

AEC-Solving the Collaboration Challenge

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Introduction

Collaboration between architects, engineers and constructors has traditionally been formalized around a carefully orchestrated exchange of drawings and schedules with a rigid commenting and approvals procedure. Given the risks at stake, conformance to this process has always been carefully audited, and it is generally placed with an independent reprographics service. It can form the basis of much claim and counter-claim subsequent to the completion of the project, so high stakes are involved.

Unfortunately, this process in its traditional form is somewhat sub-optimum, as evidenced by the amount of re-work and wastage associated with most construction projects. Given pressures to reduce these costs and to shorten lead times, design teams often short-circuit the process with “unofficial” team-sites or cloud file shares - to the detriment of governance and records keeping. Also, the process originates with the architect, and is focused on designing and creating the building in the first instance. It does not take account of the hugely longer lifetime of the building within its “user context”. Nor does it adequately reflect the needs of the owner or developer, and the transference of risks as the project progresses.

The engineering and construction industry is slow to change. Exchange of paper drawings within the collaboration process is still prevalent, despite moves to electronic drawing exchange, and increasing interest in standardized 3D BIM models (Building Information Models). The Holy Grail has always been to hand over a comprehensive as-built technical record of the building to its owner or operator on completion of construction, so they can manage the facility, and maintain it as an asset. However, even with the increasing use of electronic drawings and models, the sticking point has always been: who manages the model? Who acts as the asset librarian, servicing the requirements of collaboration between one set of professionals at the start of the project, and the owner, tenants and maintainers during the operational life of the building, even up to its eventual demolition?

In this paper, we propose that the traditional role of the reprographic services provider as the hub of collaboration at the start of the project can equally be extended to the long-term role of custodian of the asset descriptors, providing a service primarily to the owner of the building from start to finish. Whether the asset descriptors are paper drawings, 2D electronic drawings or 3D building models, the reprographics provider will ensure safekeeping, controlled revision and carefully recorded distribution.

The Need for Services

Collaboration is an essential part of every project. While you may not think about it specifically, we all collaborate naturally. It is all about the exchange of ideas and information, leading to a common goal. There is a challenge with collaboration in that people may be reluctant to change the way they collaborate. If you are currently in a physical environment passing papers drawings, etc., the introduction of technology alone will not be convincing enough to make change happen. User adoption will require education about the types of change, the reasons to change, and the benefit gained as a result of the changes being made.

Challenges

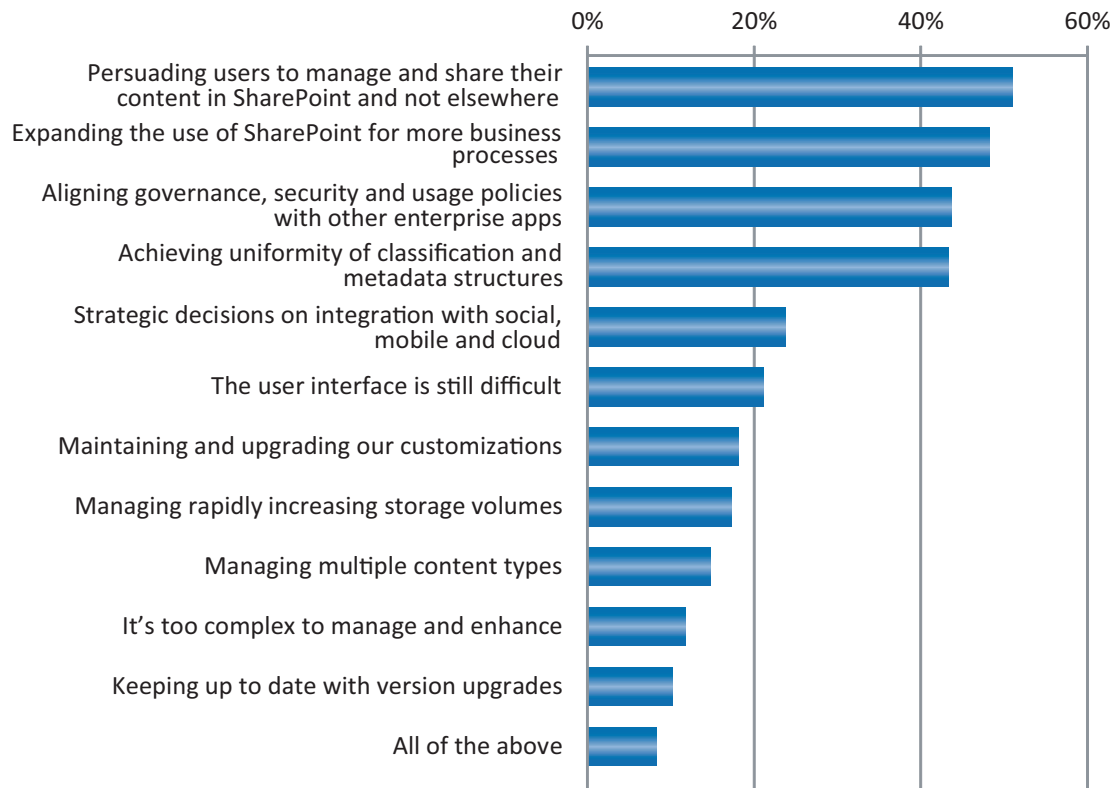
One of the main challenges in a collaborative setting is choice and standardization of which tools to use, and getting the user community to use them. Unless there is some effort to standardize, users will make their own choice, resulting in the creation of a digital landfill and information chaos.

