IBM

Opening the door to a service oriented architecture

IBM® Workplace™, Portal and Collaboration products for an SOA

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ON DEMAND BUSINESS™

Contents

Introduction

The concept of a service oriented architecture (SOA) has gained immense popularity in recent years with the acceptance of On Demand Business, and developments in standards and products have gradually turned the concept into a reality capable of implementation today. Much of the thinking and writing about SOAs has concentrated on the back-end issues — that is to say: How do you design and build services, repurpose traditional applications into reusable services and link these services together into workflows? This white paper, in contrast, focuses on an equally important aspect of an SOA — what it will mean to an end user.

This paper begins with an overview of SOA and, in particular, a discussion of the way that SOA redefines the traditional concept of an application. The second part explores the role of collaborative work in an SOA environment, and the value and innovation that collaborative products can bring.

A discussion of IBM® Workplace™, IBM WebSphere® Portal and collaboration products, and the role they play in an SOA comprises the third section, followed by an explanation of how these products can be used in a staged rollout of an SOA.

You will see throughout this white paper how IBM's collaborative products can provide a doorway for the end user into a new and innovative way of interacting with the IT environment, restructured according to an SOA. So, let's open that door now and step right into the meaning of a service oriented architecture.

The whys and wherefores of a service oriented architecture

What is an application? This may sound like a rather philosophical and technological question to begin our exploration of SOA, but our ability to answer it is key to understanding and taking advantage of a sea-change that is taking place in business and IT today. In fact, this very change forces us to rephrase the question. What has an application been until now, and what will we mean by the same word in the future? And, as we answer the second part of this new question, we will discover how this is not just an IT question, but one that has widespread implications throughout the business.

So, traditionally, what have we meant by the word application? In truth, the word is poorly defined. However, the majority of applications have a number of key characteristics in common. An application:

- *Consists of a number of interrelated business tasks that together constitute a significant portion of some business process, e.g., the order entry process.*
- *Is based on a self-consistent base of data and creates or manipulates some subset of that data to represent a change of state in the business, e.g., create an order.*
- *Has been designed at some point in time as a largely static and carefully bounded representation of the business process, regulations, organizational structures and assumptions that existed at that time.*

While this approach has given rise to relatively efficient and dependable applications, it also has a number of significant drawbacks. First, it is very inflexible. Applications designed in this model deeply embed many complex interdependencies that describe the business process at the time the applications were originally conceived. Subsequent changes in business processes can prove very difficult and expensive to incorporate. Second, the approach

taken to design has either been organization dependent, or the organization has been molded to conform to a purchased package. In either case, organizational change is inhibited by the application. Third, the self-consistent sets of data upon which each application depends often create islands of incompatible data within the different departments of a business and further inhibit sharing of data among businesses.

These drawbacks have been a source of contention between IT and the business for many years. The business perception is that IT, as deliverer of these applications, is an impediment to change and growth in the business. As the concept of On Demand Business has gained ground, this perception has strengthened. In fact, applications as defined earlier cannot easily support an On Demand Business.

At the heart of the On Demand Business vision lie two key drivers: flexibility and integration. An On Demand Business is one that can respond flexibly and speedily to any stimulus, internal or external. Flexibility enables the business to change and adapt in an increasingly competitive world. As we have seen, yesterday's application model does not readily provide flexibility.

An On Demand Business is also characterized by business processes that are integrated from end to end, both internally and also externally with customers and suppliers. Integration emphasizes the need and ability for effective communication. Of particular interest for an On Demand Business is communication and interaction among disparate parts of a business process across traditional boundaries, both within the organization and between a business and its partners, customers and others. However, the old application model described previously provides only preplanned integration and then mainly within the bounds of a single organizational entity.

An On Demand Business environment requires that the principles of integration and flexibility be carefully balanced, allowing the creation of end-to-end business processes that are at once precise enough to ensure the validity of critical business actions and flexible enough to allow speedy redefinition of the processes to meet changing needs. This approach supports new, emerging business models where companies or departments become increasingly specialized and focused on core competencies, but depend completely on partners in extended value networks or business ecosystems to fulfill any particular process.

Thus, we return to our original question, and in particular the second part of it: What will an application be in the future? The answer must be: whatever the business requires it to be in a particular time, place and context. The individual functions and features that comprise today's applications and are currently tightly bound to one another in particular sequences and dependencies must be made available to the business to be recombined and restructured as changing business needs demand. New function must be capable of being easily developed and integrated with that which already exists. Some of the functions required may even be of a quite different form to any that are currently available or envisaged.

