For: Application Development & Delivery Professionals

The 10 Most Important Technology Trends In Business Application Architecture Today

by Jost Hoppermann, Paul D. Hamerman, and George Lawrie,
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KEY TAKEAWAYS

Technology Is Reshaping The Value Proposition Of Business Applications

Technologies that disrupt traditional notions of process flexibility, insight, delivery speed, ownership, and support costs will transform business applications. Ten key trends drive this transformation, enabling more flexible support of business requirements and changing how application delivery teams build and buy future business apps.

The 10 Most Important Technology Trends In Business Application Architecture Today

Understand These Trends To Shape Your Application Strategy

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with Mike Gilpin and Nasry Angel

WHY READ THIS REPORT

This report enumerates the top 10 technology trends that are reshaping the nature and value proposition of business applications today and in the coming years. Application delivery leaders, application architects, and enterprise architects should use this report to inform their application strategy. The report will help them define their road map for implementing that strategy and avoid basing their long-term strategy on the technologies or architectures of the past, as these are inherently ill-suited to meeting the challenges of the coming decade.

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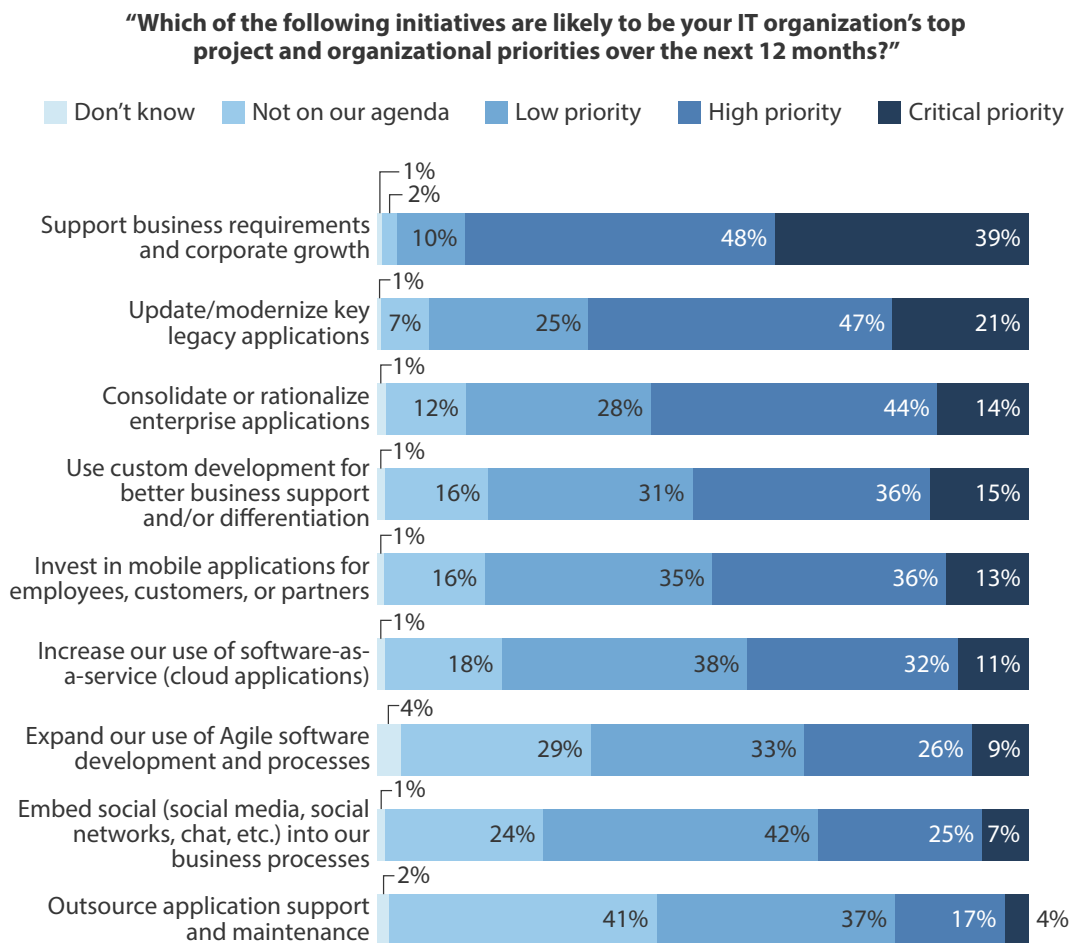March 23, 2011

