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White Paper

The Open Standards Approach to eForm Automation

a White Paper prepared by:
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EXECUTIVE SUMMARY

A white paper for CIOs, CTOs and Business Unit Owners tasked with automating paper- and form-driven business processes across the enterprise. This paper discusses the benefits of an open standards approach in providing the broadest levels of savings and uses for diverse departments across the enterprise, both now and in the future. The paper also briefly describes three vendor offerings that are based on an open approach, along with the benefits of each method and the capabilities that differentiate each from the other.

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OVERVIEW

Even in today's world, where every knowledge worker has a personal computer on his or her desk, paper forms and documents continue to be the currency of business processes and transactions. According to the Association for Information and Image Management (AIIM), the cost of paper forms is now a hefty $6 billion per year -- but the cost of processing them is astronomical-- as much as $360 billion. Add to this the cost of storing and retrieving archived forms, and it is no wonder that enterprises are continually evaluating different approaches to the automation of paper- and form-driven business processes.

One approach to the automation of paper-based and digital processes is the open standards approach, which uses industry-accepted rules and protocols to leverage already-approved and deployed technology, regardless of business need, computer architecture or user-adopted formats in place.

This paper discusses the benefits of an open standards approach in providing the broadest levels of savings and uses for diverse departments across the enterprise, both now and in the future.

By utilizing industry standards, the entire business enterprise can take full advantage of the value of the Internet while ensuring bi-directional communication with legacy business systems and the sharing of documents and data both inside and outside the enterprise.

The paper also briefly describes three vendor offerings that are based on an open approach, along with the benefits of each method and the capabilities that differentiate each from the other.

AN OPEN APPROACH ENSURES GROWTH

In the early days of computers, innovation prevailed -- and communication between systems was next to impossible. Information stored on one proprietary system could not be read by a different system.

Similarly, when the Internet first became widely used, chaos was the norm. Over time, in both examples, individuals concluded that standards were necessary for the growth of the industry. Businesses couldn't efficiently do work without technical standards in place that would allow disparate systems to talk with each other and transfer data back and forth. Additionally, it wasn't feasible for third-party vendors to spend tight R&D budgets on creating tools that would only work on systems in use by a limited sector of the market.

An Open Approach Uses Open Standards and Open Architectures

- Open standards enable end user reach throughout the entire enterprise, via Web-based, client side standard format support.
- Open architectures enable compatibility and interoperability with existing business system server-side architectures.

Benefit

- An open approach leverages already-approved and deployed technologies

An open approach uses open standards and open architectures to address these issues. In the end, both innovation and growth prevail.

Proprietary and Open Standards

A standard is a common way of doing things, for example, of exchanging data between otherwise incompatible computers. Standards are created by governments and corporations as well as individuals and special interest groups.

- *A proprietary standard* is typically owned by a corporation. The owner, who can change it at will, licenses its use and typically prevents inspection of internal code.
- *An open standard* is a published standard that can be used by all. It is managed by a standards organization, which oversees its dissemination and evolution. The primary standard-setting group for the Internet is the World Wide Web Consortium (W3C).

There are two main types of open standards: *de jure* and *de facto*.

A de facto standard is prevalent in the industry but has no "official" standing. A de jure standard is one that is set forth by a standards body made up of industry representatives and is formalized by a committee such as the W3C. If there is no

Top Standards Groups

IETF (Internet Engineering Task Force)
IEEE (Institute of Electrical and Electronics Engineers)
FRF (Frame Relay Forum)
EIA/TIA (Electronic Industries Alliance andTechnology Industry Association)
ATM Forum (Asynchronous Transfer Mode)
ITU (International Telecommunications Union)
W3C (World Wide Web Consortium)
NIST (National Institute of Standards and Technology)
ATIS (Alliance for Telecommunications Industry Solutions)
OASIS (Organization for the Advancement of Structured Information Standards)
UN/CEFACT (United Nations Centre for Trade Facilitation and Electronic Business)
ISO (International Standards Organization)

existing de facto standard, the experts associated with the committee create a standard from scratch. The standards committee, however, only recommends specifications for the standard; it does not enforce the standard. The only enforcement is via voluntary compliance on the part of technology providers. The degree of compliance is dependent largely on how much technology consumers demand that the standard be used.