To meet the On Demand Business needs of flexibility and integration, therefore, we need to be able to quickly and easily assemble individual components of business and other function into the precise application needed by the business at any particular time. Furthermore, we must be able to disassemble existing monolithic applications into their component parts to provide readily available components rather than having to create all new components from scratch. Doing this in a managed and efficient way can best be achieved using a service oriented architecture.

What is a service oriented architecture?

Put simply, a service is any well-bounded, defined and repeatable business task that can be invoked in a standard manner. The scope of this task can range from very narrow to quite broad. Thus, it may be a simple, one-step task, such as setting a customer's billing address, or a more complex task involving several steps and a number of possible outcomes. Consider, for example, a task such as opening a new account. This includes a number of steps, such as setting customer details, including billing address, doing a credit check and setting credit limits on the account.

Even from this simple example, a number of characteristics of services are clear. Services can be nested; that is, one service can call another to perform a subtask. Within a service, the outcome of one task can influence whether another task is called or not. For example, depending on the outcome of the credit check, different credit limits may be imposed, or, in the worst case, the account may not be set up at all. This type of integration of services and the linking of outcomes is called service orientation. It is precisely this service orientation that allows applications built in this style to be both flexible and integrated.

A service oriented architecture, therefore, is simply an IT architectural style that supports service orientation, based on open standards. It enables the modeling and design, assembly, deployment and management of flexible, integrated applications from reusable services that are independent of the applications and computing platforms on which they run, supported by a governance approach and best practices derived from experience. This style is illustrated in Figure 1.
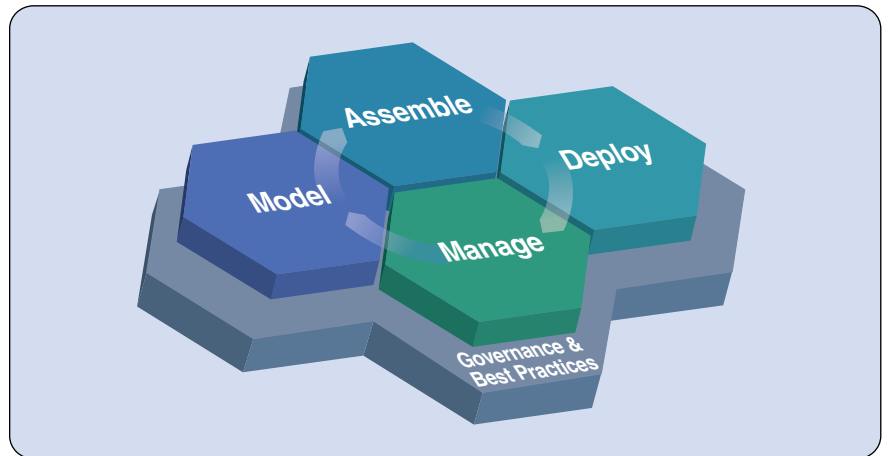
Figure 1. Service oriented architecture

Flexible and integrated applications, built according to this architecture, are known as *composite applications* and form the foundation for business processes that are well-enough integrated and sufficiently flexible to meet the needs of an On Demand Business. In the past, a business process was seen as a largely static set of tasks residing mainly within one organizational unit, and the drive was to implement it as far as possible within a single, monolithic, traditional application. Going forward, a business process will be treated as a flexible workflow, composed of independent services spanning organizational boundaries and easily changed as mandated by a business need.

While much attention has been focused on services that can be extracted from traditional, operational, line-of-business applications, other types of services can be just as easily incorporated into an SOA. These include decision support services, external data-access services and others that expand the scope of traditional operational interactions. However, another important type of services can and must be incorporated into any successful SOA. These, forming the basis for user interaction with the workflow, are the portal and collaborative services described in the next section.

Simple, open access to a service oriented architecture

As business processes move from the old model based on monolithic and largely static applications to the new SOA approach of loosely coupled, integrated and flexible orchestrated workflows, users will take on a new and empowered role. In the past, the application was in control and the role of the user was simply to feed it data as required. In the future, the user will take back a significant level of control of the running business process and will be in greater control of the overall flow of business activities needed. For example, a procurement user could be empowered to step outside the standard buying process to take advantage of a particularly good deal from an alternative supplier. Similarly, a user may need to suspend a running process to deal with a higher-priority interrupt. Such capabilities point to a new level of importance for the user interface in the SOA world.

