

# The business benefits of rich Internet applications for enterprises

## Executive summary

### Table of contents

- 1 Understanding rich Internet applications
- 3 RIA access points
- 4 The role of RIAs in the enterprise
- 6 The value proposition of RIAs compared to existing technologies
- 8 The Adobe Flash Platform
- 9 The value of the Flash Platform for IT delivery teams
- 10 RIA development and delivery considerations
- 11 The reality of enterprise RIAs
- 12 Appendix

*“The term rich Internet application (RIA) describes the new category of applications that bridge the client and the Internet cloud.”*

Adobe has a long history of providing technologies that have changed how people engage with ideas and information: technologies that have redefined business, entertainment, and personal communications. For nearly two decades, Adobe has focused on improving the web experience and on delivering the underlying technologies used to produce more interactive and expressive websites and applications. These engaging experiences have been widely adopted and deliver tangible return on investment (ROI) to the businesses that deploy them.

The term rich Internet application (RIA) describes the new category of applications that bridge the client and the Internet cloud. They have come about as a means of solving the “rich versus reach” conundrum, enabling Internet applications to be both rich in functionality and engaging to use, yet able to take full advantage of the Internet’s reach, connectivity, and deployment model.

To date, RIAs have been promoted in support of engaging and retaining consumers and applied broadly to improve consumer facing applications and interactions. However, many of the capabilities that make RIAs a significant value proposition for consumer-facing applications offer similar benefits for business-to-business interactions and applications. Online stores, product selection and customization, the streaming of video, and rich imagery all have value within the context of enterprise-facing applications.

The real excitement is that RIAs enable new classes of enterprise applications that can greatly improve the access to data stored within the organization, helping employees to better understand and use that data and to support their working practices in richer, more interactive, and more intuitive ways. The outcome of this is not only increased levels of employee productivity and effectiveness; it can be the differentiator needed to achieve competitive success, business innovation, and operational excellence.

The most important consideration for RIAs is that they are used appropriately and within the context of the interaction. The Adobe® Flash® Platform is an integrated solution that enables designers and developers to easily work together to build and deploy enterprise RIAs that enable more effective interaction.

### Understanding rich Internet applications

#### What is an RIA?

A rich Internet application is the focal point of the convergence between desktop applications and browser-based clients. RIAs combine the strengths of both domains while liberating the user from their respective constraints.

A rich Internet application is a lightweight application with a subset of the functionality and feature set of a desktop application. The user interface may run in a web browser or some other application runtime. On first use RIAs are downloaded and accessed on demand. They may then be cached for future use or, in some scenarios, be deployed onto a device to provide access even when the user is disconnected from the network. Data may be cached locally and then synchronized with a remote server or may be kept on the server and retrieved when necessary.

### **Why are RIAs important?**

Interactions with data and information stored in IT systems have evolved. The mobility of applications is a reality underpinned by the evolution of the Internet, the ubiquity of communication networks, and the explosive growth of portable devices and home entertainment systems. As bandwidth availability has grown and quality of service improved, more cost effective connectivity has increased adoption and reach. Your employees are no longer bound by their desktop systems. The affordability of improved bandwidth connections, combined with the rapid adoption of handheld devices and connected systems inside the home has led to a workforce and consumer audience that is more aware of the types of interactions open to them and expects more as a result. The boundaries between software applications and computers systems at work and those available to the home market are disappearing. Your workforce may be better connected and exposed to the flexibility and mobility of applications at home and on their personal handheld devices than they are at work.

The volume of structured and unstructured data is growing within organizations as well, even as it spreads to a wider range of computer-based systems. How your workforce gets access to that data in a seamless, more intuitive and flexible way will be a vital component to long-term success and productivity.

RIAs separate the application from the platform or device on which it is being used. This partitioning makes RIAs flexible and reduces the costly support associated with desktop applications. Small and lightweight, RIAs can be installed by the user quickly, easily, and when they are needed.

Unlike static web applications and desktop applications that are constrained by their domain, RIAs can be used in either a connected or disconnected mode. As a result, the richness typically associated with large desktop applications can be applied to a lightweight application. This is something that static web-based applications have struggled with substantially in the past, and marks a big step forward.

Underpinning RIAs are the tools that bring together design and development teams to realize the opportunity presented by combining a rich user interface (UI) with rich functionality.

RIAs represent an important value proposition to usability, flexibility, and the long-term effectiveness and efficiency of business applications and operations.

### **Types of RIAs**

One of the best ways to facilitate the adoption of new technology is to introduce it where it can have the most benefit. This is very true of RIAs. It would be easy to look at the rich media that RIAs support and see them as simply a better way to engage with consumers. This view is reinforced for many because the first wave of applications has centered on consumer and media consumption. The focus has been predominantly on the media and marketing and social applicability of RIAs. In this domain, rich media and graphical imagery have held sway.

However, this ignores the value proposition of RIAs for the enterprise, where the ability to effectively consume, interpret, and create data and the capacity to communicate flexibly to key audiences (for example, your employees, supply chain, and consumers) can differentiate your company from your competitors.

Despite overlapping value propositions, there is a clear separation between consumer RIAs and enterprise RIAs.

### Consumer RIAs

There are generally two types of consumer RIAs: those that allow your customers to engage with you and your products (marketing and business-to-consumer applications) and those that provide a better experience when consuming content such as films and music (media applications). RIAs work well in both of these spaces because the rich-media capabilities and interactivity allow developers and designers to engage users and create that stickiness that defines an exceptional customer-facing application.

