



# Adaptive SOA

## *Adaptive Discovery™ Enables Composite Applications with Real-time Agility*

15200 Weston Parkway, Suite 106  
Cary, NC 27513  
Phone: (919) 678-0900  
Fax: (919) 678-0901  
E-mail: [info@ultimus.com](mailto:info@ultimus.com)  
<http://www.ultimus.com>

*The Information contained in this document is accurate as of July 2006. Because of the speed at which technology is advancing, the information recorded herein is dated and may have changed since this document was authored.*

*All the contents of this White Paper are protected by Copyright Laws and International Trade Agreements. Copyright © 2006 Ultimus, Inc. All rights reserved.*

## Introduction

Over the past few years, Services Oriented Architecture (SOA) has emerged as the leading paradigm for application development for many good reasons. SOA enables the deployment of composite applications adept at handling change in heterogeneous environments prevalent in modern organizations. This white paper touches upon the importance of SOA and composite applications and the reasons for their widespread popularity, but leaves an in-depth discussion to excellent white papers authored by others.

We expound the importance of processes as the backbone of SOA-based composite applications because of their ability to orchestrate services in ways that are unique to each organization and its needs. The importance of processes to SOA makes BPM the central nervous system of SOA. We then explain how the Ultimus BPM Suite provides 360° support for SOA out-of-the-box. Finally, we discuss how Ultimus Adaptive Discovery enables Adaptive SOA for rapid deployment as well as real-time agility of composite applications. Adaptive SOA empowers composite applications to handle the dynamics of change in real-time which is a competitive imperative for modern organizations.

## Processes are the Central Nervous System of SOA

Analysts, industry gurus and vendors have written extensively about SOA and why it has become the predominant enterprise architecture. Two examples of articles on SOA that provide a succinct explanation of the technology and its benefits are listed in the references section of this paper<sup>1,2</sup>. It is not the intention of this white paper to restate the description, evolution, and the benefits of SOA that have brought it to the forefront. However, there are two important attributes of SOA that must be highlighted because of their central relevance to the discussion about Adaptive SOA.

First, in SOA, the logic and rules of many processes can be extracted and abstracted from the underlying application. Traditional enterprise applications are monolithic as illustrated in Figure 1. They try to be as all-encompassing as possible and include all the services (functions), the processes to use these services for delivering value to users, and the logic and rules of these embedded processes. The ability to change the embedded processes, logic and rules is limited and available only through pre-defined templates or configurations. While undoubtedly there are significant benefits of providing complete functionality, the embedding of the processes inside enterprise applications makes it difficult for the application to adapt to the unique needs of different customers. If customer requirements are met by the capability of the embedded processes, then it works well for them. However, if customer requirements are beyond the flexibility provided by the application, the only recourse is to either to customize the application, which adds significant cost, or for the customer to forgo their existing business processes and adopt the ones embedded in the enterprise application. Even more importantly, embedded business processes are constrained to the enterprise application and cannot be easily extended to include the services provided by other applications in the organization.