Fortunately, the technology already exists in the form of the portal and collaborative and other services, shown in Figure 2, to satisfy this need for a flexible and orchestrated workflow. Within this environment, portlets form the

key means of user interface, and task pages provide the basic business functions. An orchestrated workflow is essentially a business process where the task pages and portlets are presented by the portal server to the user based on an understanding of that particular user's role, and supporting the most appropriate navigation of these tasks and portlets under current circumstances.

In a business process implemented through a set of loosely coupled services, each task page and portlet must be able to stand alone, because invocation of preceding or following services is not guaranteed. On the other hand, when a tightly linked sequence of services has been invoked, information does need to be seamlessly and easily passed between the portlets of the different services so that the user doesn't have to manually reenter or cut-and-paste data from service to service. These are precisely the characteristics of portlets that are delivered and managed through a comprehensive and sophisticated portal server.

In the case of the on demand procurement process already mentioned, if the user decides to place an order outside the normal process through another service, the last thing that user will want to do is to reenter address, billing or order details that already exist within the normal process portlets. Fortunately, the portal server can recognize corresponding fields in the nonstandard service and prepopulate them with the necessary data either automatically or at the user's request. Such functionality is represented in the composition services layer of Figure 2, while standard portlet management and presentation support reside in the lowermost portal services layer.

Innovation through collaboration

While an SOA clearly promotes the reuse of existing application components as services, and the development of new services and their assembly in flexible ways, that is only part of the story. In combination with IBM® Workplace™ tools, an SOA enables the creation of business processes that support and encourage teaming through local and remote collaboration. Such approaches can drive substantial innovation within the business by easing access to the tacit knowledge residing in users' heads and information dispersed broadly across multiple data repositories. As shown in Figure 2, functions include team collaboration, and productivity and learning tools, as well as access to and management of documents, Web content, workflow and forms.
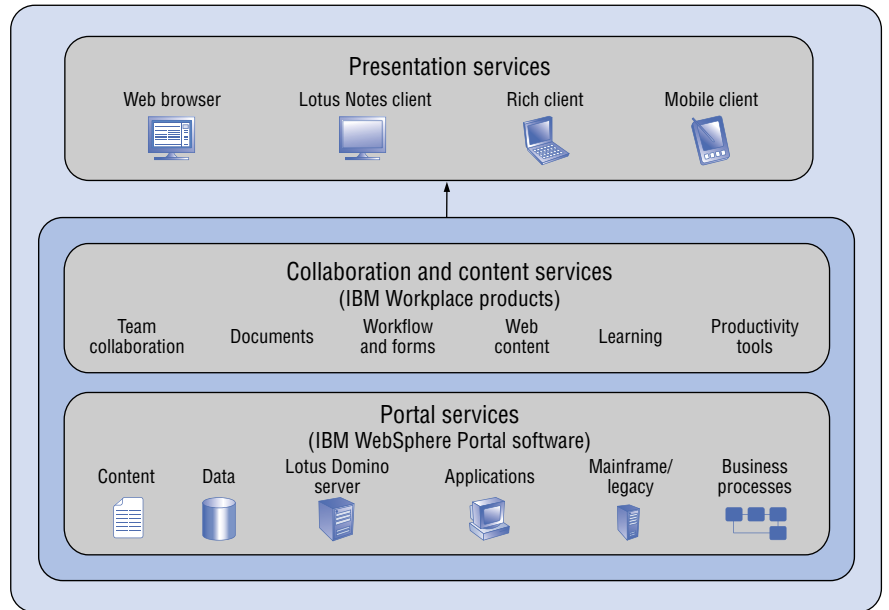

Figure 2. A layered infrastructure supporting an SOA

Consider, for example, the process of verifying an automobile insurance claim. The claims process portal will, of course, display various portlets from the formal claims verification process, such as details of the claim, an insurance policy overview, payment history and an assessor's report. When all aspects of the claim are straightforward, the clerk needs access only to these portlets. However, in doubtful cases, additional checks may be required, including access to police databases, conversations with the assessors or referral of the claim to a supervisor. In each case, the collaborative functions of IBM Workplace offerings allow the clerk to reach out by e-mail, instant messaging or Web browsing to immediately access the required information or person and quickly reach a conclusion regarding the claim. If the required support is not available onsite, presentation services, as shown at the bottom of Figure 2, support remote or disconnected use of the collaborative function.