There are many free and freemium cloud-based tools to choose from, like Box, DropBox, and Google Docs. These products are easy to get up and running, appealing in their simplicity, and are readily extended across project members. However, there are huge dangers in using these ad hoc tools, not least of which is ownership: who sets the security standards, who defines the structures, and who takes responsibility for long term ownership of the content?

Inevitably, when discussing collaboration, Microsoft SharePoint is also brought into the conversation. AIIM research finds that fifty percent of respondents to the AIIM SharePoint 2013 survey cite user reluctance to manage and share their information in SharePoint and nowhere else, as the number one issue. This is not surprising as change management at a corporate cultural level is still a common issue.

Also cited among the top five issues are governance, security, uniformity of classification, and metadata. All of these are signs of poor governance over content, process, and people. It is this lack of control that creates collaboration problems and slows down the overall project. It is this lack of control that causes discrepancies leading to claims and counter claims between the various participants on the project.

Figure 1: What are the biggest ongoing issues for SharePoint in your organization?¹ (Max FOUR)



Unofficial Collaboration Systems

Poor collaboration can be costly, and in construction, potentially fatal. The dangers of using cloud shares and non-construction oriented ECM systems could result in poor versioning and numbering, poor security, lack of internal/external barriers, no audit, undefined ownership, and poor metadata. Miscommunication and missing or outdated content are potential consequences. This in turn could lead to cost overruns for rework, lack of proper documentation during inspections, fines, and even structure failure.

What we are talking about here is the need for collaboration management. The key requirements of a content and collaboration management system for construction projects include:

- Version and revision control
- Commenting and feedback
- Sign-off and auditability
- Collaborative workspaces
- Multi-company access
- Mobile access

The ability to control your content and processes, using consistent practices, reduces the probability of error, miscommunication, and challenges related to which version of a drawing or change notice you are dealing with. This is an area where SharePoint, and other available solutions fall short without add-on applications or customization. In an AEC environment a document register is a likely requirement, along with auto-numbering of documents, management of versions, renditions within document work-packs, and other functions that are common and essential in the AEC collaborative process. Evaluating these requirements is critical to making the right selection of functionality and service provider.

Multiple Repositories/Multiple Copies

Avoiding duplicates, and setting only one true record is vital, particularly when it comes to audits, legal discovery and legal hold. All organizations face the problem that content is stored in multiple repositories across the business – file-shares, email systems, ERP, CRM, and multiple content and collaboration systems. AIIM's State of the ECM Industry report finds that 72% of larger organizations have three or more ECM (Enterprise Content Management), DM (Document Management), and RM (Records Management) systems while 25% cite having five or more systems.² This does not mean they are integrated nor does it mean they are all searchable from a single interface. It does however, reflect the need to plan how, where, and what will be stored, with access provided to those who are authorized. Connecting these systems together for search and access has been underway in many companies, and CMIS (Content Management Interoperability Services) can provide a useful standard for this connectivity.

The requirements listed in the previous section relate primarily to selecting the right systems and service providers, but you might also consider the need for long-term preservation and storage, distribution and chain of custody, and eventual destruction of the content when legally allowed. The different systems options you might consider include:

- Industry-dedicated transmittal and approvals systems
- Standard in-house ECM systems
- SharePoint, with add-ons
- Cloud collaboration and file-shares
- BIM (building information modelling) systems

Implementation of these systems can also take many forms, e.g. in-house, hosted, or cloud services. You should also consider chain of custody through the lifecycle of your project content, not only for the duration of the project, but the life of the building. Migrating content from system to system through the life of the building is undesirable. It is best if there is a central location where each participant through every phase of the building lifecycle, can find and access the relevant content.

