the possability to use isolated applications. It is no question that there are several very good specific solutions on the market. But this opportunity was associated with too much uncertainty and too little self-determination to pursue it further.

The solution

We finally decided to develop an eco system with own sources. We want to follow the principle of the single source of truth and wanted to control the entire digital process on ourselves.

The biggest hurdle?

Uncertainty/Risk

There is a certain risk in the development of a software and also with the uncertainty about the correctness of the development you must learn to handle. You never know exactly where you stand and how the competition develops.

Long investments, undefined duration

The own software development is connected with large investments which are not measurable at the beginning. It takes a very long time until you see the first results. When you buy a software you exactly know what you get. For us it was important to accept it and to remain patient.

Setbacks

Setbacks have to be accepted and it is important to continue to believe in the development and remain positive. It is also important to review the process chain and to remain flexible in the development.

Take management and employees with you

There were intensive discussions with the 2nd generation management, becaus they were not familiar with this workflow and also they can‘t understand, why we should take such big risks.Here it was very important to take them along in this process. But in the same time, it shows that if the understanding is present it is maybe easier and faster for small and mid-sized companies to introduce developments.

Zapper

What is Zapper?

So Zapper can be defined as follows:
“Zapper is a collaboration platform based on Autodesk Forge technology, and allows the connection of deep Autodesk Revit knowledge with standardized ERP-Systems like Microsoft Dynamics 365.”

Zapper in the lifecycle of a building

Zapper is already implemented in the first five steps oft the lifecycle:

- **Programming**
- **Conceptual Design**
- **Detail Design**
- **Analysis**
- **Documentation**

For the future, we want to extend the modules in case of Fabrication, 5D, Construction Logisitc and also Facility Management. For FM, weh ave already developed a prototype as an client app. In this app, Grimm customers can among other functionalities control and manage their building. All Data ist he output of one single-source-of-trugh – the BIM-Model.

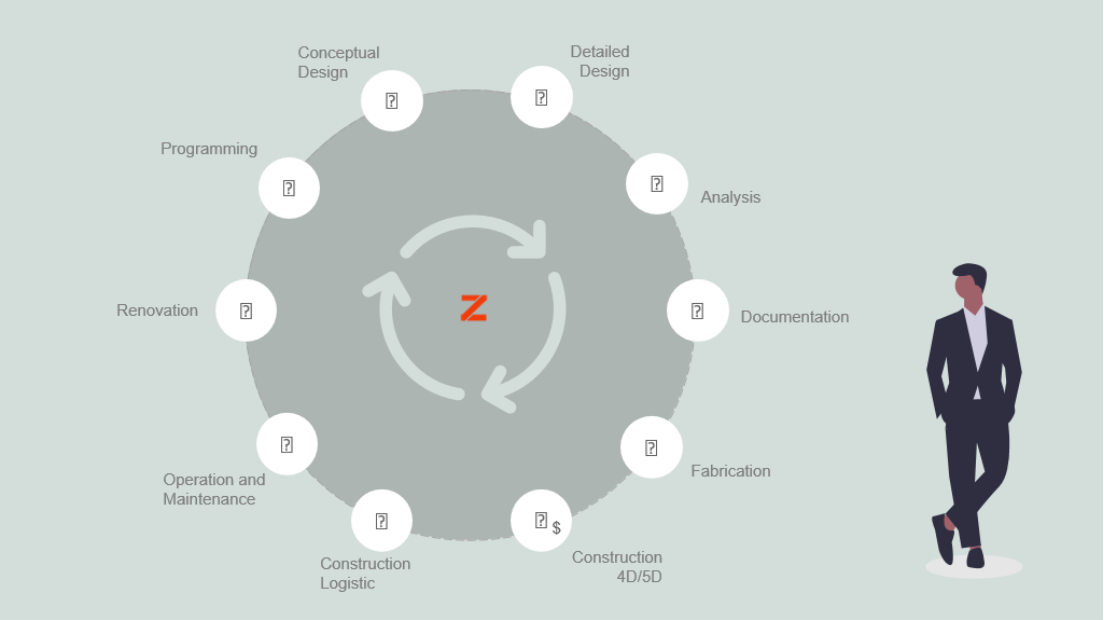

FIGURE 3: ZAPPER IN THE LYFECYCLE OF A BUILDING

Deep Dive into Zapper

Modules

Zapper is divided into different Modules, which in turn are divided into application ares. Following Modules are integrated into Zapper:

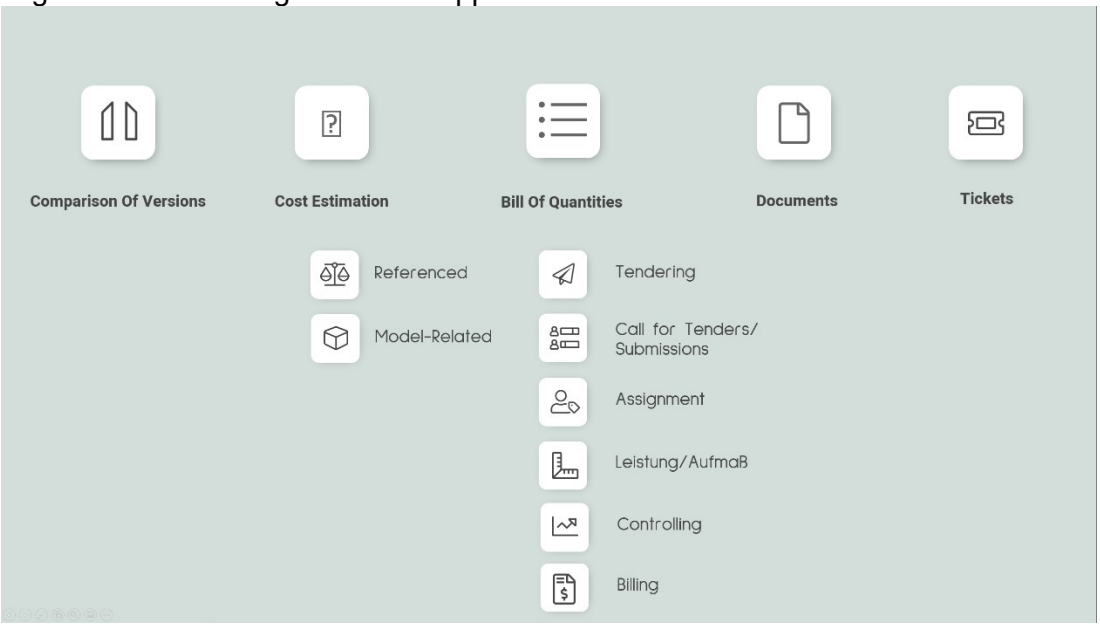

FIGURE 4: THE MODULES OF ZAPPER

Cost Estimation (Referenced & Model-based)
This module is especially needed at the beginning of a project, for example when there is no proper design planning yet. Using various parameters, similar projects are searched for within our database, which are then compared with the construction project. Thus, a first meaningful cost projection can be made right at the beginning. If the first design model is then created, the assumed, comparison-based costs are overwritten with the actual costs of the model.

Version Comparison
Different versions or variants can be compared within this module in terms of design and costs. Within this module, the models are visually compared and linked to the costs, which is ultimately used as a basis for decision-making.

Bill Of Quantities
This is the central module of the collaboration platform and elementary for the construction-specific process handling.Tenders are generated, calculations are generated, tasks are assigned, projects are controlled and automated billing workflows are created. This is where the collaboration of all project participants takes place on the basis of the principle of the single source of truth.

Ticket System
We use the issue function from BIM 360 and extend it with additional functions for our own ticket system. In this way, even more workflows can be initiated and agile collaboration is further promoted.

Documents
The Documents modul stores all information and data to the specific project. For this we embed BIM 360 Docs in our environment. In adittion to BIM 360 Docs as project specific cloudstorage we use Teams and shaerpoint in case of general cloud storage. To further ensure the principle of the single source of truth, these two storages are synchronized live via Mapper, a software developed by Grimm and Summo.

Mapper

Mapper allows BIM-Manager to synchronize Projects between BIM360 Docs and Sharepoint. With the web app it is easy to choose exactly which foolders and also files (e.g. file formats) should be synchronized and save this set up for future projects. From this point on, all files that are already in the folder or that are added to one of the two storages are synchronized live. Finally the principle of the single source of truth is given.

