



The Adobe Solution for AEC

A Cyon Research White Paper
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Executive Summary

In this white paper, Cyon Research addresses five key questions with regard to the Adobe Solution for AEC:

What is the nature of the problem it addresses?

Construction is an enormously complex activity. Professionals at each step in the process use a wide variety of computer-based tools with a plethora of file formats. Each of these tools and its accompanying format has been designed to accommodate the needs of specific steps in the construction process. The unintended result is an unmanageable diversity of software installations, file formats, electronic document types, and competing standards.

The AEC industry requires digital data for better communication, for project control, and for major reductions in project time and cost. Yet the proliferation of electronic document formats has itself become an obstacle to the realization of these benefits for improved workflow.

How has that problem been addressed in the past?

To cope with the complexity, some firms have tried to dictate what software tools and file formats will be used on a project. But most construction projects are temporary alliances; companies that try to enforce standards often lack the clout to ensure compliance.

Project participants resist for many reasons. For one, an investment in new software is rarely included when jobs are bid. Too often, the result is a return to lowest-common-denominator workflow—using vast amounts of paper and gaining little or no cross-project benefit from digital data.

What types of solutions are currently used or proposed in the market?

Typical solutions in use today address only small segments of the overall workflow problem. Many firms solve their documentation workflow issues by providing all project members with original authoring software, even if most team members only use it for document review. There are many document review/markup products in use, along with file-translation products, file-translation services, and competing data formats. There are Web-based collaboration services, enterprise document-management solutions, and email. Adobe's PDF format is widely used for electronic distribution of individual documents.

These disparate products and services address individual “pain points” in the AEC process; they are not solving the overall problem of cross-project digital data workflow.

What is the nature of Adobe’s solution to the problem?

Adobe proposes the “intelligent solution for AEC,” based on its PDF (Portable Document Format). With more than 500 million downloads, PDF is the de facto worldwide standard for document exchange. PDF also provides a comprehensive solution when working with EDM (electronic document management) partner solutions, such as Documentum. Industry-specific standards initiatives have resulted in a proposed PDF archive standard (PDF/A). The PDF engineering documentation format (PDF/E) is currently under review with a working group. PDF/A is expected to be finalized the spring of 2005 and PDF/E in late 2006.

What is Cyon Research’s opinion of Adobe’s solution?

Cyon Research believes that Adobe’s approach is a workable and comprehensive solution—perhaps the first solution that addresses the complete AEC digital-data workflow problem. Adobe’s solution has a strong chance of success, given its stature in document publishing. If the Adobe solution can provide adequate functionality and performance for all types of construction documents (as we believe it does), it should have an easy time becoming the predominant format for transmitting construction information.

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Introduction

Automation of the many and varied activities of construction projects has led to an unmanageable diversity of digital document formats, each requiring its own software to be read and marked up for editing. So overwhelming is this challenge, its complexities threaten to outweigh the productivity gains attained by the automation.

At the same time, digital documents offer unprecedented opportunities for better communication and project control, and reduction in project time and cost. But the maze of document diversity has prevented their exploitation.

The Adobe Solution for AEC, based on Adobe's PDF (Portable Document Format), confronts these challenges squarely. Is it the answer? Are there any objections to its universal deployment? In this white paper, Cyon Research takes a close look and gives you its unvarnished appraisal.

The Nature of the Problem

The AEC Business Process Today

The typical AEC (architecture/engineering/construction) project is the most document-intensive of modern business processes. It requires many document types, distributed to a wide variety of participants with different levels of professional expertise and project responsibility. It is a serpentine process that moves from design to engineering to detailing to specifying to procurement to construction to operations. Each participating firm—and there can be many—creates, edits, approves, references, distributes, and finally archives the data they contribute to the project.