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TECHNOLOGY IS RESHAPING THE BUSINESS APPLICATION VALUE PROPOSITION

Today's business drivers and requirements are motivating business and BT decision-makers to place a high priority on consolidating, rationalizing, and transforming their business applications to support business requirements and corporate growth (see Figure 1).[1] Considering the multiyear nature of many software initiatives targeting the consolidation, rationalization, and transformation of business apps, it would be shortsighted to plan for the future of business apps based on the architectures that exist today. This is even more relevant in the context of large business transformation programs, of which business apps are only a part. The 10 trends outlined below will transform the future of business applications and their architecture and reshape how application development and delivery teams build and buy business apps (see Figure 2).

Figure 1 Business Applications Dominate Software Initiative Priorities

"Which of the following initiatives are likely to be your IT organization's top project and organizational priorities over the next 12 months?"

Legend: Don't know | Not on our agenda | Low priority | High priority | Critical priority

| Initiative	Don't know	Not on our agenda	Low priority	High priority	Critical priority
Support business requirements and corporate growth	1%	2%	10%	48%	39%
Update/modernize key legacy applications	1%		7%	25%	47% / 21%
Consolidate or rationalize enterprise applications	1%		12%	28%	44% / 14%
Use custom development for better business support and/or differentiation	1%		16%	31%	36% / 15%
Invest in mobile applications for employees, customers, or partners	1%		16%	35%	36% / 13%
Increase our use of software-as-a-service (cloud applications)	1%		18%	38%	32% / 11%
Expand our use of Agile software development and processes	4%		29%	33%	26% / 9%
Embed social (social media, social networks, chat, etc.) into our business processes	1%		24%	42%	25% / 7%
Outsource application support and maintenance	2%		41%	37%	17% / 4%

Base: 2,444 IT executives and technology decision-makers from SMB and enterprise companies
(percentages may not total 100 because of rounding)

Source: Forrsights Software Survey, Q4 2012

103541

Source: Forrester Research, Inc.

September 23, 2013

Figure 2 Technology Is Reshaping The Business Application Value Proposition
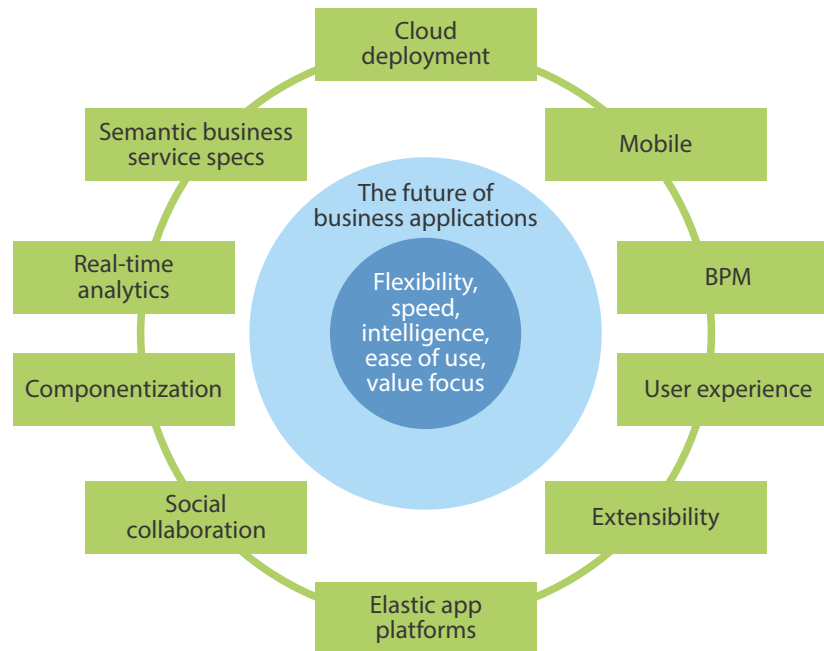
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Source: Forrester Research, Inc.