The key to systems and implementation is to match your requirements to what is available and to implement in the way that best fits your needs. If you need mobile access from field locations, a locked down, on-premise system may not be the best choice. Make time to truly identify and understand your options.

Ownership

The potential "owners" of such a system include but are not limited to architects, constructors/project managers, building owners, and reprographic service providers. You will also find that developers/funders, and facilities managers are often part of the mix. Each has a distinctive role and each has a distinctive need for the related content. The point of ownership tends to follow the building lifecycle. Architects, constructors, and project managers require ownership rights in the development stage while facilities managers will take ownership post-development and through to the building's eventual destruction. Each of these participants is also potentially managing their own systems without linkage to the others.

Figure 2: Librarian Role

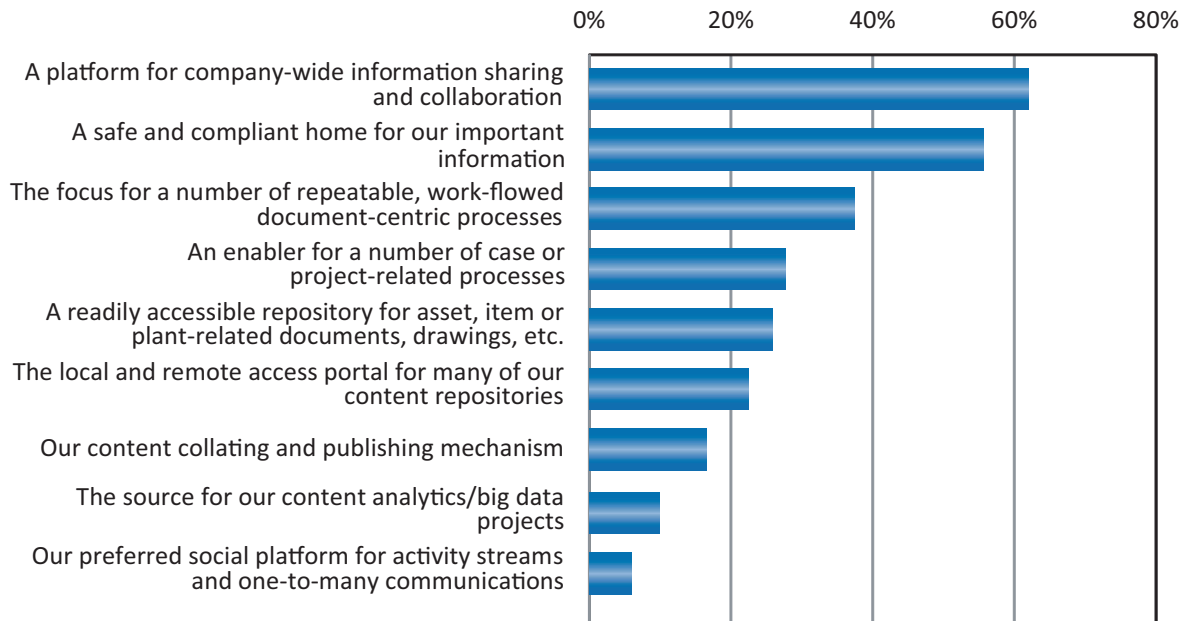


Preservation and storage of content also requires ownership and accountability. The length of time the various bits of content are to be maintained will be driven by legal and regulatory statutes. This means someone in the organization will need to be responsible for long term preservation of this content whether it be the architect, building owner, or developer.

Why use ECM?

AIIM research shows that 62% of ECM users cite establishing a company-wide platform for information sharing as the strategic focus for their ECM system. This approach delivers a central storage facility where updated versions of the information are maintained and made available to those who have the need and right to access it.

Figure 3. Which of the following best describe the strategic focus of your main ECM system?²



The Benefits of Reprographic Service Providers

Reprographic service providers and repro houses have always been the independent resource for paper drawings and documents. The role they have played is one of librarian, quality assurance, single source plan room, and integrator. When you look at an average issuance consisting of 500+ sheets, the discrepancy factor could be around 30, so corrections need to be made. Reprographics services have always been there to assist in identifying and correcting these discrepancies, to ensure accuracy, and to make sure that the latest revisions are maintained and available, serving as the single source of truth for construction projects.

