



Searching for the Mango in the Construction Industry

ZÜBLIN is participating in a research project in Denmark on potential applications for **blockchain technology** in the construction industry. We met with the other project partners at BLOX in Copenhagen for an “open table” to discuss the project. 



Open Table at BLOX in Copenhagen – ZÜBLIN has built this innovative building. Today there is a discussion about how digital technologies such as blockchain will revolutionise the building industry of tomorrow. Ole Berard, Mayes Ali, Lisbet Qvist, Niels W. Falk and journalists Lea-Marie Kenzler and Dirk Böttcher took their seats.

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On this June morning, the glass façades of the BLOX reflect water and clouds. The six-storey building is enthroned directly on the inner harbour of Copenhagen. A steady stream of cyclists and pedestrians moves past the award-winning building. The Danish architecture centre is based here, along with a restaurant, a playroom with huge building blocks for children, and a co-working zone spread over several floors. Lounge-like workplaces are arranged in labyrinthine nested cubes.

In a meeting room overlooking the Inner Harbour, Lisbet Qvist and Mayes Ali from ZÜBLIN discuss with Niels W. Falk, CEO and partner of HD Lab, a data processing specialist and one of eight partners in the blockchain project. The table in the room is plenty big – more people are expected this morning. At this special place, which ZÜBLIN built from concrete, metal and glass, we talk today with experts from various fields about building with digital data. In 2019, the Danish Industry Foundation announced a research project with a volume of around €1 million to develop ideas to use blockchain in the construction industry. ZÜBLIN is involved in this research project.

Why are you involved in this project, Mr Falk?

Niels W. Falk: I like to familiarise myself with technologies and consider how to use them sensibly. Blockchain is no longer magic today, if you deal with it seriously. In this project, we want to go deep into the subject and consider what can be done with it.

The Dane is neatly dressed in shirt, jacket and pocket kerchief. He speaks eloquently and entertainingly. The data specialist works in the BLOX building himself and appreciates the inspiring atmosphere, and he was also instrumental in developing the blockchain project. A tall man enters the room. Ole



Berard works for Molio, specialist for digital information infrastructures and also a project partner at Blockchain.

Ole Berard: When we talk about blockchain, we must first talk about data. One of the main problems in the construction industry is that data from projects can hardly be reused and reutilised, because there are seldom standardised rules and regulations.

According to estimates by Aon, a risk consultant to the construction industry, up to 95% of construction data is lost when the project is handed over to the owner.

Ole Berard: That's exactly the problem. We not only have to ask ourselves how to recycle building materials but also recycle the data.

Mayer Ali: The data are even a prerequisite for sustainable ideas; for example, on issues such as dismantling or recycling. There is often a lack of information about what exactly is built into buildings. A blockchain could be a reliable source of data for future generations.

Can you be more specific?

Mayer Ali: For example, I am fascinated by a project from Walmart and IBM. They used blockchain to digitally reproduce the supply chain for mangos. From the minute

the fruit is harvested to the moment of sale, all movements and data are stored in the blockchain. It takes only a few seconds to check where a mango was, when, with whom, and in what condition. This information is unchangeable and can be checked by all those with access rights. The most important question we ask ourselves in our blockchain project is: What is the mango in the construction industry?

Is there an answer?

Mayer Ali: To store the information about what has been installed, repaired and accepted in a building, how, when, and by





Ole Berard is Head of Digitisation at the Danish data specialist Mollo. For him, uniform data standards in the construction industry are the prerequisite for technologies such as blockchain.

whom, unalterably in a blockchain would be an important first step to consider dismantling during planning and construction. Just as Walmart offers its customers an app to trace where the mango purchased comes from at any time, we want to tell our customers exactly who designed and delivered the specific component of a building, what it's made of, and who installed it. We are pursuing this goal as one of six projects in this blockchain project.

Niels W. Falk: Exactly – that is the vision, that we don't just say, 'Hey, let's track a window'. We track all of the components of a building, and we do it automatically. And if this data is stored reliably and unchangeably in a blockchain, standardised for every project, it becomes interesting.

Mayes Ali: We see ourselves as pioneers who innovate so that others in the industry can follow. The six teams work independently on different problems. We also cooperate with IBM, which introduces us to the technology and current best practices from other industries.

What other possible applications do you see in the construction industry?

Mayes Ali: We want to track changes in the BIM models – who changed what, when, for what reason and with what effects. This is information for later decision-making or accounting. Then we take care of smart contracts, i.e., whether we can au-

tomatically control invoicing; for example, if a subcontractor had deficiencies in its services, the cause is documented in the blockchain for all parties involved and the invoice is reduced. Logistics is exciting; we want to develop a digital twin of material deliveries to optimise logistics on the construction site.

Blockchain is not a new technology; it has been tried and tested for decades. Isn't the construction industry a little late?

Niels W. Falk: No, we are not too late. The industry is only now sufficiently digitalised to be able to use technologies such as blockchain. There are other industries at this point as well.

Ole Berard: But we are still at the beginning; we still have to explain to all parties involved what exactly blockchain can do and how to use it. What hinders us is the insufficient and uneven degree of digitalisation in the construction industry. This still holds us back from bigger developments.