Linking the more formal and traditional processes with ad hoc communication in this manner creates a space where human ingenuity can be applied to real problems that often arise, but cannot all be anticipated and embedded in the process flow from the beginning. Similarly, as business needs change in unexpected ways, this approach brings new flexibility to processes that have been created with different assumptions or parameters in mind.

IBM Workplace, Portal and Collaboration products in support of an SOA
IBM Workplace, Portal and Collaboration (WPLC) software is focused on improving people productivity, and as shown in the previous section, SOA encourages and, indeed, demands enhanced usability, flexibility and ease

of integration in its user interface. WPLC software is designed to meet those demands.

Three key business drivers can be identified:

- **Composite applications.** *WPLC software enables and encourages the creation of reusable assets that help reduce engineering costs and deployment times.*
- **Productivity.** *WPLC software has at its core the concept of dynamic, role-based composite views with embedded features for pervasive contextual collaboration among users.*
- **Enterprise agility.** *WPLC software is engineered to support open standards and deliver process-driven portals.*
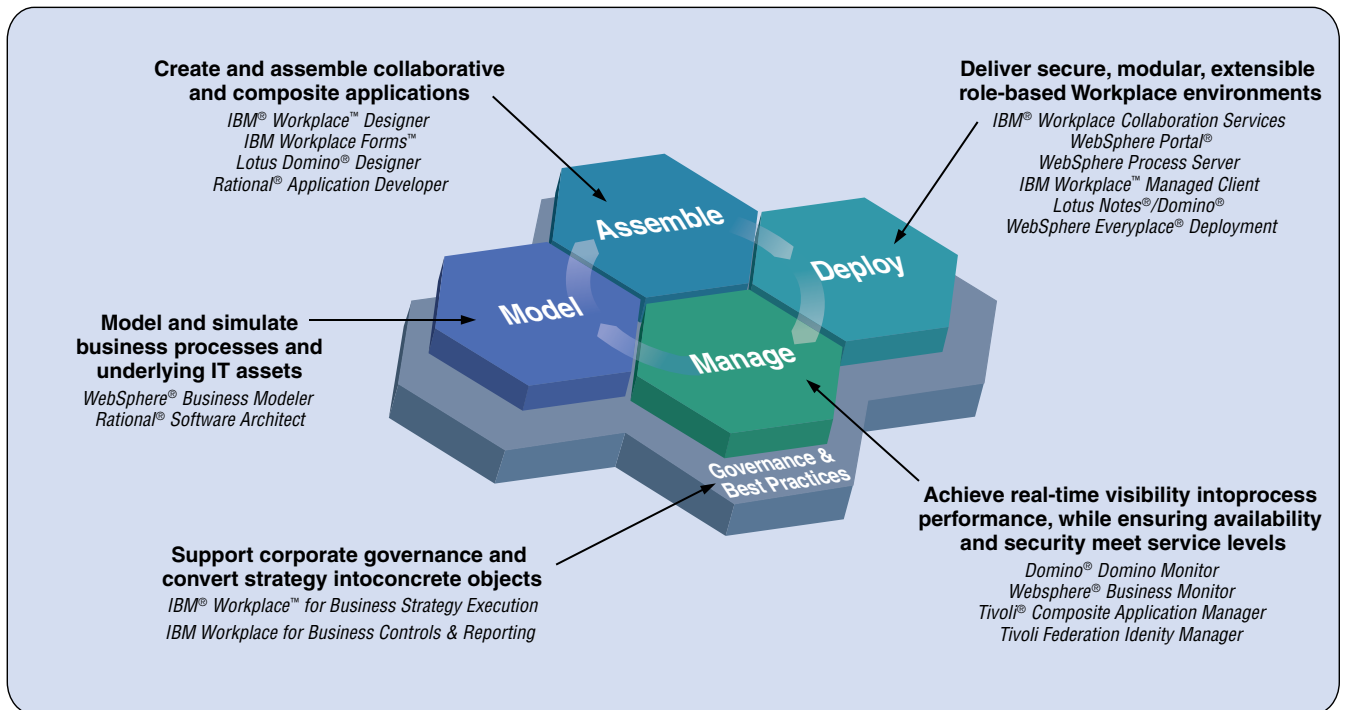
Create and assemble collaborative and composite applications
IBM® Workplace™ Designer
IBM Workplace Forms™
Lotus Domino® Designer
Rational® Application Developer

Deliver secure, modular, extensible role-based Workplace environments
IBM® Workplace Collaboration Services
WebSphere Portal®
WebSphere Process Server
IBM Workplace™ Managed Client
Lotus Notes®/Domino®
WebSphere Everyplace® Deployment