Sometimes a de facto standard is adopted by a sanctioning organization and becomes a de jure standard. This happens most commonly when the owner of a de facto standard offers it for scrutiny to a relevant standards organization.

For example, TCP/IP (transfer control protocol/internet protocol), the packet and transmission standard that controls how data is exchanged between computers on the Internet, was first developed by a community of researchers for the U.S. Defense Advanced Projects Research Agency (DARPA). Its original purpose was to allow incompatible systems owned by the various branches of the U.S. armed forces to communicate with each other. It began as a de facto standard but today is an officially sanctioned open standard.

The Value of an Open Approach

An open standards-based solution is one that adapts to the way a company does business, and to the way the company's partners and customers do business. The value of an open approach is that it provides cost-effective access on a broad basis and enables the kind of collaboration and interoperability capabilities that weren't present in the early days of computers.

From the perspective of the IT department, the value lies in the ability of an open standards-based solution to integrate easily with legacy,

The value of an open approach
An illustrative example

Video-game platforms are based on a technology that has no open standard. As a result, a person cannot play a Sega or Nintendo game on a Sony player, or vice versa. If open standards were available, the consumer would have many more games to choose from, and competitors would have to compete through pricing, quality and creativity.

decades-old systems upon which mission-critical processes reside. Corporations can ill afford to scrap systems that have taken years to perfect, even if it means enabling communication with partners and customers across the extended enterprise.

The open-standards solution is also attractive to the front lines and supporting business units of the organization. Where once a sales representative was forced to collect paper orders and fax them in every night, now digital solutions support and streamline the sales and CRM processes. Many of these tools can be used on all platforms, including wireless, and are not dependent on input or output requirements.

Disadvantages of Not Adhering to Open Standards

On the flip side, organizations may occasionally want to ignore open, published standards. Most often they see advantages to a particular proprietary technology that aren't perceived to be available with a completely open solution.

It is also important to realize that solutions vary in how closely they have followed a given open standard (see text box for an example). A product can claim to support a de jure standard but not implement it exactly the way the standard was intended. Similarly, a vendor can claim that its product is a de facto standard when, in reality, the product is not widely used.

Organizations that opt to use a specific proprietary technology, whether loosely based on open standards or entirely on unpublished (closed) standards, run the following risks:

- The possibility of reduced or lost future flexibility.
- Huge costs associated with having to change to open standards at a later date.
- Increased costs related to insuring compatibility and connectivity with existing systems and external and partner systems.
- Risk of incompatibility with other packages due to lack of standards.

Buyer Beware:
Not all XML-based code is the same

The eForms company PureEdge implemented a proprietary XML technology that used .xfd as a file type extension. Adobe Systems was also using .xfd as an Acrobat 6 file type. These two specific implementations of XML caused confusion for companies using PureEdge forms and Acrobat 6 on the same system. As a result, PureEdge was forced to provide a restore utility to their customers, which restored the .xfd file extension for use with their forms viewer.

Open Architectures

An open architecture is a hardware and software configuration whose specifications are public. The specifications may contain officially approved open standards or privately designed architectures whose specifications are made public by the designers.

An open architecture uses off-the-shelf components that conform to approved standards, enabling it to be easily connected to devices and software made by other manufacturers. A system with a closed architecture, whose design is proprietary, is not easily connected to other systems.

Linux, for example, is considered an open architecture because its source code is available to the public for free. In contrast, DOS, Windows, and the Macintosh architecture and operating system have been predominantly closed.

An open architecture usually involves delivering a complete set of application programming interfaces (APIs) to allow businesses to efficiently and seamlessly integrate different components of their projects for enterprise compatibility. No matter what platform is selected, an open architecture allows businesses to adopt a combination of best-of-breed applications and hardware to meet their unique requirements. These purchases are often driven by large investments in legacy systems upon which mission and business-critical operations depend.

