



Mobilized Applications and Solutions: Using Intelligent Documents as Enterprise Front-Ends

by Chris Thomas

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Introduction

A growing number of large providers are developing mobilized solutions that allow rich, human-friendly documents to communicate with business back-ends using lightweight XML schemas. These solutions present the user with a document in PDF, DOC, or similar format, which contains the intelligence to send data from the user back to the publisher using Web services and other transports.

Thus, rather than requiring the publisher to glean information from a form, for example, and enter that data manually into a database, the document itself acts as a front-end for the database, in much the same way as a traditional Web form or rich-client interface. This modality builds on the concept, however, in that it natively and smoothly supports offline use, in the same manner as a conventional document. A user might download a form, fill it out over the course of several sessions, e-mail it to other members of a work group for input, and then finally submit it back to the publisher. Moreover, only the data entered by the users is communicated back to the publisher, rather than the entire form, which increases the solution's efficiency.

This technology cuts network traffic, maintenance costs, and user labor requirements dramatically while also providing a new modality for document publishers to efficiently gather information from their users. It eliminates the necessity for the publishing entity to perform manual data entry, and it also conforms to the user's workflow by supporting offline use and making use of multiple transports. It is therefore an example of cutting what I refer to as "solution-induced labor," or the tendency of inflexible solutions to create work for users.

Strategists and solutions architects looking for lightweight, mobilized, standards-based methods of gathering information from end users can benefit immensely from using such documents as the front-end for their business systems.

Creating Smart, Mobilized Application Forms for Government Grants

The United States federal grant process traditionally required applications in the form of Web-based forms, hardcopy documents, or large word-processing documents that applicants submitted to one of approximately 900 agencies and programs. In the case of Web-based forms, users often had no way to fill out the form over the course of multiple sessions, leading to problems for users who needed to collaborate on grant applications with colleagues or who found themselves missing a required piece of information. A large number of applicants would typically try to access the same Web server around the time of major application deadlines, causing large traffic spikes that impacted availability.

Moreover, neither hardcopy nor electronic word processing documents provide an automated, direct means to extract specific information from those applications. As a result, redundant data entry created inefficiencies and inaccuracies. Sharing information between programs and agencies was also problematic.

Submission

Submit Save Print Cancel

GRANTS.GOV

Grant Application Package

Opportunity Title: Distance Learning and Telemedicine Loans and Grants
 Offering Agency: Rural Utilities Services
 CFDA Number: 10.855
 CFDA Description: Distance Learning and Telemedicine Loans and Grants
 Opportunity Number: USDA-GRANTS-110403-001
 Competition ID:
 Opportunity Open Date: 03/01/2004
 Opportunity Close Date: 04/30/2004
 Agency Contact: Joan Keiser, Management Analyst --
 e-mail: dltinfo@usda.gov --
 phone: 202-720-0413

This electronic grants application is intended to be used to apply for the specific Federal funding opportunity referenced here.

If the Federal funding opportunity listed is not the opportunity for which you want to apply, close this application package by clicking on the "Cancel" button at the top of this screen. You will then need to locate the correct Federal funding opportunity, download its application and then apply.

* Application Filing Name:

Mandatory Documents
 Project Narrative Attachment Form
 Open Form

Move Form to Submission List =>
 Move Form to Documents List <=<

Mandatory Completed Documents for Submission
 Application for Federal Assistance (SF-424)
 Open Form

Optional Documents
 Budget Narrative Attachment Form
 Other Attachments Form
 Open Form

