Hype Cycle for Web Computing, 2013

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Modern Web techniques, tools and technologies are critical success factors for delivering compelling user experience via websites, portal sites and mobile apps. Staying abreast of innovations in the Web is vital.

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What You Need to Know

The Web is in the center of the Nexus of Forces, providing the primary human interface to social, cloud and information, the leading model of mobile app development, as well as the primary programmatic interoperability model used across all four forces.

The Hype Cycle

The Nexus of Forces (social, cloud, mobile and information) profoundly impacts both technology and business strategies. The Web is in the center of the nexus, providing the connective tissue:

- Social: The Web is the primary human interface, and RESTful Web-centric models delivered provide the primary programmatic interoperability model.

- Cloud: The Web is also the primary human interface, and Web-oriented models (mostly REST-based) provide the programmatic interoperability models.

- Mobile: The hybrid model of mobile application development, using the wrapped HTML model and HTML5, has become the primary enterprise model for mobile.

- Information: The Web provides a significant amount of information and analytics, and through the Internet of Things, it will provide a large percentage of future big data.

The intersection of the Nexus of Forces provides a force multiplier, with synergies between the forces facilitated by the connectedness of the Web.

The Web is ubiquitous. It is used daily by almost every professional enterprise employee (continually by many), as well as the majority of humans on the planet. The Web is also the preferred mode of communication for enterprises and organizations, and it is the preferred choice of customers, prospects, business partners, potential employees, investors, regulators and other interested parties.

Virtually every G2000 enterprise has a Web-based intranet, and Web-based portals are used by most of them. The Web provides the user interface to most business applications.

With HTML5, Cascading Style Sheets 3 (CSS3), JavaScript and related standards steadily maturing, the Web provides a platform for apps that rival native approaches in fidelity and capabilities. RESTful models of interoperability have overtaken SOAP-based Web services and are the most popular models for producing and consuming services.

The Web is cemented as the platform of the future for both traditional PC and mobile apps.

Web-based digital marketing is now the primary marketing channel for many enterprises, and it is an important secondary channel for most. The Web, via marketing-centric websites, portal sites and mobile apps, is the primary platform for customer interaction.

All this adds up to the fact that the Web is the primary tool for integrating, interoperating and delivering content, applications, and processes to humans and machines alike. It is *the* most important weapon in the IT arsenal.

User experience (UX) has become a major focus, especially when applied to customers. Unfortunately, there is still significant room for improvement in terms of enterprise adoption of user-centered design processes and methodologies (for example, split A/B testing, multivariate testing, usability testing, persona and interaction patterns) that make effective use of new user interface technologies. Gamification is appearing in enterprises, but it has a long way to go.

A common question is, "What's beyond Web 2.0?" We already know that Web 3.0 isn't on the near-term horizon, as the step-function change that got us to Web 2.0 is not likely to recur soon. However, new, innovative technologies and approaches are launched every day. The Internet of Things grows by the minute.

However, there are still many opportunities for improvement, including better processes for content management, deployment, and the management of international, decentralized and multilingual websites, as well as accessible websites for users with disabilities. Semantic Web is seeing a rebirth, driven by applications in big-data analysis. New standards such as HTTP2 and WebRTC will provide even more capabilities for future Web applications.

This Hype Cycle covers a broad collection of Web-oriented technologies and methodologies. It is an update of "Hype Cycle for Web Computing, 2012." Particular items to note include:

- User experience platforms (UXPs) — The UXP market will emerge in late 2013, initially sourced from the suite-oriented horizontal portal product vendors. The UXP market will be dominated by large independent software vendors (ISVs; for example, IBM, Oracle, Microsoft and SAP), but will be somewhat balanced by smaller players (for example, Temenos and eXo), as well as new providers of these technologies (for example, Cisco and Adobe).

- Big data — Web traffic generates a significant amount of big data. One huge enterprise challenge is how to correlate big data with other sources of analytics information, most of which are siloed (such as data warehouse/data mart [traditional] business intelligence analytics, Web analytics and social analytics).

- Mobile Web applications — Mobile Web applications are evolving rapidly, with three models: native apps, mobile Web apps and hybrid apps. The hybrid apps model, with HTML wrapping as the leading approach, is now the leading enterprise strategy.

- HTML5 — A collection of powerful technologies under the HTML5 umbrella (including CSS3 and JavaScript) is maturing rapidly, with many features enterprise-ready. Vendors and enterprises are already adopting sections of the specification that are complete.