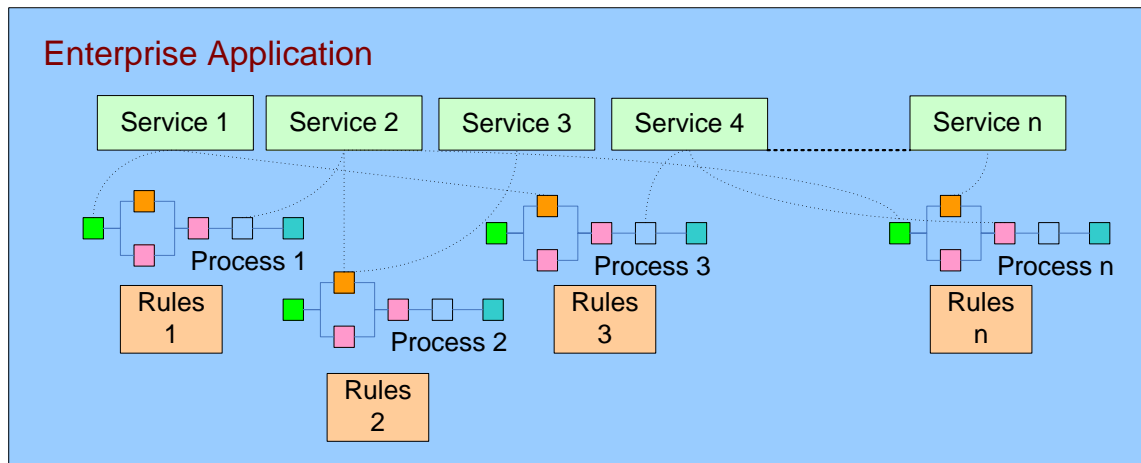


Figure 1: Traditional Enterprise Applications have Embedded Processes and Rules

SOA changes all that by allowing enterprise applications to expose their core services as discrete functions. The consequence is that the processes that consume these services to deliver value to the users and their logic (rules) can be externalized and abstracted as shown in Figure 2. When processes are externalized, they are much more easily customizable to the unique needs and “personality” of each customer, and they can also be easily modified to respond to changes in the business environment.

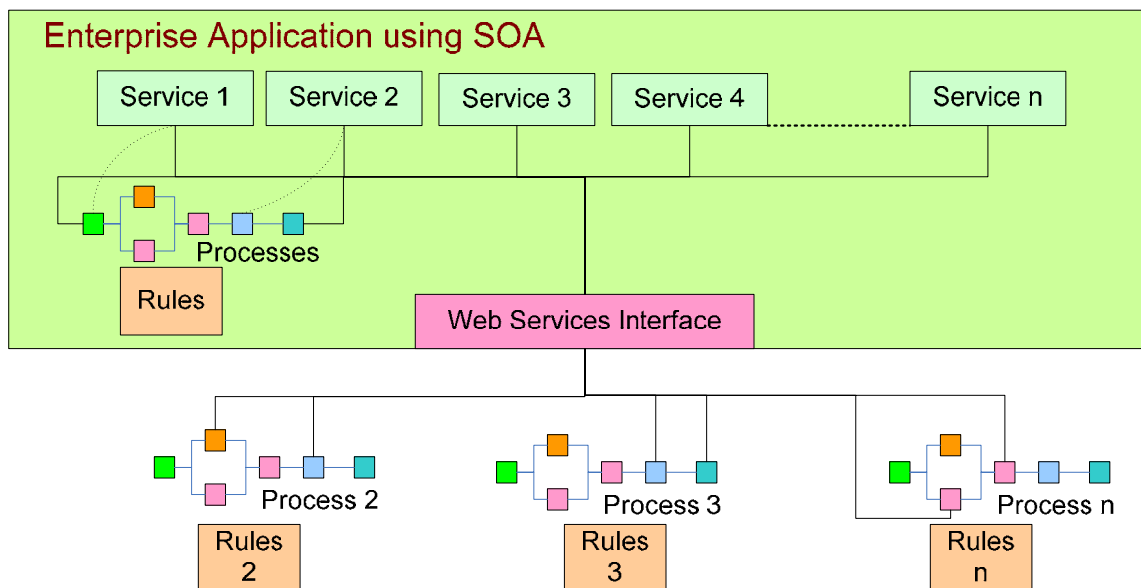


Figure 2: Enterprise Applications using SOA Allow Processes and Rules to be Externalized

Second, services in SOA are exposed using an industry-standard protocol. This protocol is generally Web Services which is fast becoming the default lingua franca of software systems. The use of Web Services as the vehicle of integration in SOA means that third-party applications can readily consume the services exposed by enterprise applications without the need for point integration which is expensive and brittle. The use of Web Services provides other benefits. Web Services are based on XML which means they are platform agnostic. They provide means of rapid discovery so that consuming applications can discover not only the services available but

also the means of integration with the services. Finally, Web Services provide loose coupling between the provider and the consumer. This means that when the underlying service is changed due to a new version, substitution of a new application or changing the platform, the consuming application does not have to change since the Web Services isolate the change and makes it transparent to the consumers.