Niels W. Falk: I agree with that, and remember, Ole, it took us a year before we in the team even had a common understanding of the definition and explanation of blockchain technology, which we then presented to the outside world.

Mayes Ali: But we quickly realised how value-adding this technology could be. Construction projects are becoming more and more complex, with more stakeholders and different suppliers and subcontractors. The more complicated these cooperations become, the more that trust becomes an important issue. With blockchain you create that – trust.

But how do you work together in this diverse team on corresponding applications?

Mayes Ali: We apply design thinking, initially developing the first wireframes and prototypes for user interfaces. There were regular workshops, but then came the coronavirus, and unfortunately the exchange of ideas fell by the wayside until we repositioned ourselves and used online formats to collaborate. For example, instead of physically testing processes on construction sites, we used live data and digitally simulated the processes.

Digital networking is the basis for digital applications. It requires those involved to make their data accessible. Is that even conceivable?

Niels W. Falk: I have a clear conviction: 95% of all project participants would share their data; it's just that nobody really knows how to use this data.

Ole Berard: We don't even have a standard that allows us to share this data. In many cases we do not even manage to do this in our own companies. For me, this is the first step in implementing blockchain: we have to define what type of documents we want to use, what name we give them, and what type of data is stored there.

Mayes Ali: For this reason, we developed an app that visualises the blockchain. It shows what data each stakeholder has to contribute and what we can do with the technology. And the platforms we're now working on are predicated on other construction companies connecting to them and using a common blockchain infrastructure. We need to bring the big players of the industry together, so that the rest follow suit. You cannot set up such a technology as a company on its own. We have to collaborate.



Mayes Ali also belongs to the 'nerdy nerds' in Copenhagen. As Digital Manager, she represented ZÜBLIN A/S at the blockchain project. When the magazine was published, she took up a new professional challenge.

Ole Berard: Blockchain also offers a decisive advantage in terms of transparency: the core of the technology is that all information is available to all authorised persons in unalterable form, but that does not necessarily mean everyone has access to all of the information.

Is this project already in practical use on construction sites?

Mayes Ali: We have installed numerous sensors to generate data. We also presented the project and our ideas to site managers. Now we are developing the necessary processes.

The door opens. A young man enters. Jakob Guldbrandsen works as an architect for Vilhelm Lauritzen Arkitekter. The office employs more than 150 people, not only for architecture and construction but also for digital applications.



The architect **Jakob Guldbrandsen** works for the Vilhelm Lauritzen Arkitekter office in Copenhagen. In his opinion, architects should be involved in digital planning as early as possible.

Why is an architect involved in the blockchain project?

Jakob Guldbrandsen: Pioneering projects like this are always exciting. In general, architects want and need to be on-board as early as possible for digital projects; especially since BIM, there have been many early decisions that will later have a significant impact on the

data situation. I am convinced that we can do much more with the data we have today than we have done in the past, if we only change the way we handle this data. But we must also recognise that we are not yet truly a digital industry.

How could one work differently?

Jakob Guldbrandsen: At a moment like this: say that a customer wants to build a house. The customer makes applications, plans, specifications, and then throws everything over a wall, so to speak. We stand behind this wall, and so we have to understand what is meant by it, to make our design and throw it over the next wall, where there is the construction company. With blockchain, we could finally make these walls, which block the view, transparent.

We spoke at the beginning about how it took time to develop a common vision of this technology. Did that apply to you too?

Jakob Guldbrandsen: Yes. I first had to understand that blockchain is not a database into which we load files. Blockchain is a system that assures me that these files exist, which of them are the current versions, and who has edited or changed them. Understanding this abstract complexity was one of the most difficult things. The input from IBM helped us to see how consistent and structured they are in working with formats like design thinking.

Ole Berard: We are still learning. We need even more ambitious goals. I agree with you – we have many more opportunities than we have so far exploited.

Jakob Guldbrandsen: That’s also because our industry is so special, so distinct from others. And that is why what others have been doing for a long time would never work for us. That said, we are not so different.

Ole Berard: At the construction sites people simply expect too much. New solutions must work immediately and perfectly; otherwise they will not be used for a long time. It is difficult to develop something in this way.

Mayes Ali: Yes, we are innovative when it comes to solving concrete problems that keep coming up in our daily work. But we find it difficult to work on fundamental innovations and processes beyond that.

Ole Berard: And that leads us to use this variety of platforms and tools on the construction sites, which were once developed to solve a

specific problem. Blockchain, perhaps, also has potential because it can be an information substructure in which the data from all platforms is combined, so a horizontal and transparent flow of information along the value chain is finally possible.



Niels W. Falk is partner and CEO at the Danish IT company HD Lab. He is one of the initiators of the blockchain project. He believes the construction industry is well prepared to apply these technologies.

The Blockchain Project proclaimed by the Danish Industry Foundation is based on the Ethereum technology. The project is divided into six projects: Lifecycle Tracking, Tracking BIM Changes, Decision Made by Clients, IoT Devices, Smart Contracts Defects and Logistics/Digital Twin.



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