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Rich Internet Apps Move Beyond The Browser

by Jeffrey Hammond and Michael Goulde

for Application Development & Program Management Professionals

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Adobe, Microsoft, And Sun Push The Envelope With New RIA Platforms

by Jeffrey Hammond and Michael Goulde
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EXECUTIVE SUMMARY

Forrester clients are adopting rich Internet applications (RIAs) because they demonstrate clear benefits. Early RIAs were exclusively browser-based, but new platforms from Adobe, Microsoft, and Sun Microsystems broaden developer options for delivering rich media and content to clients. Adobe Integrated Runtime (AIR) extends Web development to the desktop, while Microsoft Silverlight takes the .NET Framework and Windows Presentation Foundation cross-platform and cross-browser. Sun Java FX extends Java's reach with a new mobile offering and improved scripting for the Java virtual machine. Microsoft has a tactical edge because its dominant position at the desktop with the .NET Framework will attract large numbers of developers who already target Microsoft's desktop and browser platforms. However, if Microsoft is to succeed strategically and displace Adobe's offerings, it will have to ratchet up its appeal to designers and content providers to match its standing with developers. While Java developers will find Java FX appealing, Sun will need to improve its RIA developer and designer tools to be competitive in the long run.

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NOTES & RESOURCES

Forrester interviewed seven vendor and user companies, including Adobe Systems, Cynergy Systems, Electric Rain, IdentityMine, Metaliq, Microsoft, and Sun Microsystems.

Related Research Documents

"Measuring Rich Internet Applications" February 7, 2007

"Ajax Or Flex?: How To Select RIA Technologies" December 28, 2006

"Rich Internet Applications: Why And How" September 1, 2006

NEW PLATFORMS EXPAND THE CAPABILITY AND REACH OF RIAs

Forrester clients are adopting rich Internet applications (RIAs) because they demonstrate clear benefits, including improved customer satisfaction, higher Web conversion rates, and reduced application maintenance costs.[1] Early experiments with RIAs have been so promising that developers are now pushing their limits and demanding more from RIA platforms.

Developers Are Pushing Rich Internet Apps Beyond The Browser

Developers built first-generation RIAs inside the browser or with browser plug-ins like Adobe's Flash, but now, they are increasingly pushing RIAs beyond the browser "chrome." Here's why:

- **Rich media and content are playing a central role.** Many of the hottest properties on the Web today are centered around rich media like streaming video, music, and images. YouTube, MySpace, and others are becoming models for developing new applications. HTML and standard browser capabilities do not provide the needed support for these media types.

- **Browser apps have a limited form factor, size, and footprint.** Standard browser interfaces are great for conventional business apps but are poorly suited for apps like simple widgets. A square window border, long load time, and defined menu buttons and bars detract from a designer's creative expression and pale in comparison with rich client capabilities in modern operating systems like Microsoft Windows Vista and Mac OS X.

- **Browser security limits application functionality.** Browsers have always been security headaches. Shoring up browser security has resulted in limitations that end up preventing intuitive user gestures like drag-and-drop between client applications and interfere in other ways with RIAs. Limited access to local resources, such as the ability to access local data or user preference settings, also reduces what a developer can do on the desktop side of a browser-based RIA.

- **Browsers limit disconnected usage.** Even though broadband Web coverage is better than ever, there are still times when mobile users are disconnected from the Web. Applications like the Microsoft Windows Presentation Foundation-enabled *New York Times* Times Reader work while offline, and they resynchronize the next time they connect to the Web.[2]

- **Mobile devices promise even broader reach.** Considering the sheer number of Internet-capable devices coming online, the need for greater breadth of rich applications has become critical. Today's rich Internet experience on these mobile devices is hit-or-miss. For example, while Google Maps is the poster child for mash-ups on the desktop, mashing up the mobile version is a trickier proposition. Multidevice RIA frameworks aim to eliminate this limitation.

A recent set of announcements from Adobe (Apollo), Microsoft (Silverlight), and Sun (JavaFX) further address developer demands for better RIA tools and platforms. In the process, they further blur the line between browser-based and desktop applications by introducing new ways of delivering content.