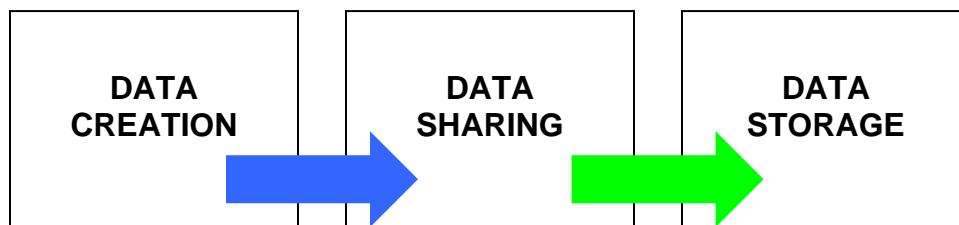
Unlike most other business processes, the AEC project mixes technical data and business data. Design and construction are guided by aesthetics, business imperatives, engineering requirements, legal limitations, industry standards, and the owner's budget. Participants in an AEC project need unfettered access to the information created within their own firms as well as selective access to many kinds of information created at other firms sharing in the project.

Because construction projects are generally created by firms in temporary alliance, there are often many software products and file formats in use on a project. The architecture firm may use Autodesk AutoCAD, while the various building-systems engineers may use Bentley MicroStation, or no CAD program at all. One firm may create AIA-approved contract documents with Microsoft Word, while another fills in pre-printed documents by hand. Some firms distribute paper documents via courier or fax, others email files created by various software authoring tools.

There may be a project extranet in use, or (in larger firms) an electronic document management (EDM) system may control access to project documents. The back office may run an accounting and management suite from an AEC specialist such as Timberline or J.D. Edwards/PeopleSoft, or it may use a homegrown system based on Excel spreadsheets and a FileMaker database. Some of the largest AEC firms, including Bechtel and Fluor, have created proprietary software solutions for such tasks as document management and procedure tracking.

AEC Documentation Workflow

To fully understand the complex nature of AEC requires looking at the process across time. A building, a power plant, or any other built asset has a life cycle; so also does the documentation of that asset. There are three distinct stages:



Data Creation: Automation's greatest impact in AEC has been in this first stage. Architects and engineers create plans, surveyors identify terrain and boundaries, construction managers allocate resources. CAD geometry is only one form of data; soil analysis, construction details, environmental impact statements, bills of material, labor costs and dozens of other data types and reports also are required. Each data type has an established form of presentation, largely unchanged from pre-computer days.

Data Sharing: The second stage is about putting the information to use. No matter how well information is organized, to be useful it must be both accessible and timely. The current AEC documentation workflow is largely paper-based. Reports are created, printed and distributed. Reprographics shops are kept busy printing E-size construction drawings. Fax machines, large-format plotters, and photocopiers are still essential business tools.

Data Storage: The third stage, Data Storage, is guided by a wide range of requirements both legal and logistic. Archived AEC information must remain accessible and readable in a stable format with a guaranteed long shelf life.

The Comforting Continued Use of Paper

There is a comfort factor in the continued use of paper in AEC workflows. Paper offers a three-part harmony that, despite advances in computer technology, remains valued:

- **Presentation:** Paper-based documents have a “look and feel” that is clearly understood. Most early automation efforts went to some lengths to maintain the same look, if not always the “feel,” of familiar forms—so that whether encountered on a screen or in paper form, they would be recognizable to users. The use of software to create AEC documents has not changed the visual context of the information.
- **Distribution:** Reports and other AEC documents rarely travel alone. In the paper-based workflow, it is easy to combine documents for distribution. Staplers are fast, binders are cheap, UPS and FedEx are convenient.
- **Archiving:** Those stapled and bound documents are easy to store in a cabinet; if left alone, they will be readable in 100 years. There are no software upgrade issues, no worries about what equipment to keep on hand (how many 5.25” floppy-disk drives are in your workplace today?).

The three stages of the AEC documentation life cycle match up well with the three-part harmony of the paper-based workflow. Data Creation flows into Presentation, Data Sharing is the act of Distribution, and Data Storage is the equivalent of Archiving. If AEC workflow documentation is to move from its comfortable relationship with paper to an intelligent electronic alternative, the three-part harmony must be retained—and strengthened.

How the Problem Has Been Addressed in the Past

Automation Has Made Inroads, but Only for Individual Activities

The current dizzying array of AEC data types, project requirements, and software tools has evolved piecemeal. The familiar, time-tested paper-based workflow has been superimposed onto computer automation; technology has not been used as the basis for a new designed-from-scratch workflow (what the IT industry calls business process automation). While there is a high comfort factor in continuing to use paper-based forms and processes in an automated environment, the result is both inefficient and costly.