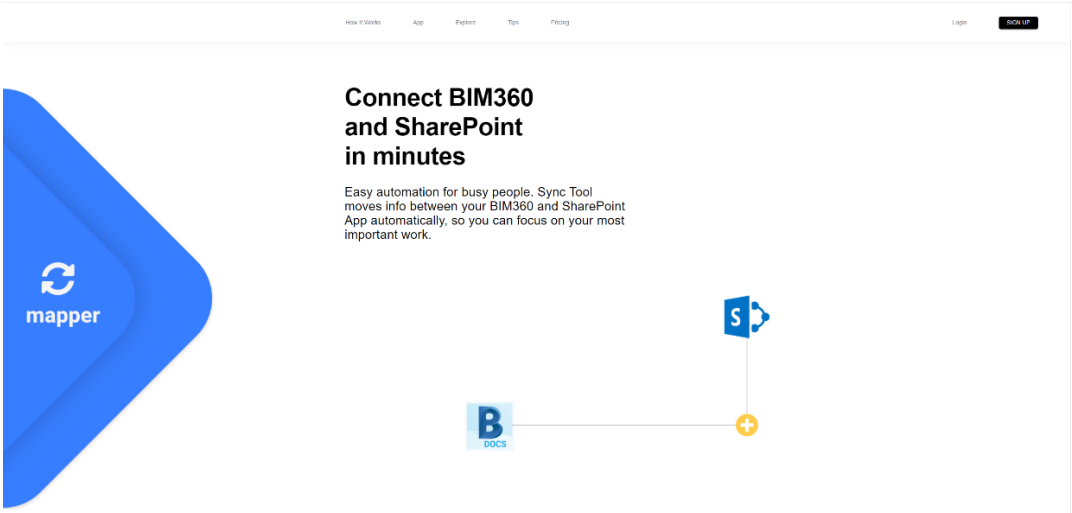

FIGURE 5: MAPPER

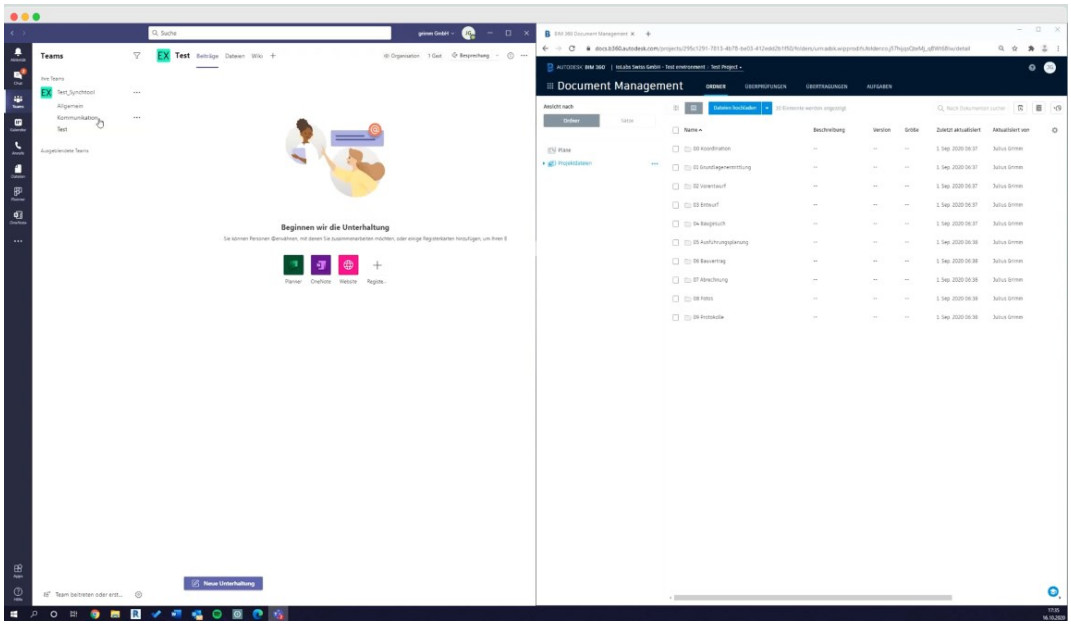

FIGURE 6: SYNC TEAMS AND BIM 360 DOCS LIVE

Technology behind Zapper

Database	MSSQL
UI	nativ iOS, nativ Windows, Web-based, React, Redux, TypeScript
API	.NET core, Entity Framework, GraphQL
CAD	Autodesk Forge + BIM 360 Docs
ERP	Microsoft Dynamics 365