Trend 1: Cloud Deployment Models Are Changing Application Economics

Traditional on-premises applications are tapped out. Software upgrades have become so costly and difficult that most customers defer them for years, sometimes even for a decade. Customizations and extensions — custom-built add-ons using defined APIs and exit points — complicate the upgrade challenge, and vendor deadlines and technical obsolescence, rather than business value, too often drive upgrade timelines. Such upgrades drive up costs, yet these costs are difficult to estimate or justify. Cloud computing in general and software-as-a-service (SaaS) in particular provide an alternative model with more predictable costs. The all-in rental model includes hosting, maintenance, managed services, automatic upgrades, and software usage.

In the future: As SaaS adoption grows, application economics change for customers and vendors alike. SaaS momentum is expanding to enterprise resource planning (ERP) and finance and is becoming sufficiently extensible, flexible, and scalable to make it a suitable replacement for on-premises ERP and finance systems. Technology trends, such as platform-as-a-service (PaaS) and business process management (BPM) across or within a business app, will enable these capabilities.[2] Multitenant models will evolve, enabling better data isolation and more flexibility to manage upgrade timing in the cloud. Firms in industries such as banking will be a bit more reluctant to

move to SaaS, while more industries enrich their application mix, blending off-premises business applications with off-the-shelf and custom-built on-premises apps to meet varying objectives.[3]

Trend 2: Mobile Technology Is Extending Application Usage And Value

Mobile technology — including devices, software, networks, and product distribution channels — is evolving at a blazing pace, driven by affordable, easy-to-use consumer devices. Business application vendors use mobile technology to increase the adoption and usage of their business apps by making business processes portable — whether to support employees with mobile human resource management (HRM), banking, or retail functionality or connect customers and consumers via multiple touchpoints. The potential of mobile apps to transform business processes exploits the speed and convenience of mobility itself as well as devices' unique capabilities to sense, respond to, deliver, and capture information in real time. Business app vendors, however, will struggle to adapt their product development cycles to the pace of the mobile world unless they can decouple mobile capabilities from the remaining elements of their solution architecture — which they can do, for example, by having a separate API layer serve those mobile apps.

In the future: Future use cases will expand as richer functionality exploits more powerful devices. Several factors will enrich the capabilities of mobile business apps from business application vendors and their ecosystems.[4] Rapidly evolving tablet devices will improve the depth of the functionality and user experience that mobile devices deliver. Mobile process scenarios will evolve with the appearance of packaged mobile apps that deliver rich content, broader business intelligence (BI), and product information in industry-specific areas like architecture, banking, healthcare, and real estate. Mobile apps will move beyond content delivery and data capture via scanning and sensing, making them increasingly rich sources of data about the physical world. Mobile app developers will find that they can use web-centric HTML5 approaches more often for use cases that formerly required native apps.

Trend 3: Application Flexibility Is Evolving Via Embedded Modeling Tools

Business stakeholders have traditionally depended on IT staff skilled in business application configuration, including BPM. This often led to long delivery times and patchy application architectures with limited business flexibility. Processes too often had to adapt to software limitations, or the software required extensive extension and customization. The configuration tooling that business app vendors provide is evolving beyond parameterization and coding to become flexible, graphical, and model-based, eliminating coding and making the ease of changing a business app into a differentiating capability.[5]

In the future: Application configuration tools can change the game by empowering business experts to modify app behavior without always having to go to IT for help, reducing the need for app customization that increases maintenance costs.[6] Future business apps will incorporate business-

oriented graphical modeling tools that enable rapid, code-free modifications to business apps, including process orchestration, business rules, notification, organizational structures, embedded BI, and even the assembly of new functionality from existing functional elements. As these capabilities evolve, business units will come to own business configuration.[7] App flexibility will differentiate vendors and become a key driver of application vendor selection.[8] Business-led application flexibility will become common.

