

## Putting the Web to Work:

Technology powers a new era in services procurement



A WHITE PAPER PREPARED BY PHIL WAINWRIGHT OF PROCULLUX VENTURES

# Table of Contents

- Meeting the Services Challenge..... 2
  - Why is there no Amazon.com of Services? ..... 2
  - Sharing Technology Services ..... 2
  - Service-Oriented Architecture..... 3
    - Figure 1 – SOA Enables the Reuse of Software Components in Many Different Contexts ..... 3
  
- The Language of Services ..... 4
  - Rearden Commerce: An XML-Based Service Business Language ..... 5
    - Figure 2 – The Structure and Value of SBL..... 6
  - Control for the Business Manager ..... 6
  
- A Coordinated Infrastructure ..... 7
  - Figure 3 – The Rearden Commerce Platform ..... 8
  
- Secure Enterprise Integration..... 9
  
- Connecting Suppliers ..... 9
  
- Look to the Future..... 10
  
- About the Author ..... 12
  
- About Rearden Commerce..... 12

# Meeting the Services Challenge

## WHY IS THERE NO AMAZON.COM OF SERVICES?

The online bookseller has remorselessly expanded into other retail categories – everything from garden furniture to groceries to cell phone contracts. Yet there's no equivalent to Amazon.com in the services sector: somewhere you can log in once, reserve air tickets, ship a parcel, and schedule an online meeting, and then pay for them all on a single checkout tab.

Why not? The answer is simple: a service is a far more complex entity than any physical item.

Automating the buying, selling and fulfilment of services as a single integrated system goes far beyond what's involved in building a simple trading exchange or electronic marketplace. Once specified, a physical product remains the same, whomever and wherever it is delivered to – it can be easily presented in a catalog, and in most cases has a shelf-life of months or even years. A service is a process: it varies according to time, place, and context, has to adapt to the needs and preferences of multiple participants, and is often dependent upon or interacts with other services. It has to be delivered as a joined-up process, coordinated with the requirements and circumstances of the recipient. Services, unlike physical products, are inherently perishable – a vacant hotel room, idle taxi, or open restaurant table are all revenue opportunities that disappear forever when left unused.

A service is a process: it varies according to time, place, and context, has to adapt to the needs and preferences of multiple participants, and is often dependent upon or interacts with other services.

It's difficult enough to cater for all these factors when working with just a single category of service. Doing so for every imaginable type of service – along with others that don't yet exist – requires a truly adaptable architecture: one that allows any service to interact with any other, and which provides an open mechanism for adding any new service, content, or functionality that is required by the individual or the enterprise.

## SHARING TECHNOLOGY SERVICES

Consider the infrastructure to support awareness of time and place, to manage personal and business user profile information, secure millions of transactions across unique buyer-merchant connections and finally to co-ordinate the delivery of services to recipients. Functions such as calendaring, geo-location, policy definition and implementation, notification, real-time security, and profile management must all be equally and openly available to every service and process that needs to make use of them. The architecture should also allow for adding new technology services to support emergent capabilities in fields such as social collaboration and user-designed process management.

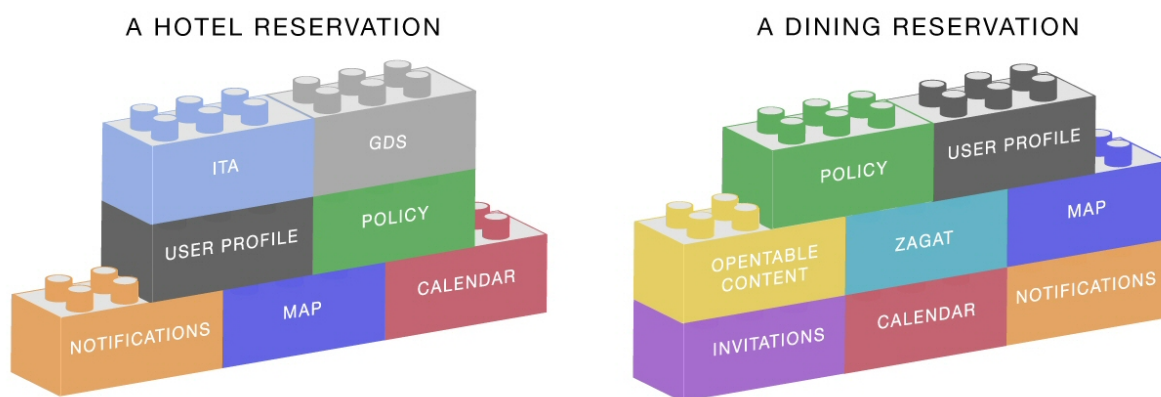
Importantly, a set of higher-level services has to seamlessly orchestrate all this plug-and-play interaction between the various resources defined in the system.