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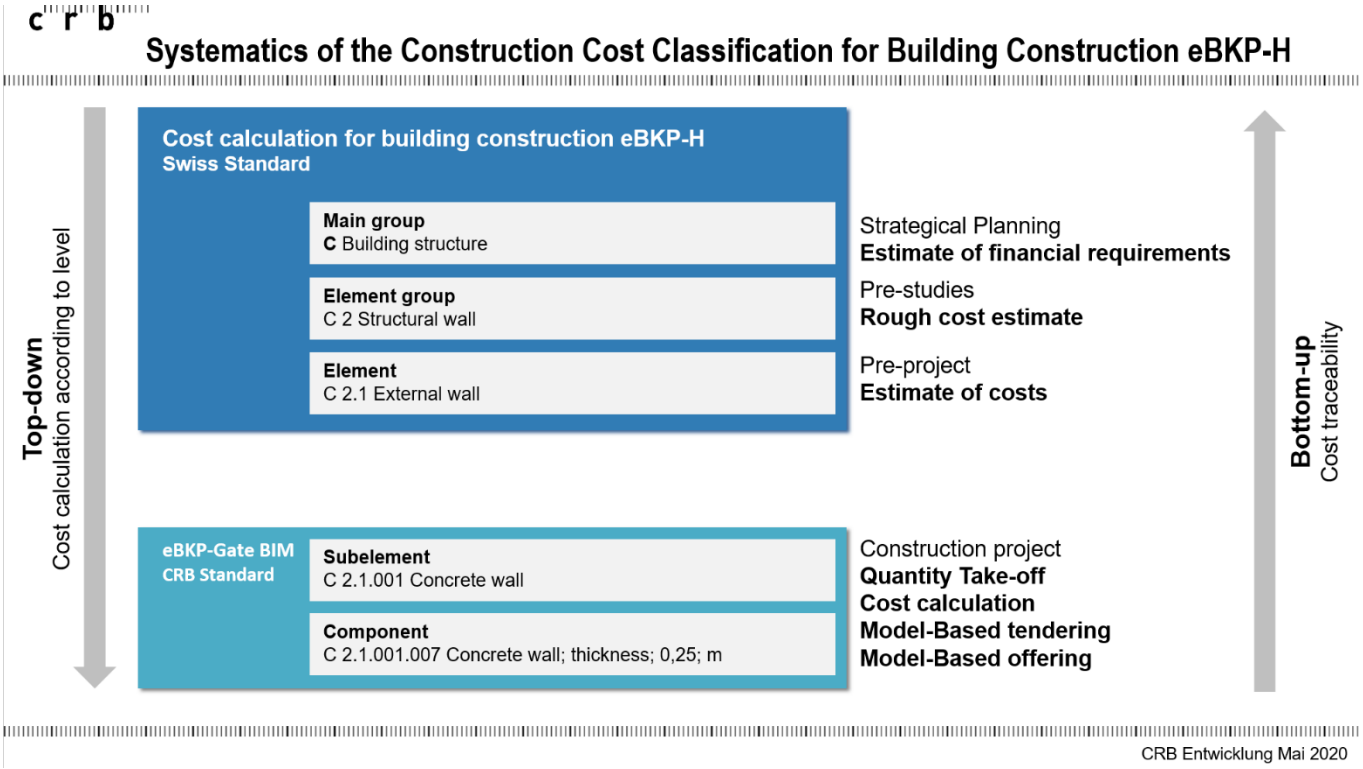