New RIA Platforms Add Options For Delivering Rich Media And Content

Selecting an RIA platform no longer comes down to choosing between ActiveX, Ajax, or Adobe's Flash/Flex. RIA developers now have more options to deliver an improved user experience, including:

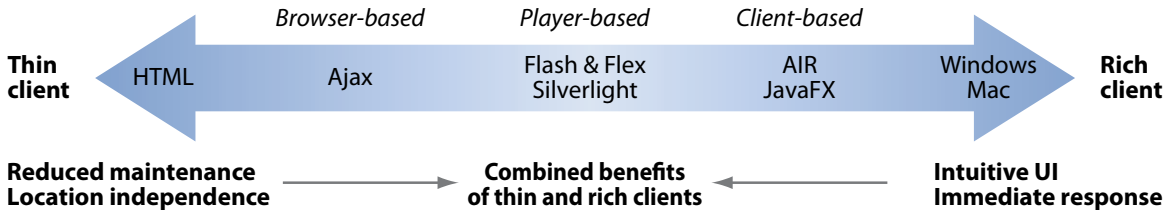
- **Browser-based solutions.** Developers deliver rich Internet applications using a browser's document object model and scripting engine, along with Ajax frameworks. Browser-based RIAs install and execute automatically, as long as the client's browser has JavaScript enabled. The downside? Cross-browser support and testing can be a problem, given subtle implementation differences across browsers.

- **Player-based solutions.** Using a browser plug-in as a common runtime, developers can provide the same ability to run across operating systems as a browser-based solution, but without the quirks that individual browsers create for RIAs. This approach minimizes cross-browser testing issues, but users may not be willing to update plug-ins or wait for a lengthy install process to complete if they don't already have the latest version.[3]

- **Desktop-based solutions.** The third option is to install a set of runtime components on the desktop client outside of the browser's security constraints. Desktop-based solutions provide full access to local file systems and the ability to persist information, even when a Web connection is interrupted. They also add deployment and maintenance headaches.

These new platforms each have a different point of reference (see Figure 1). Browser-based approaches build on HTML and Ajax to provide a richer experience than straight HTML or DHTML can provide. Player-based approaches take advantage of proprietary platforms to provide application runtimes with more functionality than the browser, but this is usually within the browser environment. Finally, client-based approaches work outside the browser environment to access client resources and provide more intuitive user interfaces. Each provides benefits with associated tradeoffs, and no one solution provides a complete answer.

Figure 1 Rich Internet Application Platform Landscape



42708 Source: Forrester Research, Inc.

NEW RIA PLATFORMS ARE EXTENSIONS OF VENDORS' CORE PLATFORM STRENGTHS

The key to understanding Adobe Integrated Runtime (formerly known by the codename Apollo), Silverlight, and JavaFX is to view them as extensions of each vendor's core platform strengths. Each vendor is seeking to move from one type of RIA platform to an adjacent type. While the strategies are different, each vendor's goal is the same: Build on existing platform strengths, and quickly fill function gaps to offer a complete solution for rich Internet content delivery (see Figure 2).

- **Adobe hits the desktop.** Adobe is moving out to the client desktop from its browser-based Flash player with AIR.
- **Microsoft expands player capability.** Microsoft is moving into the player market with Silverlight, a reduced set of rich-client Windows Presentation Foundation (WPF) and a fully capable .NET Common Language Runtime (CLR).
- **Sun reaches out to Web and mobile developers.** Sun is focused on making Java's widely deployed virtual machine easier for Web developers to use and, at the same time, improving its solution for mobile application development.

