HP Relate – A Customer Communication System for the SMB Market

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ABSTRACT
Enterprise businesses rely on variable data publishing solutions to produce customer communications, such as letters, statements, and financial reports, which are tailored to individual recipients. Until now, however, such customer communications systems were out of the reach of the small and medium business (SMB) market for several reasons. In order to produce enterprise-quality documents, businesses needed employees with advanced skills in document design and automated document composition. In addition, customized documents typically require scripted business logic and complicated data integration. To achieve this level of document composition and delivery would require the SMB user to have access to IT systems and staffing that would be prohibitively expensive.

HP Relate is an innovative document design system that delivers enterprise-quality documents for a next-generation customer communication system for the SMB market. HP Relate features easy-to-use document design tools that require no more than self-assisted training. Document business logic and data integration is accessible to SMB users through common office tools, such as dragging and dropping and spreadsheets. Instead of requiring software installed on the user's system, HP Relate is provisioned on a cloud-based platform using a software as a service (SaaS) subscription-based model. In addition, the HP Relate platform enables SMBs to deliver documents in the format of a customer's choosing, including traditional print forms, web-based deployment, and mobile devices.

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General Terms
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1. PROBLEM STATEMENT
Today's services-based economy increasingly relies on direct customer communication to attain new customers, retain existing customers, and maximize the value of the customer base. On the other side of this equation, customers increasingly demand timely, tailored communications delivered through channels convenient to each customer. These prompt and personalized communications are typically produced interactively by customer-facing employees working from underlying systems of sophisticated document design tools, scripted business logic, and complicated data integration components. The entire range of skill sets required to maintain and use these systems is rarely found in individuals and requires a highly trained front-office staff working in parallel with a responsive IT organization.

In addition to the challenges of designing, creating, and deploying personalized documents, businesses must also strive to make these documents as effective as possible in attracting and retaining customers. To stay competitive, all enterprises, large and small, are increasingly motivated to adopt outcome-based metrics. Integrating with enterprise analytics frameworks adds to the set of complex skills needed in a SMB organization.

2. OUR SOLUTION
HP Relate is a full-featured business document system deployed on a public cloud. The cloud deployment allows the SMB enterprise to avoid retaining costly IT organizations to host and administer HP Relate. By using the cloud's inherent scalability and availability advantages, the SMB can concentrate on its core competency: customer service.

For the user, HP Relate offers a document design experience that is uncomplicated and within the capabilities of a typical, non-technical business user—a skill level roughly equivalent to the level required to use Microsoft Office[1].

Specifically, the HP Relate solution has the following innovative features tailored to the skill level of a typical SMB knowledge worker.

- **A "container-based" document design format**—HP Relate uses layout "containers" as the starting point for composing various types of documents. Document components, such as text boxes, buttons, and calendars are easily added to the document by dragging them from a palette into the layout containers. Each layout container has a built-in instruction set that determines how its constituent components are arranged.
- **A spreadsheet paradigm for easy implementation of business rules—**Customized documents require

business rules to control variable content. In HP Relate, business rules are created and attached to components using the HP Relate design tool's spreadsheet editor: business rules are written as spreadsheet functions. Using a natural drag and drop gesture, spreadsheet cells can be associated with document components. In this manner, spreadsheet cells can set component values, and vice versa.

- **Plug-in components for external source integration—**Personalizing documents for individual customers requires access to external data sources containing the customer data, such as databases and web service-oriented sources such as SalesForce[2]. HP Relate features a plug-in architecture to install pre-composed external data components. Data from an external source is mapped to the document's spreadsheet data model.

- **Embedded document workflow—**HP Relate simplifies document processing by enabling workflow processes to be embedded within the document itself. Examples of business processes that can be supported include document design approval and document editing at the production phase. Workflow processes can be embedded automatically by administrative mandate, thus ensuring that a company's standard business practices are always followed.

- **Built-in document collaboration, including chat sessions—**Business processes are further simplified by the powerful document collaboration tools offered by HP Relate. Multiple users can view and edit the same document simultaneously across the network. Document changes are distributed to each client, so that a synchronized version of the document is maintained.

  Because each change is a discrete revision, users can then use the HP Relate timeline viewer to see the evolution of document changes. HP Relate also allows users to initiate chat sessions for specific document editing sessions. A chat transcript is keyed to specific document changes and can be reviewed in context with the document revisions.

