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Rich Internet Applications: Why And How

by Ron Rogowski

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Rich Internet Applications: Why And How

Leverage Enabling Technologies To Maximize User And Business Benefit

by **Ron Rogowski**

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EXECUTIVE SUMMARY

Broadband proliferation, consumer demand, and enabling technologies are driving increased use of rich Internet applications (RIAs), providing benefits for users and companies that static, HTML sites can't. Firms have leveraged the benefits of RIAs by applying them to user tasks that demand interactivity, responsiveness, and richness. To achieve the maximum benefit, executives who are contemplating a foray into RIAs should assess their customer base and their organization's culture, skills, and process to determine how and when to deploy RIAs.

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NOTES & RESOURCES

Forrester interviewed 15 vendor and user companies, including: Adaptive Path, Adobe Systems, Allurent, Avenue A/Razorfish, Daishinsha, DecisionStep, Dow Jones, Fidelity Investments, Fluid, Intuit, Laszlo Systems, Molecular, Nexaweb Technologies, Sapient, and Urban Outfitters.

Related Research Documents

"From Rich Internet Applications To Rich User Experiences"

June 7, 2006, Best Practices

"Rich Internet Application Usability 101"

June 7, 2006, Best Practices

"The Rise Of Rich Internet Applications"

April 10, 2006, Trends

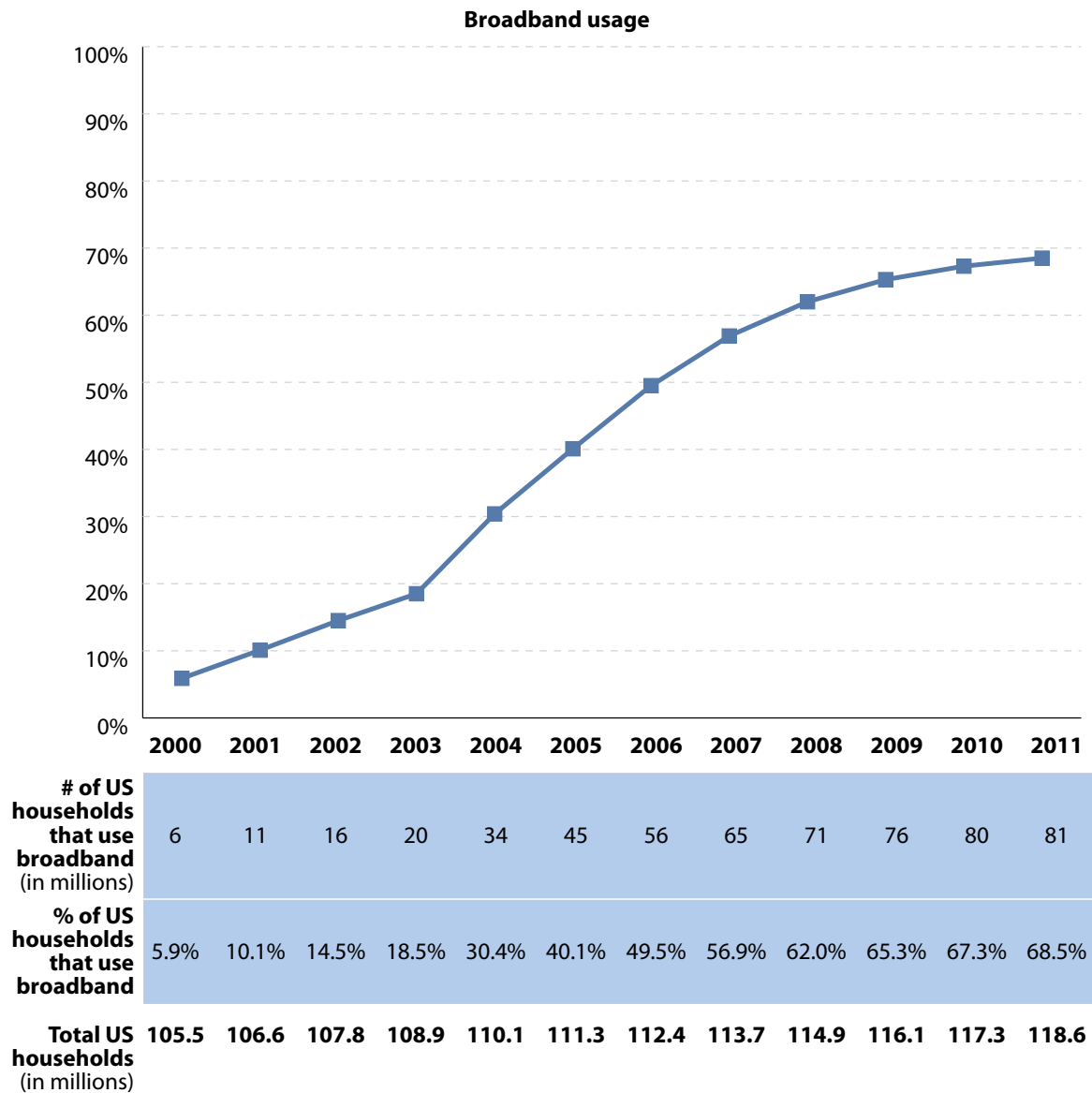
TARGET AUDIENCE

Customer experience professional

RIAs ARE GOING MAINSTREAM

RIAs aren't all that new.¹ Firms like MINI USA and Yankee Candle have used RIAs for several years to improve online user experiences and business results.² But more of these applications are making their way onto mainstream Web sites because of:

- **Broadband proliferation.** Broadband penetration among US households will come close to the 50% mark in 2006 (see Figure 1).³ Why the increased demand for higher bandwidth? Consumers want more speed for Web browsing, sending and receiving emails, and downloading software and video.⁴
- **Consumer demand.** Among the more than half of Web users who report having used interactive applications like Zillow.com, 70% say RIAs enhance their Web experience (see Figure 2-1). Another 22% report that apps like these strongly enhance their experience. What do they like most about RIAs? That they're easy to use. Beyond that, fans say these applications provide great content, are fast and responsive, and help them visualize content (see Figure 2-2).
- **Availability of enabling technologies.** Early RIAs were typically built in Flash and difficult to integrate with internal systems. Now, designers and developers have other options at their disposal — like Flex — that streamline the RIA development process. Ajax provides another attractive option.⁵ Though the component technologies that make up Ajax are not new, awareness of their use in combination was greatly increased when Google put Ajax to work on apps like Google Maps. The search giant simultaneously demonstrated how RIAs improve user experience and changed the online map-viewing paradigm.⁶

Figure 1 Broadband Penetration Is Expected To Close In On 50% In 2006

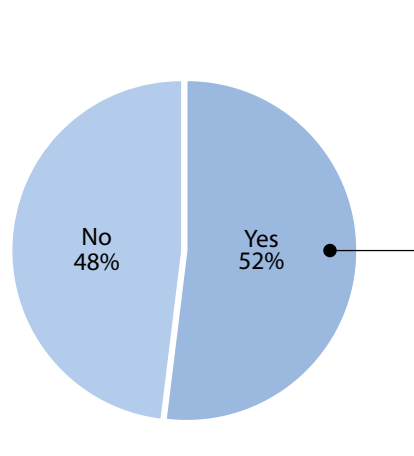
Source: Forrester's NACTAS 2006 Benchmark Survey

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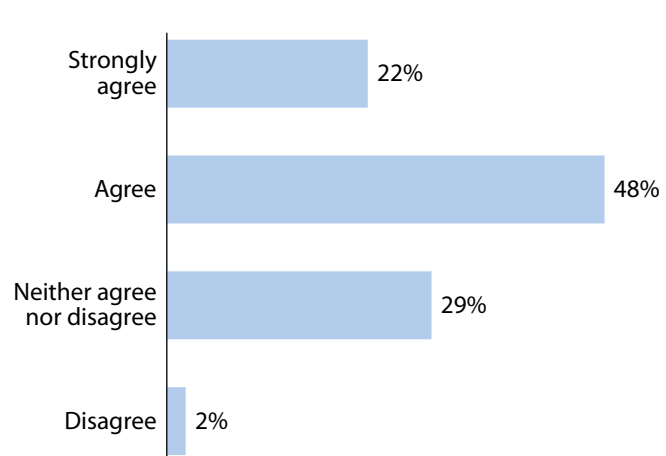
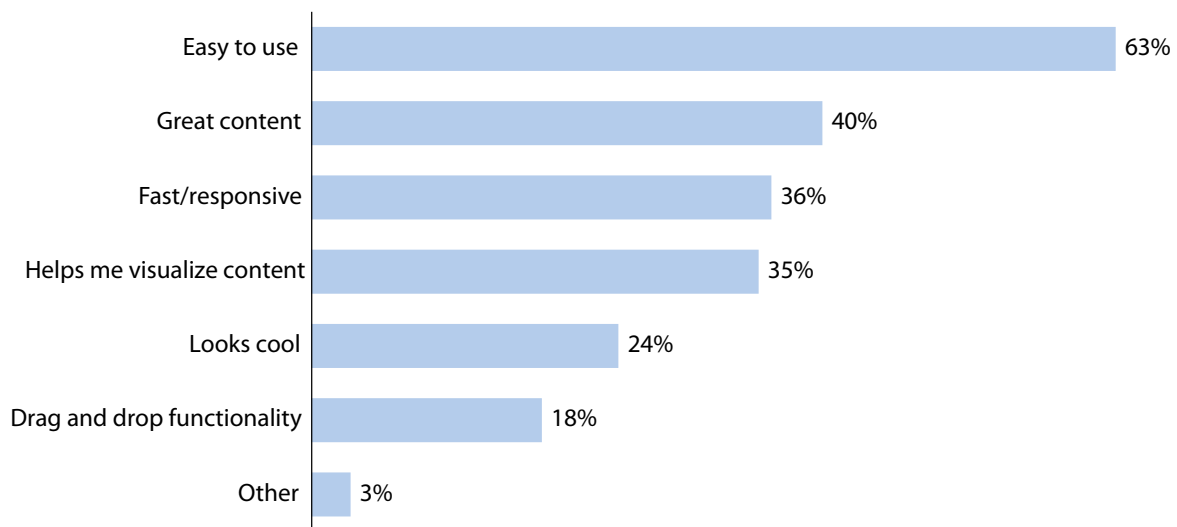
Source: Forrester Research, Inc.