- Portals — Many aspects of portals have matured adequately to reach the Plateau of Productivity. Other aspects, such as portal-less portals and the portal fabric, are continuing to mature.

- UX — Website optimization techniques, such as multivariate A/B testing and online channel optimization, as well as Web usability capabilities and tools, are being steadily adopted.

- Semantic Web — Languishing for almost 20 years, Semantic Web has seen a rebirth, based on its applicability to big-data problems.

- Web Components, HTTP2 and WebRTC — These new standards are the next wave of critical Web functionality and will lead to new types of Web applications.

Figure 1. Hype Cycle for Web Computing, 2013

Figure 1. Hype Cycle for Web Computing, 2013

expectations

- Big Data
- Social Media Metrics
- Gamification
- Online Channel Optimization
- Context-Enriched Services
- Hybrid Mobile Development
- Portal Fabric
- UX Tools
- Context Delivery Architecture
- Semantic Web
- Tag Management
- Portal-less Portals
- Responsive Design
- Public Web APIs
- Lean Portals
- Cloud Office Systems
- Portal PaaS
- Online Product Recommendation Engine
- Multivariate A/B Testing
- Social Analytics
- Mobile Containers
- UXPs
- Event-Driven Web
- Augmented Reality
- Customer-Centric Web Strategies
- Web Widgets
- Web Analytics
- Web Real-Time Communications
- Server-Side JavaScript
- Cloud UXP Services
- HTML5
- Federated Portals Across Vendor Families
- Client-Side MVC
- Web-Based Office Productivity Suites
- Consumer Web Mashup Tools
- Cloud Computing
- Native Mobile Development
- Composite Applications
- HTTP 2.0
- Mobile Web Applications
- Web Customer Service Suites
- Web-Oriented Architecture
- Web 3.0
- Content Migration
- Web Components
- Web Experience Analytics
- Social Software Suites
- Content Integration
- Cloud/Web Platforms

As of July 2013

| Innovation Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity |

time

Plateau will be reached in:

○ less than 2 years   ◓ 2 to 5 years   ● 5 to 10 years   △ more than 10 years   ⊗ obsolete before plateau

Source: Gartner (July 2013)

The Priority Matrix

Many technologies on the Web computing Hype Cycle have seen broad adoption — among them, Web analytics and composite applications. These are stable, mature technologies, with little risk in adoption.

Other technologies on this Hype Cycle are not so mature and warrant care in adoption. These include portal PaaS, server-side JavaScript, UXPs and Semantic Web. Type A enterprises can use these widely with some caution, Type B enterprises should examine these closely and use them opportunistically, and Type C enterprises should sit back and track them for a while.

Figure 2. Priority Matrix for Web Computing, 2013

benefit   **years to mainstream adoption**

	less than 2 years	2 to 5 years	5 to 10 years	more than 10 years
transformational		**Cloud Computing** **Composite Applications** **Context-Enriched Services** **Public Web APIs** **Web Real-Time Communications**	Big Data Context Delivery Architecture Semantic Web	
high	**Native Mobile Development** **Web-Oriented Architecture**	Cloud/Web Platforms Customer-Centric Web Strategies Hybrid Mobile Development Mobile Containers Mobile Web Applications Online Product Recommendation Engine Social Analytics Social Software Suites Web Customer Service Suites	Augmented Reality Cloud UXP Services HTML5 Online Channel Optimization Server-Side JavaScript UXPs	
moderate	Content Migration Federated Portals Across Vendor Families Web Analytics Web Widgets	Client-Side MVC Event-Driven Web Lean Portals Multivariate A/B Testing Portal PaaS Portal-less Portals Responsive Design Social Media Metrics Tag Management Web Experience Analytics	Cloud Office Systems Gamification HTTP 2.0 Portal Fabric UX Tools Web Components Web-Based Office Productivity Suites	
low				

As of July 2013

Source: Gartner (July 2013)

Off the Hype Cycle

The following were present in the 2012 version of this Hype Cycle but are off the 2013 version for a variety of reasons:

- B2B Web services — Reached plateau

- Citizen developers—No longer hyped

- Collaborative customer interfaces — No longer hyped

- Enterprise mashups — No longer hyped

- Infrastructure as a service — Focused via the cloud computing Hype Cycle

- Platform as a service — Focused via the cloud computing Hype Cycle

- Private cloud computing — Focused via the cloud computing Hype Cycle

- Second-generation portlet standards (JSR 286 and WSRP v.2) — Reached plateau

- Service-oriented architecture — Reached plateau

- Web-based office productivity suites — Replaced by cloud office systems

On the Rise

Web Components

Analysis By: Ray Valdes; David Mitchell Smith

Definition: The Web Components initiative is an HTML5 project that will define and implement a browser-based component architecture. This architecture allows user interface modules to be constructed and maintained in a standards-oriented manner. The Web Components initiative combines multiple proposed specifications, including HTML templates, custom elements, shadow Document Object Model (DOM) and HTML imports.