- **Document analytics—**HP Relate provides a framework enabling the gathering of analytics across a document's lifecycle [3]. All data is collected in real time and is tracked to the document instance. The collected data can be imported to selected archiving or search appliances, such as Autonomy's IDOL [4] server.

3. PROBLEMS SOLVED

Developing the appropriate tools a business user can use for creating interactive documents based on custom data is the most important milestone in the SMB solution. An interactive document is the foundation upon which the rest of the HP Relate product rests. The remainder of this paper describes out interactive document solution to this critical problem.

The creation of an interactive document requires defining functional logic and specifying data binding for the variable content.

- *Functional logic* includes field calculations using formulas and data validation.
- *Data binding* involves using the cells of the spreadsheet for data population to and data capture from interactive controls. Examples of variable data fields are numeric and text fields, list boxes, dropdown lists, tables, paragraphs, and other form input controls
- *Data mapping* implies specifying data sources for the variable content to incorporate external data from xml files, database tables and web services into interactive web documents.

These three tasks are traditionally implemented using scripting or programming languages. The complexity and variability of these documents restrict potential designers to those who have advanced knowledge of programming languages. However, the primary users of these documents are business people. Not only they are not able to define functional logic and specify data binding when the document is first created, they cannot change these predefined values when the document is used, which is often required by the unstructured nature of the workflow process.

Thus a new approach is needed to allow business users to define functional logic and specify data binding and data mappings without using any programming or scripting language.

4. PRIOR SOLUTIONS

The majority variable data document design tools require use of scripting/programming languages to define functional logic and specify data binding. Thus, in web-based interactive document solutions, such as Adobe Lifecycle forms [5], Acrobat forms [5], and Microsoft Word Mail Merge [6], field calculations and validations of html forms are implemented with JavaScript, Visual Basic, and other scripting languages. Data binding is defined programmatically and is executed on the server side within .net or j2ee frameworks.

Drawbacks of current approach:

1. Advanced programming skill levels are required for users to be able to create and modify interactive documents.
2. Web documents have to be recompiled and redeployed if any changes are made to the functional logic or data binding.
3. Code maintenance issues: debugging tools are needed to support the scripting language environment.

An alternate cloud-based document solution offering is Google Docs [7] by Google. Google Docs is a cloud-based document word processor similar to the Microsoft Word product and has a very low price point. Google Docs enables the creation and editing of business documents. The documents can also be shared in real-time using a collaborative framework similar to HP Relate.

A close examination reveals the similarities end with the word processing features. Google Docs has no intrinsic business rule engine, nor the ability to query and embed user data from external data sources. These capabilities alone distinguish HP Relate as a complete business document system.

5. DESCRIPTION

We introduce a spreadsheet data model paradigm as a new approach to define functional logic and specify data binding in web interactive documents.

The primary users of interactive documents are business people, who have rich experience using spreadsheet logic to define

formulas and calculate values of the variables. So using a spreadsheet interface and built-in functions, business users should be able to create interactive web documents quickly and define and modify functional logic on the fly.

The built in functions are provided for arithmetic, logical, date and time, financial and other miscellaneous operations.

A spreadsheet cell, or collection of cells, is bound to the content or properties of a visual interactive control on the document. This binding is bidirectional. Changes to the spreadsheet are reflected on the control, and user input captured by the control that modifies its bound content or properties will update the underlying spreadsheet cell(s).

The spreadsheet paradigm provides a simplified method to specify data mapping in the interactive document. HP Relate provides out-of-the box integration with commercially successful platforms.

In the future, HP Relate will provide more sophisticated data access tools, such as XPath [8] expressions, SQL [9] select statements, or URL functions to populate spreadsheet cells with external data. These special queries are entered into the spreadsheet cells similar to formulas. These are more complex data resources are targeted at satisfying more sophisticated users or large enterprise customers.

Scenario: At design time, a document designer defines functional logic by entering formulas into a spreadsheet cells using built-in functions and common spreadsheet syntax. These cells are bound to the visual controls on the document page. At runtime, the spreadsheet is not visible to the end user; values of the variables on the document page are calculated accordingly when data is entered by the end user.

Figure 1 is an example interface representing a generic data source mapping. The data values in Figure 1-A data can be mapped to the HP Relate interactive document by direct drag-and-drop operation to the document spreadsheet. Data can also be copied from the paste buffer or pre-existing Excel spreadsheets can be imported.