Trend 4: Application User Experiences Are Advancing To The Next Level

Early business apps captured data using bland, character-based screens with rows of input fields in systems such as teller workstations in early core banking systems or in HR or retail apps. The addition of colors, drop-down lists, icons, and other features did little to advance application usability, as apps tended to reflect their data model rather than the user's process. Applications have reached a critical stage as Millennials reject experiences that fall short of the high expectations set by consumer apps, so vendors are delivering new user experiences with rich graphical features that embed analytics, decision support, offers, and direct customer interactions. The focus is moving from data capture to business outcomes, extending application reach to a more diverse array of user roles.

In the future: Business apps are evolving to resemble consumer experiences, embracing touch from mobile, collaboration from social networks, and motion sensing from gaming. For example, Lithuanian software company Etronika offers a Microsoft Kinect-based user interface for banking software. Apps will increase their use of motion and 3D from gaming platforms, along with video and rules-based avatars. Brazilian Banco Bradeso's Next prototype branch features robot guides, digital avatars, remote consultants, large-screen conference tables, and gesture-based interaction.[9] Rich, interactive user experiences make for great demos — but they must deliver tangible business value to be truly competitive. Real value comes from extending business process support to a wider and more diverse range of roles, including customers; driving business outcomes by improving customer interactions; and delivering measureable business performance improvements.

Trend 5: Extensibility Is Improving Via PaaS

Most vendors offer some proprietary tools to customize or extend their business apps. However, the complexity and cost of using these tools, including the downstream impact on upgrades, has caused many companies to seek better options to meet their requirements, including custom apps. In the past, many SaaS apps did not allow customization beyond built-in configuration options, but an increasing number offer PaaS, a set of rapid application development tools for building apps in the cloud, to support application configuration. PaaS will disrupt the notion of "build versus buy" in apps.[10] Advanced PaaS tools complement core application configuration capabilities, speeding the development of cloud apps that leverage the elastic and multitenant infrastructure of SaaS.

In the future: PaaS will allow business apps to thrive in the cloud. Barriers to the growth of SaaS apps include limited extensibility, functionality, and vertical industry features. To overcome these barriers, PaaS tooling must add model-based configuration and BPM to accelerate development for the cloud. Furthermore, partner ecosystems must add functional breadth and industry-specific capabilities with dedicated offerings beyond what SaaS vendors can do on their own. This will enable larger, more complex customers to adopt SaaS applications. To maximize extensibility, PaaS must achieve greater componentization and embrace semantic business service specifications.

Trend 6: Componentization Is Supporting The Smart Assembly Of Custom Functionality

Manufacturers in mature industries such as automotive and, more recently, aerospace have evolved from making every component to focusing on market requirements and designing and managing "bought-in" subassemblies. Facing a maturing IT industry and the move from IT to BT, smart app delivery professionals will design and assemble software and service components to meet differentiating requirements for their line of business. For years, retailers have bought in tax tables to enable them to comply more swiftly with local sales taxes, but now providers such as Vertex deliver tax calculations as a remotely invoked service via an API. For many years, the Norwegian government has provided software objects that perform payroll gross-to-net calculations. Componentization will enable app delivery teams to blend the best elements of custom-built apps and components and off-the shelf-components for functions such as loan origination and know-your-customer apps.[11]

In the future: Componentized business functionality and information will serve both enterprises and vendors. More componentized functionality and externally sourced information via APIs will become commonplace.[12] Firms of all sizes will use internal and external business app components within component frameworks in their quest to achieve maximum competitiveness.[13] In doing so, they will break today's pattern, where smaller firms tend to use more prepackaged business app approaches.[14] Vendors can serve these target audiences with both flexible bundles of components and prepackaged end-to-end application suites at a competitive price. This will enable the economies of scale needed for integrated, flexible, easy-to-use, and quick-to-deploy business apps.[15] Enterprises using this approach will be able to change their business strategy much faster than today.