The paper-based workflow (even if electronically augmented) is inefficient because every time a document is distributed, the creator loses control of the information. It does not matter if the document is distributed on paper or sent electronically using an authoring format such as Autodesk AutoCAD DWG, Bentley MicroStation DGN, or Microsoft Word DOC. As the document moves along, key-in errors or readability issues corrupt the information flow; sticky notes fall off or get misplaced. En route, paper documents can be recreated, electronic documents issued in authoring formats can be modified, and the document’s creator often has no control—or even knowledge—of the changes. We recognize that a few well-controlled sets of printed, large-format drawings will always be necessary, as “read-only” reference documents.

Some file formats can be sent out as “read-only,” but if some users need “write” access to the document, then the only choice is to create multiple versions, opening up a whole

new layer of inefficiency in managing the forked document trail. Such action increases project and team risk, by increasing the possibility that action will be taken using outdated documentation.

The paper-based workflow is costly. The time involved in creating and using paper documents is expensive, especially when you include the time it takes to manually search for specific pieces of information. It is costly to manage accountability and confidentiality. It is costly to archive the final documentation. There is the cost of the paper as well as the cost of printing, delivering, and storage. And most costly of all is the potential for undetected mistakes.

In the final analysis, information technology to date has automated independent activities of AEC technical and business professionals. There are many fine software products for creating AEC data. There are now also good tools for document sharing, such as EDM systems, intranets/extranets, and email. There remains a fundamental need to streamline the collaborative, document-based AEC business processes.

Solutions Currently Used or Proposed in the Market

A Different Solution for Every Project

The challenge of tracking the great numbers and types of documents that are the “blood” of a construction project is recognized and even understood in the construction industry; many software tools and services are available to address it. Some of the tools being used to deal with this problem are:

- **Markup/viewers.** Dozens of excellent programs are available that permit users to view files in any of hundreds of formats and make editing marks on them that can be read by others who have the same brand of markup/viewer. They are typically inexpensive desktop programs that are installed by individual users, and do not require IT department intervention.
- **EDM** (electronic document management) systems. The “librarians” of the AEC industry, these systems allow secure storage and tracking of electronic documents, principally through “check-in/check-out” schemes and various forms of user-authentication methodologies. They are used to ensure that all project participants know which is the latest version of a document, who saw it, who edited it, and when.

Document management solutions employ one or more multi-format file markup/viewer products, such as AutoVue or Myriad, allowing every user of the document-management system to view and make editing marks on CAD files of every major format, as well as on documents created by other applications.

- **Extranets/intranets.** Distinguished only by whether they are deployed outside or inside a corporate firewall, these products and services are used to share project information in different ways. At one extreme, some keep track of every project

communication, in auditable form; at the other, they are used to augment other modes of communication and information sharing.

Many extranet/intranet solutions incorporate their own or third-party markup/viewers, for viewing various types of documents.

Each part of the AEC process has its own well-crafted professional software applications. Yet, fundamental impediments exist that prevent these products from solving fundamental problems:

- None deals completely with all the issues of project-document management—formats, permissions, security, and so on. Each must be used in combination with one or more of the others. EDM systems, for example, control and audit access to documents, but do not address the issue of how many authoring software products are deployed in the organization.
- In any new project, most of the participants will have made irrevocable commitments to one or more such tools. Getting them to switch to competing solutions just because they have been made the standard on the current project is a serious business challenge.

The overall project manager can simply ordain the use of a single tool in each category. Or—and this is far more complex and yet more common—the manager can allow a limited pool of choices for each tool category. However, the loose coupling of project participants in most construction projects gives the project manager little authority over the way each firm does things, and attempts to institute such uniformity by fiat are seldom successful.

Although there are many such tools available, and new ones appearing frequently, there are no other approaches to the automation of AEC project-document management on the horizon.

CAD and Microsoft Project on Every Computer

In AEC today, electronic documents are often substituted for paper, but in a form that requires the authoring tool for viewing. If you send a Microsoft Project file via email, the person you send it to must also have Microsoft Project. The same for CAD drawings, word-processing documents, and other common AEC document formats.