With services exposed using industry-standard protocols and methods of discovery and the possibility of externalizing processes, the role of BPM becomes central in SOA. Organizations have a hierarchy of interdependent business processes as explained in a separate Ultimius white paper<sup>3</sup>. Processes that are best executed within the framework of the enterprise application remain there. However, other processes can now be developed and modified outside enterprise applications and can leverage the services and embedded processes of the application. These processes can span more than one enterprise application and provide end-to-end functionality that was not possible within the framework of a single application as shown in Figure 3. This “cross-application” capability is very important because in almost all cases customers require services to be provided by multiple enterprise applications. Another important benefit is that if a human-centric BPM system is used, these processes can involve people. The effective participation of people is essential for rapid decision making, exception handling and the subtle but extremely important “human touch” that differentiates people-centric processes from data-centric processes where more rigid automation may be sufficient. Organizations have many processes that orchestrate services and the participation of humans to provide the end-to-end functionality they need. The management of these processes necessitates the use of a robust BPM system that is adept at handling business processes over their life cycle.

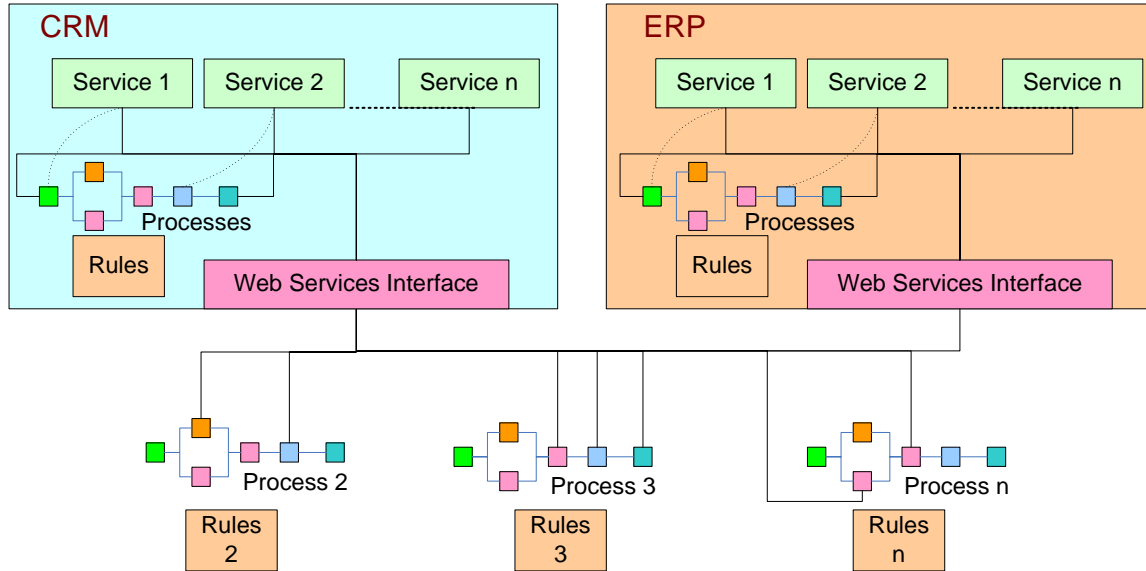


Figure 3: Externalized Processes can Span Multiple Enterprise Applications

BPM provides adaptability and agility to SOA. It is the central nervous system in the architecture as it orchestrates the services provided by different applications that excel at what they do. All processes are no longer embedded exclusively inside enterprise applications where they are more difficult to change. Instead, they exist outside the application and can therefore be changed to the unique requirements of each customer. As shown in Figure 3, these external processes can leverage the services as well as the embedded processes in the enterprise application. The more

powerful the BPM solution used to manage these processes, the easier and more cost-effective will it be to adapt to the unique business requirements. Furthermore, as business conditions change, the power of BPM can be used to adapt to this change.

