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### To portal or not to portal

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# To Portal or not to Portal, ...

Lloyd Waugh<sup>1</sup> and Jon Makar<sup>2</sup>

The architecture-engineering-construction (AEC) industry is very information intensive. During a typical construction project very large amounts of information such as drawings, specifications, requests for information, and change orders flow between the different parties to the project. Managing this information is often difficult. Adversarial relationships, liability issues and the amplified economic cycles in the AEC industry have driven a separation of design and construction responsibilities and have produced specialization into small firms with narrow expertise. This has led to a level of contractual fragmentation that is unparalleled in any other industry. This contractual fragmentation has in turn led to: (a) a large number of legal entities involved in any major construction project, (b) inefficient management processes among project participants to accommodate legal constraints, and (c) re-interpretation and re-entry of information by each project participant. The result, relative to other sectors of the economy, is significant duplication of effort and introduction of errors.

Information technology (IT) through the medium of the Internet is the driving force behind a revolution that is changing the fundamental dynamics of the AEC industry. Web based software is moving the management of construction projects from a print-based to a digital medium. While verbal communication (on the telephone or in meetings) remains almost as important as ever, the combination of information providing *content* web sites, information sharing *collaboration* web sites and financial *commerce* web sites (the three C's of construction websites – see (\*the sidebar or the web site\*) for Canadian examples of each type of site) are providing completely new tools to the industry.

## Dot.Com but not Dot.gone

The use of IT for managing construction processes has been discussed in the industry since the early 1970s, when the idea of an electronic repository to store and exchange project information was first raised with the BEAM project and the subsequent Canadian Construction Information Service (CCIS). In 1994 COOLNet was established by the Canadian Construction Association to facilitate the dissemination of procurement information. However, it was not until the late 1990s that the full potential of IT and the internet to assist the construction industry was recognized by industry participants. By 1999 full scale web operations in all three web site categories were a reality. By the spring of 2000, over \$1.5 billion CDN was estimated to have been sunk into research, development and start up costs as investors tried to tap into the multi-trillion dollar global construction industry. Unfortunately, construction industry dot.coms only really got going at the peak of the last business cycle and by early 2000 the dot.com die off

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occurred throughout the e-commerce industry. A number of construction oriented dot.coms went out of business, while others consolidated and retrenched, often allied with “bricks and mortar” organizations such as large general contractors or industry associations. In fact, while the financial return to investors who entered the market at the top of the "gold rush" was often minimal, the technical advances resulting from the funds sunk into research and development were largely a success and are being applied in different forms by companies around the world.

## **The Three Cs: Content, Collaboration and Commerce**

Each of the three primary types of construction portal web sites, can be found supplying services for a wide variety of construction industry participants. Of the three, collaboration portals will have the most impact on AEC business practices.

*Content* Portals store and distribute information to a wide variety of industry participants. Some sites offer information on construction projects, others provide industry news and analysis or information about products and niche construction techniques. Many of these sites are open to all visitors, but some are available only to paying site members or the members of a particular industry association. In general, content portals offer information to the AEC industry that has always been available for purchase in print form either from a publisher or from an industry association repository. The difference is in the accessibility and speed of delivery of the information, rather than the content itself.

*Collaboration* Portals focus on tools such as document management systems that allow people to collaborate and work together, improving project management. These tools are the ones that are allowing the AEC industry to re-engineer its work practices. While different collaboration portals offer different tools, they have a number of attractive characteristics in common:

- Transmission speed compared to deliver of paper documents
- A central repository
- Workflow automation
- Accountability
- Reduction in the need for data re-entry

As with any Internet transmission, the speed is almost instantaneous. The fact that transmission speed is faster via the Internet than by traditional means, needs no explanation. There are several important implications of a Portal repository:

- an opportunity for central and comprehensive storage of all project documents, from CAD drawings to meeting minutes;
- web-based pervasiveness (24/7, office/project/home);
- the ability to control access to specific records, documents, and folders while leaving others open to all project participants; and
- the ability to digitally archive all information for historical purposes

Automation of workflow processes is the combination of predefined forms with automated circulation sequences to various project authorities with a request for review,

approval, or other decision making. While the exact document range depends on the portal, anything that is produced in the course of a construction project can be mounted on the web and its distribution automated, increasing the speed of the project.

Accountability is a side effect of the previous characteristics. If the project administrator chooses, records may be kept to indicate who posted each document, and when, as well as how long requests remained unanswered. Questions such as the following will be more easily answered:

- When a document was received?
- What was the latest revision of a drawing at any time during the project?
- Where a request was delayed?
- Who's in-box is the request currently in?
- Who had access to the latest revision of a document?