Interface to the ERP-System

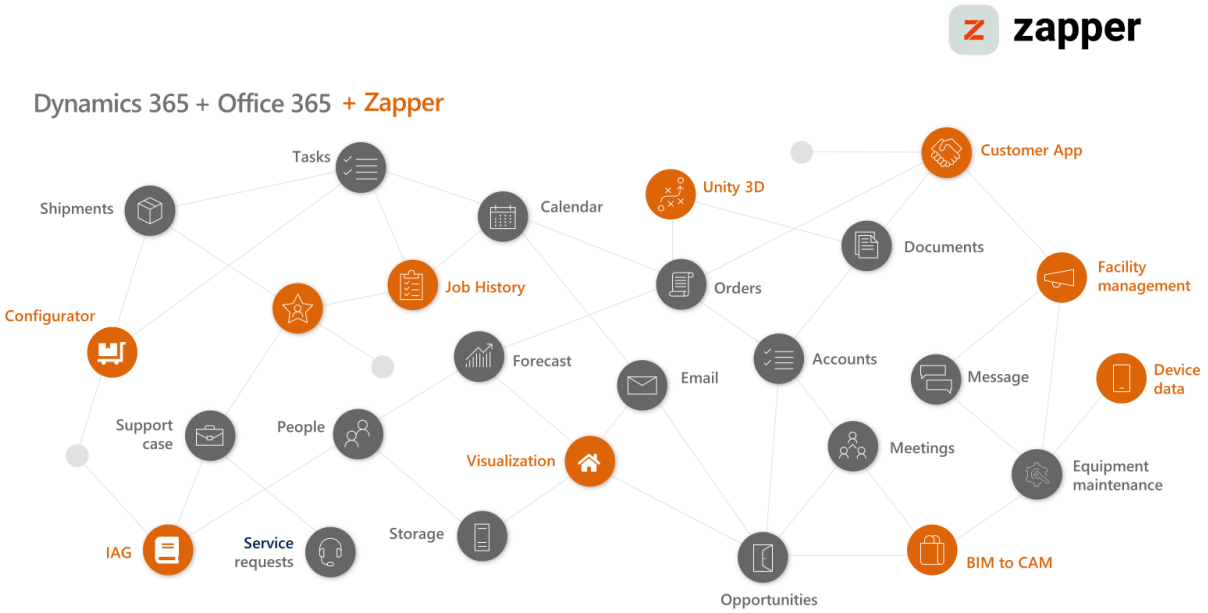


FIGURE 8: THE EBKP-H

Client app

The Zapper client app is already developed as a first prototype he. The main focus is still the user friendly design and User Experience .

So the app contains the following modules:

•Task/Confirmations

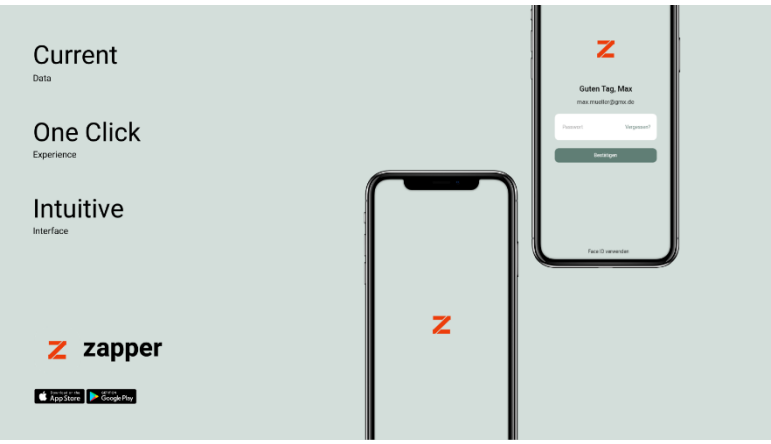
•Communication

•Documents

•Visualization

•Building management

In summary, the app can be used for the planning and execution phase and also for the facility management.



Visualisation with a mobile device

This process is quite complex, because the Revit module with all its textures, furniture and lights is to be used for the preparation in Unity. With a script we have managed to connect the components.The quality of the visualization in the video of the class is in our case a subordinate role, since there will be no problems with Unity to achieve a high-end -rendering quality. The main focus was to get the opportunity to change parameters from Revit into Unity.