Assemble

Deploy

Model

Manage

Model and simulate business processes and underlying IT assets
WebSphere® Business Modeler
Rational® Software Architect

Governance & Best Practices

Support corporate governance and convert strategy intoconcrete objects
IBM® Workplace™ for Business Strategy Execution
IBM Workplace for Business Controls & Reporting

Achieve real-time visibility intoprocess performance, while ensuring availability and security meet service levels
Domino® Domino Monitor
Websphere® Business Monitor
Tivoli® Composite Application Manager
Tivoli Federation Idenity Manager

Figure 3. IBM software products supporting the SOA life cycle

As shown in Figure 3, SOA identifies a closed-loop development approach comprising four steps: model, assemble, deploy, manage. The IBM software product portfolio covers all four steps with an extensive range of products, as described in the white paper, "IBM SOA Foundation: providing what you need to get started with SOA," G224-7540-00, available on www.ibm.com. IBM's recent acquisition of Bowstreet brings additional tools into this product set.

Here, we focus on the specific WPLC product mapping to SOA, which focuses on maximizing people productivity within an SOA, delivered through a natural, intuitive, adaptive user interface.

Building and assembling components for an SOA
As previously discussed, exposing function from existing and new business applications as Web services and enabling their assembly into process workflows is one of the fundamental bases of an SOA.

Furthermore, we have seen the importance of the collaborative aspect of business processes in an SOA. Where do these collaborative business applications and processes come from?

Experience in the IBM Lotus® Notes® and Lotus Domino® sphere indicates that much of this type of function originates directly from the user community itself. Power users, with some minimal support from IT and the right tools, are best equipped to create these collaborative functions. This ability exists because these users are close enough to the business to recognize the subtle and flexible interconnections that such collaborative work requires. For many years, IBM has provided the right tools in the form of the IBM Lotus Domino Designer tool.

Today, WPLC software continues to extend and enhance Lotus Domino Designer technology to expose IBM Lotus Notes applications as Web services for integration with an SOA. Also, the concept has been extended to the IBM Workplace environment with IBM Workplace Designer and IBM Workplace Forms.

The key to flexibility lies in a template-based approach, combined with role-based management and deployment of function. The IBM Workplace Designer tool provides the ability to design and build powerful collaborative Web services as templates that can be directly used, reused, customized or specialized depending on the context in which they are required. Such customization and specialization can be performed directly by ordinary business users in many cases. For example, in a procurement process, a collaborative Web service is created to handle situations where management approval is required for purchases over a certain value. By creating this function as a template and using a role-based approach to identify the appropriate manager or other users involved, the resulting Web service can easily become the basis for a variety of similar functions involving approval from different levels of management or even external parties, without having to rewrite the fundamental function every time.

These products in the WPLC software set focus on building and assembling the collaborative components of an orchestrated workflow. Such components include discussions, e-mail and instant messaging, custom forms, enterprise content and expertise location, as well as allowing access to and reuse of existing Lotus Domino applications and databases.

Deploying and managing applications for an SOA

As we move into the deployment and management phases of the SOA cycle, WPLC products perform two distinct but related roles. The first role is to provide a doorway to the entire set of Web services and workflows in the SOA environment. The key product in fulfilling this role is IBM WebSphere Portal software. The second role revolves around the collaborative aspects of user interaction that are vital to a true On Demand Business. An example of products involved here includes Lotus Notes and Lotus Domino, IBM Workplace Collaboration Services and IBM® Workplace Managed Client™, as well as IBM WebSphere Everyplace®.

WebSphere Portal software is the base tool for deploying and managing portlets in a Java® 2 Platform, Enterprise Edition (J2EE) environment and, as we shall see later, provides one logical starting point for implementing an SOA. It provides the infrastructure for the creation and administration of portlets irrespective of whether they will eventually be displayed through a Web browser, or a rich or mobile client. It is also responsible for managing the arrangement of portlets within the portal and supporting communication between the portlets themselves. In the case of a browser-based interface, WebSphere Portal software is entirely responsible for all user interface management. However, in the case of a rich-client environment, Workplace Managed Client software (optionally licensed) and WebSphere Portal software work together to create the required user interface. In fact, Workplace Managed Client and IBM® Workplace™ Collaboration Services software both depend fully on WebSphere Portal technology to provide the foundation function for managing and presenting portlets. When mobile clients are involved, WebSphere Everyplace software provides the needed support.