Although there will always remain uncertainty, the net effect is greater accountability.

Reduction in data re-entry is a direct result of the use of the portal. All documents are stored and accessible in electronic form. Not only does this practice reduce the errors that are inevitable in transcribing information and data from one piece of software to another, but it also greatly reduces the costs involved in document printing and delivery.

People are often attracted to Collaboration portals for one or another of the above characteristics, yet each characteristic builds on the previous in the capabilities that it provides. Together, they provide significant benefits in improving the process of construction management.

*Commerce* or E-Commerce Portals focus on a very specific sub class of construction information, the ability to carry out financial transactions.. Some of these portals enable the purchase of the goods and equipment necessary to complete a construction project, but this category extends far beyond sites that are the construction equivalent of Amazon.com. Equipment can be rented on the web, permits can be issued, bids submitted, financial standing investigated and timesheets filled out and authorized. Even the purchase of goods and equipment can be done following different models. Some companies sell used equipment, others provide auction services or simply delivery of purchased products while still others act as virtual distributors or wholesalers, purchasing the goods only while they are in transit.

## **Speed Bumps on the Information Superhighway**

While, the advantages of using web-based project management tools are many, there are some speed bumps that are slowing down the adoption of this technology. Like any other innovation, there is an overhead cost to its adoption. Companies must decide that the expense is worth the benefits. The complicating factor is that the expense and benefits do not necessarily go to the same parties in the project. The major benefits in collaboration portals are to the eventual building owner, who will receive a more efficient and likely better built structure; and to the general contractor, who will gain the greatest advantage of the efficiencies created by the collaboration tools. In contrast, engineers and architects

may have to invest more heavily in IT in order to put the required project information on the web, while the specialty contractors and suppliers may need new hardware, software, and networks to use the web portals and print out the documents that have been placed on them. An additional problem for the engineer and architect is protecting the intellectual property that has been posted on the web. All parties need to deal with the fact that there is not one company providing portal services, but many; the investment in time and money to learn to use a particular collaboration system may therefore have to be repeated on new projects.

Some of these speed bumps will be dealt with by developing modified contract terms so that the people who need to do the additional work will be properly compensated. Intellectual property issues are really little different from those that exist currently, since copyright laws still apply and since the traditional distribution of documents relies on enforcement of these laws rather than on 100% control of access. In some ways the web systems are more secure, since it may be easier to trace who has had access to a particular document. The question of multiple collaboration systems in the market place will be dealt with in a number of ways. Building owners, prime designers, and prime contractors are likely to specify which project management system will be used. Other parties to the project will therefore include the cost of learning that system in their decision to bid on the project. Longer term relationships between different team members may also develop. The final step towards eliminating the issue of multiple collaboration systems will be the development of industry standards for the communication of construction information, allowing different management systems to work together as needed.

## **Trends**

Construction portals are continuing to evolve with time, providing new features and improved functionality. Some important trends to watch in the future include:

### **Regionalization**

It is clear from the crash of NASDAQ and the dot.com die-off that the “pursuit of global dominance” business model was a failure. An alternative model entails specialised regional portals that can provide exactly the features needed by the local construction industry. This trend is already being seen in content Portals with the development of CINet in the Eastern Canada and CITi in the Western Canada. Both of these Portals disseminate tendering information for the AEC industry.

### **Standardization**

Portals should evolve quickly toward standard information exchange protocols. This paper simply discusses the sharing of information from one project participant to another. The companion article by Froese discusses the evolution of information exchange standards which will radically change our ability to integrate information from one project phase to another, from one application to another, and from one project participant to another. The development of these standards will make possible sharing of information and gains in efficiency that far exceed the gains from Portals alone.

**Specialization**

The construction industry is divided into specialised vertical markets such as home building and heavy construction. Some portals in each of the three categories described above already exist that are intended only to serve a particular vertical market. Further specialization is likely to develop as Portal service providers tailor their products to the specific needs of vertical markets.

**Conclusion**

Construction portals offer significant advantages for project management, including better work flow, higher levels of accountability and efficiencies in finding and distributing information. These advantages will continue to grow as the Portals evolve.

## Project management service providers

This list should not be considered exhaustive.