Engaging customers is always a challenge for online business-to-consumer applications. It is one that has restricted the potential for online shopping compared to visiting real-world shops. Early attempts to create online clothing shops where the user could see what the clothes looked like on a mannequin with their measurements were slow and difficult to use. RIAs are now being developed to improve these types of applications, allowing the buyer to get a real idea of whether the clothes will fit and resulting in a reduction of costs associated with returns and stock management for the vendor.

Buying cars is another area where RIAs have revolutionized customer interaction by enabling users to create their own car specification, see how it looks, make changes, and then submit an order to be custom built by the factory. Kitchen and bathroom suppliers are already following suit and building their own RIAs to streamline similar processes.

*“RIAs work well where line-of-business applications need to be deployed quickly and maintained constantly.”*

### Enterprise RIAs

For some time, enterprises have had to choose between using static web applications, which are often low on rich features, and deploying desktop applications, which are complex and difficult to install. By combining the strengths of both web and desktop applications, RIAs add value rather than complication.

There are a number of ways that RIAs can be used effectively within the enterprise. RIAs work well where line-of-business applications need to be deployed quickly and maintained constantly. They have a small footprint and can be delivered via a web server or an application server on the company network. This multiple delivery approach is important because it allows RIAs to be delivered over a wide variety of connections from the LAN to the web and even via CD or DVD.

Just as with consumer RIAs, there are two areas where initial development has been concentrated in the enterprise: task-oriented applications and providing decision support. In some cases these can be extended to your customers. See, for example, the insurance claim forms outlined in “The role of RIAs in the enterprise” later in this white paper. Often these task-oriented RIAs provide an opportunity to incorporate real-time collaboration between customers and employees.

In the appendix, three enterprise RIA case studies that demonstrate the effectiveness and reach of RIA solutions within an IT portfolio typical of many enterprise organizations today are examined.

### RIA access points

Web, desktop, and mobile applications all serve as entry points for accessing RIAs. The de facto approach has been through the browser using asynchronous JavaScript and XML (AJAX), a group of development technologies for creating interactive web applications. Alongside AJAX are applications that execute in a virtual machine (VM) such as Adobe Flash Player, which can be delivered through the browser and also as a desktop application on top of the Adobe AIR® runtime. There are also VMs based on Java and other technologies that, like Adobe Flash Player, can run in the browser. Some of these other technologies can also be deployed on the desktop, but they are typically limited to a particular operating system.

One area in which RIAs are delivering on their promise is portal technology. RIAs are being used to enhance, and in some cases replace, portals. The flexibility that portals were expected to deliver has been hard to achieve, and RIAs are now being used to provide the functionality that portals were going to bring to the market. Packaged application systems from vendors such as Salesforce.com and SAP are good examples of how RIAs can fit into existing solutions without requiring a rip-and-replace strategy.

Adobe AIR moves the entry point away from the browser and onto the desktop. The AIR runtime provides the underlying technology to allow developers to use both Flash and HTML to build and deploy applications outside the browser.

When an RIA is deployed outside the browser it can be cached locally, allowing users to work when connected or disconnected from the network. In addition, the application can also integrate better with existing installed programs, such as word processing, spreadsheet, and e-mail applications, enabling common actions such as drag-and-drop between RIAs and native applications.

Today, users are no longer bound by the web browser and desktop. The next frontier for RIAs is the plethora of devices beyond personal computers. Just as the Internet greatly extended the reach of personal computer applications, the rapid evolution of smart phones and Internet-connected mobile devices is changing expectations for how content is delivered on the go and how applications can be accessed by a more mobile audience.

Deploying an RIA as a mobile solution presents challenges. There is a lack of consistency between the mobile browsers on phones, PDAs, and other Internet devices. At the same time, screen size and quality limit the richness of the media. Interactivity can also be a challenge given the limited size of the handset.

The Open Screen Project spearheaded by Adobe is a consortium of partners committed to providing an open platform for the next generation of RIAs that reach across devices ([www.openscreenproject.org/about/faq.html](http://www.openscreenproject.org/about/faq.html)). The consortium comprises vendors from the software development, networking, hardware, handsets, and operator markets, working together to improve the consistency of user experience across multiple device platforms.

Regardless of the mobile device (laptop, mobile phone, or PDA), RIAs work independent of the underlying operating system. As with any technology, however, reaching out to all access points will take time. The Open Screen Project will help drive direction and consistency, which in turn will help accelerate wider adoption.

## **The role of RIAs in the enterprise**

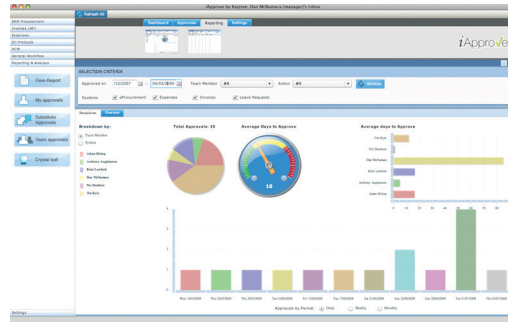
### **Decision support**

RIAs in the enterprise enable interactive and easily accessible dashboards, which promote better decision making across the organisation. A primary advantage of RIAs is that they are agnostic when it comes to back-end data sources. They employ a data service layer that enables them to be linked to back office and management systems. Two of the case studies that follow provide good examples of RIAs being used to help employees make decisions that can have a major impact on the organization's ability to perform effectively.