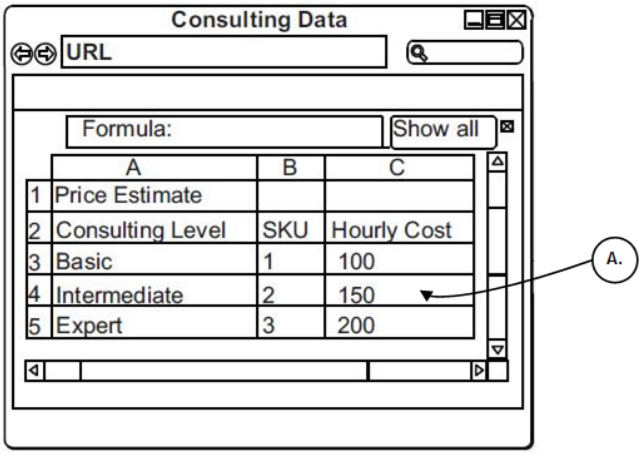

Figure 1. Generic Data Mapper.

Figure 2 illustrates the document spreadsheet interface. After the data has been mapped to the document's spreadsheet cells, a path representing the data's location within the data source is cached. When the data source is updated, each spreadsheet cell is updated with the new values. This is an important feature because the binding is defined when the document's template is created, see Figure 2-A. When the document is instantiated with real customer data, the expected customer values are inserted into their appropriate cells and the cell's dependent document control is updated.

After data has been mapped to the document's spreadsheet, the document components controls (text boxes, label, lists, etc) are bound to the spreadsheet as demonstrated in Figure 2-B. The same drag-and-drop operations are used to bind controls to a cell or a set of cells. Once bound, data values in a cell are automatically visible in the control bound to the cell.

A document's spreadsheet cells can also contain functions which generate values dynamically. Document controls can be bound to cells with functions which makes the control's value completely derived data that may have been entered by a document editor.

Additionally, document control properties (visible, immutable, etc) can be bound to spreadsheet cells as shown in Figure 2-C. This adds the capability to completely drive an interactive document's look and feel through data and functions.

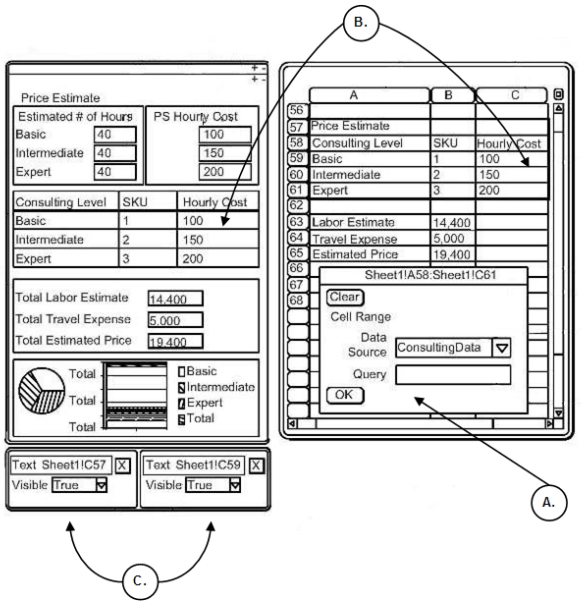

Figure 2. Document control and spreadsheet cell binding.

6. ADVANTAGES

Complexity of using scripting languages in interactive web document applications has forced a specialization of the interactive document designer, since the typical business user does have necessary programming language skills. Spreadsheet data model approach, on the contrary, uses a familiar functional logic paradigm, so it will significantly lower adoption barriers for business users. The suggested approach provides flexibility required in interactive document workflows, since business users can make necessary changes to the functional logic on the fly, with minimal IT or third party involvement. Another issue is the complexity in defining functional logic using a scripting programming language is the introduction of programming errors by business user. This approach eliminates code maintenance and deployment issues typical for programming environment.

In addition, spreadsheet model has proven to be an effective solution to perform calculations, validations, and data modeling for enterprise applications in many industries, including Finance, Insurance and Healthcare.

7. EVIDENCE THE SOLUTION WORKS

A pre-production of HP Relate was successfully deployed on the AWS cloud offering from Amazon. All HP Relate functionality is available and multiple client forms are available, including desktop, HP TouchPad, and Apple's iPad.

HP Relate is currently deployed and in Beta release.

8. NEXT STEPS

Active development is underway to build a SalesForce composite application for integrating with SalesForce customer data and additional Salesforce resources. The Beta is release is available for private download on the Salesforce App Exchange.

Development is actively researching Autonomy for leveraging IDOL and its ancillary functions to provide analytic services to HP Relate customers.

9. REFERENCES

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