Engineering in Real Estate

With technological advancement in design and construction of buildings, new business models offering greater opportunities for all players in the real estate value chain are being developed.

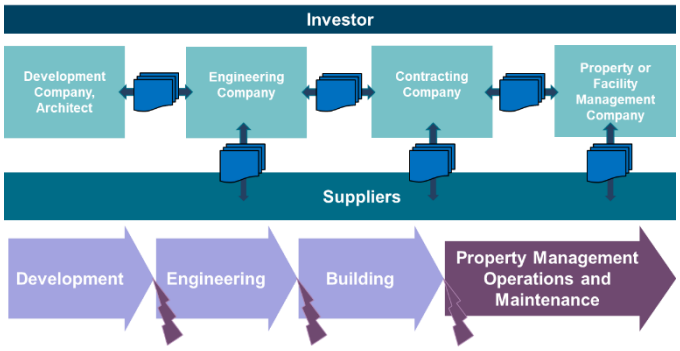
New technologies and opportunities that digitalization is creating are the basis for new business models and fundamental changes in the real estate industry. Its value chain undergoes a transformation:

- Responsibilities and value creation will become concentrated and alter current decision processes.
- New players entering the market with completely new approaches will be the game changers.

Industry: Before

As it can be seen from Figure 1, the traditional value chain from development to takeover and operation of finished buildings is a complex process involving many different stakeholders with their own agendas and interests. This process requires to have many contracts between these parties and may get even more complicated when responsibilities start changing and a greater number of disciplines and different companies are involved. Communication between these multiple and changing parties is complicated and not standardized at all. A lot of information is lost between different steps, which result in cost and time increase, quality reduction and heightened risk.

Figure 1: The traditional value chain



Changing responsibilities, loss of information create inefficiencies, high cost, quality problems, extended time tables increase the overall risk.

Source: A. Vaccani & Partners, 2018

Building Information Modeling (BIM) as game changer

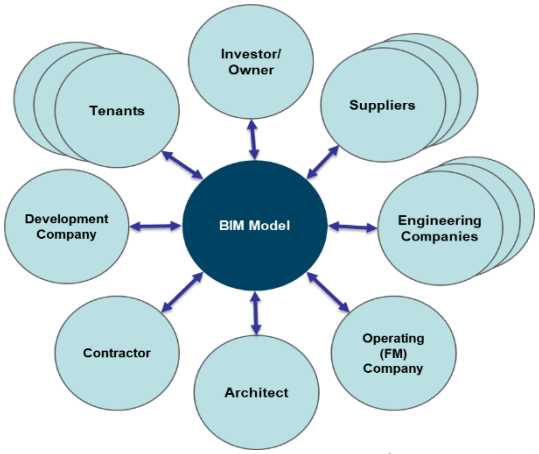
In many markets, particularly for large projects and, in some countries such as the UK, for all public projects, Building Information Modeling (BIM) (Figure 2) becomes the new standard for design, build and operation.

As the name indicates, there is a virtual model of the real building being created and everybody involved, including all stakeholders, are working on the same model. All information is constantly available to everybody. This has tremendous advantages in collaboration efforts and, as an outcome, buildings are being designed, engineered and built on a holistic basis.

Management and quality assurance of information and data becomes the crucial key success factor. Companies which do not have the financial capacity to invest in this technology and are not using these processes as a standard, will have difficulties being competitive in the market for medium and large buildings and will not be able to serve large investment customers.

Keeping data up-to-date and maintaining its accuracy are the basic principles for successful BIM implementation. Engineering data, detailed specifications for systems and parts, all must be accurately fed into the model. Suppliers who are the owners of the large part of this data, will need to be involved in the process at a much earlier stage than in the past.

Figure 2: BIM Model



Source: A. Vaccani & Partners, 2018

From development and design to takeover of the finished building, the overall responsibility for the model should not change from one milestone to another. However, it is not clear yet which player in the value chain will take this overall responsibility.

One of the increasing needs for building a reliable BIM model is availability of accurate data at an earlier stage than in the traditional process. Milestones for commitments by the owner, contractors and suppliers also move to earlier stages in the process.

In summary, a more integrated approach using BIM will minimize time from development to takeover and significantly reduce cost and risks.

Automated design based on algorithms – the next quantum leap

The next step in design and building construction has already been taken by one of the leading companies in the new world of design, Aditazz.

Aditazz automated a building design process, which is widely used in the semiconductor industry through software algorithms. A set of design requirements based on customer needs, business constraints, building regulation and other aspects are input into the software, which in turn generates different designs to meet those requirements. These design options are then tested in a virtual simulation to find an optimal solution. Such building metrics as capital expenditures and operational expenses, potential buildings materials and their quantity, operational performance of a design are direct outputs of the BIM model.

For example, a hospital requires a nurse to reach a patient's bedside within 60 seconds. A BIM model will help owners, architects and engineers design a hospital building with the consideration of time requirements, visitor traffic, equipment location and many other significant details to enable access to patients within the required timeframe. Automated process eliminates human error and omissions and improves design-and-construction productivity (space optimization, material savings, reduced costs, etc).

Opportunities for today's leaders

Aditazz is only one of many examples of new entrants without a legacy in this industry. Absence of the legacy gives them an advantage to be more agile and adapt to changes quickly. The challenge such companies are often faced with is a lack of expertise to transform these game-changing models into real world projects. Real world design, engineering and construction know-how are some things that can be obtained by experience only.

On the other side, legacy companies struggle to find capacity for the transformation they have to undergo and to adapt to change quickly. They also have to continue exceling in their existing business models if they want to have cash flow for such transformation. It is hard to be agile for a large organization with established processes.

One of the obvious possibilities to resolve challenges of the two worlds is to form partnerships between them. But how do you navigate a myriad of companies to find the right partner?

When a successful partnership is formed, small and large companies should have:

- An understanding of the industry development;
- A clear analysis of the current status of one's company and its place in the industry today;
- A clear picture of the financial capacities to fund the transformation;
- A vision of potential scenarios of the industry for the coming years;
- A gap analysis: where the gaps are and how big they are;
- Scenarios to close the gaps including financing of the transformation;
- Profiles for ideal partners to close certain gaps and a respective partnering strategy.

In addition to partnerships between the "new" and the "old", partnerships between traditional companies could create leaders for new business models and make them attractive for partnerships with the innovative companies.

Engineering, construction and supplier companies have the opportunity to become leaders in this transformation if they can master the big challenge of the speed of change.

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