Position and Adoption Speed Justification: Web Components are an ambitious approach that strives for a more robust component model, improved developer productivity (through reliance on declarative HTML rather than procedural JavaScript), cross-browser portability and high performance (through built-in browser support). The subsystems that enable Web Components include the shadow DOM and HTML templates. The shadow DOM refers to a capability in the browser where the DOM can be partitioned into subtrees that are rendered on the page but are otherwise isolated —- meaning that Cascading Style Sheets (CSS) and JavaScript cannot cross the boundary between the main DOM and one or more shadow DOMs. The shadow DOM and related mechanisms are in the early stages of definition and standardization, and it will be several years before browser implementations catch up. The effort closest to realization is the Google Polymer project, which implements a "polyfill" layer that provides backward compatibility for browsers that do not yet support the new constructs, such as the shadow DOM. Even this backward-compatibility layer runs only on newer browsers (it does not work on any version of Internet Explorer older than Internet Explorer 10).

In the past, there have been many attempts to define components that have a UI aspect, as well as a software architecture perspective. These include portal components (JSR168-based portlets), gadgets (XML-based wrappers on HTML and JavaScript), and various proprietary models (including SharePoint Web Parts, ASP.NET MVC, Windows widgets and Apple Desktop widgets). These

initiatives were initially server-centric (JSR168/286) and later added a client-side aspect (Google gadgets). More recently, there has been wave of activity around client-side JavaScript frameworks that support a Model-View-Controller (MVC) architecture (for example, Backbone, Knockout, Ember, Angular, Meteor and Derby). Web Components are not directly comparable, but in some scenarios will replace the need for these older component models and frameworks, or prod them to evolve further in the direction of declarative, HTML-centric approaches.

User Advice: Developers should track the Web Components initiative, including the Google Polymer project, but should not consider using it in production-level systems for several years.

Developers using legacy approaches, such as jQuery, should learn and understand the concept of client-side templating, RESTful Web services and client-side MVC architecture.

Developers using modern client-side MVC frameworks, such as Angular and Meteor, should continue with these tools until foundational browser-based component frameworks mature.

Business Impact: The promise of Web Components is to improve developer productivity and allow rich Web applications to be built more quickly and maintained more effectively and at lower cost. Eventually, Web Components could replace server-side constructs, like JSR168/286-based portlets. However, achieving these goals will require increased complexity in browser implementations and carry some risks as to cross-browser compatibility, testability of applications, and emergence of an ecosystem of third-party components.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Sample Vendors: Angular; Derby; Ember; Google; Meteor; Polymer Project

HTTP 2.0

Analysis By: Ray Valdes

Definition: HTTP 2.0 is the next-generation successor to HTTP 1.1, the protocol that governs the transfer of documents between servers and clients on the World Wide Web. HTTP 2.0 stems from an initiative of the Internet Engineering Task Force (IETF) to address perceived problems in performance and efficiency, and possibly provide enhanced security as well.

Position and Adoption Speed Justification: The world has been well-served by the HTTP protocol for more than 20 years. Now a major successor, tentatively called HTTP 2.0, is slowly taking form in the early draft stage.

When Tim Berners-Lee defined version 0.9 in 1991, he chose a deliberately simple and straightforward approach, consistent with other well-established Internet protocols, such as FTP and Network News Transfer Protocol (NNTP). Explicitly rejected were approaches that might have delivered better performance (binary-oriented remote procedure call [RPC]) at the cost of

complexity and cultural incompatibility. In 1995, version 1.0 added content negotiation, plus some basic security mechanisms. This was followed rapidly by version 1.1 in 1996, which introduced reuse of connections across requests (the "keep alive" mechanism), pipelining of requests, and chunked transfer encoding (enabling streaming). There have been minor improvements since (for example, in 1999), but the protocol has been mostly unchanged for 15 years.

In the meantime, the Web has grown by multiple orders of magnitude, and with that, application requirements have escalated to include two-way, real-time communication; always-on, rich media; and so forth. The home page of a modern website is not served by one or several HTTP requests, but may require between 100 and 300 synchronous request/response cycles.