Figure 2 Users' Awareness Of — And Preference For — RIAs Is High**2-1 What do online consumers think about RIAs?**

"Have you ever used highly interactive Web features like Google Maps or Zillow.com?"



"Highly interactive applications like Google Maps and Zillow.com greatly enhance my Web experience."

**2-2 "Please indicate from the following what you like most about highly interactive features like Google Maps and Zillow.com."**

(multiple responses accepted)

Base: Consumers who go online once a month or more
(percentages may not total 100 because of rounding)

Source: Forrester's NACTAS Q2 2006 Automotive, Customer Experience, And Government Online Survey

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Source: Forrester Research, Inc.

RIAs BENEFIT BOTH USERS AND BUSINESSES

Compared with static HTML pages, RIAs make it possible to improve user experience in fundamental ways (see Figure 3). Applied in the context of well-designed interactions, RIAs improve the way users:

- **Find and manipulate content.** RIAs help users find, manipulate, and display relevant content without waiting for constant page refreshes. For example, Blue Nile's diamond search makes it easy for users to sift through thousands of diamonds. Sliders for dimensions like cut and clarity dynamically update the list of results — enabling users to immediately see the impact that changes have on their list of options. MarketWatch.com automatically updates stock quotes for companies in the body of articles where they are mentioned. When rolled over, these quotes expand to show charts and give links to additional information about the company.
- **Complete transactions.** RIAs let users move through processes without disruptive server calls and the linear, stepwise order typically imposed by HTML. For example, the Broadmoor Hotel's reservations process allows users to choose dates, select rooms, and enter credit card information — all within one page. The single-screen application limits instances where server errors can derail users and eliminates blank interstitial screens that increase users' task time.
- **Consume multimedia.** RIAs make it possible to not only consume — but also interact with — multimedia like video and audio. For example, a Flash video on Acura's site showcases its RL model in a day-in-the-life setting that reveals the car's features from a user's perspective. The story begins by showing a day planner with an evening appointment. But instead of expecting users to sit back and watch, the video invites them to participate in the unfolding of the story by offering clickable, interactive elements that reveal plot elements — like a section called “the message,” where users can read a text message from the driver's wife to get clues about the driver's final destination.

Figure 3 RIAs Provide User Experience Advantages

User experience principle	HTML experience	How RIAs improve user experience
Control	Users are limited to a linear process when they use site functionality like shopping carts.	Users move back and forth between steps in a process, quickly and easily.
Direct manipulation	Click and wait for a new page to download.	Users drag and drop data freely around the screen.
Forgiveness	To undo or modify actions — like changing data in multipage forms — users must back up, and may lose data when pages refresh.	Users can undo actions or change data input without long waits or the risk of lost data.
Feedback	Users have to wait for page refreshes to find out whether the site did what they wanted it to do.	System response to user inputs and changes is immediately visible.
Error handling	Field validation often requires a server call. Error message windows can appear disconnected from areas on a page that require attention.	Form fields are validated in real time as users fill them in — problem areas get highlighted before the form is submitted.
Efficient task flow	Processes are broken up into separate pages with server calls in between.	Whole processes contained on a single “page” flow smoothly from end to end.