Business intelligence (BI) and customer relationship management (CRM) application suppliers are using RIAs to improve access to complex environments. They are developing RIAs as a replacement for some web-based applications, and using them to extend their portals where they want to offer more interactive applications to their customers.

SAP, Salesforce.com, Oracle, Business Objects, and Intuit are examples of those suppliers who see RIAs as a valuable user interface to their products. As a result they provide compelling examples of the potential of RIAs in business-to-business applications.

For many of these companies, RIAs represent an opportunity to produce interactive applications that take advantage of the rich media inherent in the RIA model. Consider, for example, the form-based systems that abound in the enterprise. When written as web applications they become page driven, they must download information every time the user goes forward or backwards, and they have limited functionality. Their desktop equivalents have a tendency to grow surprisingly large and require increasing amounts of support to install and manage.



Existing RIA implementations by CRM and packaged application vendors demonstrate the kind of opportunities available for businesses to build custom RIAs that integrate with multiple back-end office systems.

The RIAs developed by Keytree at News International for financial data entry and approval met a general need in large enterprises for streamlined and intuitive decision making and approval.

In the Keytree application iApprove, for example, Adobe Flex® and Adobe AIR combine to provide high performance access to multiple back-end ERP systems, a highly flexible and intuitive UI, and easy deployment.

### Task-oriented workflows

Making task-oriented workflows more productive is another core function for RIAs within the enterprise.

RIAs can accelerate data input through caching, just as in a desktop application. The input screens can be easily tuned to streamline them for the data entry user, just as in a web and portal applications. When the user wants to interpret the data they can use media-rich components to present the data simply and effectively.

Facing budget and time constraints, many companies have begun to make more use of online training. This media rich environment has suffered badly from the limitations of existing web-based and desktop approaches. Vendors such as Parleys.com are moving beyond those limitations by using RIAs to introduce more interactive training solutions. Users no longer learn just by rote; instead the materials and the tests are more interactive, enabling better comprehension and enhanced learning.

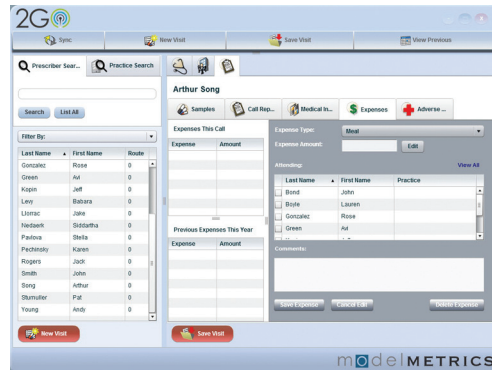
Using RIAs for data entry systems can also dramatically reduce workloads. Consider the example of insurance claim forms. While there have been web-based options for some time, they are often inflexible and all the forms have to be validated and reviewed with the customer. This is not much faster than the old method of sending out paper forms and then entering the information manually. The problem lies with making the forms easy to use and to complete. RIAs allow these forms to be more interactive, prompting the user for information, dynamically determining the workflow of data inputs based on the information given, and suggesting examples. This speeds up the process, improves accuracy, and saves time for the customer and insurance company alike.

Substantial effort has gone into developing self-help customer service solutions that help users resolve problems without accessing a call center. While make these applications easy to use has been a challenge, the rich media capabilities of RIAs can be a significant help. Examples include:

- Interactive videos and tutorials
- 3D images that can be rotated by the user to match what they are looking at in the real world
- Hot spots that allow the user to zoom in and access more detailed information
- One-click buttons to talk to a live person
- Real-time sharing and data collaboration

Many of these features can be applied to existing applications that you may be using today to reduce costs and improve customer loyalty. Without an RIA focused development and delivery platform, however, implementation can be difficult, costly, and require specialized skills and an experienced knowledge base.

One of the main business benefits of using the Model Metrics Pharma2Go application, built on top of Adobe AIR, is the ability to capture data in both online and offline environments and then deliver that data automatically to back-end systems. This allows sales reps to capture information where and when it is available, without worrying about whether they have an Internet connection.



### The value proposition of RIAs compared to existing technologies

RIA technology has not arrived in a vacuum. For years, users have been trying to access corporate data and applications from remote locations such as the home, hotels, or on the road. Developers are always looking for new and better ways of delivering applications and improving functionality.

For many organizations the move towards RIA is an extension of their existing outreach through web-based applications and is driven by a need to reduce the cost of supporting users whether they are office-based, mobile, or home workers. Supporting these users has not been easy with existing technologies.

### Virtual Private Networking

Companies frequently employ a Virtual Private Network (VPN) to allow users to connect securely to the corporate network and access applications and data. VPNs create a secure link between the user and their office by encrypting traffic sent over a public network.

With VPN tunnelling, the challenge was managing access from hotels, which have often charged more for IP addresses that would allow the use of VPNs. Then there was the technology itself, which often differed from one security provider to another, forcing companies to rip and replace hardware to get a working solution. With the introduction of Secure Socket Layer (SSL) VPN, these problems have been largely eliminated, but not every company uses SSL VPN or has a single provider of firewalls or security products.

### Thin clients

Thin clients, which run the application on the server and keep the data on the corporate network, are another widely deployed option. Access is through a web browser to a remote desktop inside the office.