Figure 2 Comparing The New RIA Platforms

Specification	AIR	Silverlight	JavaFX
Desktop OS support	Windows, Mac OS X	Windows, Mac OS X	Windows, Solaris, Linux, Apple
Browser support	Desktop-based. Uses Flash for browser-based RIAs.	Internet Explorer, Firefox, Safari, Opera	Internet Explorer, Firefox
Video codec support	H.263, ON2 VP6	VC-1 (up to 720p), WMV (7-9)	With Java Media Framework: AVI, MPEG-1, QT, H.261, H.263
Audio codec support	MP3, Nelly Moser	WMA (7-9), MP3	AIFF, AU, AVI. With Java Media Framework: GSM, MIDI, MP2, MP3, QT, RMF, WAV.
Download size (min/max)	8 MB to 9 MB	1.38 MB to 10.3 MB	7.1 MB*
Pricing and licensing	Free: closed source†	Free: closed source	Open source: license to be determined
Target release dates	Late 2007 to early 2008	Version 1.0 Q3 2007, version 1.1 early 2008	Early 2008

*The Java VM is pre-installed on a significant percentage of new PCs, which eliminates this requirement.
†Although Apollo itself is closed source, it uses many open source frameworks, including Webkit, Tamarin, and SQLite.

42708 Source: Forrester Research, Inc.

Adobe's AIR Extends Web Programming To The Desktop

Adobe's AIR blurs the dividing line between rich client and browser by extending Web programming to the desktop. AIR is part of an integrated RIA platform that includes:

- **A cross-platform desktop runtime.** AIR supports development of desktop applications using HTML, PDF, JavaScript, ActionScript, and/or MXML.[4] AIR apps don't use a browser, so they are free from security and usability restrictions that limit browser-based RIA applications. For example, AIR can access local files or directory resources and gives developers more freedom to customize the look and feel of their application. AIR also includes a small-footprint relational database that makes it possible for developers to manage structured data more efficiently on the client.

- **A freely available software development kit (SDK).** These command-line utilities compile, debug, and package apps, allowing designers and developers to build AIR applications with the same tools they use to build browser-based apps today. While the AIR function libraries are a superset of their Web-based counterparts, developers don't have to adopt new, unfamiliar tools to move outside the browser.

- **A new version of Flex Builder.** To build AIR apps visually, Adobe has released a beta of its upcoming Flex Builder 3 to automate the edit-compile-debug-package cycle for AIR apps. Flex Builder's Eclipse-based user interface is already familiar to many Java developers, and tight integration with Adobe's Creative Studio Suite allows developers and designers to closely collaborate when designing an application's interface.

- **Open source appeal.** Adobe is making key technologies — like the Flex SDK and code from the ActionScript virtual machine (AKA the Adobe/Mozilla Tamarin Project) — available under open source licenses. This will appeal to developers with a bias toward open source by reducing dependence on proprietary technology and reducing vendor lock-in. Incorporation of ActionScript into the Mozilla Tamarin project will accelerate developer adoption of a standard language for creating rich Web applications, increasing their ability to create richer, more interactive apps that work across multiple platforms.[5]

Microsoft's Silverlight Focuses On Rich Media And Extending .NET

Microsoft Silverlight is a cross-browser, cross-platform plug-in designed to deliver RIAs, including support for rich media, using Microsoft's .NET platform. Microsoft will use the Silverlight platform, formerly known as WPF/E, to further establish itself as a player in the RIA space, while attempting to displace Adobe's well-established Flash player as a competing application platform over time. Microsoft has assembled an integrated platform offering that includes:

- **A cross-browser player plug-in.** Silverlight supports a full implementation of the .NET CLR, a subset of the Windows Presentation Foundation (WPF) and Extensible Application Markup Language (XAML). Silverlight runs in Microsoft Internet Explorer, Mozilla Firefox, Apple Safari, and Opera on Microsoft Windows and Apple Mac OS X (yes, you read that last bit right). Support for the VC-1 codec, one of three mandated in HD-DVD and Blu-ray players, gives the Silverlight player an advantage when it comes to delivering low-cost, high-quality rich media, especially for high-definition sources.[6]

- **Integration with the .NET Framework.** Using Silverlight, .NET developers will be able to build RIAs using Visual Basic (VB) .NET, C#, IronPython, or IronRuby — even if they will have to wait for the Silverlight 1.1 release to do it.[7] Silverlight runs on the newly open sourced Dynamic Language Runtime (DLR), opening the door to support from other dynamic languages in addition to those that Microsoft is already implementing.[8] As a result, developers who use Silverlight will have a broader choice of languages for client-side development than any other RIA platform.