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Source: Forrester Research, Inc.

Firms That Get RIAs Right Reap Hard And Soft Benefits

When RIAs are well-designed, firms turn their usability benefits into measurable business benefits such as:⁷

- **Improved conversions.** Amazon.com’s loose diamond search has two versions: Ajax and HTML. The Ajax version makes it easier to manipulate data and narrow results and produces three times more conversions than the HTML version. PC Connection created an Ajax component for parametric search — a critical tool for narrowing products by features. Selection criteria that help users narrow their choices “fly out” from lists of results and make critical navigation impossible to miss. Making these essential — but previously buried — options visible has helped the company boost conversions by 50%.
- **Increased sales leads.** Disney’s Flash-enabled wedding Wish Book allows couples to choose, configure, and price a wedding package from a single page. Users can get details on different ceremony and reception venues, while modeling prices based on day of week, time of day, and number of guests. The application also allows users to click a button on the screen that enables them to share their configured packages and confer with a Disney phone agent. This innovative, cross-channel tool has powered a 200% increase in generated leads compared to its HTML-based predecessor.

- **Enhanced brand.** Building brand is high on firms' list of site business priorities.⁸ RIAs build the two critical dimensions of online brands by delivering more value to customers (Brand Action) and communicating brand attributes through a more engaging presentation (Brand Image). For example, the North Face allows users to view and select product colors within search results — supporting user goals that bolster the bottom line *and* aligning with the firm's stated brand attribute of technical excellence.

HOW TO LEVERAGE RIAs

Across industries and business models, firms reap the benefits of RIAs by using them to:⁹

- **Simplify complex processes.** Increased control over process steps plus enhanced feedback lets users see the results of their actions almost as quickly as they take them. Genworth Financial's retirement calculator allows customers to model income, savings, and time to retirement. When users punch in changes, graphics that show sources of retirement income and the income gap are dynamically updated. Users can visualize the impact of changes they make and understand what they need to do to reach their retirement goals.
- **Customize products or services.** Direct manipulation and improved forgiveness reduce a user's task time and lessen the impact of going back in a process to make changes. Users can customize SureWest's portal page using a drag and drop function that lets them arrange page element size and location. Nike ID allows users to customize their footwear with preferred colors online, using a single-screen for the multistep configuration process. The site's Flash-enabled RIA has another benefit as well: It introduces an element of play for users and gives Nike something its ads can't — consumers who are directly engaged with its brand.
- **View and manipulate images.** RIAs let users manipulate and view different versions of images without waiting for a page refresh every time they make a change. For example, Timberland enables users to change colors on product views and rotate those images on a single screen. Without RIA capability, multiple views become time-consuming endeavors as users request and wait for each of the 20 snapshots in succession.
- **Sort and visualize large data sets.** Efficient task flows help users find what they are looking for more easily. Ford's Vehicle Showroom allows users to search for vehicles across all of its brands by setting parameters for body type, price, fuel efficiency, and seating capacity on a single screen without page refreshes. As users change each variable, a list updates with vehicles that match a user's selected criteria. In addition to getting a list of matching vehicles, users can also see grayed-out vehicles that are close matches — and how far they fall outside specified ranges. This way users can see the impact of their decisions without having to redefine and resubmit parameters multiple times; and it helps them decide whether compromising on one of their specified parameters would be worth it or not.

- **Update specific data on a page.** Content updates without page refreshes bring content directly to users. One of the primary reasons that E*TRADE customers come to its site during trading hours is to check stock prices. So, rather than refreshing the entire page each time a customer requests a quote, the site uses an Ajax tool that updates just the part of the page where the quote was requested, speeding the time it takes the user to get the quote and making economical use of bandwidth.