Thin client technology has been successful in many areas, but it is difficult to size servers appropriately, leading to performance degradation. In many cases, load-balancing clusters, which can be both expensive and technically challenging, are required. A more important issue is the limitation of the types of applications that are suited to this approach. While many promote thin clients as personal desktops, in practice, the shared processing and resource space means that graphic intensive applications and those with large memory or processing requirements are often difficult, if not impossible, to access via thin clients.

### **Web applications and portals**

Web applications and portals were designed to make life more flexible for the IT team and to take advantage of near universal access to the Internet. While eliminating overhead of installing applications locally, web applications and portals come with a loss of the rich functionality that desktop applications possess.

Developing web applications and portals that behave consistently across different browsers and browser versions has been another struggle.

Response times and performance depend heavily on the ability of the server to manage the number of users and their requests. Security is an even bigger challenge. With the number of malware threats constantly on the rise, there is a persistent risk of usernames and passwords being captured and of infected data being sent to the server. These threats show no signs of subsiding even though there are now standard security approaches in place.

### **Remote desktops**

Remote desktops through the use of virtual machines (VMs) are the closest to a controlled desktop. The first challenge here is getting users familiar with the technology and the fact that the remote desktop is different from the local desktop. Also, because the remote desktop is a client on top of the local desktop, deployment is limited to machines that can run the VM client and have sufficient memory and processing capability. There is no synchronization capability for remote desktops meaning that they have to be copied to protect them. This takes time, as the size of a VM is substantial. While in the office and connected over the LAN it is not too onerous, but for mobile users synchronization with corporate computers is impractical. Using USB devices opens up security problems and puts the data stored on them at risk. Until providers create a viable synchronization technology this is not a remote-user-friendly solution.

### **The RIA advantage**

The limitations of all the approaches listed above have understandably delayed the adoption of new technologies. Rather than embrace technology, many users find themselves shaping the technology, something they don't have time for. This has a cost implication for the business. If users are unsure about an application or if the perception is that it hinders rather than helps, they will not use the technology.

If the application has problems with stability or there are differences between the user interface depending on how the application is accessed, then support calls increase as users look for features that are either missing or in a different place. All of this has a financial impact on the business, including wasted money and time in the development process, increased support costs, and lower productivity.

RIAs provide a way to deal with the problems of these earlier approaches. They use local processing resources in the same way as a traditional desktop application while eliminating the desktop application's biggest problem: frequent patches and changes.

RIAs are lightweight and delivered on demand, just like web-based applications. The UI components available to RIAs make them more intuitive and useful than traditional web applications. There are no large files to synchronize, as with VMs, and the local processing removes the resource problems of thin clients.

By allowing users to combine RIAs in their own workspace, the flexibility of portals is achieved with the advantage of cross-platform support and the ability to use local processing and memory. The local cache allows key data to be downloaded and stored, accelerating form input. Data can then be synchronized in burst mode, creating short bursts of network traffic, reducing the effects of network latency which can slow web applications.

## The Adobe Flash Platform

Adobe has a successful track record of delivering technology and tools that advance the user experience and support the creation of engaging, rich, and user-friendly interactive applications.

*“The Adobe Flash Platform provides the infrastructure to support the creation and distribution of high-impact, rich web and desktop applications.”*



The Adobe Flash Platform comprises four tightly integrated layers. Together, these layers provide the infrastructure to support the creation and distribution of high-impact, rich web and desktop applications.

**Clients**—Adobe Flash Player and Adobe AIR provide the cross-platform runtime capabilities that enable RIAs to be both pervasive and engaging. Flash Player offers the ubiquity of web deployment, while Adobe AIR allows the application to be extended to take advantage of desktop features.

The widespread use of Adobe Flash Player provides a broad foundation for RIAs, as it has since the original design principles of RIA were defined. By delivering content in the browser with Flash Player, developers achieve a consistent and engaging presentation experience with a wide reach that spans computers and devices. Flash Player is installed on over 98% of connected desktops and a growing number of mobile devices.

Adobe AIR supports occasionally connected computing for business applications that need to continue running even when a network connection is unavailable. This lets mobile workers such as sales and field support personnel continue use applications while offline and then synchronize when they reconnect to the Internet.

Developers can create a single Adobe AIR application installer that deploys consistently across Windows®, Mac OS X and Linux® operating systems. Once running, these RIAs can access Internet resources, as well as local files and resources.

**Frameworks**—Adobe Flex provides a highly productive, open-source RIA development framework. Flex leverages the powerful Adobe ActionScript® programming language for client-side logic and MXML to describe user interface layout and behavior. The Adobe Flash Platform also supports the use of AJAX for RIA development. With Adobe AIR, developers can use Flex and AJAX together to create revolutionary new user experiences.

**Tools**—Designers and developers must work together closely to deliver highly engaging applications. Adobe Creative Suite®, Adobe Flash Catalyst™ and Adobe Flex Builder software provide integrated workflows that enable designers and developers to efficiently collaborate in the development of RIAs.

**Servers and services**—The Adobe Flash Platform includes powerful back-end servers and services, including Adobe ColdFusion®, Scene7®, Flash Media Server, and LiveCycle® ES, as well as Blaze DS, an open-source solution for high-performance data interchange with RIAs. These servers and services provide developers with an efficient development model to leverage prebuilt services or build custom services that drive rich client applications, adding capabilities such as streaming media, collaboration, and real-time data delivery.