We believe the role of BPM is so central to SOA that the name, Services Oriented Architecture, is a misnomer. A more appropriate name is Process Oriented Architecture (POA). Services exist so that they can be used by processes, and not vice versa. As the world moves to shared services, it is likely that more and more services will be commoditized and shared among many companies. As that happens, the key competitive differentiation among organizations will be the agility of business processes and the BPM systems used to manage them.

## Ultimus BPM Suite and SOA

The Ultimus BPM Suite is a complete seventh-generation BPM solution for modeling, automating, integrating, managing and optimizing business processes. It provides a comprehensive set of software modules necessary for a variety of people with different skills and needs who touch business processes through their lifecycle. A key differentiator of the Ultimus BPM Suite is its exceptional ability to support human participation in business processes. The human-centric approach of the Ultimus BPM Suite has evolved over Ultimus' 12 years of experience in automating thousands of business processes for over 1600 customers. This differentiation enables Ultimus to provide the capabilities and features necessary for adoption and adaptation in the areas of rapid deployment, change management, collaboration and human convenience features necessary for widespread and effective participation of people in business processes.

Robust support of SOA and Web Services is an out-of-the-box capability of the Ultimus BPM Suite. Ultimus provides 360° integration with Web Services as a provider as well as a consumer through a number of powerful built-in functionalities:

- i. **Web Services Flobot™:** The Web Services Flobot is a “workflow robot” that can be included graphically at any step of the process to call a Web Service and execute a transaction by exchanging data from the processes with the Web Service.
- ii. **Event Conditions Web Services:** Web Services can also be invoked whenever an event occurs at any step of a process based on customer-defined rules. This enables Web Service to be invoked for transactions based on rules that are triggered by events such as when a step in the process is completed, becomes late or is re-submitted.
- iii. **Form Event Web Services:** Web Service can also be invoked from Ultimus form events. This allows customers to develop rich user interfaces that can extract or submit information from client machines directly to enterprise applications in an SOA environment.
- iv. **Web Service Step Completion:** Any step in an Ultimus process can be completed and data passed to the process from a Web Service. This powerful capability is an example of how third-party applications can consume Web Services provided by Ultimus and also transfer information to an Ultimus process.

- v. **Web Services Process Initiation:** Third-party applications can start a new incident of an Ultimus process by calling a specific Web Service. This enables these applications to start process incidents with specific data provided by the application.
- vi. **Reporting Web Service:** This Web Service allows third-party applications to extract business data as well as process data from the Ultimus BPM Suite. This enables these applications to develop business intelligence, performance management, reporting and other applications to manage and optimize processes in SOA.

Using these built-in capabilities, customers are able to deploy business processes that orchestrate services in an SOA architecture using the full fidelity of the Ultimus BPM Suite as illustrated in Figure 4. Furthermore these processes can span multiple applications in an enterprise and are also adept at including people in the processes which is an essential ingredient of successful BPM, and a source of sustainable competitive advantage. A separate white paper<sup>3</sup> describes the role of Ultimus in the process ecosystem.