Culture, Skills, And Process Factor Into Success

RIAs enable firms to support customers' goals online in new and improved ways, but increased complexity can make them challenging to get right.¹⁰ In preparation for a foray into RIAs, firms should assess their own — and their customers' — readiness (see Figure 4). Firms that have been successful with RIA implementations, share common practices and attributes — among them, the most important include:

- **A design-centric culture.** Design-centric cultures have a shared understanding of the business value of customer experience. Understanding the customers and goals they must serve enables firms with high design-centricity to design for user successes that move the most important business metrics.¹¹ Taking advantage of new opportunities like RIAs also requires a willingness to invest in them. Leading companies like Google, Dow Jones, Amazon, and Fidelity have teams of people whose primary function is to find new and innovative ways to improve customer experiences using rich Internet technologies.¹²
- **A business-centric design process.** Before moving forward with RIAs, Urban Outfitters' business team pinpointed several key trouble spots where RIAs could help prevent user abandonment: search refinement, product presentation, outfit arrangement and customization, and checkout. The retailer decided its first use of RIAs would be on the redesign of their shopping cart and identified a conservative target goal at the beginning of the design process — to add .06% to the firm's overall conversion rate.
- **In-house skills.** It's not necessary that firms have *all* of the capabilities to build RIAs in-house, but having enough knowledge to work collaboratively with vendors helps ensure that RIAs built by third-party vendors serve both user and business goals. Companies like Intuit hire individuals with experience working on RIAs to help the firm understand how it can solve problems and temper vendor hype with pragmatic insights.
- **The ability to adjust to the unexpected.** Intuit found that the first version of its Flash shopping cart and checkout process actually lowered conversions compared with its HTML version. Why the poor result? Customers couldn't understand how to use the interface and were confused by the merged shopping cart and checkout. Instead of reverting back to the HTML version altogether, Intuit kept an improved version of the Flash-enabled checkout process — making improvements like more recognizable and predictable interface elements.

Figure 4 Determine How And When To Leverage RIAs

Questions to ask	Actions to take
Do you have well-defined business goals for your site?	Interview stakeholders to uncover views about business goals and build a prioritized list of site goals.
Do you know the primary goals users come to your site to accomplish?	Research users to identify the goals they bring to the site. Identify user goals that are most important to driving business goals.
Do your design personas identify attitudes toward and usage of RIAs?	Conduct ethnographic research to uncover users' attitudes and behaviors related to RIAs and unmet needs RIAs might help satisfy. Build relevant information into personas.
Can you pinpoint a problem that cannot be solved using technology in-place?	Target opportunities where user goals can't be well-served even with the best HTML designs, like configuring complex products or sorting through large data sets.
Can you identify the change in metrics that will make the RIA implementation cost effective?	Make success measurable with clear goals for returns on investment like a .15% increase in conversion rate, or 5% reduction in user abandonment.
Do you have RIA development skills in house?	Train current staff in RIA-enabling technologies and make RIA skills part of requirements for new hires.
Can you test the waters with a smaller project or roll out a larger project incrementally?	Look for low risk projects to validate user acceptance and provide lessons for future implementations.
Does your analytics tool allow you to track within your RIA to identify potential problem areas?	Identify ongoing user pain and make design adjustments through analytics, heuristic evaluations, and usability tests.
Does your brand positioning statement focus on innovation or use of leading edge technology?	Facilitate user goals and align with corporate brand positioning by referring to personas for target users and a brand "persona" for messaging.

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Source: Forrester Research, Inc.

RECOMMENDATIONS

KEEP HTML PAGES AND PHASE IN RIAs

RIAs provide better interactive experiences than HTML, but they aren't the most suitable option in every case. Firms migrating to richer experiences should keep their HTML around for:

- **Search engine indexing.** Though applications like configurators and shopping carts don't need to be indexed by search engines, if you're building a piece of function with a substantial amount of content in it, getting search engine placement will be problematic. This is why Discovery Channel Store doesn't default users who are shopping for telescopes into its slick telescope finder. By keeping product pages in HTML and the finder app separate, Discovery can provide links to specific products through Google *and* give users who don't come to the site with a model in mind a useful and engaging way to find the right product.
- **Users who aren't ready for RIAs.** While the penetration rate of Flash is extremely high, not everyone has the latest version or necessary bandwidth to take advantage of experiences enabled by a Flash or Ajax. Because its shopping cart runs on the latest version of Flash and requires a large initial download, Intuit serves up its HTML version to site visitors who don't meet strict (and conservative) requirements for connection speed and version of the Flash player installed on their PC.
- **Testing and comparison.** How can you tell if the fancy new configurator you built with Flex is effective? Conduct an A/B test and compare it against the HTML version. A/B tests can help you do more than just compare how many people completed configurations and took the next step to save, buy, or contact a dealer. They can also help identify what parts of the Flash version might have problems that are getting in users' way like unrecognizable or unpredictable interactive elements. And even if your Flash version beats your HTML version, the comparison can provide insight on how to further tweak the app to maximize its effectiveness.