### **The value of the Flash Platform for IT delivery teams**

Because many web and application developers are already familiar with web technologies and programming and scripting languages (including AJAX, PHP, Java, and so on), many have little trouble writing RIAs, reducing the need for costly retraining programs. The Adobe Flash Platform and tools portfolio make it easy for developers to transition to RIA development and overcome the differences in underlying runtime environments and browsers. Adobe solutions offer support for key roles in the IT delivery team.

#### **Developers**

Developers can leverage existing skill sets to get started right away. Many existing development tools can also be used for developing RIAs, so developers can often use their existing environments. Additionally, Adobe Flex Builder is based on Eclipse, the integrated development environment that has been widely adopted by corporate IT teams and web application providers.

#### **Application and interface designers**

RIAs enable more control over how the application looks and behaves, particularly in the context of usage and interaction. The Adobe Flash Platform enables developers and designers to work together in a way that is rare in web development and not possible with desktop application development. Application and UI designers are a necessary part of the development team, and helping them collaborate effectively is a key to success.

#### **IT management and operations**

For the IT manager, an RIA strategy mitigates the need to upgrade hardware every time a new software release is planned.

From an operations/help desk perspective, RIAs have a very small footprint. Moreover they reduce support calls because they install inside a controlled environment and have the same look and feel across multiple platforms.

#### **IT security teams**

Application and data security is a significant challenge for developers today. Sharing resources at the platform and application level means that there is always a risk of malicious code. RIAs do not remove this risk but they can reduce it.

Adobe AIR provides a multi-tiered security model that enables RIAs to be more safely deployed to the desktop. A strict separation between application and non-application content minimizes the potential for unauthorized changes to the application. An enhanced HTML security model limits injection threats, and developers are provided with minimum-privilege and safe-by-default APIs. Users and administrators get the information and controls they need to help ensure that only trusted applications are installed onto their system. Finally, it is easy to deliver application updates that remedy issues, including potential security vulnerabilities; updates are verified using digital signatures to confirm their authenticity.

#### **Software testers**

Adobe has released a unit-testing framework, FlexUnit, to help developers test Flex and ActionScript applications. Developers who have worked with Java will find FlexUnit familiar as it mimics JUnit, the popular Java unit testing software.

Any code written in Adobe Flex Builder can also be tested using tools such as HP LoadRunner, HP QuickTest Professional (QTP), RadView, and Borland SilkPerformer. The Flex automated testing feature comes with built-in support for HP QuickTest Professional.

## **RIA development and delivery considerations**

To make the most of RIAs in the enterprise, there are several important guidelines to consider.

Enterprise RIAs need a good architecture and sound design principles. In addition, the delivery process must be aligned to the roles and processes of the IT organization, including web content and application providers. Hence the successful implementation of an RIA depends on many of the same requirements for delivering any successful corporate application:

- Clear vision of the application goals and requirements aligned to a desired business outcome
- Flexible and agile methodologies that promote short release cycles and interactive participation with all relevant stakeholders, especially the end customer
- Good supporting tools that promote team collaboration and communication
- Reasonably skilled resources, possessing a positive attitude and a willingness to learn
- Strong user interaction and a clear separation of concerns with a robust governance model
- Commitment, vision, and support from key stakeholders and management boards
- Robust monitoring and analytics with sophisticated reporting facilities to ensure maximum effectiveness and productivity from the application and the delivery process
- Integrated quality assurance for all phases of the delivery process

Although RIA-specific methodologies have yet to be standardized across the industry, there are areas where reuse of existing practices makes sense. Because RIAs are Internet-based applications that draw on existing web technologies and programming skills, many of the current web application design and usage patterns remain applicable, as do common fixes for known issues.

In essence, RIAs are client/server applications where the client can be deployed anywhere while the data stays on the server. Once again, existing design and coding patterns such as Model View Controller (MVC) can be applied. The process of gathering user requirements differs little from what is done today; however the tools for designing the UI are more flexible and sophisticated, making it easier to match user expectations to the requirements gathered.

Adobe has also codified years of experience and research in building expressive interactive applications and content in Cairngorm, a reference framework for RIA solutions to support clients in delivering effective RIAs.

Agile development methodologies are important to delivering timely and focused RIA solutions, but their use can lead to the reinvention of functionally similar components. So while there are significant advantages to using agile methodologies, they should be used within the context of a larger scope. It is important that RIA components and solutions are developed with a view of the potential for larger connected applications and solution strategies.

The move from linear development to state development is one aspect of development that becomes more important in delivering RIAs. If a user rearranges the UI of an RIA, the various components that make up the UI are still aware of each other and their interdependencies. Therefore understanding and applying state development patterns is vital to ensure that when components are added, deleted, or modified, the RIA does not break and fail.

Because RIAs place an increased emphasis on the UI, every opportunity to get better feedback from users, especially during the design and development process, should be seized.

### **User-driven best practices**

From years experience working with clients, Adobe has assembled a set of best practices for enterprise RIA development:

- Think about the business problem that you are trying to solve, the business services that you want to deliver, or the business outcome that you want to achieve and make sure that your RIA design and delivery process is aligned to these goals.