As the world shifts from hard copy to electronic, there is a sense that technology is the solution to collaboration between parties involved in a construction project. Cloud solutions are implemented to “manage” the information yet, there is no agreed upon structure – taxonomy – for how the information is stored and managed. The tools chosen may vary from party to party, creating a series of silos, including paper silos, to be searched when information is needed. Versioning is also an issue as is QA to ensure the latest information is not only available, but that it is accurate.

In the electronic world, reprographic service providers can continue to serve in that familiar role – and can extend that role throughout the life of the building. Acting as librarian, they can also provide quality assurance, managing assets and contractual SLAs, and provide a foundation for indisputable audits throughout the lifecycle of the project and beyond. As the “source of all information” they can provide all of the project players with the latest and most up-to-date version, logged, documented and recorded as issued.

As an example, during one of the interviews conducted for this paper the service provider being interviewed was urgently contacted by an on-site project manager. This project manager was looking for the latest information related to his project. The service provider had just been brought in to manage the information, which was scattered across many repositories and cloud based apps, yet the service provider already had a solid grasp of where things were stored, and who was managing them, and assigned his staff to locate and deliver the information.

One Current Version, Stored Once

The pressure on architects, engineers and constructors is immense, but at the end of the day, it is the owner or developer who carries the biggest risk. They should grasp the opportunity to own and superintend the document reference and exchange process. In an ideal world there is only one copy of the “latest” drawing, and everybody pulls it down from the same place. AIIM research finds that 40% of organizations lack confidence in the accuracy, accessibility, and trustworthiness of their electronic information.² This is due mainly to the fact that there is no versioning, multiple copies live in multiple repositories, and there is no single source of truth wherein everything is stored.

Reprographic service providers offer a balance of risk that is fundamental to project success. They establish and maintain one current version, one copy that is immune to changes of project players, templated for fast set-up and run, and with potential future migration to the owner’s system. In this sense, the reprographic service provider becomes that single source of truth where all of the players involved in the collaborative process can go and confidently know they have the latest information - regardless of format.

The All-Electronic Future

The all-electronic future is now. Regulations requiring digital versions of documentation for audit and litigation are today’s reality. Flexibility in the workplace and the need to collaborate from remote locations is at hand. Mobile devices are commonplace for use in project update meetings, on-site reviews, and even change reviews. Technology features like real-time white boarding, and DAM (digital asset management), not readily available in the free and freemium products, offer additional collaborative flexibility and control over digital assets. Major projects cannot afford costly delays due to wrong information, and inability to connect with the project teams. Always-on availability of a central electronic document library across the different project sub-contractors, whether in their own offices, or on site should be a pre-requisite for any modern project.

Enhanced collaboration provided through a reprographic service provider could also provide presence-based meetings, on-site IT provision, long-term archiving, and support for e-discovery and legal claims. If paper-based information is still part of the project package, the service provider can capture and convert it to a digital format using wide-format document scanners. If a print copy is needed on site, a print-on-demand facility can furnish it immediately using the plotter located in the on-site office.

Conclusions and Recommendations

In scenarios where there is no planned management of the content and collaboration process, content chaos is the likely result. Multiple copies spanning multiple repositories create a situation where no one knows which is the “official” version of documentation to work from. Cost overruns are the result of unplanned rework, failed audits and inspections result in fines, and there is a potential for lost information after the project is complete.

Planning your information and collaboration needs is important to your project’s success. Make it part of the overall project. Include your reprographics services provider as a stakeholder whose expertise in construction project workflows, content management, and administrative services, will help you make the right choices. Working with your reprographics services provider, you will get library services to organize and standardize the way project information is managed. They will also offer a way to validate and serve as quality assurance for your issuance documents. As independent operators, reprographic service providers serve as a single point-of-collaboration, between all parties, managing all content - paper and electronic - and providing a one-off chance to create a cradle-to-grave documentation asset - a bibliography of the building - that serves the needs of all those involved with the building through its lifetime. Everyone has a stake in the game so:

- Architects: Identify the need for design library services early in the project and build into tendering process
- Constructors: Avoid using proprietary or in-house ECM systems and services
- Owners: Take the initiative and appoint a library service with a view to lifetime management of building data

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1. AIIM SharePoint: Clouding the Issues, September 2013, 538 respondents.
www.aiim.org/research
2. AIIM ECM at the Crossroads 2013, 538 respondents.
www.aiim.org/research

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