Move Form to Submission List =>

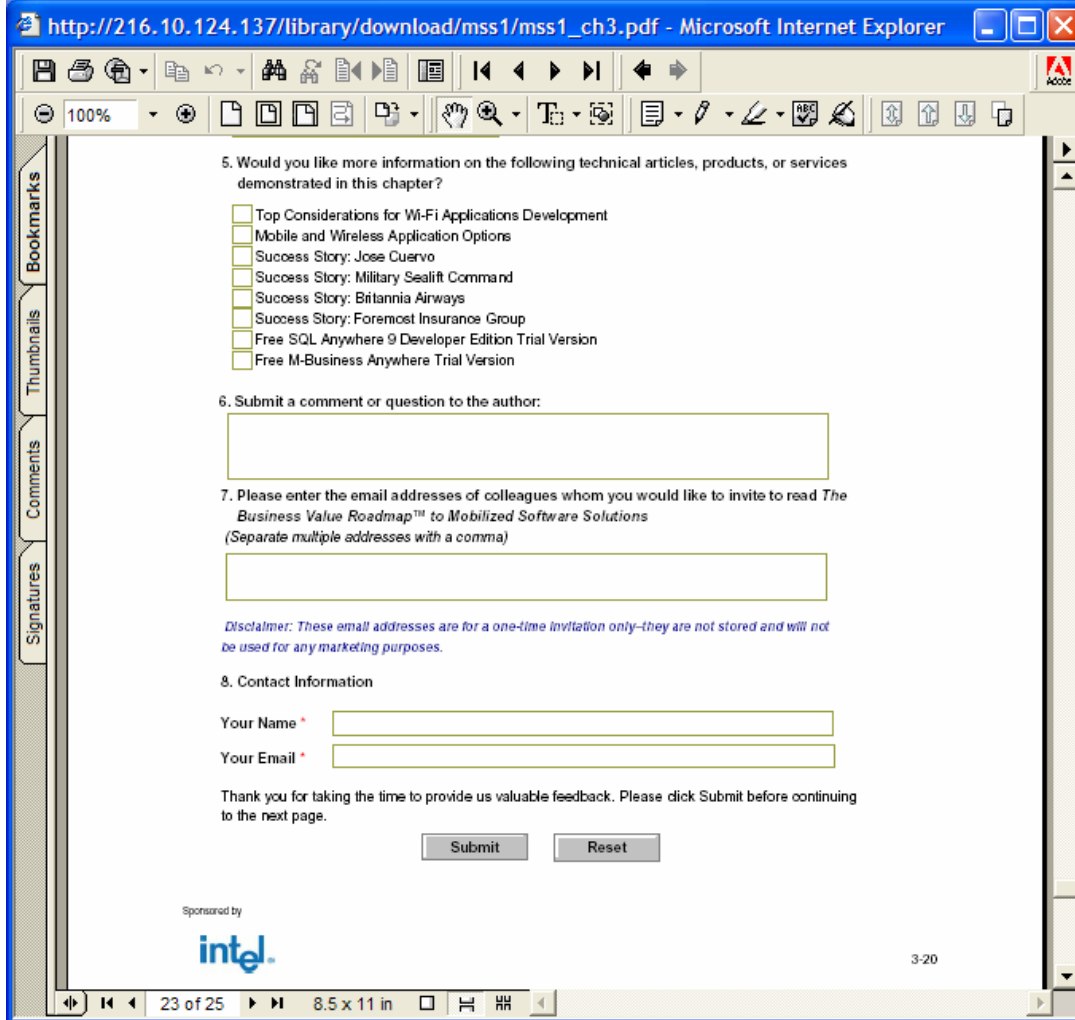
Optional Completed Documents for Submission

In order to address these inefficiencies and shortcomings, Intel advocated creating a mobilized solution at grants.gov*. The site delivers federal grant applications as intelligent documents that can be used offline and circulated among colleagues and that also incorporate a **Submit** button.

This mobilized solution uses the freely available PureEdge Viewer* to view the application documents, which are similar in appearance to Web forms, and to manage supporting documentation that must accompany grant applications. Since the applications are stand-alone documents, they do not require a network connection except during the actual download and submission phases of the grant application process. Since the submission process is based on a lightweight XML schema using SOAP and other Web services protocols, network traffic is minimized, which removes the majority of the burden on agency servers, even at peak traffic times.

Information Gathering from Offline Electronic Books

It is often useful for companies to distribute information free of charge in book form. For example, it may be advantageous to a technology company to share details of enabling technologies to speed their general adoption. In response to the expense of publishing such books in hardcopy, one common solution is to distribute books over the Internet in PDF or similar formats.