SUPPLEMENTAL MATERIAL

Companies Interviewed For This Document

Adaptive Path	Fluid
Adobe Systems	Intuit
Allurent	Laszlo Systems
Avenue A/Razorfish	Molecular
Daishinsha	Nexaweb Technologies
DecisionStep	Sapient
Dow Jones	Urban Outfitters
Fidelity Investments	

ENDNOTES

- ¹ Forrester has written about the power of RIAs for several years. See the April 8, 2002, Report “[The X Internet Revives UI Design](#).”
- ² The MINI USA site brought significant innovation to Web site design — and set the new standard for online customer experience as one of the Web’s first RIAs despite some usability flaws. See the September 16, 2003, Brief “[MINI USA Highlights The Future Of Site Design](#).”
- ³ Broadband penetration continued to increase dramatically in 2005 — ending at 44 million US households and is expected to further increase in 2006 to more than 55 million US households. See the July 27, 2006, Data Overview “[The State Of Consumers And Technology: Benchmark 2006: North American Consumer Technology Adoption Study](#).”
- ⁴ In the past year, all types of ISPs have offered consumers more options with broadband offerings that range in speed and price. DSL providers have made the most aggressive price cuts, offering multiple tiers of broadband based on speed that start as low as \$14.95. Cable operators also offered a lower-speed, lower-priced service to entice consumers to sign onto broadband. See the April 7, 2006, Trends “[The State Of Internet Access](#).”
- ⁵ RIAs attempt to overcome the shortcomings of HTML alone through a variety of additional technologies — like Flex, Ajax, Active X, and Java applets — and in so doing, they provide benefits that are more usually associated with desktop applications. See the April 10, 2006, Trends “[The Rise Of Rich Internet Applications](#).”
- ⁶ Google Maps elicits a visceral response in many new users: “I’m never using MapQuest again.” However, customers’ perceptions that Google Maps is more accurate than MapQuest or Yahoo! Maps are flat-out incorrect: All three online mapping sites get data from the same source. So, if the data is the same and you

count out silly things like brand affinity, what is it that makes customers feel all warm and fuzzy about Google Maps? A user interface that treats them with a little respect. See the April 11, 2005, Quick Take [“What’s So Cool About Google Maps?”](#)

- ⁷ Companies like Dell, Fidelity, and Staples — famous for doing serious business on the Web — have been measuring the results of their site design and redesign efforts for years. This historical data puts the cost of design projects in their correct perspective — as a secondary consideration to benefits. See the March 17, 2006, Best Practices [“The ROI Of Web Redesigns Made Simple.”](#)
- ⁸ Some 148 B2C and B2B decision-makers on Forrester’s Customer Experience Peer Research Panel reported “building brand” as the second most important goal for their primary customer-facing sites. See the June 9, 2005, Best Practices [“How Brands Succeed Online.”](#)
- ⁹ Through technologies like Ajax and Flash, RIAs overcome traditional page-based Web browser constraints to deliver more interactive and responsive Web functionality. RIAs beget rich user experiences when they help users sort large data sets, control multistep processes, manipulate images, get information that’s hidden or out of view, and use familiar desktop controls and features. See the June 7, 2006, Best Practices [“From Rich Internet Applications To Rich User Experiences.”](#)
- ¹⁰ RIAs promise improved experiences for users and, in turn, bolstered bottom lines for companies. But RIAs are newer and more complex than their HTML counterparts, making them vulnerable to well-known — and potentially undiscovered — usability flaws. To ensure that RIAs don’t frustrate users with avoidable problems, designers should look out for some basic pitfalls and test their applications — in the context of the full site experience — throughout the design and implementation phases of an RIA development project. See the June 7, 2006 Best Practices, [“Rich Internet Application Usability 101.”](#)
- ¹¹ To gain greater insight into the factors that enable customer experience success, we conducted in-depth interviews with leading design agencies and executives at companies like Fidelity, Discover Financial Services, E*TRADE, and Orange. We started each conversation by asking about organizational barriers and how best to overcome them, but interviewees universally dismissed the idea that organizational structure (reporting relationships) could solve customer experience problems. Instead, they focused on two elements as key to design success: 1) Design-centric cultures that understand the business value of customer experience, and 2) business-centric design processes that align business goals with customer goals. See the March 31, 2006, Best Practices [“Culture And Process Drive Better Customer Experiences.”](#)
- ¹² Forrester recommends devoting 50% or more of design budgets to solving problems that go beyond basic competence and differentiate value propositions. See the February 17, 2006, Best Practices [“Beating The Three Web Design Challenges.”](#)

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