To improve AEC information workflow, a clear distinction must be made between authoring tools and the information published using these tools. Research has shown that for each person in a construction project requiring access to CAD data in its original, editable form, four team members need read-only access—and ten team members don't need access to the drawings in any form. Yet many organizations supply CAD on every desktop. An architect uses CAD to create content, but it does not follow that a CAD program is the only proper context for viewing drawings.

Deploying authoring software throughout an organization is expensive, both in the original cost of the software and in ongoing maintenance. If the company is large enough to support a separate IT department, it must keep track of licenses and renewals for many persons who do not create information with the tool, only read or review it. Supporting casual users adds an additional, hidden burden. They do not use the software often enough to become well-versed in its use. They turn to IT support staff or co-workers when they have questions or problems with the software.

In addition to the expense, the required use of authoring software throughout the organization affects liability, confidentiality, and project control. For example, a construction engineer may repackage varied pieces of a design deliverable to put into a particular supplier contract. That supplier may then further break up the package into smaller pieces. If only the original authoring software is used to disseminate this information, there are few controls on the data; there is no way to ensure that it is not changed at one or more of its “stops”—thus breaking the accountability chain so important in construction.

Email is often the tool of choice in most construction firms for distributing these documents. This puts an unnecessary burden on the company email server, which must store and process the (often large) documents attached to email messages. Documents proliferate, breaking down the notion of “original” and “copy.”

The Nature of Adobe’s Solution to the Problem

Distinguishing Content from Context

Adobe proposes that the construction industry adopt its Adobe Solution for AEC. To understand the fundamentals of an intelligent document workflow and why it is superior to a paper-based workflow, it is necessary to understand the difference between content and context in AEC. Content is the information you acquire, calculate, or design; context is the presentation of the information. This refers to both the physical presentation of the individual sheet and the relationship of each page or sheet to others in a set.

When we talk about specific construction documents, content is the information supplied to a specific reader; context is the “wrapper” for the information. Construction drawings, bills of material, schematics, contracts, and technical illustrations contain much useful content; the context names and defines both the individual data elements and the document. To send a MicroStation DGN CAD model when all you need to do is show basic design elements confuses the content you seek to share and the context you provide it in.

The difference between content and context becomes crucial if the goal is to create an AEC data storehouse usable by every person in the enterprise. The marriage of new technologies and established documents can happen, if the new context of the information is an intelligent document, not a paper document. The familiar document look-and-feel can exist in the intelligent document. This best-of-both-worlds approach is

the essence of the Adobe Solution for AEC: familiar documents transformed into intelligent documents.

The Adobe Solution for AEC Workflow

Consider one of the most routine communications in AEC, weekly construction update reports. Traditionally, each week an assistant will gather, print, collate, and distribute a set of documents (Pert and Gantt charts, CAD drawings, change request forms, etc.). If anyone has comments or changes, the information must find its way back into the authoring software (and each may have its own approval process), and then the cycle of gather/print/collate/distribute starts over.

Now consider the same process using Adobe solutions. In an email review cycle, all the source documents are gathered as a single file and sent out. Using Adobe Acrobat, comments are entered into the document by each reviewer, who then returns the file to the sender. With one command, all comments are merged back into the original PDF. Depending on the authoring software in use, the originator can merge the comments in the PDF file back into the original report files. It is also possible to conduct the review session as a browser-based process (Windows only), posting the PDF on a website instead of sending it out as an email attachment. This process can also be driven by an enterprise document-management solution like Documentum, by integrating PDF and Acrobat reviewing tools.

Compare the Adobe Solution for AEC with the traditional approach:

- **Two-Way Communications:** With paper, once information is printed it is frozen in time. If a section-detail changes in the afternoon, the plot you printed this morning is now wrong. The only way to update the information is to print and distribute again. In the Adobe intelligent document workflow, electronic-information transfer becomes a two-way street. The review comments are used to update the original documents, and then a new PDF set can be created as needed.
- **One Container for All Documents:** Using Adobe Acrobat to gather documents for distribution, all necessary formats can be displayed. Wide-format drawings and models, Gantt charts, and various forms can all co-exist. Bookmarks in the PDF file makes it easy to organize (by site, building systems, etc.) allowing quick access to the exact content reviewers seek.
- **Instant Standardization:** The use of the Adobe intelligent document platform in an AEC project creates instant standardization around an existing de facto industry standard without impossible constraints on authoring tools. No matter the level of technology sophistication in the firm, all players can share one format for all project documents. Most participants already have the free Adobe Acrobat Reader; not everyone will need Adobe Acrobat Professional.