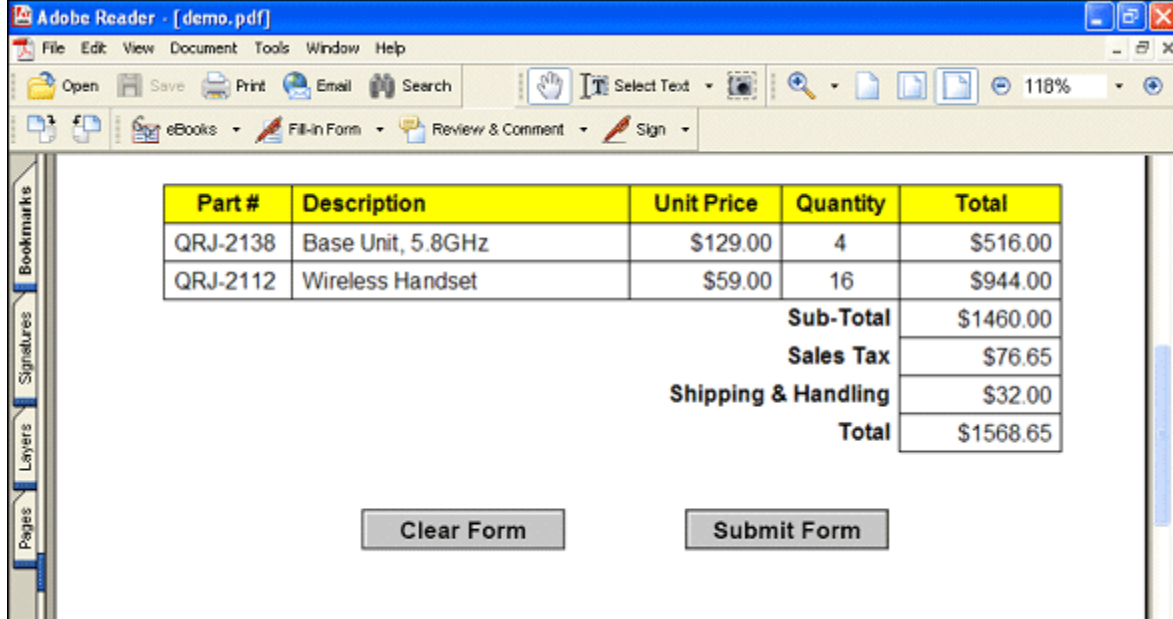


Such formats lend themselves to offline use, since they are downloadable, stand-alone files. On the other hand, the offline modality traditionally sacrifices the Web medium's potential for the publisher to collect reader feedback and other valuable information. Including a URL in the PDF document that leads to a reader survey is a step in the right direction, but it requires the user to connect to a server in order to use the survey, severely limiting response rates.

[Sand Hill Systems](#)* provides the means to place dynamic forms in static content, such as the survey forms at the end of each chapter of the PDF-based Web book, *The Business Value Roadmap* to Mobilized Software Solutions*:

The surveys gather information about the readers, feedback related to how valuable the content is to them, and where they learned about the content. It also allows readers to submit their contact information and that of colleagues for further contact by the book's publishers. This type of survey represents a new modality for information gathering from content users.

Sand Hill's [SubmitIT Server](#)* product supports gathering and manipulating data, and making it available to external systems from a variety of document formats. It's built upon Microsoft BizTalk Server* that can communicate asynchronously using XML schemas so users don't have to be connected in order to take advantage of the communication capabilities. The standards-based nature of the solution makes it compatible with a wide variety of back-end platforms.



Adobe Intelligent Documents Allow General Users to Create Front Ends

The past twenty years or so of computer history have seen a gradual democratization of capabilities to less-technical users. At one time, the skills required to make a simple report were arcane to the typical user, and it was necessary to employ a programmer when any changes were required. The development of PCs and desktop personal productivity software like word processors and spreadsheets put more power in the hands of the general population, and the rise of the Web extended the reach of end users even further.

Throughout this democratization, however, most users have relied on programmers and other IT professionals to provide and maintain the means of access to back-end data. Creating even a relatively simple interface to collect data and populate a database in an enterprise back-end is beyond the scope of most workers, and they must also rely on the IT department to make changes to such interfaces. On the other hand, the vast majority of office employees are comfortable creating word processing documents, which can themselves incorporate text, dynamic data, form fields, and graphics to produce sophisticated forms for data collection. As a result, workers often create forms, have users fill them out, and then manually input the data into a database, which is an inefficient means of meeting business needs.

The [Adobe Intelligent Document Platform*](#) provides one approach to bridging the gap between such word processor-generated forms and the back-end systems that need to house the data those forms collect (back-end data may also be used in creating the form itself). In fact, this platform is not limited to word processing documents, but may use intelligent documents based on a wide variety of sources, including common office software like the Microsoft Office* suite, graphics applications, and even CAD tools.

The form can be used offline, just as any other local PDF file. It includes a **submit** button that allows the data on the form to be communicated using XML Web services to the enterprise back-end, if a connection is available. If no connection is available when the user clicks the **submit** button, the system can queue the submission using asynchronous Web services or by attaching the PDF file to an e-mail message.