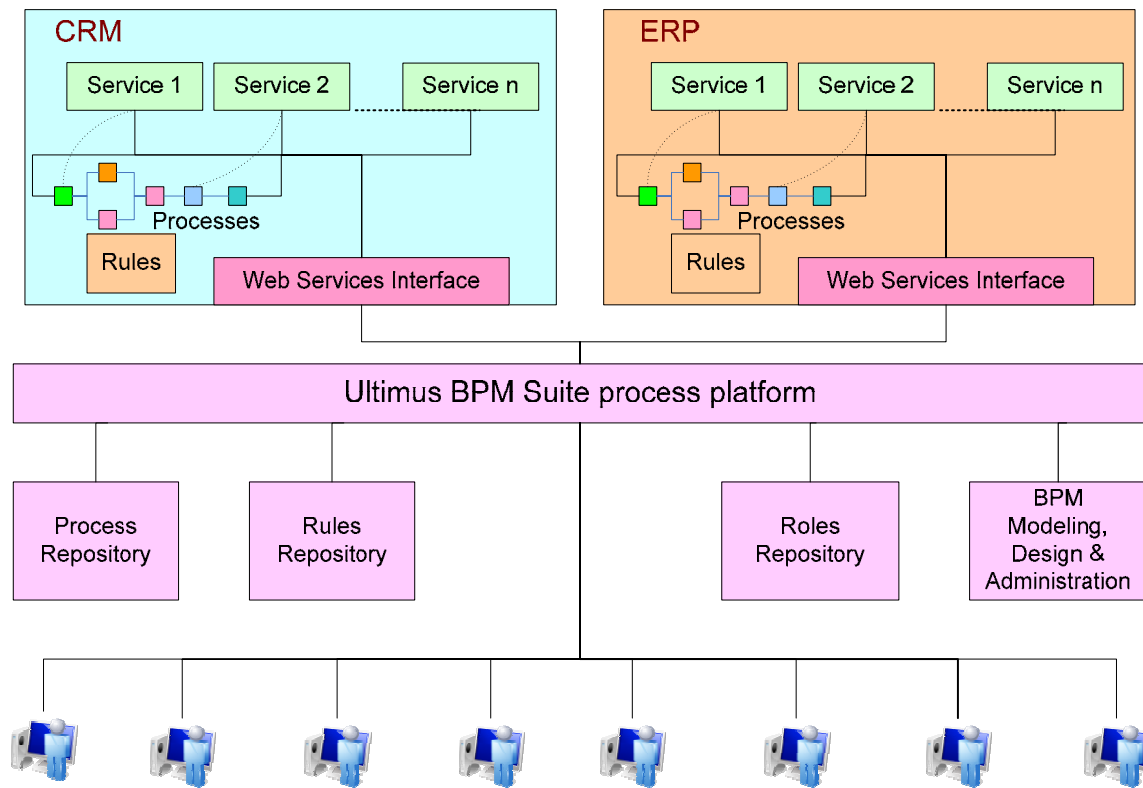


Figure 4: Ultimus BPM is the process platform for SOA

## Ultimus Adaptive Discovery™

While the extraction of business processes and their logic from applications in SOA and using BPM systems to manage these processes does provide major benefits for adaptability and agility, there continue to be two major problems:

- i. **Discovery Takes Time** - Business processes are typically complex and time consuming to fully discover. Without full discovery of the exceptions, rules and nuances, it is not practical to automate the process. This slows down the deployment of business processes; therefore, the deployment of SOA applications orchestrated by these processes.
- ii. **Change is Difficult** - While extracting processes from applications makes it somewhat easier to adapt to change, it is still time consuming as it requires IT involvement. In business, the need for change occurs in real-time, but the adjustments of business processes to respond to change may take weeks, or even months; even with the power and agility of modern BPM systems.

Ultimus Adaptive Discovery is new patented technology that addresses these two limitations using a pragmatic and intuitive approach. Adaptive Discovery is based on the industry best practice of extracting the rules engine from the BPM system. By extracting the business rules from the BPM system, it is easier to change the rules without changing the underlying processes; therefore, shortening the response to change. However, Adaptive Discovery goes much further. It provides companies the ability to automate processes without fully discovering all the flows, rules, recipients and exceptions of a process. Companies do not have to spend an excessive amount of precious consulting time and resources discovering every minor rule, special case or exception. Instead, they can simply automate processes by incorporating the rules, flows and exceptions of which they are aware, and start reaping the numerous well-documented benefits of process automation.