Improving the Ad Hoc Electronic Workflow

Firms who have moved from paper-based workflows to electronic-document publishing have generally improvised a workflow based on the original paper trail. Such an ad hoc solution creates as many new problems as it solves. Lack of standardization among firms means time is spent converting, translating, and re-keying data between applications. As mentioned before, often the perceived solution is to purchase common authoring tools for all project members, a costly approach. The Adobe Solution significantly improves upon typical ad-hoc electronic document publishing methods:

- **Universal Readability:** It is no longer necessary for every reviewer to have a copy of each authoring program in use on the project, or for information creators to take time from their primary tasks to do file conversion for reviewers. Publishing AEC documents to Adobe PDF insures that every person on the project can read the documents, as they were intended to be read.
- **Publishing Ease:** Most of the primary authoring tools of AEC now support direct-to-PDF “printing.” With Adobe Acrobat Professional, users can right-click on one or more selected files in Windows Explorer—of virtually all file types—and choose from a variety of options to organize and publish. There is also one-button PDF document creation from within Microsoft Internet Explorer (for converting the currently displayed Web page to a PDF file). Downloadable plug-ins are available for other popular Web browsers for the same purpose.
- **Business Logic Remains Intact and Accessible:** CAD tools such as Autodesk AutoCAD and Bentley MicroStation support the export to PDF of drawing layers and other aspects of the internal logic used by drawings and models. Links to web sites remain live and usable. The users of all document types benefit because—with the appropriate permissions in place—all resident data becomes accessible for use in downstream applications.
- **Information Fidelity:** Files shared as Adobe intelligent documents display a representation of the original data, but without the unnecessary (and sometimes confidential or embarrassing) metadata from the original file format. The data is locked down; access is set by the person who creates and distributes the PDF.

Moving to the Next Level: Process-Based Intelligent AEC Workflow

It would be a noteworthy advance for AEC if the Adobe intelligent document platform’s only contribution to the industry would be to automate the existing paper-based process. But this technology also offers AEC the opportunity to redefine and improve AEC workflow, using intelligent-document processes.

“Intelligent documents” look like standard construction documents, but they differ in five key ways

- **Document Preparation and Presentation:** Intelligent documents follow the structure and style of familiar paper documents, which can accelerate acceptance

and speed compliance to new processes. The Adobe “one button” approach to document preparation makes it easy to combine multiple document types into a single PDF, even if the preparer does not have all the various authoring tools (CAD, project-management software, estimating programs, etc.).

- **Business Logic:** The use of live forms in PDF documents allows widespread participation in the gathering of project information, without compromising original documents. Such forms can include access rights and embedded business logic such as calculations, validations, and routing instructions. Collaboration is simplified as such documents and forms replace paper-based processes.
- **Information Transport:** An intelligent document can hold information from multiple sources and carry it to the people and applications that require the information. For example, a Request For Quotation (RFQ) form could be created and made available on the Web. As interested firms fill in the form, the information can be accumulated back in one master document, or various replies could be routed to the individuals responsible for the information. Input from firms and individuals still using paper processes can be scanned and made searchable, in effect automating their paper-based contributions.
- **Security:** With support for electronic signatures and document control, AEC firms can better protect document authenticity, integrity, accountability, and confidentiality. Security features are tied to the document, so they provide enhanced security even when the document moves outside of a controlled network. This provides persistent security for the document—online or off-line, inside or outside the firewall—for the entire life cycle of the document. Also, permissions can be revoked or modified as needed. Procurement and supplier communications may be combined with relevant contracts and distributed widely, yet access to specific aspects of the project controlled on a user-by-user basis. It is also possible to track when and how each team member uses each document.
- **Archiving:** Intelligent documents can lock down content to create auditable, searchable documents of record, a key requirement in construction.

In a process-based Adobe intelligent document AEC workflow, all construction-project information becomes transactional data; it is accessible and usable in electronic form by project participants. This includes project metadata—information that explains what specific data is about. The PDF format also includes support for XML formatting, opening up additional opportunities for transforming AEC paperwork into intelligent documents.