Workplace Collaboration Services software, along with Workplace Managed Client software in a rich-client environment, provide the full range of collaborative function such as e-mail, instant messaging, enterprise content and so on to the end user. As shown in Figure 4, these collaborative functions appear to the user simply as other portlets within the user interface. However, these services, although fully independent of one another and the other application portlets, do not behave in a completely stand-alone manner. Nor should they! The collaborative services portlets interoperate and share information with other portlets as appropriate. This interoperation and sharing provide the user with the opportunity to modify or extend predefined processes to take advantage of the tacit knowledge that exists in the heads of colleagues or to apply changes to the process as the need arises.

Lotus Notes and Lotus Domino 7 software also plays strongly in an SOA environment. Existing Lotus Domino applications can be defined and opened up as Web services by providing a standards-based interface to allow external applications to call them. These new Web services can, of course, appear as portlets in any WebSphere Portal environment. This approach leverages existing Lotus Domino applications and Lotus Domino development skills to provide existing collaborative business function in the new SOA environment. In addition, a new and simple portlet builder has been provided to enable end users to create portlets that access or manipulate data in a Lotus Domino environment, without the need for any programming skills on the part of the end user.

Governance and best practices
WPLC software also provide solutions that support corporate governance in an SOA environment and help convert strategy into concrete objectives for the organization. These include IBM Workplace for Business Strategy Execution and IBM Workplace for Business Controls and Reporting solutions.

Stepping into the SOA environment

In the previous section, we have seen the increasing level of support for an SOA that is already available in the WPLC product set. And that support is increasing on an ongoing basis. However, we must be aware that adopting a service oriented architecture cannot be the work of a single project. An SOA has implications across the entire spectrum of the infrastructure and application environment of the organization. SOA must be seen not as a project, but as a journey. And every journey starts with a single step.
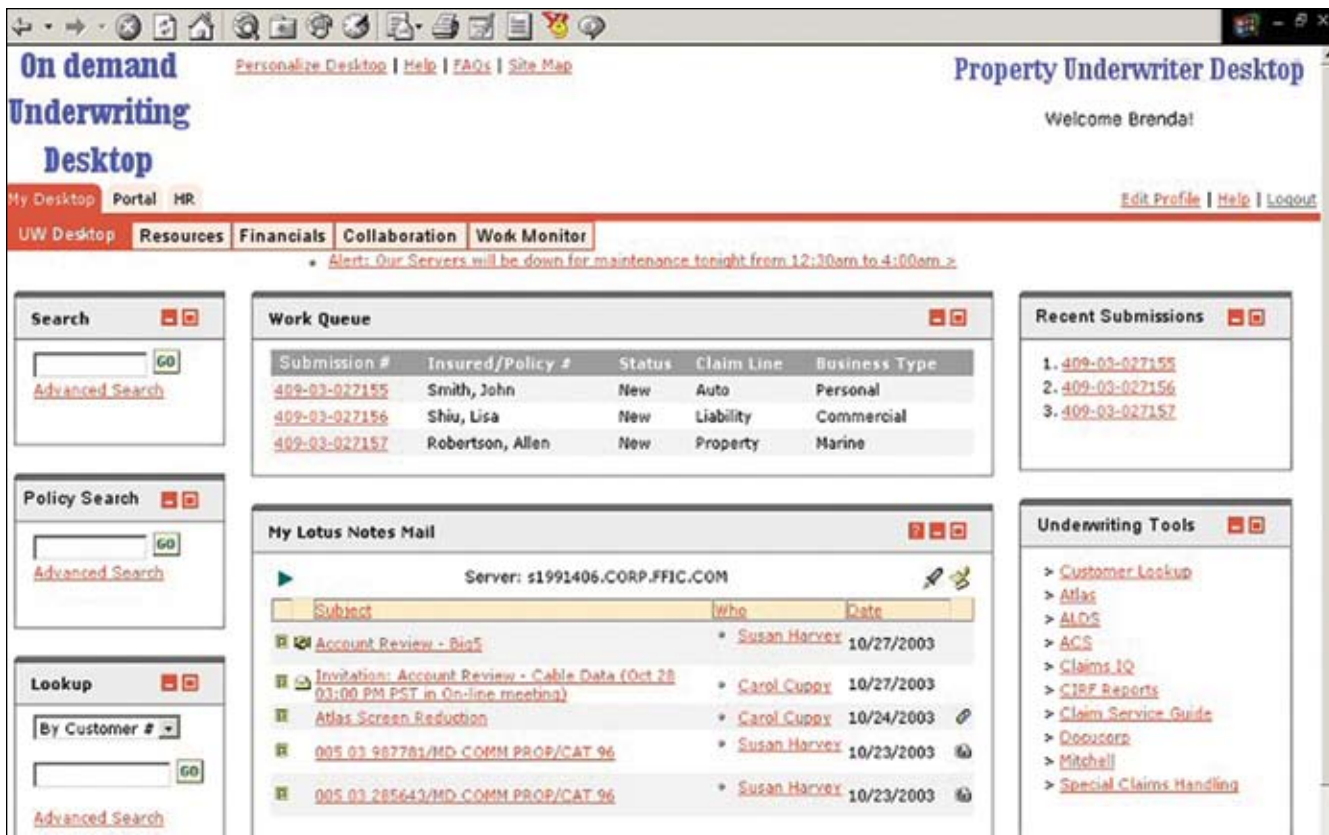
Figure 4. A composite application with collaborative functions