Trend 7: Elastic Computing Platforms Are Scaling Transactions And Analytics

Forrester defines an elastic application platform (EAP) as an app platform that automates the elasticity of transactions, services, and data, delivering high availability and performance using elastic resources.[16] New scenarios with uncertain scaling demands — such as "big data" analytics of hundreds of gigabytes or more of rapidly growing data (especially for data that originates in the cloud) or established business apps with varying demand — will benefit from EAPs, delivering faster performance during peaks at a lower overall cost. But the greatest business benefits are likely

to come from the insight gained from rapidly analyzing massive amounts of business information, drawing insight from the vast data resources in public and industry domains.

In the future: EAPs will enable innovative new apps that benefit from high scalability and elasticity, as well as enabling cloud apps to support larger enterprises and more sophisticated multitenant designs. The speed and scalability of in-memory architectures will enable apps that provide new levels of predictive simulation and insight. EAPs are well-suited to SaaS, allowing the speed and performance necessary to scale to hundreds or thousands of customers on the same application architecture. EAPs will also free customers from the constraints of multitenancy by enabling automatic app upgrades and providing better levels of isolation. This is better for industries like banking that are concerned about data security and privacy, especially during recovery.[17]

Trend 8: Social Collaboration Is Coming To Applications In Context Via Social Tools

Rampant adoption of social-based communications in the consumer world has left app vendors scrambling to harness this technology within, or alongside, business apps. When it is properly applied to solve a business problem, social collaboration accelerates business results. For example, social collaboration can rapidly drive consensus and promote informed decisions when solving a business issue, reacting to events, or developing new business opportunities. Crowdsourcing, for example, has become a tool for banks to develop and test new financial services products.

In the future: Social collaboration will move into the application fabric. In the near term, it will sit alongside business apps: Only a few app vendors will succeed in harnessing social collaboration to enable business processes. As social media adoption thrives on widespread adoption and frequent use, corporate rollouts may suffer from limited uptake and overly marketing-focused, rather than collaboration-focused, usage. On the other hand, high usage may bring information overload, leading to difficulty in governing its appropriate and productive use. The effective use of social collaboration in business apps and processes will take several years to mature, eventually becoming a relatively ubiquitous and standardized feature.

Trend 9: Big Data Is Driving Real-Time Analytics That Improve Business Results

Today, customers typically know more about companies and their products than these companies know about them.[18] Price comparison websites, aggregator websites, and social computing — including product-, service-, and industry-specific forums — help customers assess both the price and quality of services and products better than ever before. Enterprises are attempting to digest vast quantities of information, often exceeding their ability to manage them: Big data has arrived. Firms in industries such as banking and retail need to learn more about their customers and consumers.[19] To do so, they must leverage public information from the Internet for uses such as credit scoring and understanding consumer preferences and also track customer behavior across channels — all while trying to get a single view of their customers from internal business apps.[20] Information asymmetry is real, and it works in customers' favor.

In the future: Real-time information in the outside world, such as traffic and weather conditions or stock quotes, can help optimize business processes. Future (business) intelligence systems will reach out to leverage Internet information like customer data for adaptive intelligence, increasingly delivered via APIs. A 360-degree view of internally available customer and business information complements this approach. However, simply integrating today's "local" data silos won't suffice. A truly businesswide 360-degree view will extend beyond the boundaries of the enterprise, reaching out to all kinds of business partners and/or countries of operation to compile this 360-degree view using in-memory architecture to deliver a more current, comprehensive view of customer and partner relationships, as well as the state of the business, in real time.[21] Acting on instantaneous and predictive analysis of rich big data will be the norm.

Trend 10: Standardized Service Semantics Are Crucial For Agility And Extensibility

One of the key promises of service-oriented architecture (SOA) has been easier interoperability between service providers and consumers. SOA has delivered mostly on syntax specifications: Specifications and standards from W3C and WS-I have defined a service language for service providers and consumers to use. However, a key challenge remains: The *meaning* of this service language remains undefined. Thus, in many industries, a gap continues to exist between the promise of full business agility and the reality of only syntactically standardized business services interfaces. Bridging this gap is crucial for those companies intending to leverage the combined business value of architectural elements, such as components, BPM, model-driven configuration, and SaaS.