### Canadian Organisations

Organisation	Web site	Product Status
CITi*	<a href="http://www.citinc.com">http://www.citinc.com</a>	Available
AEC Innovations	<a href="http://www.aecinnoventions.com">http://www.aecinnoventions.com</a>	Available later this year
Vertical Builder*	<a href="http://www.buildersharbor.com">http://www.buildersharbor.com</a>	Available

**\* This organisation offers services beyond project management**

### United States Companies

Organisation	Web site
Bricsnet*	<a href="http://www.bricsnet.com">http://www.bricsnet.com</a>
Buzzsaw.com*	<a href="http://www.buzzsaw.com">http://www.buzzsaw.com</a>
Citadon*	<a href="http://www.citadon.com">http://www.citadon.com</a>
Constructware*	<a href="http://www.constructware.com">http://www.constructware.com</a>
E-builder.com	<a href="http://www.e-builder.com">http://www.e-builder.com</a>
Harddollar.com*	<a href="http://www.harddollar.com">http://www.harddollar.com</a>
Hotbuilder.com	<a href="http://www.hotbuilder.com">http://www.hotbuilder.com</a>
Primecontract*	<a href="http://www.primecontract.com">http://www.primecontract.com</a>
Meridian Project Systems*	<a href="http://www.ProjectTalk.com">http://www.ProjectTalk.com</a>
Projectgrid.com	<a href="http://www.projectgrid.com">http://www.projectgrid.com</a>
TheJobSite.com*	<a href="http://www.thejobsite.com">http://www.thejobsite.com</a>

**\*This organisation offers services beyond project management**

## Information service providers

### Canadian Web sites

Organisation	Web site	Product Type
Canadian Construction Association	<a href="http://www.cca-acc.com">http://www.cca-acc.com</a>	Industry Association + related information
Construction.ca	<a href="http://www.Construction.ca">http://www.Construction.ca</a>	Business Directory
Constructioncanada.com	<a href="http://www.Constructioncanada.com">http://www.Constructioncanada.com</a>	Business Directory

## Commerce sites

### Canadian Web Sites

Organisation	Web site	Service
Builddirect.com	<a href="http://www.builddirect.com">http://www.builddirect.com</a>	Building materials
Explorer Software	<a href="http://www.explorer-software.com">http://www.explorer-software.com</a>	Web based back office services
PEETA	<a href="http://www.peeta.com/">http://www.peeta.com/</a>	Web cameras

## Tendering and bidding sites

### Canadian Web Sites

Organisation	Web site	Service
British Columbia Construction Association	<a href="http://www.bccasn.com/">http://www.bccasn.com/</a>	Electronic plans room
BC Ministry of Highways and Transport	<a href="http://www.explorer-software.com/query.htm">http://www.explorer-software.com/query.htm</a>	Project listings
Canadian Construction Association	<a href="http://www.coolnet.ca">http://www.coolnet.ca</a>	Project listings
Construction Association of Nova Scotia	<a href="http://ctca.unb.ca/CANS/">http://ctca.unb.ca/CANS/</a>	Electronic plans room
Fredericton Northwest Construction Association	<a href="http://ctca.unb.ca/FNWCA/">http://ctca.unb.ca/FNWCA/</a>	Electronic plans room (to start this year)
Government of Alberta/Edmonton Construction Association	<a href="http://www.coolnet.ab.ca">http://www.coolnet.ab.ca</a>	Electronic plans room
Government of British Columbia	<a href="http://www.bcbid.gov.bc.ca/">http://www.bcbid.gov.bc.ca/</a>	Project listings
Government of Nova Scotia	<a href="http://www.gov.ns.ca/fina/tour/">http://www.gov.ns.ca/fina/tour/</a>	Project listings
MERX	<a href="http://www.merx.cebra.com/">http://www.merx.cebra.com/</a>	Electronic plans room
Moncton Northeast Construction Association	<a href="http://ctca.unb.ca/MNECA/">http://ctca.unb.ca/MNECA/</a>	Electronic plans room
Ottawa Construction Association	<a href="http://www.o.ca">http://www.o.ca</a>	Electronic plans room
Saskatchewan Construction Association	<a href="http://www.saskconstrhouse.com/SCA/">http://www.saskconstrhouse.com/SCA/</a>	Electronic plans room
Toronto Construction Association	<a href="http://www.tcanetworks.com">http://www.tcanetworks.com</a>	Electronic plans room
Western University Procurement Association	<a href="http://wupa.uregina.ca/index.html">http://wupa.uregina.ca/index.html</a>	Project listings
Winnipeg Construction Association	<a href="http://www.wpgca.com/">http://www.wpgca.com/</a>	Electronic plans room (starting this year)