The Future of the Open Approach

The World Wide Web is overwhelmingly standards driven: The creation of the open standards Hyper Text Transfer Protocol (http), Hyper Text Markup Language (HTML), and the Uniform Resource Locator (URL) effectively gave birth to the World Wide Web that we know today. Without HTML, HTTP and URLs, browsers wouldn't know what to display on the screen, and collaboration and communication wouldn't be possible.

> *"The value of the Web is proportional to the number of the people who participate in it. It is a collaborative environment that is only possible because of open standards."*
>
> Mark Seamans, CTO, Cardiff Software

Time and again, open standards have fueled phenomenal growth. In Europe, for example, early adoption of a single, open digital cell phone standard drove rapid use that has far exceeded that of the United States. Additionally; since equipment manufacturers only have one set of specifications to address, services such as messaging and two-way data transfer are being offered much faster and much more comprehensively in Europe than they are in the U.S.

> *"As long as we accept the rules of sending packets around, we can send packets containing anything to anyone."*
>
> Tim Berners-Lee, from his book, *Weaving the Web*

Open standards ensure that products will improve -- not only in quality but also in cost. Most importantly, open standards provide new forms of cooperative communication and exchange that can both standardize and energize an entire industry.

OPEN STANDARDS RELATING TO EFORMS

Forms are the basis of many critical business transactions. Today, paper is still a pervasive format because of requirements for the storage/archival of original signatures. In the future, electronic forms (eForms) will increasingly take the place of paper forms, and many organizations have already begun the challenge of migrating to digital form-driven business processes.

Unfortunately, the adherence to legacy eForms and applications, which are often based on proprietary formats, has locked many organizations into a specific input and output approach to the gathering and distribution of data. Of necessity, these historical business processes are evolving to serve different needs and uses in the future -- as well as to address diverse needs and formats of different users and organizations. Critical to this evolution is the use of XML as the backbone communicator of information between applications (see later section for more about XML).

In general, the more an eForms system is based on open standards, the more value it offers an organization, particularly if taking advantage of the latest interactive uses of technology such as Web services and structured workflow tools. Additionally, an open standards-based solution provides the greatest assurance of future compatibility with emerging technologies.

Existing eForms Open Standards

There are two predominant open format standards for eForms today: HTML, PDF and a third, soon to be released standard will be XForms. The format used for eForms is usually dictated by the requirements of the business process or the applications already in use.

HTML

The HTML open standard has become pervasive with Web usage because it is fast now and does not require users to purchase or install any client-side software. HTML is an important part of the Web because it enables interactive Web applications. It has been in existence since 1990 and has gone through several revisions.

One downside of HTML, among others, is that its format may not faithfully mimic an existing paper form. In those cases, the PDF option is often substituted.

What is HTML?

HTML has been in use by the World-Wide Web (WWW) global information initiative since 1990. HTML is an application of ISO Standard 8879:*1986 Information Processing Text and Office Systems; Standard Generalized Markup Language (SGML)*. The language of HTML is used to delimit characters added to the data of a document to represent its structure. There are four different kinds of markup: descriptive markup (tags), references, markup declarations, and processing instructions.

PDF

PDF (portable document format) is a proprietary de facto standard for document publishing and handling that is widely used despite requiring (free) software on the end user's computer. It was invented to enable the viewing and printing of documents on a wide variety of computer platforms without requiring the software and fonts that created the original document on every single machine. PDF is most often used when it is important to mirror an existing paper form. Originally pushed by Adobe Systems, PDF is actually an open format widely used by multitudes of vendors.

XForms - The Latest in Web Forms Technology

Web applications and electronic commerce solutions have sparked the demand for better Web forms with richer interactions. XForms is a W3C initiative that has responded to this demand. As the successor to HTML forms, XForms benefits from the lessons learned from HTML, as reflected in its design goals (see charter below).

XForms Working Group Charter

To develop W3C specifications for the next generation of Web forms. The key idea is to separate the user interface and presentation from the data model and logic, allowing the same form to be used on a wide variety of devices such as voice browsers, handhelds, desktops and even paper. XForms brings the benefits of XML to Web forms, transferring form data as XML. XForms aims to reduce the need for scripting, and to make it easier to achieve the desired layout of form fields without having to resort to using nested tables etc.