In the future: Semantic business service specs will result in a quantum leap in extensibility. More sets of semantic specifications for business service interfaces and information will emerge for application-to-application (A2A), with the Banking Industry Architecture Network (BIAN) an early mover in this space. At the same time, the convergence of semantic specs with large sets of vendor-proprietary, prebuilt business services, such as those from IBM, will speed this trend.[22] Standardized semantics will make business services, components, and information services more easily "switchable" as they improve the ability to add, consume, and rapidly deliver new functionality and information.[23] They will also further enable trends such as "buy plus build," BPM, and SaaS. Finally, rich, deep business services offerings — components — are emerging for industries like banking; these will serve as a substitute for, or even ultimately replace, today's business applications.

WHAT IT MEANS

CHANGE YOUR DELIVERY APPROACH TO LEVERAGE THESE TRENDS' POWER

These 10 key technology trends will reshape the way application delivery teams will design, develop, and select business applications. The full impact of these technology trends will not be felt until off-the-shelf business apps and the tools and application infrastructure to build business apps evolve more fully to embrace their potential.

- **Short-term business apps projects will see only a small impact from these key trends . . .**
An application delivery team working on a relatively small business app for delivery within
the next six to 12 months will probably not see much impact from these trends, unless the
app must differentiate based on its use of cloud services or mobility. Vendor investment
cycles, limited R&D budgets, and vendor road maps will limit how fast these trends will
affect business apps and tooling.

- **. . . but large business transformation programs must embrace them now.** Updating and
replacing business apps is typically only part of any large-scale transformation program.
However, even this part may take four or five years to complete. Application delivery teams
must consider the latest technology and design paradigms when deciding on or designing
new business apps. Failing to do so means that the new apps will be based on legacy — and
possibly obsolete — technology at the end of a multiyear period of transformation.

ENDNOTES

1 Forrester uses the term "business applications" to refer to all applications used in an organization to conduct
business, regardless of whether they are custom, packaged, legacy, off-the-shelf, customized, composite,
front-office, back-office, desktop, mobile, or server-based. We chose not to use the term "enterprise
applications" because, to some ears, that sounds like it is limited to applications used in large companies or
to packaged applications such as ERP — although to others it seems synonymous. Our definition, however,
excludes personal productivity and email tools (desktop apps).

2 For more discussion of the relationship between BPM and business applications, see the January 9, 2012,
"The Smart Way To Implement Process-Centric CRM" report, see the October 25, 2011, "ERP Workflow: A
New Option To Treat Business Process Pain" report, and see the March 8, 2011, "Put Process At The Heart
Of ERP" report.

3 Banks still have security and privacy concerns and do not yet see sufficient potential to help them
differentiate from their competition.

4 Business application vendors will build mobile developer ecosystems and channels that expand their reach
beyond their internal development capabilities.

5 Business process management suite (BPMS) vendors already have more sophisticated capabilities that leading
business application vendors will attempt to replicate or are in the process of replicating. Building out these
capabilities may prove challenging, given the high degree of flexibility, variability, and adaptability built into
BPM suites, so business app vendors may need to acquire some of the remaining pure-play BPMS vendors or
build on a close and trusted partnership that will be beneficial for both BPMS and business apps vendors.

6 Forrester refers to this shift of technology ownership and responsibility as "IT to BT," where BT stands for
business technology, meaning technology embedded in the business without requiring IT specialists.

[7] Business involvement and ownership will naturally increase. These configuration capabilities will enable and further define the role and skill set of business process owners with respect to business applications. In parallel, BT organizations need to ensure that sufficient control mechanisms are in place to avoid turning small, business driven change projects into large, enterprisewide, complex and unmanaged — thus potentially risky — transformation-type initiatives.

[8] High levels of configurability are essential for both SaaS applications and on-premises applications — so that the apps can be configured using metadata without compromising the ability to upgrade.

[9] Avatars are meant to offer product information, advice, and even advertisements for financial services and non-financial services products. Banks are already using the first instances of these. See the September 19, 2008, "Bank Branches Are Here To Stay — But With Key Differences" report.