- **A common project format.** Using a common format for projects unifies design and development. For example, shared artifacts made a big difference at IdentityMine, a company that specializes in user experience (UX) design and development. Instead of throwing designs "over the wall" to developers, designers refine them in Microsoft Expression Studio at the same time that developers implement code in Microsoft Visual Studio 2008.[9] As a result, they've streamlined their project workflow and reduced their cycle time on Silverlight projects compared with similar projects delivered on Adobe's Flash.

- **Free Web services to attract developers to Microsoft's Web platform.** Microsoft is pursuing an approach that connects rich desktop clients with services "in the cloud," in addition to local servers that Microsoft describes as a "Software + Services" strategy. As part of this vision, Microsoft has made 12 Windows Live services, including Silverlight Streaming, freely available to developers with very high service-level agreements (SLAs).[10] These services will appeal to RIA developers who want to incorporate search, mapping, media streaming, contact management, and authentication into their applications.

Sun's JavaFX Aims For A Consistent, Cross-Platform User Experience

Sun announced JavaFX in May 2007 as a new family of products targeted at high-impact RIAs.[11] JavaFX will eventually support pervasive deployment across desktops, home entertainment consoles, and mobile devices, but the initial release focuses only on mobile devices and scripting. The initial release of the JavaFX family includes:

- **The Java Runtime Environment (JRE).** Java FX applications require the JRE to run. Developers can deploy JavaFX applications as desktop applications or browser-based applets, or they can enable single-click Web deployment through Java Web Start.[12]

- **A software system for mobile devices.** JavaFX Mobile is built with Java Standard Edition (SE) technologies running on a Linux kernel.[13] Java Micro Edition (ME) already runs on more than 1.8 billion mobile devices, but JavaFX Mobile will replace a mobile device's operating system from the hardware layer up. Sun's goal with JavaFX Mobile is to significantly reduce device application porting costs and improve the mobile development experience.

- **JavaFX Script.** Sun has created a language called JavaFX Script that generates user interfaces using Java's Swing and 2-D libraries. Content creators will find that JavaFX apps will have the same user interface characteristics as today's rich-client Java applications, but they'll be easier to build, and they'll also run on JavaFX Mobile.

- **Open source licensing.** JavaFX Script will be made available under an open source license, although for some unfathomable reason, Sun has not yet announced what that license will be. Our guess is that Sun wants to release it under General Public License (GPL) V3 but won't announce that until the new version is finalized.

- **Plug-ins for popular Java IDEs.** Sun will provide plug-ins that add code libraries, a context-sensitive editor, and project support for JavaFX Script for its NetBeans IDE. The open source OpenJFX project has also released a plug-in for Eclipse. As a result, millions of Java developers can experiment with JavaFX Script with minimal changes to their existing development tool set.

RECOMMENDATIONS

NEW RIA PLATFORMS SHOW PROMISE, BUT NONE ARE COMPLETE

New RIA platforms add breadth and capability, but none of them are complete solutions for cross-platform application and media delivery at this point. Until these new platforms are released:

- **Use RIA platforms as an extension of current programming platforms.** Microsoft .NET developers will find a lot to like about Silverlight because it lets them extend their existing skills to RIA development without having to learn new programming languages. JavaFX compiles to Java, so developers should expect JavaFX apps to behave like Java applications. Developers who have already invested in Ajax and Flash will find that Apollo gets them from the browser and player to the desktop with minimal disruption.
- **Assume that Silverlight will play a big role.** Considering how strategically important Silverlight is to Microsoft, developers can assume that it will be a safe and popular platform to target. Silverlight spans Windows and the MacOS X, providing a rare cross-platform opportunity for developers from Microsoft. It is not out of the question that Silverlight will find its way to Linux desktops through the Mono project and possibly the Novell SUSE Linux Enterprise Desktop, which will complete the cross-platform play for developers.

