

INTEGRATED PROJECT DELIVERY USING 4PROJECTS

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Abstract

This paper deals with changes in delivery methods in construction and with software tools for project management in construction. New ways of delivering projects (Partnering approach, Integrated Project delivery and Building Information Modeling) and using information technologies in construction are introduced. The main subject is to describe and evaluate the online collaboration solution 4Projects. The purpose is to assess potential benefits of the implementation of this originally British software. Its tools are briefly presented and some competitive IT products are described and evaluated. The last point is to apply the Integrated Project Delivery model in the Czech environment – on a construction company operating as a general contractor in the Czech Republic. This case study deals with traditional processes in working, in managing projects and companies. There are analyzed things to change when adopting new ways of collaboration and implementing 4Projects. Potential benefits as well as problems and risks associated with the system implementation are predicted.

Keywords

4Projects; Building Information Modelling; cloud computing; Integrated Project Delivery; project management

Introduction

Czech construction industry has been in recession since the end of 2008 [1] and there are still negative tendencies when the volume of works is not increasing. Construction has been criticized for its poor performance, poor teamwork and communication and low productivity due to high inefficiencies and lack of innovation. [2] Lack of trust and adversarial relationships are caused mainly by conflicts over money and quality. Construction industry is not flexible enough and does not meet these changing demands. Many projects are not delivered in required quality or budget or on time. Therefore, conflicts, disputes and negative environment in companies and between all project participants are then generated. Clients have also started to place an emphasis on sustainability and to focus more on the whole life cycle costs. Meeting of client objectives should be one of the drivers to change the way of delivering projects which must be more efficient, effective and economic.

In 1994 Michael Latham issued the report *Constructing the Team* known as *The Latham Report* in the UK [2]. Due to poor performance of the British construction industry he was commissioned by the government to review procurement and contractual environment. He identified problems described above together with fragmentation of the construction industry. Second important report *Rethinking Construction* called as *The Egan Report* followed later [3]. These reports were very important for changes in British construction industry, some recommendations were made to improve its performance. Traditional procurement system (Design-Bid-Build) that separates the design and construction was identified as insufficient for current requirements. The main reason for criticism of this approach is separation design and construction stages and responsibilities as well. This separation causes problems stated above and inflexibility in case of changes requirements. [2, 3]

New Approaches in Delivering Projects

Compared to the traditional approach, the main characteristic of integrated or management procurement systems is single point responsibility for the design and construction (Design-Build, Develop and Construct, Turnkey, Management, Management Contracting, Design and Manage). The main advantages of these systems are savings in time, flexibility (when client changes are needed) and early contractor involvement in project (contractor can participate on better design development, bring some technical improvement and innovations that can improve buildability).

Partnering approach has been suggested to increase efficiency in construction industry. It is based on collaboration, teamwork, adopting *win-win* principle (achieving common objectives), building mutual trust and better relationships. Creating mutual trust, honesty, openness and sharing of information will help prevent conflicts and disputes. [4]

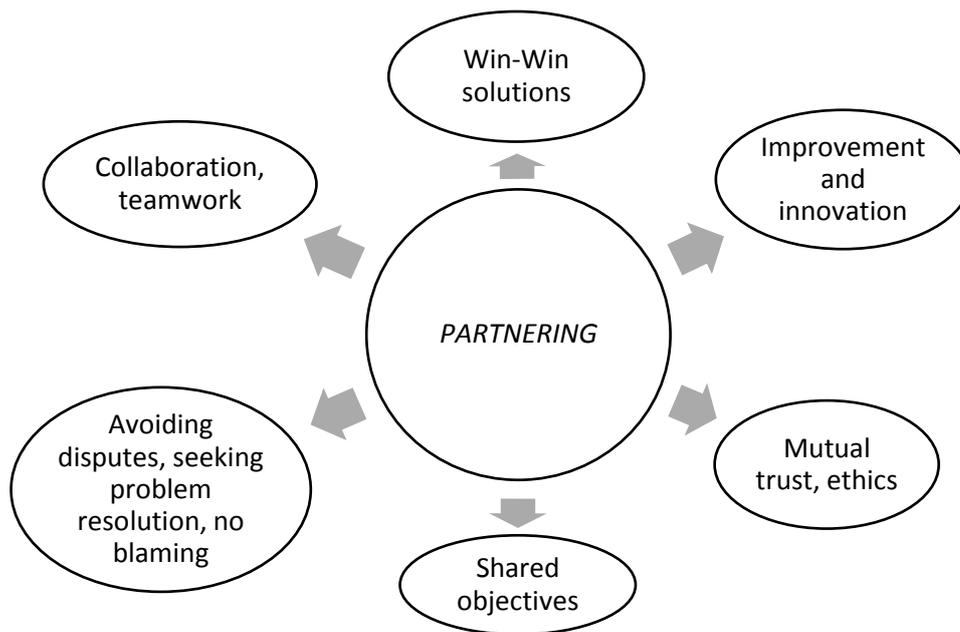


Figure 1: Main principles of partnering approach (source: authors with the use of [5])