Adaptive Discovery provides BPM systems with the intelligence to know when it has encountered a special case or exception that it does not know how to handle. These are called “UnRuly Events™”. Adaptive Discovery technology alerts the business analysts responsible for a process as soon as an UnRuly Event occurs. Ultimus also provides a business friendly user interface called the Ultimus Director that allows business professionals to view the UnRuly Event, the current flow of the process incident and the contextual information that the process is carrying. The business analyst can also view the rules that have been defined to date and determine why they are insufficient for handling the special case that triggered the UnRuly Event.

Because Adaptive Discovery was designed to return control of the processes to the business professional, the business analyst can use graphical constructs to define additional rules or modify existing rules to handle the UnRuly Event. These rules can be easily tested and documented. Once defined, they can be used to update the rules repository and applied to the current instance so that it can be resolved and move on. The process has now become smarter and learned the rules of how to handle the special case, and it is no longer a special case anymore. If another similar case occurs in the future, it will simply use the rules already defined and not generate an UnRuly Event. As the system is used more and more, and additional UnRuly Events are generated and resolved, the process becomes smarter and smarter.

Adaptive Discovery is, therefore, an excellent and powerful technology not only for shortening the deployment of business processes, but also for adapting to change. When business conditions change, business analysts can proactively use Ultimus Director to change the rules, logic and flows to account for the change. However, if the change occurs before the business

analyst can be proactive, an UnRuly Event is spawned and is routed to the business analysts for resolution. The business analyst can then react to the change.

If BPM is the central nervous system of SOA, then Adaptive Discovery is the cerebral cortex which evolves in response to change and discovering new realities. Like the brain, Adaptive Discovery uses its rules engine, memory and sensors (the opinion of process experts) to adapt business processes to respond optimally to the external environment and new situations rapidly and seamlessly. The more it is used, the better and more agile it becomes as it masters the full complexity of all the scenarios with which it is dealing.

## Adaptive Discovery Spawns Adaptive SOA

The Ultimus BPM Suite powered by Adaptive Discovery enables the deployment of Adaptive SOA. Processes that orchestrate services can be deployed quickly and discovered in real time using actual real-life scenarios. This means that adopting organizations can rapidly benefit from SOA and BPM by reducing the discovery time as well as by taking advantage of the numerous rapid deployment capabilities of the Ultimus BPM Suite. In addition, SOA becomes adaptive because it can respond readily to change. Business processes that are essential for the success of SOA can be changed in real-time, either proactively in anticipation of change, or reactively when UnRuly Events are triggered by changes and new circumstances. The use of Ultimus Adaptive Discovery to deploy Adaptive SOA is depicted in Figure 5.