[10] Forrester defines PaaS as an externally hosted service providing a complete platform to create, run, and operate applications, including development tools, administration and management tools, runtime engine(s), data management engine(s), security facilities, and user-management services. PaaS is based on Internet protocols and patterns. See the February 10, 2009, "Platform-As-A-Service Is Here; Can It Help You?" report.

[11] Many banking application vendors have already released components (still coarse-grained) and defined their path toward componentization in their medium- to long-term plans. A few vendors already provide larger chunks of their banking platform as components; one example is SAP with its "Banking Services." See the December 8, 2009, "The Banking Platform Of The Future" report and see the December 17, 2010, "The Forrester Wave™: Global Banking Platforms, Q4 2010" report.

[12] Enterprise execs who seek to understand their customers, market, and competitive landscape can't afford to limit their insights to the data they generate. Nor can they hope to gain sufficient insight by purchasing data or target audiences from third parties. To meet the needs of perpetually connected customers, firms must become collaborative, both sharing their data and insight outward and absorbing it from suppliers and partners. See the August 16, 2013, "Improve Business Outcomes With Adaptive Intelligence" report.

[13] Firms with larger IT and BT organizations will continue to follow the notion of the "right" IT/BT portfolio, but at a more granular level than in the past.

[14] A typical example can be found in banking: Smaller banks (including subsidiaries of larger banks) will continue to seek complete suites of packaged applications such as banking platforms, particularly if they don't intend to differentiate via business apps, but, for example, via customer relationships instead. While a few larger leading-edge banks have already started designing application architecture frameworks that support componentization, larger banks will continue to follow a more balanced off-the-shelf/custom-build strategy. See the December 8, 2009, "The Banking Platform Of The Future" report.

[15] Vendors will sell components as "products-as-a-service" in the form of SaaS and cloud applications, as well as licensed components to be used on-premises or using PaaS.

[16] For a definition of elastic application platforms, see the April 26, 2011, "Cloud Computing Brings Demand For Elastic Application Platforms" report.

[17] Banks told Forrester that security and privacy issues are the main obstacle to SaaS for banking apps. See the December 8, 2011, "Off-The-Shelf Banking Platforms Are Still Scarce In The Cloud" report.

[18] Forrester identified information asymmetry as one of the crucial challenges for today's enterprises and sees information as the crucial weapon in the battle for the customer. See the November 14, 2008, "The Future Shape Of Banking Architecture In 2023" report and see the August 10, 2009, "Retail CIOs: Prepare For Retail 2020" report.

[19] This approach will particularly drive cross-selling and upselling initiatives to optimize customer retention.

[20] Enterprises face growing challenges in bridging disparate sources of data to fuel analytics, predictive analytics, real-time insights, and applications. The data explosion is also exacerbating integration, security, performance, quality, and availability issues. Business users need reliable information fast (in real time) to make business decisions, while IT needs to lower costs, minimize complexity, and improve operational efficiency. Eight years ago, Forrester invented the category of data virtualization with our vision of the "information fabric"; these solutions continue to evolve to address the pressing problem of delivering comprehensive capabilities to enable dynamic, real-time data services. In updating our information fabric reference architecture to version 3.0, we reflect these new business requirements to accommodate new technology enhancements supporting big data, cloud, mobility, distributed in-memory caching, and dynamic services. See the August 8, 2013, "Information Fabric 3.0" report.

[21] In banking, real-time alert capabilities that target customers as well as employees will allow for more personal interaction, more on-the-spot identification of business opportunities, and more relationship development. In retail and consumer packaged goods, supply chain event management, supply chain intelligence, and "traditional" BI will deliver significant insight to the business.

[22] IBM became a BIAN member in January 2012.

[23] To enable the provision or consumption of service functionality, well-defined service interfaces must include the semantics as well as the syntax of business service interfaces. However, if companies want to avoid backsliding to the era of "handmade" integration adapters, they must ensure that semantic specifications go beyond a pure project, enterprise, or vendor level. Ultimately, "semantically standardized" business service interfaces will change the way applications are built, thus further extending flexibility and reducing the time-to-change.

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