Desktop or Server? You Decide

AEC firms come in all sizes, from sole-proprietor architects to Fortune 500 construction firms. The level of automation and electronic sophistication in AEC varies as much as firm size. The Adobe Solution makes sense for AEC because it is not a one-size-must-fit-all technology. A single copy of Adobe Acrobat Professional can put into play the essential benefits of intelligent-document workflow by a sole proprietor or a small firm.

Clients, collaborators, and contractors can download the free Adobe Acrobat Reader and become active project participants.

Adobe Acrobat Professional offers the user predefined processes instead of only a set of tools. To start a Web-based review, for example, the user would select “Set Up a Browser-Based Review”; the software then guides the user through the process.

As firm size and requirements grow, so can the Adobe Solution. Construction firms large enough to have an IT department can take advantage of additional aspects of the Adobe Solution for AEC:

- **Adobe LiveCycle Reader Extensions** turns on hidden features in the free Adobe Reader. Reader users can work offline with live documents, digitally sign documents, and review/markup documents—all within Adobe Reader. Adobe LiveCycle Reader Extensions also automates Web-based review/markup procedures.
- **Adobe LiveCycle Policy Server** (scheduled to ship before the end of 2004) extends the authentication infrastructure of an existing network to PDF documents. Consider this scenario: Joe User routinely works with confidential project information, and often sends intelligent documents as PDFs. When Joe User starts his work day, he logs on to the company network using his username and password; he later uses the same password credentials to open confidential PDF files. One day Joe User quits and goes to the competition. His former employer immediately removes his password account from the network. Adobe LiveCycle Policy Server then automatically revokes access to any protected PDF files previously in Joe’s possession. If Joe User is unscrupulous and takes these documents with him, he will no longer be able to open them. Policy Server can also audit all document access, extending digital rights management and version control beyond the check-in/check-out procedures of content management systems.
- **Adobe LiveCycle Document Security** uses industry-standard public-key technology and digital certificates to authenticate and control batches of PDF documents. This allows firms to guarantee the integrity and authenticity of documents while taking advantage of existing public key encryption technology.

Adobe server products are not access-specific solutions (as compared to EDM platforms). It is not necessary to give clients or collaborators network access to allow them to actively, electronically participate in the project. It is possible to fine-tune document control with Adobe server products so that you can specify not only who can see a particular document, but when.

Cyon Research's Opinion of the Adobe Solution for AEC

Ending the Tyranny of the Tool

AEC automation today suffers from an overabundance of tools. Each participant in the construction process—from conceptual design and structural engineering to cost estimation and facility management—works with specific tools that automate specific tasks. Unlike the broader business world where consolidation has created de facto software standards, many niche applications exist in AEC. Too often “collaboration” amounts to manually re-entering data obtained from a document created by a different software product. Such a segregated approach strangles productivity; it forces inefficiency into the workflow. AEC must move beyond its existing vertical automation, in which each profession creates and uses data without regard for others in the construction workflow.

Cyon Research believes that the Adobe approach represents a much-needed bridge. It offers a path from today's paper-based workflows to a more streamlined and profitable workflow based on intelligent documents.

The beauty of this solution is that it gently guides the user into the realms of increased efficiency and productivity. Because PDF documents can contain virtually any file format, it becomes a simple process to “wrap up” project documentation in an intelligent document. Users can grow with the software, moving from review and markup to the creation and use of PDF-based forms and XML data.

Based on our analysis, Cyon Research believes that the Adobe Solution for AEC is suitable for use by AEC firms of every size, for these five reasons:

- **The learning curve in adopting Adobe Solutions is minimal.** All primary functions are presented to the user as processes, not as tools. Think of this as Help Files coming to life and doing the work for you. Such non-threatening access to increased efficiency is a rare and welcome achievement.
- **Much of the information created in AEC is domain-specific:** Structural engineers don't need to know about construction labor costs; estimators don't need to know about AIA layer-drafting standards. Such specific types of information do not have to be compromised when added to the intelligent-document workflow. The Adobe Solution for AEC offers a variety of ways to gather, distribute, and protect project data.
- **Adobe's solution extends control of project information:** Most construction projects consist of short-term alliances. Today's collaborator is next year's competitor. Adobe's solution makes it possible to permanently control access to information. Documents can be safely shared today beyond the corporate firewall, yet be impossible to open once a project is finished.
- **Improved review cycle:** Using the Adobe Solution for AEC, it becomes possible to conduct completely automated reviews. CAD documents can be marked up;

comments can be added to spreadsheets or forms. The new information starts electronic and stays electronic. Because of the simplicity of information management, it is easy to include owner/operators and subcontractors in the crucial early review phases of a project. This allows their expertise to affect the project while it is still on the network—where change is cheap—instead of at the building site, where change is either expensive or impossible.

- **Reduced IT infrastructure:** Many AEC firms currently give their employees authoring tools such as CAD or project-management software, when they only need to review and comment, not create. The cost of purchasing and maintaining authoring software is expensive. In the Adobe Solution for AEC, firms can replace most copies of authoring software with either Adobe Acrobat Professional or the free Adobe Acrobat Reader. Deployment and maintenance costs are streamlined, saving time for IT staff as well as saving money on software.

A Workable, Comprehensive Solution

Cyon Research examined the current state of document workflow in AEC projects and has found it to be a hodge-podge of old manual methods, faxes, emails, and a plethora of software approaches—with little standardization. Moreover, the one-time nature of many project alliances, even on very large projects, makes it unlikely that uniform system-level document homogeneity will begin to be seen in the coming decade.

Document translators, general-purpose multi-format markup/viewers, and single-point enforced approaches address only parts of the challenge.

The Adobe Solution for AEC may be the first workable comprehensive solution to the problem. It is based on the familiar and widely accepted PDF format, recently enhanced to address many AEC-specific needs, such as large document formats, drawing layers, multiple formats within a single package, security, markup, document integrity, and more.

Additionally, we are encouraged by both the accessible nature of PDF and Adobe's eagerness to form strategic alliances with leading AEC software vendors. Because PDF is a published, referenced standard, many companies have created value-added products that increase its utility. Adobe welcomes such initiatives. Adobe is also working directly with AEC vendors, including Bentley Systems, Documentum/EMC, Agile, PTC, OpenText, and Layton Graphics, to improve the use of Adobe Solutions in AEC.

If the Adobe solution can provide adequate functionality and performance for all types of construction documents (as we believe it does), it should have an easy time becoming the predominant format for transmitting construction information. Pilot projects will be the quickest way for industry firms to come to terms with how the Adobe approach will work for them.

Like any ambitious undertaking, this solution has areas that are sure to be improved in coming releases. But as it stands right now, the Adobe Solution for AEC is more than

adequate to the challenge of providing a smoothly functioning modern digital mechanism for tying together all the different pieces of document workflow in AEC projects.

About Cyon Research...

Cyon Research is a consulting firm that provides design, engineering, construction, and manufacturing firms with a strategic outlook on the software tools and processes they rely on to create the world around us. Cyon Research also supports the vendor community with its unbiased insight, vision, and expertise to help them understand the complex nature of their markets and grow, by serving the needs of their customer base.

Cyon Research brings to its clients a unique combination of experience, perspective, and insight, supported by an extensive network of well-established industry relationships. Our close contacts throughout the user, analyst, vendor, and developer communities provide surprising benefits for our clients and add significant value to our services.

Those relationships are enhanced by our publications and events. While consulting is the heart of our activities, our publications and websites—including *CADCAMNet*, *Engineering Automation Report*, *A-E-C Automation Newsletter*, and *CADwire.net*—are our voice. Through them, we connect daily and monthly with the user and vendor communities. And COFES: The Congress on the Future of Engineering Software, our annual, invitation-only event, is our face—the place where we can make the types of connections that just aren't possible through any other means than face-to-face.

The focus of our research within the realm of design, engineering, construction, and manufacturing is technologies and markets that are likely to become real within the next two to six years.

The domain of our research is the tools, processes, and procedures used in the design, engineering, management, and production of the built environment and manufactured goods.

We are a company focused on strategy and vision for our clients. We help our customers understand where they need to go and how to get there, but we don't walk them down the road.

Cyon Research—Vision. Clarity. Insight. Direction.



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