During the past decade, there have been various attempts to improve, replace or work around HTTP. In the late 1990s, there was a World Wide Web Consortium (W3C) working group around HTTP-next generation (NG), which explored concepts that more recent efforts have also taken up. In the new century's first decade, Roy Fielding, best known as the "father of representational state transfer (REST)" and a seminal figure in the history of the Web, spent several years developing Waka, a binary, token-based replacement for HTTP that included client-side macros and allowed unsolicited responses. In that same time frame, other approaches emerged that were more evolutionary and incremental, such as Comet, a name for a family of techniques that leverages a persistent HTTP connection between client and server to simulate real-time server push. These techniques include long polling, hidden iFrame and multipart HTTP response. Browsers open up multiple connections to servers and use techniques such as domain name aliasing to get around the limitation of six concurrent connections per browser.

More recently, in 2009, Google introduced the SPDY protocol, in which browser and server negotiate to run a different protocol that preserves the HTTP semantics (GET, PUT, and so on), while allowing many concurrent requests to run over the same underlying TCP socket connection. In addition, headers are compressed, and the server can initiate requests (not just the client). SPDY is now implemented in recent versions of Chrome, Firefox and Opera browsers. In addition, Amazon Kindle uses it to connect to Amazon's servers. Some of the Web's highest-profile and highest-traffic sites have implemented SPDY: Facebook, Twitter, Google search, Gmail and Wordpress.com.

Another related development is HTML5 WebSockets. While SPDY makes synchronous HTTP-style communications faster, WebSockets enables two-way live communications. SPDY is designed for maximum compatibility with existing Web applications, while WebSockets is intended for a future generation of interactive, bidirectional applications, such as real-time chat.

The IETF standards body has a working group called HTTPbis, which is chartered with improving HTTP. The initiative came together in March 2012 and considered various starting points, including SPDY and Microsoft HTTP Speed+Mobility, which builds on SPDY and also incorporates ideas from WebSockets. The main point of difference with SPDY is removing the requirement for header compression, which limits battery life on mobile devices. In November 2012, the initial draft of HTTP 2.0 was published and is essentially based on SPDY. That draft has been followed by a progression of revisions, including Draft 3, published on 29 May 2013, which moves away from SPDY into something unique. Because the process is still nascent, it is too early to tell how the standard will evolve. If the process around HTML5 video and offline storage is any indication, the road to a

standard will have multiple twists and turns, driven both by vendors' competitive agendas and the common desire for a unified standard that advances the Web.

User Advice: HTTP 2.0 is in the very early stages of the standards process, where a starting point has only recently been defined. Over time, this initiative will grow and will eventually be implemented across most browsers and many websites. At this point, however, most enterprise development managers need take no action other than tracking the progress and understanding the concepts, many of which date back to HTTP-NG in 1999.

It is now well-known that slow page load times can have significant negative impact on user experience and, in the case of e-commerce sites, negative impact on revenue. Developers should not wait for foundation-level improvements in protocols to optimize page load speeds. There is now an established set of techniques and practices for optimizing pages that developers should consider, beginning with tools such as Google Page Speed and Yahoo YSlow.

Business Impact: There are three areas that can benefit from an improved HTTP: existing websites that are in competitive sectors and need maximum performance, mobile-oriented sites that need efficient use of bandwidth while preserving battery life, and applications that offer a real-time live experience.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Google; Kaazing; Microsoft; Opera; The Mozilla Foundation; Yahoo

Client-Side MVC

Analysis By: Ray Valdes

Definition: Client-side Model-View-Controller (MVC) refers to a browser-side implementation of the long-established MVC architectural design pattern.

Position and Adoption Speed Justification: MVC is an approach to interactive applications that partitions the system into three major subsystems:

- **Controller —** The part of the system that receives and responds to user actions (keystrokes, mouse clicks, mouse movements, gestures, etc.).

- **Model —** The data object, which is updated as a result of user input and whose contents "persisted" into a back-end database and also rendered onto a view.

- **View —** The means of presenting the contents of the data object to the user. There can be multiple possible renderings of a data model, sometimes simultaneously (i.e., a graphical view, as well as a textual view, of a network diagram; or, alternatively, a side view and a top view of a 3D object).

The MVC pattern has been proven in complex graphical user interface (GUI) applications dating back to the Smalltalk system in the late 1970s. After Smalltalk, there have been multiple manifestations of MVC, including server-side Java and .NET Web platforms (for example, Struts framework in Java, or ASP.NET MVC in .NET).

