PROJECT EXTRANETS AND DISTRIBUTED DESIGN: THE VALUE OF INTERNET-BASED MEDIA FOR DESIGN COLLABORATION

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Abstract

Internet-based project extranets represent a new generation of CAD tools that has been much talked about in the design professions recently. Many believe they hold considerable promise to change dramatically how design participants collaborate in the AEC industry. Yet we are only beginning to understand the real value that such project extranets provide. Clearly, empirical studies of project extranet usage are needed to illuminate the situation. This paper summarizes the results of an explorative study into the implications of such project extranets on design collaboration.

Introduction

Project extranets allow project participants to collaborate and communicate through easy documentation exchange, transfer, and storage via the Internet. Many believe it will bring about a change to the AEC industry as pivotal as moving from the hand drawn plan to the computer aided design (CAD). The mystique surrounding project extranets is just beginning to dissipate as we are able to get closer to the facts behind the hype.

In this article, we summarize the first results of an explorative study we are conducting at the Harvard Design School on the value of project extranets. We work with Blue Line Online, a leading project extranets provider, with the objective to study the value proposition of their extranet product, ProjectNet. Three cases were examined so far that have used ProjectNet in design development and construction processes. The projects were the Venetian Hotel and Casino in Las Vegas, the Philips Sunnyvale Campus in the Silicon Valley, and the renovation of the Hotel Californian in down town San Francisco. These cases were selected for their accessibility, participant variety, and experience with the extranet product. The cases will be published elsewhere in a forthcoming article, here we give a summary of the feedback and generalize some findings across the projects.

Methodology

A questionnaire was prepared outlining the issues to be addressed. The questions ranged from qualitative (how do you perceive the acceptance of ProjectNet among subcontractors) to precise quantitative questions (how much time did you save for the RFI process), and served as a guideline for the interviews. We started by understanding the setting of each project, and then selected the interviewees, based on infor-

mation needs, covering the spectrum of architects, engineers, contractors, consultants and owners. Interviews were semi-structured and conducted over telephone. The average duration of an interview was two hours.

The difference in backgrounds and project participation was taken in consideration while examining the research data. Since the projects were different in scope, size, time-to-market, program, and design and construction, conclusions were drawn cautiously with respect to the context of the case. The information provided by the interviewees was also compared with similar project situations where no project extranet was used.

Results

The value proposition of project extranets can be grouped into two categories: direct benefits and indirect benefits. Direct benefits most frequently associated with the introduction of ProjectNet were: time savings, improved documentation/ Information accessibility, better control/tracking capabilities, and savings in cost. Indirect benefits are benefits that arise from a change in the communication structure, including less litigation, better communication and knowledge sharing within teams, and quality improvements.

Time Savings

The speed of information transfer, resulting in time savings was mentioned as the greatest benefit. 77% of the interviewees mentioned that it was a substantial improvement. The workflow was affected directly, and encompassed mainly the information intensive processes. Instant uploading and downloading, as well as daily data updates were part of the features that made project celerity possible. In average, the architects interviewed estimated that they saved 80% on data exchange time and 10-15% on the whole project time. Consider, for example, these remarks made by architects:

"It made it a lot easier because we could download the files every day. It would have taken a lot longer if they had to be mailed."

"It speeds it up dramatically. It helps us out receiving files without having to wait overnight."

Information Accessibility

Several interviewees found that ProjectNet not only provided a faster method for information exchange, but also granted the participants greater accessibility to information, data and drawings. The drawing depository, the backbone of the project extranet, was accessible at all times, from any location, to all members of the team regardless of individual hardware of platform. 79% of those interviewed considered it a very positive situation within the projects:

"Information was a lot easier to get- it was pretty consistent information- there weren't different offices with different sets of information. It allowed people to stay up to date more than normal."

"If I wanted access to the electrical, or plumbing drawings, I could get it. I could just go to one place. At least scan through it. There were times where we didn't need to print it out – but we'd at least view it."

Increased Communication

Benefits in terms of communication were applauded by 74% of the participants interviewed, and questioned by the other 26%. In general, participants perceived that the communication network was strengthened visibly, and increased frequency of information exchange on the projects. The tools that facilitated communications include project email, on-line meetings and conferences, and discussions groups. Consider, for example, this response made by a project engineer:

"It helped with communications, because everyone can see some of the interaction that's going on, its like project email-you send everyone information all at once. You can attach drawings or photos of things on site, for the people who can't be here, and then they can see it quickly and respond quickly as well."