*“RIAs enable new classes of enterprise applications that can greatly improve the access to data stored within the organization.”*

- Keep your first RIA in the enterprise simple. Though you have the capability to use rich and expressive graphical animation or video, you do not always have to take advantage of it and overcomplicate things. Remember your audience and do not try to do much all at once. If your users prefer to work with a spreadsheet style report rather than a 3D pie chart, give them the spreadsheet approach. Use RIA technology to get information to them faster without changing how they work unnecessarily. Focus first on solving business problems with RIA, not on making a more impressive UI just because you can.
- Ensure that the application that you choose is suitable for implementation as an RIA. As noted previously, enterprise RIAs are proving to be best for data entry and where you have higher performance requirements than a traditional HTML-based system. If you need to show thousands of items, a RIA is much better than a traditional web-based application.
- Do not undertake an RIA project without having the right technical resources in place. This might sound self-evident but it is easy to overcommit.
- To maximize the usefulness of the UI, it is important to have properly trained GUI designers or developers with GUI flair. Using design teams to help design the application will ensure that any graphical elements you do implement will work properly rather than become noise.
- It is important to get a prototype application working end to end as soon as possible. This will help you to identify any integration challenges as early as possible so that they can be resolved in parallel with other development.
- Services-based architectures will make it easier to plug in the RIAs you create and then replace them down the line.
- Blend, don't replace. There is little to be gained by spending time re-engineering or redesigning components that work well. For example, it rarely makes sense to start building an RIA to replace existing reporting tools that generate reports. Begin by blending new components in with existing solutions, rather than tackling a big design and build phase.
- Establish a steering committee to oversee RIA development. If an enterprise is going to embrace RIA across multiple systems, an overarching body that mandates the look and feel of RIAs will ensure consistency across different development groups around the company.

While some of these best practices might seem obvious, they are easily forgotten or ignored in the rush to implement technology that is both new and exciting, and in the case of RIAs offers, so much potential.

The users will ultimately determine if an RIA succeeds or fails. For them, the interest is in what the RIA allows them to achieve. Ease of use and stability of the application are two key factors in user acceptance, and RIAs have inherent advantages in both of these areas.

### **The reality of enterprise RIAs**

As the case studies that follow demonstrate, RIAs are already having a positive effect within enterprise organizations by improving the productivity of employee interactions with data and with each other. In all three cases, the Adobe Flash Platform has been instrumental to the successful and fast deployment of the applications. RIAs are no longer just for consumers; today, they streamline the working practices of employees and improve the efficiency of key business processes.

Enterprise RIAs are a reality. With Adobe solutions, your organization can be at the forefront of delivering them successfully.

## **Appendix**

### **Case studies of enterprise RIAs**

The following three examples highlight companies that have used the Adobe Flash Platform to deliver successful enterprise RIA solutions.

#### **Case study 1: The Editorial Commissioning System and iApprove by Keytree**

The Editorial Commissioning System (ECS) that Keytree ([www.keytree.co.uk](http://www.keytree.co.uk)) designed for its client, News International, is a good example of an enterprise RIA that supports decision-making processes: enabling the right decisions to be made by the right people at the right time. It is a complete workflow solution covering the entire editorial commissioning and payment process.

One of the primary goals for the commissioning application was to streamline and coordinate the process of commissioning freelance and external content across newspaper and magazine titles. The interface had to be intuitive enough to help occasional users, who may enter only one or two items per month, but clean and simple enough for those who were responsible for entering hundreds of items every day.

#### **The route to the Adobe Flash Platform**

The choice of technology was driven by the business case. The solution needed to be simple, intuitive and responsive, whilst also being able to run on multiple platforms, including different browsers (Safari, Internet Explorer, Firefox) and desktops (Mac and PC). The user interface had to allow for one touch approval and present all the data needed to make the approval without having the user scroll through multiple screens.

The company had made an investment in a SAP R3 back-end system, and Keytree needed to build a front-end application that would integrate with it. To reduce the need to write and maintain multiple applications, Keytree chose to use the Adobe Flash Platform, enabling them to write once and deploy to many platforms.

Keytree developers are SAP specialists both at the back-end and in the client technology market. They are experienced in writing software for the web, and their use of Eclipse for web application development made the choice of Adobe Flex Builder (as a plug-in to Eclipse) an easy one. With the development skills their developer teams had from building SAP, Java, and web-based applications, they were able to learn Flex quickly without using training courses.

#### **Business benefits**

To make decisions effectively, staff within News International need access to large amounts of up-to-date data. Using a RIA powered by Adobe Flex and Adobe Flash Player, Keytree improved performance by sending relevant data to the browser-based application and using the desktop's local processing power. For users inputting large numbers of transactions, this approach eliminated the need to wait for forms to refresh and reset data as they enter the information.

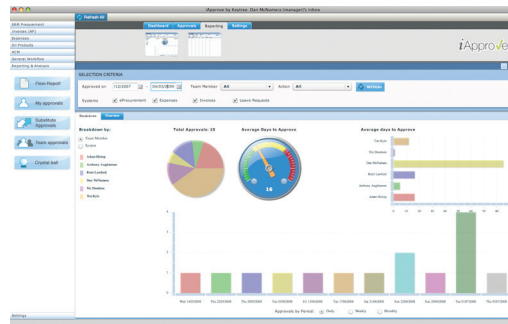
A key benefit gained from using the Adobe Flash Platform is scalability; much of the data that the user needs to refer to as part of the approval process is pushed down to the client, rather than being processed on the server. In a traditional web server environment, Keytree would have likely had to increase the number of web servers deployed to support the users.

Additionally, significant time savings were realized because the application runs in the Adobe Flash Player. This makes it very easy to deploy and extremely stable. It is not impacted by patches and changes to the operating system and does not require the development and support of complex code targeted at a multiple disparate browsers. The separation of application from platform that RIAs provide simplifies application development and support.