Manage Information with Flexible Microsoft InfoPath* Forms

People who gather information in the field must often input that information into one or more business systems when they return to the office. This redundant data entry tends to be both inefficient and error-prone. Consider the case of a salesperson who calls on several clients over the course of a sales trip. Back at the office, the road-weary salesperson must enter data from the trip into a number of business systems: writing a weekly status report, updating a customer-relationship management (CRM) application, and completing an expense-reporting form, among others. Since these systems are not mobilized, our salesperson cannot complete the data input on the plane and therefore must spend most of the day after returning from the sales trip with these tedious, unproductive tasks.

By comparison, a mobilized solution that uses [Microsoft InfoPath 2003*](#) could remove the need for redundant data entry, also allowing the salesperson to perform all data entry tasks during the sales trip itself. The salesperson is more productive with less risk for errors that arise from repetitive data entry.

InfoPath provides a WYSIWYG design environment to create forms using text boxes, drop-down lists, and other familiar controls. This characteristic gives relatively non-technical managers and others control over the data gathering process, while also reducing the ongoing costs of maintaining business processes, since it is not necessary to involve the IT department in day-to-day changes to data gathering forms. The form design GUI allows users to configure the behavior of controls, and a script editor supports more complex functionality. InfoPath handles information using XML, which allows a single form to communicate with any number of enterprise information systems, such as a CRM application, an order management system, inventory control, expense reporting, and so on, through integration with an application server such as Microsoft BizTalk Server 2002.

A solution that incorporates this functionality therefore allows the field sales employee in our example to update records while offline, including in the hotel at night, between client visits, and on the plane while returning home. When the salesperson reconnects to the office network, the InfoPath form populates the appropriate business systems with that information automatically.

Interactive Forms Bridge the Gap from Paper Documents to SAP Systems

Despite their associated inefficiencies, hard copy forms remain a staple of information gathering mechanisms in most enterprises. Paper forms typically require manual data entry into back-end systems, and business owners often must populate such forms with personalized information for each user. This latter issue carries with it the hazard of non-current data, since stale hardcopies persist long after they become obsolete. Moreover, even though the production of such personalized forms from back-end data is automated, changing the format and contents of the form can be a complex undertaking that is beyond the capabilities of most business owners. This forced dependence on their IT departments decreases the business owner's productivity and increases costs.

Adobe and SAP are developing [joint solutions*](#) that integrate PDF-based forms with SAP business back-ends. These solutions focus on integrating the structured, machine-friendly data storage

modality of SAP systems with the flexible, human-friendly presentation modality of PDF documents, in order to meet the needs of both in a single solution.

This solution generates electronic forms as PDF files that may incorporate static text, logos, and so on, as well as personalized data from SAP data stores. Business owners route those interactive forms to users, who can use them either online or offline and submit data from them back to the SAP back-end using lightweight SOAP and XML. The system can also generate forms as e-mail, fax, or Web pages, according to the needs of the individual situation.

Conclusion

Extending the capabilities of documents to enable them to directly populate back-end systems with data is a revolutionary idea that dramatically cuts the amount of work required to collect and manage data. The inherent mobilized nature of these documents means that they are well-suited to the continuing deployment of mobile computing like that based on [Intel® Centrino™ mobile technology](#) and [Intel® Personal Internet Client Architecture \(Intel® PCA\)](#). Moreover, creating these documents is within the reach of most employees, as opposed to writing traditional front-end interfaces that require specialized programming skill and customized integration into business systems.

Enterprises that deploy interactive documents will also benefit from distributing those documents to mobilized clients using a publish-and-subscribe model. This technique allows users to subscribe to the documents that they need, and the system can push updates to them automatically, so that mobile users have access to current versions offline. Policies set by administrators can manage, in whole or in part, the selection of documents to subscribe to. This relieves the user's burden of choosing among a large numbers of documents. That method also decreases the network traffic and storage requirements associated with making local copies of every document used by large enterprises on every end user system. Managers also have the ability to push documents out to their employees.

As the solutions described in this article, and others like them, become more widely deployed, we will see productivity gains by the businesses that deploy those solutions, as well as opportunity for the ISVs and integrators who implement the solutions. The ability of general users to create mobilized front-ends for enterprise systems is a welcome addition to personal productivity.

About the Author



Considered one of Intel's visionaries, Chris S. Thomas drives key e-Business marketing and architecture activities within Intel's Solutions Market Development Organization and is an active industry spokesperson and organizer. He is also a [regular contributor](#) to Intel® Developer Services. He writes often on the evolving compute model and promise of writing software supporting the Mobilized Software Initiative.

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