XForms 1.0 is currently in the Proposed Recommendation status phase of development within W3C, which published final specifications in September 2003. The next step is for the nearly 500 member organizations of W3C to vote to accept it as a standard. However, early adopters have already begun to roll out XForms-based applications.

XForms uses XML syntax to describe forms, and it uses XML specifications to submit forms data to servers (see next section). Consistent with the charter, it separates form contents from form appearance by using stylesheets to define the structure of the form, which can be rendered differently depending on input and screen limitations (i.e., whether the form is displayed on a cell phone, PDA or desktop).

In short, XForms is an XML standards-based format that can provide the richness of PDF without requiring client-side software. Rather than relying heavily on scripts, it uses XML schema for defining strong form elements and building in logic for error checking and validation.

The Future for XForms

As connected systems become more diverse, XForms will be a flexible, device-independent way to provide interactivity between these devices, whether a networked computer, a handheld PDA, an Internet-enabled cell phone or a Tablet PC.

XHTML (Extensible HTML) and XForms

The open standards upon which HTML were built have been modified several times since its conception in 1993. The current HTML standard is actually XHTML 1.0 Second Edition. This allowed an HTML file to be transformed into valid XML language while still allowing current Web browsers to handle it.

XHTML 2.0 is the latest and most significant proposed change, though it isn't yet in effect. When it is published, it will use XForms 1.0 as its form-handling technology instead of the XML-based syntax that is used with current XHTML.

XHTML 2.0 will require an updated, compliant Web browser, which will likely delay its support.

However, browser plug-ins are currently available to add XForms support to popular browsers.

Many organizations have already invested in XML. XForms' open standards technology enables existing investments to be leveraged in a large enterprise system more readily than with ordinary HTML or XHTML forms. The increased demand for Web Services will increase the amount of data exchanged across the Web, which will increase the need for open standards such as XForms.

In the eForms and business automation processing arena, using open standards-based solutions such as XForms means that the solution will work, end to end, regardless of whether computing environment, user-adopted formats, or backend legacy systems are in place -- both today and in the future.

The XML Standard for Data Integration

The open standard behind the exchange of data from an eForm to another system is XML. XML stands for Extensible Markup Language. Though described as a "language," it is really an open standard specification for data interchange over the Web.

XML allows organizations to take existing paper, HTML and PDF forms and connect directly to e-commerce, e-business, server applications and legacy back office systems that support XML import. Adherence to XML ensures basic interoperability so that different computers and applications will be able to recognize the same data. However, it doesn't necessarily mean that the data will be presented in identical ways or that it will be able to be modified on both systems. (Software developers typically add proprietary extensions to XML that control data presentation.)

The Components Of XML (Extensible Markup Language)

- **Extensible:** *Extensible* describes a program, programming language, or protocol that allows users (or later designers) to later extend its capabilities without incompatibility issues arising.
- **Markup:** Markup refers to tags-- such as bold --that describe the Web page and mark up the text into areas so that applications know where certain data begins and ends as well as how the data should look.
- **Language:** XML language provides terms used to tag the elements within a Web document and describes the relationships between them. (It is not a programming language like C++ or Java.)

As with HTML, tags or page elements are the foundation for XML. Unlike HTML, XML allows developers to define tags themselves, without using a standard vocabulary. Since there is no preset vocabulary, both sides in a transaction need to agree to use a common set of tags.

In short, XML offers a valuable technology for collecting data from HTML and PDF forms and for sharing that data with other applications -- providing that developers at both ends of a data exchange have agreed on a common set of tags.

CHOOSING AN OPEN STANDARDS APPROACH TO MATCH YOUR BUSINESS NEEDS

Organizations are increasingly searching for a business process automation strategy that is flexible and provides value. Different digital formats serve different customer needs. Some organizations require input from all of the most pervasive formats, including paper, HTML and PDF. Additionally, some will have requirements for data integration, client-side validations and digital signatures.

The more a solution uses open standards, the more choice end users will have in input and output formats. Likewise, the more it adheres to open architecture strategies, the more flexible a solution will be in connecting to expensive legacy systems and emerging next-generations applications.