#### **iApprove**

The RIAs developed by Keytree at News International for financial data entry and approval answered a common need in large enterprises for streamlined and intuitive decision making and approval.

As a result of this insight, Keytree subsequently developed iApprove using Adobe Flex and Adobe AIR. As a “one stop shop” for approval-based decision-making, iApprove provides context for decisions throughout the enterprise structure. All types of decision-makers from floor managers to senior management and top level executives can see the details they need in one place at any time. Decisions on invoice approvals, leave requests, expenses submissions, and procurement orders can be made immediately through a single application.



Flex and Adobe AIR combine to provide high performance access to multiple back-end ERP systems, a highly flexible and intuitive UI, and easy deployment.

### Case study 2: Self Serve by LMG

Retail buyers must process a great deal of information when making their decisions. The difference between profit and loss depends on their ability to determine which product lines among the tens of thousands offered by the retailer are selling well and which are not. This gathering, interpreting, and trending of data is collectively known as retail analytics.

There are two main groups of people that use retail analytics: buyers and product marketing teams. Each group has its own questions that the data must help answer and each needs to make decisions based on all the available customer purchasing data. Buyers own the relationships between the retailer and its suppliers and over time tend to rely more on their experience as opposed to information in a data warehouse. Product marketing teams on the other hand want use the same data set to perform detailed analysis of product movement from the shelf to the consumer. A key component of building any marketing campaign is in understanding what each customer is buying and how often.

LMG develops, owns, and manages large retail-based customer reward programs and provides data-driven marketing services to retailers and service providers worldwide. The group owns and operates the Nectar brand, the UK’s largest customer reward program. Through its supermarket client Sainsbury’s, the company can provide access to Sainsbury’s sales figures overlaid with Nectar customer data.

The goal for LMG was to provide retail buyers with an application that had an intuitive interface, from which they could receive answers to their questions in an easily understood format. Because any solution would also have to support the buyers when they were travelling, information about the suppliers and the market had to be available offline. For product marketing teams, the solution needed to provide answers that did not require data specialists to interpret. Information needed to be presented visually and in a timely manner to enhance the decision making process. Any solution had to be capable of doing complex analytics on the data quickly.

### The route to the Adobe Flash Platform

The first question for LMG was: Build or buy? Given the size of the dataset that LMG was going to have to work with—two years of data covering every customer purchase at Sainsbury’s—the company realized that they were going to have to start with the back-end data warehouse and think about how the front-end tools would be integrated.

With a short timeframe to get the solution written and a pressing need to handle users in a connected and disconnected environment, LMG decided that building a solution would give them more flexibility than trying to adapt a pre-existing package. The company also wanted to leapfrog the competition by choosing a technology that would enable them to take a giant step forward with room to grow.

The LMG team chose an RIA strategy using Adobe Flex because they wanted a rich user interface for creating analytics and reports that can be digested and understood quickly. LMG selected Adobe AIR as the client runtime because it enabled them to deploy the application onto a range of platforms and because of the tight integration with the SQLite database. SQLite support was important because large datasets need to be returned to the user to render the analytical reports. SQLite supports compressed file transfers and these database files can then be stored locally for offline use.

*“LMG chose an RIA strategy using Adobe Flex because of its rich user interface which enabled creating analytics and reports that are easy to digest and understand.”*

### Business benefits

The application developed by LMG is called Self Serve.



Self Serve provides analysis of Sainsbury's till figures overlaid with Nectar customer data direct to Fast Moving Consumer Goods (FMCG) companies such as Nestle and Birds Eye via an Internet-based application, and offers the fastest turnaround and most comprehensive breadth of shopping data available in the industry. It has access to analysis drawn from 100 percent of Nectar customer data, allowing users to analyse the hundreds of millions of transactions made by half of UK households annually. The tool provides access to trend data only—no individual customer details are released.

Self Serve provides analysts with new insights into the data, helps them identify trends, an enables them to build sophisticated reports in minutes. Retail buyers can now view the entire relationship between customers and the purchases that they make, enabling them to see how well products have sold. When negotiating they can see all the relevant business data from other suppliers, helping them put the best possible contracts in place for their business.

Similarly, the product marketing teams know what is selling, when it is selling, and who is buying it. This not only allows them to comprehensively target in-store promotions and direct marketing campaigns, but it also provides information on how to group products inside the store to maximize sales.

For LMG, basing Self Serve on the Adobe Flash Platform has provided the flexibility to rapidly meet the needs of other clients with loyalty programs in place. LMG has deployed the application to over 500 users at Sainsbury's and their FMCG clients, who have run over 25,000 reports in the first 4 months of use.

What the company has been able to do goes beyond just providing an analytic engine. By aggregating large volumes of data and presenting it simply and intuitively, the application enables concise and actionable insight, helping users to ask the right questions and make the right decisions even when they are not connected to the corporate network.

### Case study 3: Model Metrics

As a leading Salesforce.com integration partner, Model Metrics is regularly commissioned to extend the Salesforce.com platform for its customers. Many customers engage Model Metrics to create a customized user interface tailored to their specific needs (such as inclusion of company branding), or to provide more sophisticated graphical richness to their Salesforce.com implementations.

In many cases, Model Metrics clients need solutions that provide offline access to their Salesforce.com applications and the ability to synchronize with Salesforce.com once a connection to the network is re-established.