To meet the requirements of enterprises, additional capabilities are required. The system must be able to implement corporate policies on permitted and preferred suppliers, user entitlements, and approval processes. It must be able to exchange information with other applications within the enterprise. And it must integrate with the user's environment, connecting to their calendar and colleagues and remaining constantly in touch with them when on the move.

## SERVICE-ORIENTED ARCHITECTURE

Because of the nature of the requirements described, it has been essentially impossible to deliver an open, integrated marketplace for services. The advent of what technologists call a 'service-oriented architecture' or SOA is critical to the construction of such a complex marketplace. Each service in an SOA is a separate resource – a specialized component with its own individual capabilities, ready to be called up to work together with any other service or set of services to produce a result. The services architecture provides the common framework that brings together all the individual components as required, and then choreographs their performance in real-time to ensure effective, reliable service fulfilment.

**Figure 1 – SOA Enables the Reuse of Software Components in Many Different Contexts**



LEGO blocks are often used as a metaphor for SOA. A given LEGO set includes blocks of many sizes and shapes, perhaps along with some wheels, gears, hinges, and so forth. Each piece can be fitted together to meet the needs of the user at the time – building a car or a house or an airplane – then taken apart and reassembled as something entirely different at a later date. All the pieces have been engineered to connect together without modification, allowing the user to focus on what they want to accomplish rather than spending time and energy figuring out ways to connect them. Aptly, just as the toymaker continues to deliver new types of LEGO blocks and accessories, they all interconnect with the original pieces, making the 'set' almost infinitely extensible.

In computing, the long-term aim achieved through SOA is 'reuse' – the ability to use the same software over and over again in various different scenarios, instead of having to rewrite new software every time. Using a services architecture to provide all the functionality of calendaring, geo-location, policy compliance, and so on makes each of those technology resources automatically available for use – with no coding required – to each new real-world service that is added.

More importantly, the same benefit of reuse can be applied to the business services themselves – simply by hosting the infrastructure and making all of its capabilities available as shared services to many different enterprise consumers and individuals.

Implemented as a hosted, shared infrastructure, the SOA approach means that enterprise buyers can make new business services immediately available to their users without having to wait for teams of IT consultants to craft a new integration layer to connect to an individual supplier. The enterprise only needs to connect to the shared infrastructure. Any supplier plugged into the same infrastructure is available to any enterprise that wants to use its services.

One further element is essential to bring all these capabilities to life. On its own, an architecture is just an empty framework. To populate it with services, users, business rules, processes, and interactions, there must be some agreed way of defining and directing all those elements: a common semantic framework for presenting and coordinating the characteristics, contexts, and behaviors of the various participants, capabilities, and processes.

## The Language of Services

Commerce cannot function without shared semantics – each party to a transaction must have pretty much the same understanding and use the same language to describe the deal they are striking: product specifications, pricing, quantities, delivery arrangements, guarantees, and so on. Most of the time, there is no need to explicitly acknowledge those shared frames of reference because they are implicit in the context in which a transaction takes place.

But they rapidly show up as errors and misunderstandings when taken out of context.

This is why online services procurement has largely been cordoned off within category silos. Feature sets, service delivery parameters, pricing metrics, specifications, and terminology often vary from one supplier to another, and there are even more variations between different categories of service.

When all the parties to a transaction are talking about the same type of service, the semantic context can usually be taken for granted. When many different services have to be brought together, every separate nuance of meaning must be understood in order to present a coherent, unified view for the user.