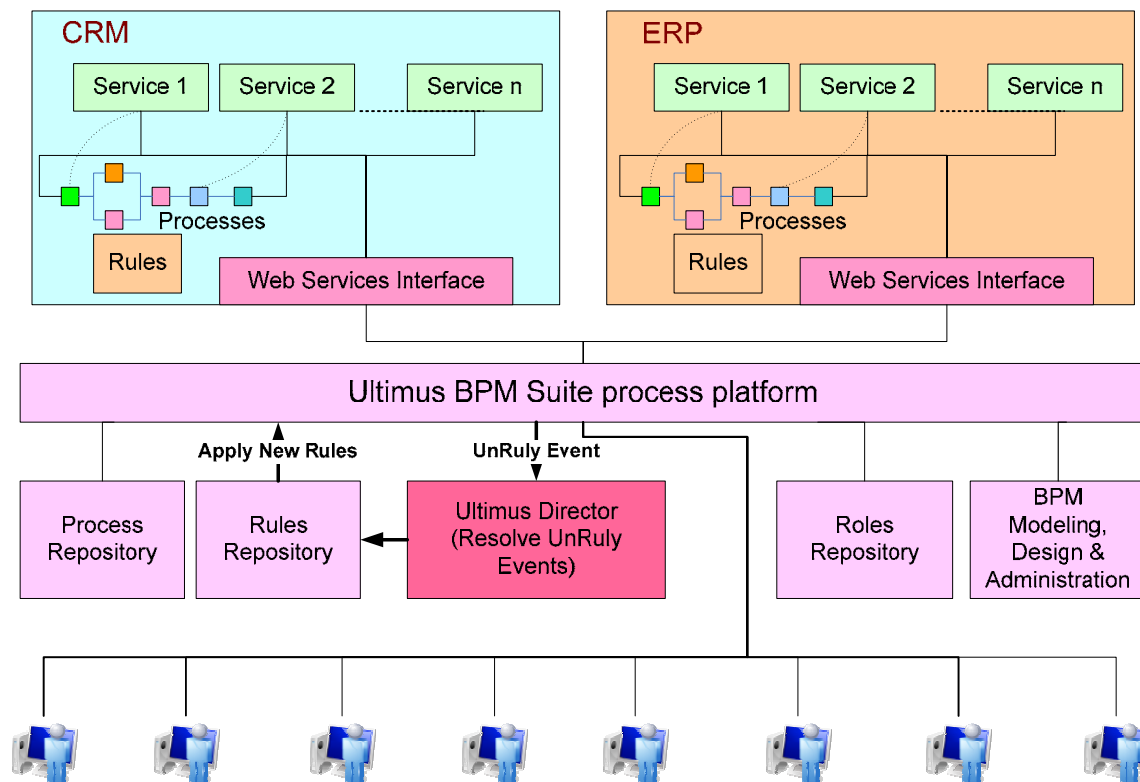


Figure 5: Ultimus Adaptive Discovery delivers Adaptive SOA

Adaptive SOA is at the pinnacle of enterprise architecture since it embodies the best practices of software application development over the past decades. This evolution has resulted in the

abstraction of more and more key components of applications into independent, self-contained, and loosely-coupled entities that can be managed and changed with relative independence. It is a natural progression and evolved through the following stages:

- i. Application development started in the 1960s and 1970s with the data, logic/process and the user interfaces all buried inside the application.
- ii. In the 1970s and 1980s, database-driven applications emerged. These applications extracted data from applications. Data resides in sql databases and the applications focused on the process logic and user interfaces. Data could be shared with other applications.
- iii. In the 1990s, client/server applications separated the user interface from the application and resulted in the emergence of n-tier applications. Data resides in sql databases, logic and process resides in the servers, and user interface resides in the client.
- iv. In the 2000s, SOA extracts the processes from the application and renders the application into a collection of services.
- v. Finally, Adaptive SOA extracts the rules from the processes allowing the rules to be changed proactively and reactively with ease.

## Conclusion

By enabling Adaptive SOA, Ultimus Adaptive Discovery takes SOA to the highest level of rapid deployment and agility. It accomplishes this by enabling business processes to be developed rapidly, and to embrace change in real-time. More importantly, it empowers business professionals and analysts who own processes to discover and change processes with IT playing the supporting role to manage the infrastructure.

The human brain is the ultimate marvel of agility and adaptability. It uses its memory and inestimable computing power in infinite ways to respond to known stimuli. The pressure of survival over the ages has also forced its evolution so that it can respond to unknown stimuli in optimal fashion with survival and maximizing human well-being as the ultimate goal. Adaptive SOA is a small step, but important step, in making enterprise software into an expert system that is able to adapt to business environments and embrace change which is inevitable while maximizing the well-being of organizations as the goal throughout.

## References

1. ZapThink White Paper; “Process-Driven SOA: Leveraging Service-oriented Architecture for Business Process Innovation” by Jason Bloomberg, June 2006
2. Gartner Research; “Achieving Agility: SOA Will Build Organizational Agility, but Watch the Hype”; by Janelle Hill, April 2006.
3. Ultimus White Paper; “Ultimus and the Business Process Ecosystem: Complementing SAP and Enterprise Applications” by Ultimus, June 2006