In addition to building Salesforce.com solutions for clients, Model Metrics also acts as an independent software vendor (ISV), providing its own rich set of Salesforce.com platform solutions that work offline and online.

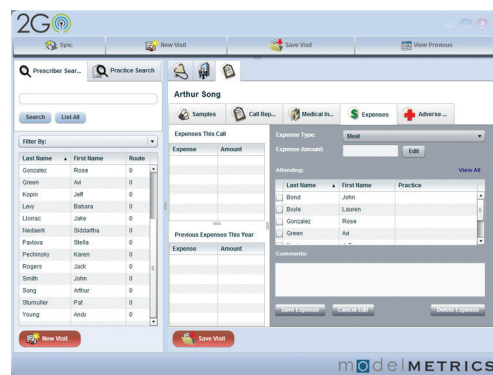
Model Metrics decided to use an RIA platform to provide their users with rich, expressive, and intuitive interactions and allow them to work when disconnected from the network. The company needed technology to develop and maintain code as an ISV as well as meet the specific custom project needs of their clients.

The RIA platform also had to handle high volumes of transactions, bring together lots of information on the screen quickly, and present it in the most effective format for easy manipulation.

*“Model Metrics chose Adobe Flex and Adobe AIR to address multiple platforms and browsers, work offline as well as online, and provide a rich and intuitive UI.”*

### The route to the Adobe Flash Platform

To meet the demands of a high volume transaction environment, Model Metrics chose Adobe Flex and Adobe AIR, which enable the company to push data to the client. The clients use a local datastore, SQLite, to handle any data calls and queries. The technology choice was also driven by the need to address multiple platforms and browsers, work offline as well as online, and provide a rich and intuitive UI.



The combination of Adobe Flex and Adobe AIR enabled the developers at Model Metrics to rapidly couple advanced business logic with rich media user interfaces. While they were new to Adobe Flex development, the developers easily adapted their programming skills to quickly get up to speed and rapidly deliver a robust application. The developers shortened time to market by developing once and deploying to multiple devices.

The integrated designer-developer workflow enabled by Adobe tools helped Model Metrics achieve a tighter and more productive relationship between its software delivery and design teams.

Using Adobe AIR and Adobe Flex together with Force.com, Model Metrics created and deployed Pharma2Go, the company's comprehensive on-demand solution for managing

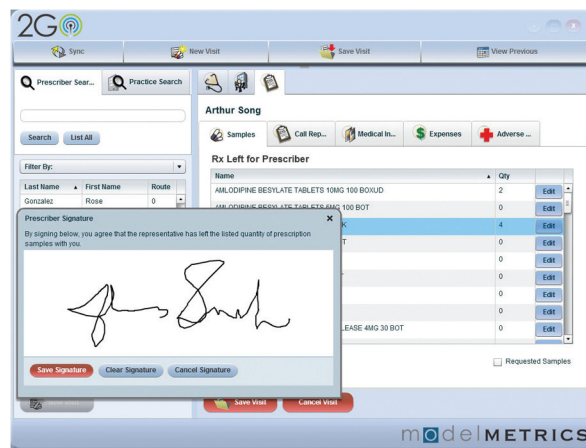
pharmaceutical marketing, sales, and customer service processes. From managing product samples to capturing digital signatures, mobile call reporting, and expense management, Pharma2Go provides pharmaceutical sales representatives with an end-to-end solution to manage territories for maximum profitability.

Without the offline client capability in Adobe AIR, Model Metrics would not have started the project in the first place.

### Business benefits

Salesforce.com introduced a new paradigm in on-demand computing with the advent of Force.com, a Platform-as-a-Service (PaaS) that allows developers to rapidly turn ideas into real business opportunities. Using Adobe Flex and Adobe AIR, Model Metrics can deploy enterprise solutions that manage, coordinate, and analyze even the most complex business processes on-demand—in online, offline, and occasionally connected environments.

One of the main business benefits of building Pharma2Go on Adobe AIR is the ability to capture data in both online and offline environments and then deliver that data automatically to back-end systems. This allows sales reps to capture information where and when it is available, instead of waiting for an Internet connection.



By enabling mobile pharmaceutical representatives to synchronize field information with large data sets before and after visiting physician offices, the solution opens new revenue opportunities for Model Metrics, its clients, and Salesforce.com.

The offline client Adobe AIR application is a framework that Model Metrics can also easily adapt to other vertical markets (including automotive, insurance, and grocery industries), raising their profile and value proposition in other marketplaces, and further expanding opportunities for new revenue streams.



**Adobe Systems Incorporated**  
345 Park Avenue  
San Jose, CA 95110-2704  
USA  
[www.adobe.com](http://www.adobe.com)

Adobe, the Adobe logo, ActionScript, Adobe AIR, AIR, Scene7, ColdFusion, Creative Suite, Dreamweaver, Fireworks, Flash, Flash Catalyst, Flex, Flex Builder, and LiveCycle are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries. Mac OS is a trademark of Apple Inc., registered in the U.S. and other countries. Linux is the registered trademark of Linus Torvalds in the U.S. and other countries. Windows is either a registered trademark or a trademark of Microsoft Corporation in the United States and/or other countries. Scene7 is either a registered trademark or trademark of Adobe Systems Incorporated in the United States and/or other countries. All other trademarks are the property of their respective owners.

© 2009 Adobe Systems Incorporated. All rights reserved. © 2007 Adobe Systems Incorporated. All rights reserved. Printed in the USA.  
95012113 3/09