Similar way of cooperation is originally U. S. approach called *Integrated Project Delivery* (abbreviated as IPD). As clients of the construction industry has become more demanding and buildings have become more complex, more specialists are needed. Integrated project delivery is defined as “a project delivery approach that integrates people, systems, business structures, and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction”. [6]

IPD seeks to improve project outcomes through a collaborative approach – people and organizations should be connected and involved at an early stage of project development, higher level of cooperation minimize errors and maximize the effectiveness of all project phases. At this moment information technology tools such as Building Information Modeling (BIM) can help. BIM is a tool and a process of virtual model development. This model should simulate the design in 3D and added parameters (such as time – 4D, cost – 5D etc.) that represent the facility during design phase as well as during construction and operation phases. It is assumed that coupling of BIM with IPD can enable high level of collaboration and early involvement of all needed specialists.

4Projects

Adopting new approaches and methods of work based on partnering and IPD principles can help Czech construction to deliver better value for money, to reduce costs and waste. However, some changes in traditional processes are needed. Surveys in Australia shows that almost two-thirds of problems in construction industry are caused by lack of communication and information exchange (ambiguities and contradictions between documents, duplicated versions of one document, late handovers or outdates, incompatible outputs from different project members. [4] Using of appropriate information technologies is important to ensure clear communication and increase collaboration between all parties. Relatively new way of working is integrated project collaboration based on central located storage of information. There are tools enabling the project team to share and manage documents this way so that problems mentioned above were minimized. One of these tools is originally British system called 4Projects. 4Projects is suggested to improve project communication and ensure effective collaboration. This system enable project teams easy sharing,

controlling and managing “large quantities of documents such as contracts, schedules, specifications and reports while having full confidence that everyone is working from the most recent version”. [7]

4Projects is operated as a Software as a Service (SaaS) model (form of Cloud Computing which means providing information technology tools as a service, virtual servers are available over the internet). There is no need of buying information technology infrastructure, users need only a web browser and access to the Internet. It provides central storage of documents and all information that are available to all given members of the project team as well as tools for collaboration (document management, drawing management, procurement, bid/tender management, 4BIM [8]).

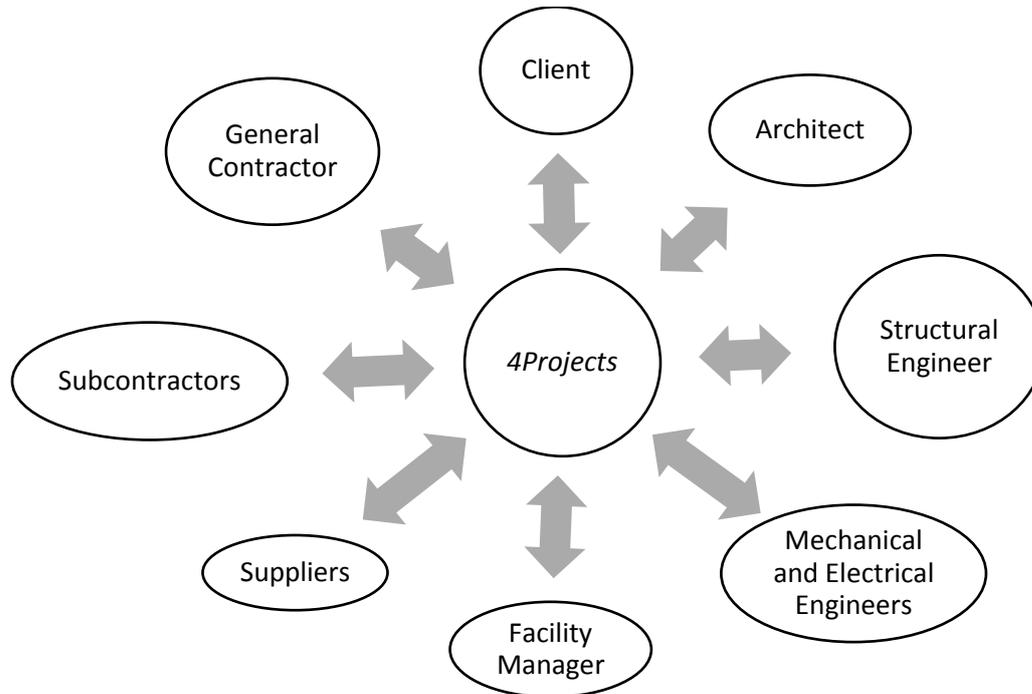


Figure 2: Collaboration using 4Projects (source: authors with the use of [9])

Functionalities of the software are [8]:

- Document and Drawing Management
 - creating a folder hierarchy for storing and sharing documents (any formats such as Microsoft Office files, CAD files, BIM files, emails)
 - Issuing, storing, distributing, reviewing and revising documents and drawings
 - Live revisions, batch operations
 - Document and Photograph Control
 - Easy searching and reporting
 - Revision control and audit history
 - Documents and drawings tracking – security of “one version of the truth”
 - Creating public folders
 - Document/Drawing Approval – Workflow
 - Document/Drawing Redlining and Commenting
 - Transmittals and Submittals
 - Drawing Register and Drawing Issue Sheets
- Email and Correspondence Management, email integration
- Discussion Forums and Tasks Management
- Bid/Tender Management

- Supply Chain Data Management
- 4BIM - common data environment for the whole project team, BIM in a browser, supports OpenBIM standards

4Projects is a tool to make some processes simpler and faster. These are processes such as document/drawing submitting, approval or commenting. It also allows to manage discussions, tasks and tenders.

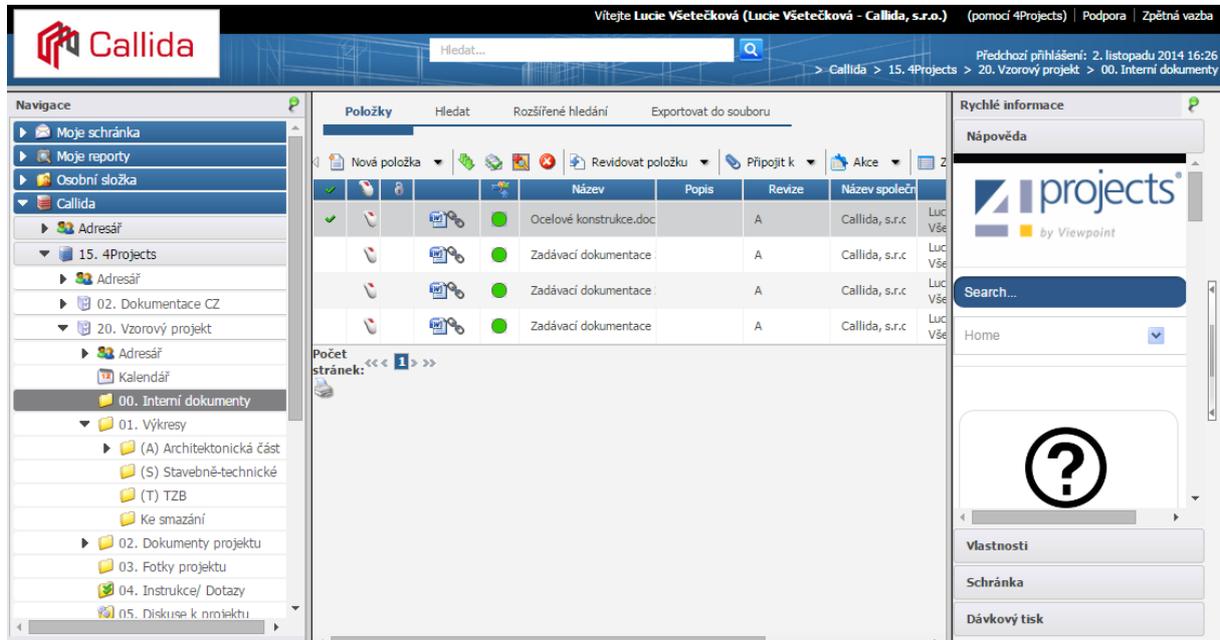


Figure 3: User Interface of 4Projects (source: authors - printscreen of 4Projects user interface)

At the end of the research some competitive products (available in the Czech Republic) are analysed as well as analysis of 4Projects implementation in the Czech construction company (case study) is presented. It is predicted that implementation of this system will be advantageous for the company. Predicted benefits are [8]:

- Quickly and easily 24/7 available project information for all participants
- Communication simplification and better collaboration with client, architect, engineer and subcontractors
- Control over drawing and document revisions
- Up-to-date information - reduced amount of misunderstandings that arise from working with outdated revisions
- Reduction of disputes, mistakes in construction phase and connected savings in cost and time
- Less paperwork - less printing and archiving, reduction of costs

Potential problems and risks associated with the system implementation in the company can be:

- Changes in processes and ways of working needed
- Lack of motivation of employees and unwillingness to change

Conclusion

This paper has presented the direction of foreign construction industry development. The Czech environment can be inspired by new ways of delivering projects to improve its performance. Principles of Partnering and Integrated Project Delivery together with tools of Building Information

Modelling should be taken into consideration. Creating mutual trust, honesty, openness and information sharing can help prevent conflicts and disputes. As regards the issue of implementing 4Projects, some assumptions are only made, because there are only few pilot projects in progress. Further research would be needed after some projects or companies will use this system. However, it is assumed that this software will be advantageous support for integrated means of collaboration and delivering construction projects.

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