Basic Checklist for Choosing an Open Approach

1. Identify input requirements
   - Needs of user communities / lines of business: paper versus digital forms; HTML, PDF, XML
   - Applications already in place
   - Feasibility of installing client-side software
   - Ease of use for internal user and external customers/partners
   - Support for government mandates
2. Identify output requirements.
   - Ability to link to legacy systems via Connect Agents
   - Interoperability with all applications / servers in the enterprise
3. Business process / workflow requirements
   - Identify open standards relevant to business needs
   - If non-standard solution seems preferable, what are the ramifications?

Input (Client-Side) Considerations

When considering the adoption of a business process automation solution, organizations must consider the following input-related factors:

- Does the solution support the varying needs of different user communities (marketing, HR, R&D, lines of business) which require different types of content and applications and who work differently from each other? If so, it is a solution that will obviously maximize technology investments.
- Does the proposed business process automation solution require client-side software? If so, what IT management and cost considerations must be taken into account?

- Does the solution support the varying formats that knowledge workers use -- paper and digital -- while making the process transparent to the user?
- If the new process is unfamiliar to users, what hidden costs (training, etc.) will there be?
- Does the solution support mandates or regulated requirements?

Output (Server-Side) Considerations

Most companies still have large investments in legacy systems on which mission-critical applications are running. Forms and documents feed data to these systems. An eForm solution must be able to talk to back-office programs and share data back and forth.

An open systems approach allows businesses to adopt a combination of best-of-breed applications and server architectures (.NET, J2EE, using IBM Websphere Application or BEA Weblogic, etc.) for enterprise-wide compatibility.

The goal is to minimize IT resources while continuing to use expensive legacy systems and established corporate platforms for application hosting, security, delivery and tracking.

Seamless data and content connectivity is accomplished by:

- An extensible set of application program interfaces (APIs). Solutions that use APIs, Software Development Kits (SDKs) and pre-built connect agents will make enterprise connectivity fast and easy for IT departments.
- Solutions that are platform agnostic and are thus interoperable with other hardware/software.

Business and Workflow Considerations

A company can choose not to take advantage of open standards, and may have to do so if only proprietary technology can meet its mission-critical processes. However, buying non-standard technology is almost certainly a short-term solution.

For planning purposes, it's important that a company or department understand its business needs. Once these are identified, the business unit can list relevant standards and determine if the standards have popular acceptance - in contrast to standards that are simply in progress.

COMPARISON OF OPEN STANDARDS APPROACHES TO BUSINESS PROCESS AUTOMATION

Open standards-based approaches to solving the business process automation challenge fall into three main categories, adapted open standards, partial open standards and authentic open standards.

Three Approaches

These three approaches differ in interoperability and the degree to which they fully comply with open standards, as well as whether they require client-side software. They are:

1. Adapted Open Standards approach, based on proprietary eForm technology - This category consists of vendors who began on the client side of the eForms challenge, and who have recently announced open systems-based solutions that include server-side workflow and transaction processing. The recent release of Adobe Systems' Acrobat 6.0 with an XML-based PDF client delivering an end-to-end solution is a primary example of this approach.

2. Partial Open Standards approach, based on proprietary versions of XML - This category includes approaches from vendors who have recently implemented partially open-standards compliant solutions into their offerings to address eForms and workflow in order to extend the reach of their base, proprietary XML-based software. Microsoft's InfoPath, scheduled for release in Fall 2003, is an example of this approach. In order to use this technology, it is necessary to have the Microsoft product on the desktop (see later discussion).

3. Authentic Open Standards approach - Vendors who have been committed to open standards from the beginning, and who built eForms/workflow products from the ground up based on evolving industry standards are in this category. Cardiff Software's business process automation (BPA) suite is an example of this zero client, open client support approach.

Three Approaches to Business Process Automation

1. Adapted Open Standards, such as that used by vendors Shana, Filenet, JetForm, Accelio/Adobe. Vendors offering this "adapted open standards" approach began with client-side software, which has since been integrated with server-side software for a more open and complete solution.

