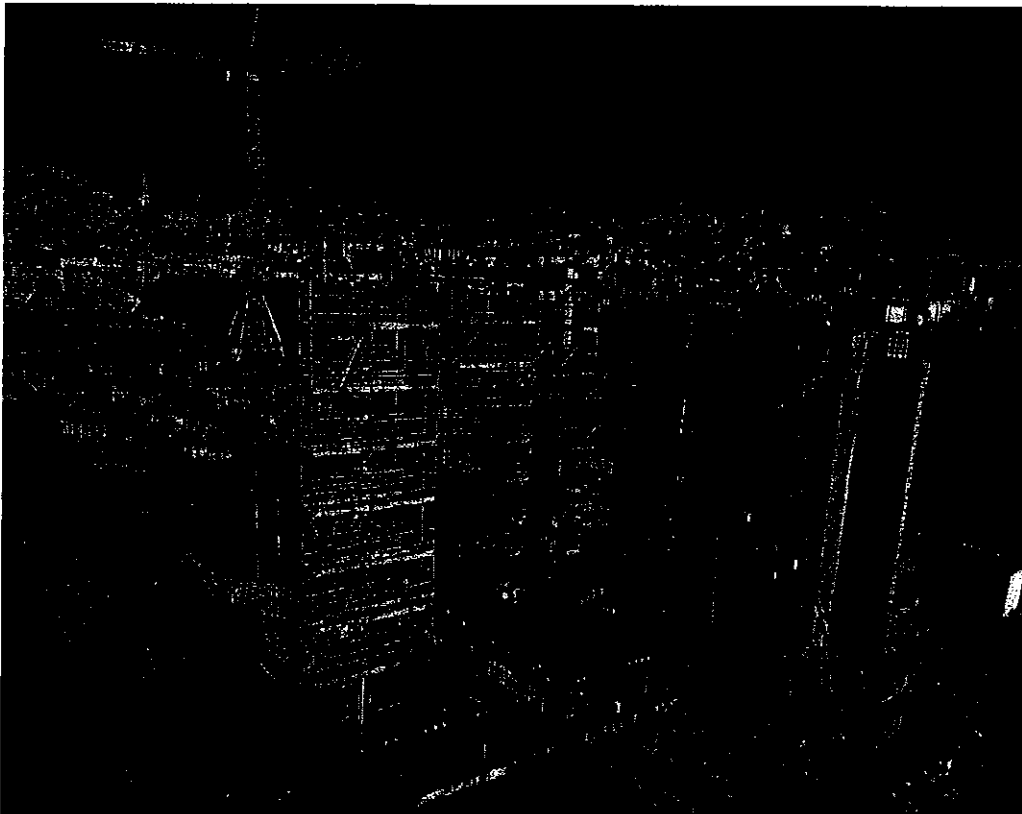


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Collaborative Building Information Management



***Visionary solutions enabling business
transformation***

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INTRODUCTION

Over the last decade the Construction Industry in dealing with individual unique projects, has investigated many tools and methods to improve their core business processes

Though Information Technology is, in many cases, still not perceived as a strategic tool, most of the big construction companies have implemented software applications supporting backend processes such as financials or human resources.

One key characteristics of the construction industry is that within a building project, dozens or even hundreds of companies are involved and depend on each other. In contrast to industries like Automotive or High-Tech where such scenarios created tightly integrated supply chain networks facilitated by electronic networks or even electronic markets, collaboration in the construction industry generally means people talking together face to face or using phones or faxes.

This is because the construction Industry deals with individual and unique products, where automated order or payment processes would provide fewer benefits and secondly, in the construction industry there exists no 'value chain masters' like the big OEMs in Automotive or High-Tech sectors dominating their supplier networks. Project members change from project to project. In Europe about 95% of the construction companies are small and medium enterprises. In other words – the industry consists of dynamic and short-term communities.



Currently there is a trend within the construction industry that is changing the dynamic of value chain communities. Public clients representing the biggest construction industry market have become more demanding and tend to move overall project risk to main contractors by requesting risk sharing and consortium based business models called Public Private Partnerships (PPP).

In this context the consortium becomes a type of 'value chain master' since these projects in most cases run over 10, 15, 20 or more years covering design, build and maintenance of a building object.

In this environment risk mitigation, re-use of intellectual property, and key performance indicators become much more important as financial investments are funded by the main contractor or consortium. Project cash flow may not become positive before several years of maintenance, long after the building has been completed.

In other words; the construction industry is moving into a more long-term, total life cycle management scenario, where connecting the main contractor with huge numbers of sub-contractors, all kind of service providers and suppliers dynamically over many years is vitally important to business success and long term profitability.