Some claimed, however, that it was not as clear a process as it would seem, and confusion can be added to an already complex situation. The fact that not everybody on the projects was connected to ProjectNet exacerbated that problem: some documents were on line, while others were still sent on paper. Further, the traditional information communication channels were never really replaced, i.e. telephone calls and meetings, though some argue that there were fewer of them.

Quality Improvement

Many people talked about an improvement in quality, but said it was a difficult concept to quantify. None the less, 75% of the interviewed users agreed that saving time on communication would allow individuals to invest more of that time in the project itself, increasing quality. However, since there was also an increased speed in transmission of data, working quality up to deadlines, as done previously, could no longer be a driving force in the project. This results in an essential change in process that could lead to increased exchange of documents in draft quality.

Tracking and Transparency

This is where tracking and control become a very important part of the whole picture. Everyone was able to keep tabs on all information-related transactions: see who did what, when, etc. It was an opportunity to free valuable man-hours for work on the project itself. Objectivity and transparency in the process was another issue frequently mentioned. Not only was it helpful in saving time, but it allowed the manager more control. Consider the following remarks:

"Its all there on the net so everyone is able to see it all at the same time, you don't have to wait to others to get it- it's there. You know when everyone has seen it- you can tell- you can see who's seen what."

"Attention to security of information and document transfer and viewing is very encouraging. It promotes confidence in that the document, once on the system, cannot be altered and it is this feature which promotes accountability and transparency in the design process."

Maturity of the AEC industry

All is not positive within the realm of the project extranets, The problems faced by extranet users, mentioned by the interviewees were diverse, but painted a consistent picture if studied as a group. The largest challenge the users felt was the technological immaturity of the AEC industry, and the adaptation problems this implies: ranging from entities using different software to those without Internet connections, or still working with plans outside of CAD. Clearly, slow connections and participants who are not willing to take a full advantage of the technological potential, impede the full usage of the systems:

"We're in an industry that's having a hard time absorbing technology into its process and processes for a couple of reasons. We are all separate entities and we all have our own internal processes, but the same time we can only automate those to a certain extent because they are tied to so many external processes that we have no influence and no ability to influence. You work with a lot of people who are not forward thinkers. You affect very little change in any one project."

"Not all our plans are on CAD so we have to send plans by mail and not electronically."

"We use computers here with relatively slow modems. Which means uploading or downloading drawings is very slow, whereas my understanding is that if you have a much faster connection to the Internet, such things are done a lot quicker, and that would certainly have saved a lot of time."

Discussion

The results of this research give a first insight into how participants perceive project extranets, and how their introduction influences the design process. The responses of the interviewees across the three projects examined so far suggest that while collaborative systems can reduce the costs of knowledge transfer —in particular resulting in time savings and increased accessibility — more importantly, they have the potential to impact on the communication structure of participants in the design process by increasing transparency and accountability of actions. In other words, collaborative media can make it more worthwhile for designers to share information, help each other, and contribute to innovative solutions, as the actions of participants become better observable and are automatically tracked.

The question is then, how will the different participants within the Construction Industry assimilate project extranets, such as ProjectNet. At the moment, the main participants, the architects during design and the General Contractors during construction, assume the use of these extranets is a step in a new direction. They provide a base for a new process, an innovative and efficient change for the better. The engineers and consultants use the system more as an additional tool to their already existing palette, noting the advantages, but going no further. Extraneous players, like manufacturers or reprographics companies, are also getting involved, as they see their opportunity to offer greater services by incorporating the project extranet in their portfolio.

Project extranets are in the early adoptation stage, but hold great promise to impact the industry profoundly as the boundary of extranet users in any given project gets expanded all the time. The Blueline Online team enumerates the challenges it faces as one of the leading project extranet provider. Their list includes: accelerating the rate of adoption of their technology to a broader segment of the market, developing and providing additional online services that will attract other members of the construction community, including trade subcontractors, building product manufacturers and material suppliers, and maintaining a clear focus on servicing the needs of a diverse customer base. Project extranet providers like Blueline Online can be seen as a new breed of participant in the AEC industry, and important driver for changing the AEC industry. Already now the construction industry can be seen as evolving distributed businesses that are woven together through project extranets.

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