The most recent trend is to use this architectural pattern in client-side JavaScript frameworks. As Web and mobile Web UIs become more and more sophisticated, architects and developers increasingly look to the partitioning of MVC architectures for the client side of their projects There has been a flourishing of activity and innovation in this space in the past two years, including frameworks like Backbone, Knockout, Ember, Angular, Meteor and Derby, among two dozen others. Backbone.js was released in October 2010 as Version 0.1. Since then, about two dozen client-side MVC-style frameworks have emerged, with likely many more to come. In the early days of Ajax JavaScript libraries, more than 150 libraries emerged before jQuery gained ascendancy.

As with any emerging sector, not all packages are directly comparable or consistently named. Some are Model View Presenter (MVP), or Model View ViewModel (MVVM), or MVC or Presentation-Abstraction-Control (PAC). A few observers used the "MV" nomenclature to refer to this family of MVC-related frameworks and libraries. Some frameworks, such as Meteor, go beyond client-side MVC to include a homogeneous server-side programming model as well.

User Advice: If you develop interactive graphical applications and online systems, understand not only the basics of the classical MVC approach, but also the refinements, such as MVP and MVVM. Even if you do not choose a framework, the MVC perspective will improve the structure of your system.

- Consider all MVC-derived frameworks (from Backbone to Angular to Meteor to dozens of others) to be highly tactical choices. It is likely that the one you choose for your next project will be superseded by some other framework, one that becomes "the jQuery of client-side MVC." It is possible that the framework that eventually dominates has not yet appeared on the market.

Business Impact: The benefit of MVC partitioning is to facilitate design, construction and maintenance of complex interactive applications. The MVC pattern limits coupling between subsystems (i.e., the model does not know about which views are "observing" it, nor does it know about controllers, it only knows about messages to update its contents) and this decoupling allows different parts of the system to evolve.

Additional benefits of the MVC approach compared with traditional approaches are reduced code to implement an application (on the order of two to three times an improvement in conciseness). The idea is that the less code developers have to write, the easier it is to maintain and debug.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Angular; Backbone; Derby; Ember; Knockout; Meteor

Cloud UXP Services

Analysis By: Gene Phifer

Definition: Cloud user experience platform (UXP) services are the cloud variant of the UXP offered in a shared, multitenant scenario via platform as a service (PaaS), or a single-tenant scenario running on an infrastructure as a service (IaaS).

Position and Adoption Speed Justification: Like the UXP, cloud UXP services are in their infancy. Cloud UXP services will follow the UXP up the Hype Cycle curve and are likely to stay in this trailing position throughout their life cycle. However, cloud UXP services could accelerate because many vendors have now become more customer-centric with their UXP offerings, and marketing- or sales-driven decisions on customer initiatives may focus on cloud alternatives, rather than on IT-driven decisions.

Cloud UXP services will likely integrate with content, data, applications and processes that reside in public cloud, private cloud, community cloud, hosted and on-premises environments. Therefore, the ability to integrate across all five domains is a necessity, and a hybrid scenario is likely.

User Advice:

- Type A (risk-tolerant) enterprises: Examine emerging cloud UXP services; after performing due diligence, engage as requirements, capabilities and risks align.

- Type B (mainstream) enterprises: Allow cloud UXP services to mature before engaging in mission-critical use of such offerings. Use cloud UXP services for non-mission-critical workloads for now. The UXP is an emerging concept, and cloud computing is still in its infancy, so there is some risk in today's emerging cloud UXP services, and there is risk of lock-in, as is true of all cloud services. This risk must be managed; otherwise, allow both the UXP and cloud computing to grow up a little more before engaging in cloud UXP services.

- Type C (risk-averse) enterprises: Track maturation of cloud UXP services, but delay engagement beyond experimentation.

Business Impact: Traditional deployment cycles for portal products are two to four months or more. Cloud UXP services can be deployed in a fraction of that time. Other benefits are the same as with other cloud computing alternatives to traditional on-premises deployments.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Covisint; eXo; IBM; Microsoft; Oracle; salesforce.com

Recommended Reading: "The Emerging User Experience Platform"

"The Ethos of Vendor User Experience Platforms"

"Who's Who in the Emerging UXP Market"

Server-Side JavaScript

Analysis By: David Mitchell Smith

Definition: Server-side JavaScript refers to the use of the JavaScript scripting language on back-end servers and in the cloud. This is not the most common use of the language, as JavaScript's most common use has been in the delivery of cross-browser Web applications. JavaScript's origin is as a browser scripting language.