## Why SOA Matters

SOA is as critical to constructing a services marketplace as the Web itself has been in enabling online sales of hard goods. Many aspects of the task are entirely dependent on the capabilities SOA was devised to achieve:

- Potentially limitless numbers of independent participants – it's impossible to know in advance the characteristics and qualities of all the services that might join the network. A services marketplace therefore has to provide a neutral framework that allows participating merchants, consumers, and content providers to interact freely, without imposing constraints on what they offer and how they fulfil their service obligations.
- Delivery to contract – there are huge variations in quality and capabilities, even between similar services. Clients have equally varied requirements and preferences. The architecture must offer a contractual framework for settlement of the various obligations and options to be fulfilled when any service is delivered to an individual client.
- Participant awareness – services are delivered to individuals in the real world. This means aligning each service with the specific needs and preferences of the individuals concerned, ensuring they are aware that the service exists when and where they have a need for it, and co-ordinating schedules to ensure participants will be available to receive services.
- Time and location dependency – unlike physical goods, which can sit on a shelf ready for use, services exist for delivery at a specific time and place. Unsold seats on a flight or in a theatre have no residual value once the gate shuts or the curtain rises.
- Orchestrated delivery – many services are interlinked, such as travel and hospitality services throughout a trip. Changes to one service (for example, changing a flight time) may have a follow-on effect on others. They may also be disrupted by external events.

The first task when setting out to build a single, coordinating infrastructure for service procurement is to develop a semantic framework – a technology “language” capable of handling every possible aspect of service description and delivery. The nature of services makes this a much bigger task than is required to describe physical products.

The framework must be able to represent actions and sequences, time and place, interactions between services, and other intangible qualities. While a book and a bathing suit purchased from Amazon.com have no intrinsic connections to one another, a flight arrival and car-service pick-up are inherently linked by time and location. Without that connection, the consumer of the service is left out in the cold – quite literally.

Importantly, the semantics must also provide a mechanism that allows each vendor to express the features that differentiate their services, without growing too cumbersome and unwieldy for practical use.

A huge, hidden benefit flows from standardization on a single, shared semantic framework: it switches the focus from suppliers to users. Closed, proprietary semantic systems force customers to adapt their processes to the needs and requirements of individual suppliers, which leads to a highly fragmented experience for users as they navigate their way from one supplier silo to the next. When suppliers all participate in a single, shared framework, it becomes possible to design the platform to bring suppliers and their services together in a way that suits the user’s requirements and workflow.

## REARDEN COMMERCE: AN XML-BASED SERVICE BUSINESS LANGUAGE

It is inevitable that such a framework should be defined using XML, the lingua franca of ecommerce, designed with the specific purpose of expressing semantic structure. XML provides the raw material for expressing the root attributes of any service in a form that can be electronically represented and manipulated at any point in the procurement and fulfilment process.

The first production example of such a framework is found in the Rearden Commerce Network, a platform that realizes the concepts outlined in this white paper. Rearden Commerce has developed an XML framework called Service Business Language (SBL), which establishes the basic structure required to describe, contract for, and deliver any type of service. Using SBL, Rearden is able to define all the components that make up any category of service, working with suppliers and customers to ensure that the definition adequately expresses all the possible permutations and behaviors associated with that type of service.

### Common Language Brings Cohesion

An XML framework called Service Business Language (SBL) establishes the basic structure required to describe, contract for, and deliver any type of service.

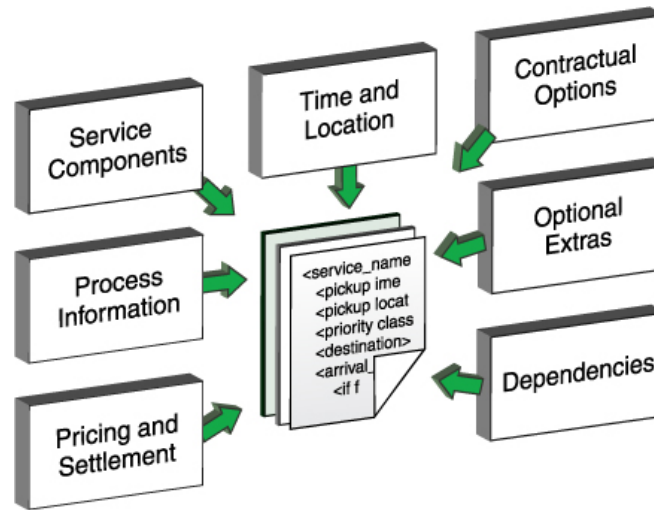
capabilities, resources, and processes behave in specific interactions, making it possible to represent and manipulate services from a multitude of different suppliers. It defines facets such as:

- Profile and preferences
- Location and time
- Workflow and orchestration
- Services characteristics (both at a category level and at an individual level)

This is the key to bringing consistency, control, and co-ordination to the automation of the services procurement process. Providing a baseline for the scope of the challenge, Rearden Commerce has identified more than 80 separate components that make up the root definition of a generic service.

**Figure 2 – The Structure and Value of SBL**

Service Business Language uses XML to establish the basic structure required to describe, contract for and deliver any type of service.



SBL encompasses both content and transaction information. For example, a parcel delivery service would require information about size, weight, from and to locations, priority options, pricing, contract terms, and so on. Some components will be core, such as having a pick-up location and a delivery address, while others will be optional, for example, whether same-day delivery is available.

Some of the information will describe the process, enabling the Commerce Network to successfully fulfill the service. For example, recording the tracking ID and raising an alert if the parcel is delayed en route. It may also document interdependencies between services, such as the potential to offer airport parking when the user is booking a flight from their home airport, or the impact of a delayed flight on a car service booking.

Once this work to define the make-up of a service category is complete, it exists in SBL as a set of common abstractions to which suppliers can relate their operations. All that a supplier has to do to connect to the Rearden Commerce Network is publish a web services interface that maps to the SBL definition.

## CONTROL FOR THE BUSINESS MANAGER

As soon as a supplier connects to the network, its services are instantly visible to potential customers, ready to be harnessed using the common semantic framework. This is where the convenience and control that flows from the shared structure becomes evident.

Procurement managers can select their preferences with a series of mouse clicks. Expressed using the system's shared semantics, those preferences are then instantly replicated to the user environment.

The Rearden platform provides a comprehensive management console, where procurement or travel managers can view all of the suppliers available on the merchant network, along with workflow options that relate to the new services, and enable or disable stores, applications, or merchants as required. In SOA jargon, the console is essentially an application registry – a listing of the applications available via the Rearden Commerce Network, along with a range of policies to govern them. The business manager can easily turn those applications on or off, along with any associated merchants, based on policy requirements. An important component of the value of shared services or SaaS

solutions, such as Rearden, is the fact that additions to the commerce network, including stores, applications or content, are immediately available to all participants, all within a common, secure management context.

The console provides a simple, point-and-click mechanism to manage and update corporate policies within the system, from company-wide decisions down to groups and even individuals. Selecting preferences with a series of mouse clicks, managers can activate a supplier for the entire enterprise, or limit availability to individual users or group of users. They can attach spending limits or conditions for service options, and they can link the new services into workflow that links to related service bookings.

Those preferences – expressed using the system’s shared semantics – are then instantly replicated to the user environment. Any user ready to buy that category of service will see the new offering integrated into their usual workflow, with comparative pricing and features from competing service providers presented side-by-side in the familiar environment of Rearden’s user interface.

With all the resources of the underlying infrastructure to draw on, the user is freed from the inconvenience and wasted effort of dealing with the old, proprietary supplier silos. Instead, the procurement process revolves around the needs of the enterprise and the individual user, presenting only those services options that meet the user’s entitlements, preferences, and context, fully integrated into their normal workflow and related applications such as calendar, email, and expense management.