2. Partial Open Standards, such as those used by Microsoft InfoPath, and PureEdge. This "partial open standards" approach uses various interpretations of XML and requires client-side software in order to share and manipulate data.

3. Authentic Open Standards, such as that offered by Cardiff Software. This approach conforms exactly to XML standards, does not require client software and provides open client support and interoperability.

Though all these vendors' solutions are open standards compliant, the manner in which they have implemented the standards differs. Additionally, each one offers a unique set of advantages and limitations.

XML-based PDF

Traditionally, Adobe's strength has been at the front (Photoshop, Illustrator, Framemaker) or back (PDF) of a process. The company's acquisition of Accelio, a legacy eForms vendor using proprietary technology, allowed it to expand into other areas of the market, but at the same time has forced it to address multiple and sometimes conflicting requirements of Accelio's diverse customer base.

As a result, more and more Web functionality has been introduced into PDF. The latest offering of PDF consists of a proprietary XML form template, which can contain rule sets. Data files combine the XML form template, the XML data stream for that form and the PDF representation of the document.

With this new version of PDF, forms can be deployed in PDF or delivered as an XML Data Package (XDP) to be processed as XML (XDP files are XML files that contain XML form data, XML form templates, PDF documents and other XML information). They can then be integrated with enterprise applications via commonly available XML tools and Web services.

However, according to a FirstTake report from Gartner Research (11 April 2003, FT-19-8041), the primary limitation of this approach lies in the XML form template being used.

Limitations of PDF v 6

"…enterprises will have to create their own templates to support Extensible Business Reporting Language, Tax XML or other XML schemas. In addition, for the new offering to work, saving to PDF from XML-aware applications (such as Microsoft Office 2003, InfoPath, and Corel WordPerfect 11) must capture the XML data model used by the source application."

Rita Knox, Gartner

Furthermore, Adobe is not presently incorporating the XForms standard into its design plan. Additionally, Adobe eForm tools do not provide an end-to-end solution in several respects. For example, they do not provide a viable migration path from a paper-based environment. The form server product that Adobe inherited from Accelio is simply a host for forms with no ability to route for approval or to track the forms through the system (i.e., ad hoc workflow processing). While it's true that Adobe's separate workflow server can be used for defining structured workflow processes, the methodology is too rigid and complex to use for everyday ad hoc workflow.

Microsoft's InfoPath

Microsoft InfoPath, the newest member of the Microsoft Office System family, is an information-gathering and presentation tool. The InfoPath format, enabled through Office Version 11 (to be released in Fall 2003), will provide Microsoft Office workgroups with a tool for publishing and gathering form-based information. In simple terms, a user will be able to create a repository document that can be used to aggregate and integrate data that passes back and forth among XML-based sources. Though InfoPath has obvious capabilities as an eForms application, which collects data from one source and passes it to other sources, Microsoft is positioning it more as a crossover product that melds data and documents into a unified application.

> *"I think (Microsoft) can make the claim that if someone ships you a file, your system can read it. Does it mean you can open it and change product numbers and update it? Not necessarily."*
>
> Attributed to **Paul DeGroot**, analyst with research firm Directions, in CNET News.com article, July 17, 2003, by **David Becker** *"Microsoft buddies up with new Office."*

Similar to the PDF format, users will need client-side software to take advantage of InfoPath. By default, InfoPath forms use a proprietary format (.xsn files), with an option of saving forms as non-interactive HTML.

According to Microsoft, the InfoPath format will support any customer-defined XML schema and integrate with XML Web services. However, it will not back the W3C XML-based XForms specification. Critics suggest that this disparity is proof that Microsoft is putting its own spin on XML, and that InfoPath will be most easily connected to Microsoft SQL Server or Access via ActiveX Data Objects links. Currently, it is not clear whether this is the case or not.

What is clear is that InfoPath will not support users of other operating systems or platforms, such as Windows 9x, Mac OS and Linux, or popular handheld devices. Additionally, more enterprise-wide business process automation needs will require Microsoft's BizTalk Server product, an application infrastructure platform that works with a variety of .Net server products.

InfoPath's out-of-the-box functionality does not support the automation of forms between users and approvers, digital signatures and Section 508 accessibility requirements. It also does not support hybrid paper and electronic forms in a single solution, nor can it gather information from end users outside the firewall.