- **Covering all the bases means using more than one platform.** Delivering RIAs using browsers, players, and desktop channels will require more that one RIA platform for the foreseeable future. Use a combination of Ajax in the browser for lightweight RIAs, Flash, or Silverlight for apps that include rich media, and use AIR or JavaFX to deliver rich media and content to the desktop.

WHAT IT MEANS

RIA PLATFORMS PRESENT RICH CHOICES FOR DEVELOPERS

Rich Internet applications are rapidly moving from the leading edge to mainstream applications development technology. As the success of leading-edge adopters is increasingly recognized, expect more large technology vendors to compete vigorously for developer loyalty as they create the next generation of user applications. Adobe, Microsoft, and Sun each bring significant strengths to bear on different developer and designer communities.

- **Developers are in tune with Microsoft.** Microsoft has always understood that winning developers' hearts and minds is one key to winning a platform battle. In this situation, winning developers is necessary but not sufficient. This time, Microsoft will also need to win designers and the firms they work for.
- **Designers identify with Adobe.** Adobe has done an effective job building relationships with influential Web design houses. In the process, Creative Studio has become a benchmark by which Web design tools are measured. But Adobe also has work to do to counter the strength of .NET among enterprise developers. Open source developers attracted to Tamarin and Flex may help, but only time will tell.
- **Java developers may prefer Sun's approach.** While Java is the most popular single programming language in enterprise IT, it originally started on the client. It remains to be seen whether enough improvements have been made in the intervening years to renew the promise of client-side Java for developers. In addition, Sun will need to do more than just make Java approachable to win over the crucial designer audience.
- **Open source has become table stakes in the game to capture developers.** Historically, Microsoft and Adobe have not been leading advocates of open source. In the pursuit of developer mindshare, however, open source has become a basic requirement for any vendor.

ENDNOTES

[1] Forrester has written about these RIA benefits. See the September 1, 2006, "Rich Internet Applications: Why And How" report.

[2] For more information about the initial version of the *New York Times* Times Reader, see http://www.nytimes.com/membercenter/faq/timesreader.html.

[3] A recent Forrester survey showed that while 87% of Flash users are usually at the current or immediately previous version, 43% of them will abandon a site when requested to upgrade. See the October 24, 2006, "Enterprise Browser And Desktop Trends, Q3 2006" report, and see the September 13, 2006, "Web Users Want Rich Internet Applications" report.

[4] The alpha version of Adobe AIR is described in much greater detail in the following book: Mike Chambers, Robert L. Dixon, and Jeff Swartz, *Apollo for Adobe Flex Developers*, Adobe Developer Library, O'Reilly, 2007.

[5] Tamarin is a project of the Mozilla Foundation that aims to provide a new ECMAscript4 virtual machine. SpiderMonkey, the JavaScript engine embedded in the Firefox browser, will use it in a future version. Tamarin is open source software. Find out more at http://www.mozilla.org/projects/tamarin/.

[6] VC-1 is a video compression/decompression algorithm originally developed by Microsoft but adopted as a mandatory standard for both the HD DVD and Blu-ray disc formats. It is an important component of Microsoft's video content technology strategy.

[7] For a more detailed overview of Silverlight, see http://silverlight.net/GetStarted/overview.aspx.

[8] Microsoft plans to create a DLR open source project at Codeplex, its home for non-OSI licensed open source. Microsoft will license the DLR with its Permissive License, which is an Apache-like open source license.

[9] Identity Mine's reader applications are described at http://www.identitymine.com/readers/.

[10] Microsoft assumes the actual costs of Silverlight Streaming for developers up to 4 GB, on a global scale. For more information about the services and service levels that Microsoft has made freely available to developers, see http://dev.live.com/.

[11] For detailed information in JavaFX, see https://openjfx.dev.java.net/JavaFX_FAQ.html.

[12] Deployment options for Java are laid out here: http://java.sun.com/javase/6/docs/technotes/guides/deployment/index.html.

[13] The JavaFX Mobile stack is substantially based on technology that Sun acquired from its purchase of the Chelmsford, Mass., based SavaJe Technologies.

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