## A Coordinated Infrastructure

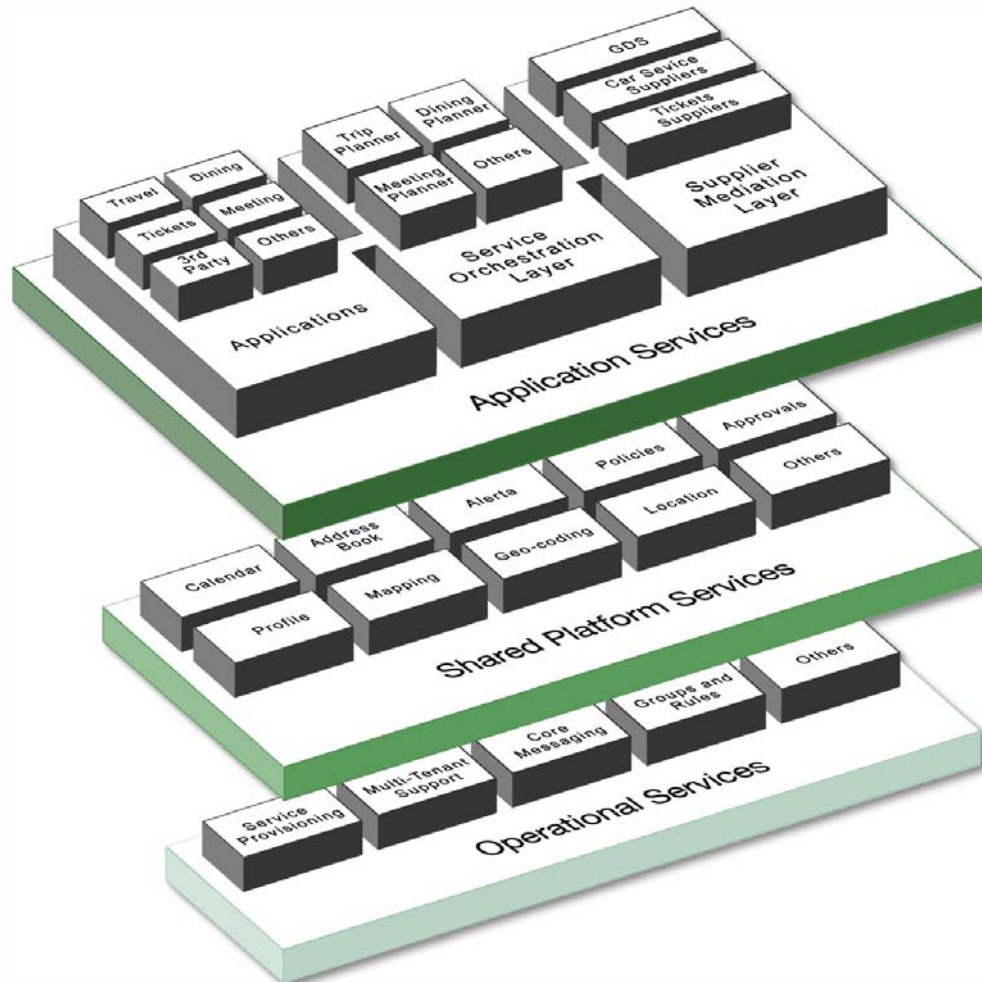
Rearden’s shared semantic framework is the foundation for the entire services architecture, delivering context and meaning to all the interchangeable ‘plug-and-play’ capabilities that come together to introduce, compare, co-ordinate, and fulfill services. While it defines the external business services themselves in a format that allows them to be represented and manipulated within the system, it also defines how they can interact with, and take advantage of, all the other resources within the infrastructure.

A number of functional services are provided within Rearden’s platform in order to provide truly user-centric, efficient, and integrated procurement and fulfillment processes:

- **Understanding time and place** – Using capabilities such as address validation, geo-coding, and calendaring, the underlying technology helps to ensure services are booked to valid addresses (saving potential errors, misunderstandings or extra charges) and by tracking user progress and activities allows applications to present selection options based on time and location.
- **Understanding identity/profile/preferences** – The system is able to look up and interpret contextual and metadata information about individual users in order to adapt service selection and delivery to the grade or context of users.
- **Recording and interpreting policy** – A policy engine provides a facility to set up and adjust rules and policies on an individual, group, or corporate level, for implementation either instantly or at a selected future date.
- **Linking to user schedules** – a set of services manage access to calendars and address books. They can synchronize information about context and location so that appropriate services are offered at the time of booking, and then update the user’s calendar once the booking is made. They can also send out notifications or trigger actions in response to specific events, such as a service delay or cancellation.
- **Device independence** – anywhere, anytime access to service information. Notifications can even be sent via automated voice messages, text messages, email, and fax.