Since InfoPath uses email for communication between users in a workflow, there is no central mechanism for tracking, monitoring or auditing. This limitation might be of considerable concern to organizations that require compliancy with Sarbanes-Oxley or HIPAA legislation. As policies begin to evolve and mandates become more specific within given industries, reliance on an email client to route, distribute and store information may become a less viable solution, especially if an enterprise requires external collaboration in order to serve customers and communicate with business partners.

A more ideal solution to the Sarbanes-Oxley or HIPAA compliance issues would include a centralized server based on open standards technology to handle the core indexing, routing and porting to a final content management repository.

Cardiff Software's BPA Solution

Cardiff Software represents a dramatically different approach to using open standards for automating document- and form-driven business processes. The Cardiff business process automation (BPA) suite contains harmonizing products that are compliant with open standards. A main difference is that, unlike Adobe and Microsoft, Cardiff's approach incorporates the latest W3C XML specification into its solution -- a powerful illustration of Cardiff's long-standing philosophy of building to open standards.

Cardiff provides open systems support in two critical areas: (1) support for open standards on the client side, which enables end users to use Web-based standard formats (HTML, PDF and InfoPath); and (2) open architecture on the server side, which ensures compatibility and interoperability with existing business systems.

Cardiff offers document- and form-driven process automation across all business models. Its solutions are capable of handling both paper-based manual processes and online transactions using digital forms.

A strength of Cardiff's offerings is that it is completely Web-enabled so that information is always available in real time. A user can submit a form and route it to a supervisor and others in the organization for viewing, approval or tracking. This out-of-the-box, point-and-click ad hoc routing is ideal for business processes that do not require a rigid workflow methodology. More complex processing can be added with scripting.

In summary, Cardiff's technology:

- Offers a unified solution that automates paper and digital processes - providing businesses with a seamless migration to an environment less reliant on paper.
- Automates Web-enabled open standard eForm formats including Adobe PDF, HTML and InfoPath.
- Does not require implementation and maintenance of client-side software for eforms.
- Provides a single platform that automates the entire transaction lifecycle - Capture, Process and Response.
- Is input/output agnostic. With Cardiff's BPA solution, input can be in the form of paper, fax or digital, from a variety of devices, including Tablet PC. Virtually any legacy system can be used for output. In addition to dozens of pre-built Connect Agents, Cardiff provides an enterprise integration toolkit (Connect Agent API) for developing customized Connect Agents.

SUMMARY

Vendors committed to open systems support provide enterprises with the greatest degree of flexibility and value as they implement systems to automate business processes. Open standards enable the greatest degree of end user reach through Web-based client-side standard formats, such as HTML, XForms and PDF. Open architectures enable compatibility and interoperability with existing business system server-side architectures.

With the final XForms specification now released, the evolving eForms standard is now stabilizing. Enterprises who have been postponing a decision due to a lack of a standard may want to revisit their business processes and implement a solution with a solid industry standard in place.

Not all vendors use XForms as part of their open standards strategy. Microsoft InfoPath and Adobe's new XML-based PDF format are two examples of vendors who are not using XForms.

An innovator in information capture solutions since 1991, Cardiff Software's Business Process Automation solutions encompass both electronic and paper-based forms and documents. Cardiff's hybrid format model supports both paper and digital formats - including the standards-based formats HTML, PDF and XForms - and will accommodate support for evolving formats such as InfoPath.

Cardiff's offerings include a standards-compliant suite of products that is designed to capture and process forms and documents regardless of format, as well as a Java-based design and an extensible set of APIs and pre-built Connect Agents for connecting with existing business applications.

Put Information to Work - Cardiff Software **www.cardiff.com** is a leading provider of document and form-driven business process automation solutions for Global 2000 organizations. The Cardiff family of integrated software products empowers organizations to automate existing business processes using technology to capture, process and connect to strategic business information, thereby improving employee productivity, customer service and profitability. In business since 1991, Cardiff has a global distribution network reaching every continent and more than 20,000 customers worldwide spanning every industry.

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