In this context Information Technology is increasingly becoming perceived as a key enabler to Implement these changes in the construction industry

TODAYS CHALLENGES IN THE CONSTRUCTION INDUSTRY

A research project, funded by the European Commission, was conducted in 2003 during which a wide consultation among key players of the construction industry in Europe was done in order to identify high priority business areas and related Information Technology requirements. Though Information Technology is not always seen as strategic tool within the construction industry, most of the challenges identified can be addressed by IT and have been addressed in other industries successfully before:

Knowledge Management

People involved in construction projects produce a huge amount of information and develop valuable professional skills over time.

Unfortunately these assets are likely to be kept in the heads of individual people or filed in paper format unavailable for people who could learn from previous experiences. Digitalisation and capture of information and knowledge is therefore seen as a pre-requisite to improve effectiveness.

When information about building standards, regulations, specifications or products can be analysed together with Intellectual Property created in previous projects, designs, proposals, overall planning as well as the core build process will benefit. Overall project risk can be mitigated.



Quality and Performance Management

Construction projects are driven by people rather than by automated business processes. This makes it difficult to measure performance and quality. Supporting systems and tools are required to establish assessment methods and performance indicators. These systems need to capture all kind of structured and unstructured information to facilitate analysis.

If all relevant data and information such as CAD drawings, contracts, daily reports or project plans are made available from a single database, communication and operational decisions improve significantly.

Tools for the exchange of CAD data during the design process is another area of quality and performance improvements. For example the composition of CAD models describing the different components of a building into a complete single 3D CAD model.

Thought leaders within the construction industry are now going even further: comprehensive building information can be made available based on a 3D CAD models and different colours are used to indicate in the 3D CAD model which parts are within, or respectively behind budget or schedule. The result is what is now known as a '4D' CAD Model of a project. Adding a 5th dimension of time over the project creates a '5D' model.

Total Lifecycle Management

New business models like Public Private Partnerships move responsibility for buildings, bridges or toll roads towards the main contractor along the entire life cycle. This means basically a main contractor is in charge of design and build, including financing and operation of a construction object. In the case of a hospital the client would pay per bed per month.

Emphasized by functional specialization in the industry the main contractor takes responsibility for the success of all subcontractors and partners along the life cycle. On the other hand partners depend on the success of the entire project as well. This creates mid to long term value chain communities with a common interest: first class business performance.

It is obvious that such scenarios require cultural changes within the construction industry; not just in regards to the use of Information Technology but also in terms of business process integration between business units within a company and as well as beyond company boundaries.

Education and Skills Management

Construction companies understanding these new challenges will have to work closely together in order to enable the evolution of cross cultural, transparent collaboration on the basis of common business goals.

New types of jobs will evolve as knowledge management and 4D process simulations become reality. Professionals with hybrid skills will be required to leverage these new possibilities. Experiences already made in other industry around knowledge worker productivities can help the construction industry to lower initial hurdles.

The role of Information Technology in Construction

The construction industry has invested in Information Technology in recent years though the use of IT tools is still behind many other industries.

Reasons for this are cultural and educational in terms of the workforce but also related to limitations of available IT solutions.

For several years now construction portals and collaborative information platforms have been offered but until today they have not really proven their business case. This is mainly because the critical mass of participating companies or users has not been achieved.

Even in the High-Tech industry, an early adopter of Information Technology, very few Electronic Marketplaces still exist. Though Private Exchanges or Electronic Supply Chain Networks owned and managed by big OEMs like CISCO or Nokia provide impressive business value and are possibly the only way to survive in their volatile eco system.

As mentioned earlier, there is a trend in the construction industry towards value chain communities, lead by a main contractor or a consortium. The value chain leader takes the financial risk of a project and therefore he should own the entire project information like the OEM in High-Tech or Automotive. This facilitates analysis and re-use of Intellectual Property and finally mitigates risk.

In contrast to manufacturing type of industries, collaborative IT platforms for the construction industry have to support less structured but much more human centric business processes. Except for some 'power users' the majority of people contributing are working on construction sites and not in a good climate for IT



equipment. This is why efficient and comprehensive information capturing are key factors for success of future collaborative IT platforms.

Since information systems represent a computer-based model of the real world, only accurate information collected from construction sites make the computer model useful.

Concepts like CAD based information repositories as described earlier, need to be extended beyond the design and pre-construction phases. Building information has to be updated on a daily basis to reflect the building progress and the up-to-date maintenance status. The data and information required has to be provided by internal and external parties. Issues coming up during pre-construction, construction or maintenance could then be simulated by all relevant experts looking at the same model; independently from their location in the world.

It will take a few years until the 'Collaborative Building Information Management Platform' is an information technology broadly used in the

construction industry though the journey towards this has started with visionary 'early adopters' already implementing now.

Document repositories organized in the context of building projects, portals and 3D CAD solutions are now being implemented and already used by several companies. These existing achievements will be the foundation for innovations to come.