**Figure 3 – The Rearden Commerce Platform**

The Rearden platform consists of a rich set of coordinated technology services.



Building on those base-level services and interacting with the business services themselves, the Rearden platform then takes all of the filtered, user-specific information it has available and uses it to co-ordinate convenient selection and accurate delivery of services as specified in the application registry. While the applications available today are all built and delivered by Rearden Commerce, the registry is designed and implemented to manage and deliver third party applications as well. Once plugged into Rearden's SOA infrastructure, those applications could in turn take advantage of the functional services described above, or other Web services delivered by Rearden and third parties.

A set of 'super-services' residing in a separate service orchestration layer then joins services together as required into user workflow, composite functionality, or orchestrated fulfilment of a process:

- **Supplier selection by policy** – Based on the information stored in user, supplier, and service profiles, the system displays content and options according to stored corporate and procedural policies and user context.
- **Service orchestration** – Co-ordinates integration and combination of separate services into complete end-to-end processes, including the ability to adapt to changing circumstances, provide alerts, etc.

- **Transaction management** – Ensures settlement of financial obligations in return for services rendered and handles distribution of payments to participating service providers.
- **Message routing and event handling** – Maintains state information up-to-date and automatically adapts to any changes in circumstances in accordance with pre-defined policies.

A further set of components interacts with the underlying services to present information and choices to the user in a readily digestible and actionable format.

## Secure Enterprise Integration

Information about employee job titles, departmental groupings, rights and privileges, home locations, calendar schedules, and so on is typically held in an organization's existing IT systems. To make this information available to the services procurement system, Rearden's architecture allows the use of standards-based Web services interfaces to connect to enterprise applications such as groupware, HR management systems, and directory services information. The connections mean these systems appear as just another set of infrastructure services, from which the information can be accessed as required.

In the Rearden Commerce Network, connections to enterprise systems are managed and controlled by an organization's own internal IT staff. Rearden adheres to industry standards for single sign-on (SSO), so administrators can simply include the Rearden

A full set of web services security standards are supported, and the system complies fully with existing enterprise security policies

Commerce Network within their existing policies and protocols. A full set of Web services security standards are supported, and the system uses real-time look-ups rather than storing the information in a separate registry, thus complying fully with existing security policies. The Rearden Console also provides robust, delegated controls for access to and consumption of services based on criteria such as location, title, roles and corporate policy. New calendar events created by the Rearden system can be automatically updated to corporate groupware applications such as Notes or Microsoft Exchange/Outlook through tiered, policy based connections that remain under the control of the internal IT staff. Only events created by the Rearden system can be modified later. In keeping with good security policy, the system has no ability to cancel or change calendar events it has not itself created.

Rearden's service-oriented architecture also permits secure, managed information exchange with enterprise business systems such as expense management applications, purchase ledgers, and other financial reporting systems. This eliminates the potential for errors when transcribing manual records and provides a clear audit and compliance trail for reporting purposes.

## Connecting Suppliers

A standards-based service description language like Rearden SBL connects suppliers into the resources of the system in a way that masks much of the underlying complexity and keeps their onboarding costs to a minimum.

Each service category defined in the Rearden Commerce Network is designed in consultation with a cross-section of suppliers and customers to represent all of the features, operations, and options associated with that type of service. This is where all of the hard work is done upfront to establish a semantic framework capable of handling all the different individual offerings that may become available, and which enables all the rich capabilities for comparison, workflow, adding value through complementary technology services, and so

on. Nevertheless, it can be completed in a relatively short period. Including the time taken to research service characteristics with suppliers and customers, implementing a new service definition on the Rearden Commerce Network has been completed in as little as 4 to 8 weeks from idea to production.