Experience suggests that many SOA journeys begin with WebSphere Portal software and the creation of a Web services gateway that provides a consistent, standards-based entry point to a diverse and distributed set of application function. Key to this first step is the exclusive (as far as possible) use of standards-based Web services interfaces to all of the application function to be integrated for the user.

Of particular importance is the need to focus on a specific and well-bounded business requirement in these early steps of an SOA implementation. By their very nature, SOA projects are prone to scope creep. It is easy to get carried away by the ease with which portlets can be created and added to the environment. However, this also makes it easy to slip into the "build it and they will come" mindset or to neglect the fact that the system being built in the SOA is combining functionality that comes from or is owned by very different parts of the organization or even different companies. In many such cases, the project is likely to be over budget, over time and of dubious value.

Defining a roadmap

As with the introduction of any major change in IT architecture, defining a roadmap is a key early step.

Such a roadmap consists of:

1. *Well-defined and bounded business needs of achievable scope with committed line-of-business owners.*
2. *A staged implementation plan that meets the needs of different business areas at different times and that all line-of-business owners have agreed to.*
3. *Infrastructure deliverables that provide novel and valuable user function, and enable the business to behave in a more responsive and proactive manner, in particular, collaborative functions.*

Well-defined and bounded business needs

The success of the first project in any new architectural approach is always vital. In this respect, SOA is no different from any other. The first SOA project must meet a well-accepted and costed business need and be scoped to deliver rapidly and correctly. SOA is not unique in this requirement. To show the unique value of an SOA, however, another condition is usually required. The function to be provided must span two or more systems that traditionally were very difficult for their users to combine.

For example, in the traditional application environment, opening an account and transaction entry may have been separate applications, each owned by a different business department. While this separation of function is not a problem for the vast majority of transactions (which all occur well after the account opening), the business is well aware that the interaction of account opening and the first transaction on the account is a problem. Potential customers don't just walk in and request to open an account; they actually want to make some transaction at the same time. A first SOA project that allowed these two functions to be carried out in an orchestrated workflow, would, in this instance, be a viable and valuable starting point for an SOA rollout.

This example, and many of a similar nature, illustrates a typical, successful approach to a first SOA deliverable. The key point is that the business users of these previously separate applications are now able to see the relationship between these functions and can interact with them in a seamless manner. IBM WebSphere Portal Server software readily provides the environment and infrastructure necessary to link these portlets into an integrated system. This powerful, yet very usable, functionality is the reason why WebSphere Portal Server software is often the entry product of choice to an SOA as mentioned earlier.

As the rollout proceeds, the size and scope of the individual projects may well increase as the infrastructure is implemented and proves itself to be robust. However, attention to the business needs and political implications of each deliverable will continue to be of the highest importance.

A staged implementation plan

The first one or two projects of an SOA rollout may well be defined and delivered in a relatively ad hoc manner. In many respects, except in terms of their business value and success, they can be considered as pilots for the wider process. Nonetheless, before these first pilots deliver, it will be vital to begin to consider the wider implementation plan.

In a simplistic view, an SOA implementation can be seen as consisting of two interdependent streams: the business deliverables and the infrastructure deliverables. The dependencies flow both with these streams and in both directions between them. Some business functions can only be delivered after others have been implemented. Some pieces of infrastructure are built upon smaller, simpler components.

Some business functions require a particular piece of infrastructure and some pieces of infrastructure can be justified only in the context of some business deliverable.

The staged implementation plan is simply the analysis and resolution of these interdependencies and the document of agreement with the myriad business and IT owners about what will be delivered and when.

Although simply stated, the crafting and negotiation of the staged implementation plan can be a challenge in all but the least-complex organizations.

Collaborative infrastructure deliverables

While there are many parts of the SOA infrastructure that must be implemented, our focus here is on the collaborative components. These parts of the infrastructure deliver substantial value and innovation in the user experience and benefit from a careful and reasoned approach to roll out. We briefly consider two cases: (1) rollout of an IBM® Workplace™ environment as the collaborative component of an SOA, and (2) incorporation of an existing Lotus Notes and Lotus Domino environment in an SOA. In both cases, the WPLC products are essentially providing the users' doorway to the SOA.

IBM Workplace products in an SOA

As previously described, IBM Workplace products enable collaborative function, such as e-mail, instant messaging and learning, to be made part of an SOA. Because each of these functions is made available through a standards-based portlet (in Workplace Collaboration Services and other browser-based Workplace products), these functions can be easily and rapidly combined into composite applications and orchestrated workflows. As a result, providing simple collaborative function in an SOA is an early and obvious infrastructure deliverable where, of course, business needs dictate.

IBM Workplace Designer software allows a very compelling next step in this strategy, allowing particular emphasis to be placed on a role-based approach to service delivery. Existing collaborative portlets can be modified and extended to link seamlessly with portlets delivering pure business function. New portlets can be defined that combine these two types of function in a single user interaction where such tight integration is required.

A final step in this infrastructure rollout or, in some circumstances, replacing the previous step, is the incorporation of Workplace Managed Client software into the infrastructure. This step enables a move from a browser-based to a rich-client infrastructure for the delivery of composite applications incorporating collaborative and business function to the user.

Lotus Notes and Lotus Domino software in an SOA
The combination of collaborative and business function already described is also applicable to the situation where Lotus Notes and Lotus Domino software is the collaborative environment of choice through the mechanism of making Lotus Notes function available as Web services. However, it is another aspect of Lotus Notes and Lotus Domino usage that potentially provides earlier business benefit by its inclusion in an SOA. This aspect is, of course, the wide and varied set of applications that many companies have built into the Lotus Notes and Lotus Domino environment.

Thousands of Lotus Notes and Lotus Domino applications have been built over the past ten years and more by companies in every industry and geography. These applications typically automate nontransactional functions performed in front and back offices, such as personnel procedures, and document management and control, as well as simple, people-oriented workflows. In considering an On Demand Business environment, it becomes clear that integration of these existing applications as an SOA-based, orchestrated workflow is not only desirable but may even be one of the most immediate and high-value steps that can be taken. This is a step worth investigating in the early stages of an SOA rollout.

The range of composite applications possible here spans the entire scope of business processes both within a company and across enterprise boundaries.

For example, many interbusiness processes are operated in semiformal processes involving managed exchanges of e-mails or other documentation, followed by one or more formal monetary transactions. Today, the document-based processes are automated in Lotus Notes and Lotus Domino applications and the monetary transactions in a traditional operational application, with the interface between the two performed manually by the office staff. In an SOA, these processes could be combined into an orchestrated workflow that reduces manual overhead and provides staff with a more usable and ergonomic work environment.

Conclusions
The implementation of SOA-based environments is proceeding apace throughout the IT industry, driven by the precepts of On Demand Business and the limitations to change inherent in the traditional approach to application design and development. Significant thought has been put into a new service oriented architecture approach, and a wide range of products supports this direction with the required infrastructure.

Analysts and software companies alike are convinced that this will be a significant and worthwhile trend through the coming years.

As outlined in this white paper, an SOA will also have a significant impact on end users, driving a new approach to their interactions with the IT systems, empowering them in new decisions, freeing them to be more innovative, and enabling them to drive the business faster and more proactively. However,

whether this change turns out to be a positive or a negative experience for these users depends on the features, level of integration and collaborative function to be found in these tools. The IBM WPLC product set, WebSphere Portal Server and Lotus Notes and Lotus Domino software, and the IBM® Workplace™ branded tools are leaders in all these areas.

SOA is becoming mainstream. There have been numerous implementations of varying levels of complexity and many notable successes. And the path to success has usually involved a step-wise introduction of the architecture with small, business-led projects leading the way. The IBM WPLC tool set strongly enables such an approach by empowering users to efficiently and innovatively combine traditional business functions and modern collaborative approaches. These tools empower the user to interact fully and intuitively in a seamless mesh of services, and provide a transparent doorway to the service oriented architecture environment. The door is already ajar—come on in!