The SBL service definition then links all of those elements to the underlying infrastructure of the Commerce Network, which means that features such as calendar integration, geo-coding, and notifications are all automatically associated with any new service. For suppliers, this means that the simple act of mapping their operations to the SBL service definition instantly connects them to every customer and adds all of the Rearden Commerce Network's automated functions to their service offering.

With the incentive of being able to reach a large and expanding enterprise customer base to lure them, suppliers need little convincing of the value of making this small investment of development time in order to join the platform. That in turn benefits customers, who have access to a larger pool of suppliers offering a more varied range of services – many of them services that have not previously been available through this kind of integrated, automated system.

## Look to the Future...

The technology services built into the Rearden Commerce Network offer a rich seam of functionality that has never before been combined with such a flexible architecture for accessing and manipulating business services. Adding a foundation of semantic structure and flexible coordination to online booking has a dramatic impact on services procurement, bringing unprecedented convenience, efficiency, and oversight to buying, management and fulfillment processes.

- **Enterprises** gain real-time visibility and control of services procurement, with corporate policies embedded unobtrusively in their users' services booking workflow.
- **Individual users** can complete services bookings that match their needs and preferences without spending valuable time and effort switching between multiple supplier websites. The system automates all the repetitive tasks of services procurement and puts the information they need at their fingertips.

## New Opportunities for Supplier Innovation

Rearden's standards-based services infrastructure provides a flexible platform for combining multiple business services and technology services into innovative new composite applications. Among the applications and services that could emerge:

- **Rebundling services in new ways** – A supplier can become an entry point for booking services targeting a specific marketplace. For example, a site dedicated to registering people for athletic events like triathlons could take advantage of flight/hotel/car and shipping services from the network. Then, when an athlete registers for an out-of-town event, the site can leverage the infrastructure to provide a "full out-of-state triathlon experience" where the participant can get their bib number, flight, hotel, rental car (with bike rack) and ship their bike, all from one website.
- **Time-based, location-based propositioning** – by intelligently collating information that the system knows about an individual's preferences, location and activities, it can proactively propose relevant services or perform appropriate actions. For example, suggesting an event ticket on an open evening; recommending a restaurant near a hotel that meets individual dining preferences; or offering to invite friends or colleagues to dinner during a trip, coordinating that with a dining reservation and handling all the confirmations.
- **Deriving categories by correlating context / attributes** – intelligent analysis of data might allow a sales manager booking a trip to a particular city to see a selection of hotels or restaurants preferred by others of a similar job title or preferences.
- **Simple access to additional third party applications** – opening up the application registry to include new and existing third party applications, such as expense management, hard goods procurement and so on, that take advantage of Rearden's shared services platform.

- **Suppliers** can expand their reach and enhance their quality of service fulfillment for a minimal upfront investment.

Most importantly, the flexible service-oriented architecture, application registry, and XML-based business semantics of the Rearden platform are designed to allow continuous adaptation to evolving user requirements. As well as establishing a new state-of-the-art in integrated services procurement for today, it provides a platform for moving forward into the next generation of services procurement applications, capable of embracing whatever new waves of innovation the future holds for buyers and suppliers.

## About the Author



Phil Wainwright is one of the world's foremost authorities on emerging trends in business services automation. He is a prolific writer with a ZDNet blog on Software as a Service, the Loosely Coupled website on enterprise adoption of service oriented architecture, and a series of influential analyst reports to his name. He serves as CEO of Procullux Ventures, a London-based strategic consultancy for web services and on-demand ventures.

Daily software as services weblog: <http://blogs.zdnet.com/SAAS/>

Procullux Ventures: [www.pcxvs.com](http://www.pcxvs.com)

Detailed biography and links: [www.philwainwright.com](http://www.philwainwright.com)



## About Rearden Commerce

Rearden Commerce, Inc. is the world's largest online marketplace for services of all kinds. Through Rearden's online personal assistant, employees purchase services from a trusted network of over 135,000 global services suppliers based on personal preferences and company policies. Rearden Commerce is headquartered in San Mateo, CA. For more information, visit [www.reardencommerce.com](http://www.reardencommerce.com).