Position and Adoption Speed Justification: JavaScript has a long history as a successful browser scripting language — a potent role that its association with HTML5 will solidify. JavaScript has been less successful as a programming language in other environments, including as a server-side component of Web applications. Although various implementations of server-side JavaScript have been available for years, the concept has only recently begun to gain traction. The introduction of Node.js in 2009 was a catalyst for the realization of some JavaScript benefits as a server-side technology. Gartner predicted the rise of server-side JavaScript in our 2006 research "What's Next With Web 2.0 and Consumerization?"

There are several implementations of server-side JavaScript. Rhino has been present for some time and Sails.js is emerging for enterprise API use cases, but it is Node.js that has generated most of the excitement. Its status as open source has been a significant factor.

Node.js is an open-source, server-side implementation of JavaScript, mated with an event-oriented runtime engine for high-performance computing. Node.js runtime support is available from Joyent, salesforce.com's Heroku, Cloud Foundry and Microsoft Windows Azure, as well as from a variety of less-visible players in the cloud application platform as a service (aPaaS) market. JavaScript was chosen as the language for Node.js because of its ability to support asynchronous processing and the relative uniqueness of JavaScript as a language defined entirely by an open specification (ECMAScript).

While Node.js has been created and used with enthusiasm by cutting-edge Web developers, enterprise adoption is just beginning.

User Advice:

- Application development (AD) leaders should monitor the evolution of Node.js, and ensure that strategic commitments are matched with environments for which there is a clear fit and will be done by qualified programmers.

- Treat JavaScript experience and expertise as critical knowledge for all Web developers. IT leaders should qualify Web programmer candidates who claim JavaScript expertise.

Business Impact: A major driver of interest in server-side JavaScript is for portability. Not just portability of code across browsers, but also potentially to servers (client/cloud) and, more importantly, portability of skills. Being able to use the same language on the client and server

enables developers to leverage the code and their skills. Portability and simplicity are key drivers of interest in JavaScript. JavaScript is well-entrenched in browsers, making portability and compatibility with it easier than trying to utilize server languages within client environments, especially on the Web.

A common criticism of JavaScript is that it is too forgiving and has enabled some poor programming practices. In the past, there have been performance issues, although this is much less of an issue today. However, much of the criticism is rooted in prejudice against scripting languages as being not good enough for "real work." Such attitudes are moderating, but are still significant in the traditional object-oriented programming (OOP) community accustomed to heavier and more-structured tools like Java and .NET. Beyond the OOP community, such attitudes are fortunately waning, because most Web developers are increasingly using other scripting languages.

The intersection of the nexus forces of cloud and mobile lead to an environment where more logic will reside on clients and the majority will be written with JavaScript. This is a result not just of the current prevalence of Web browser applications on the desktop, but also of expected growth in mobile as the "modern Web" components. Increase in hybrid mobile app development will also increase the use of JavaScript.

Server-side JavaScript is becoming a very popular language for use in back-end mobile cloud service implementations. Beyond the popularity of Node.js, this use will have the most market and business impact as mobile and cloud continue to become more mainstream in IT.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Joyent; Microsoft

Recommended Reading: "JavaScript: Past, Present and Future"

Web Real-Time Communications

Analysis By: Geoff Johnson

Definition: Web real-time communication (WebRTC) is an HTML5 standard in a World Wide Web Consortium (W3C) draft. It's an open-source framework that will enable real-time communications to be delivered from within Web browsers. Basic applications like voice calls, video chat and peer-to-peer file sharing are expected in early developments, but WebRTC is also expected to eventually facilitate the fundamental building blocks for high-quality communication for business use of browsers in broadly based networking, audio, video and collaboration components.

Position and Adoption Speed Justification: The WebRTC framework was released as open source in June 2011. It built on original work by Ericsson Labs, and is supported by Google, Mozilla Firefox, Opera and potentially Microsoft. The group's early ambitions are to develop adequate APIs so that broad developer adoption can occur. The companion RTCWeb group at the Internet

Engineering Task Force (IETF) is working to define a set of protocols that will also facilitate real-time communications in Web browsers.

Google integrated WebRTC into its Chrome development channel in January 2012, opening use of the WebRTC API. Mozilla integrated WebRTC into its Firefox alpha release in early 2012, providing audio mixing in a media stream. In April 2012, Mozilla released a demo of WebRTC video calling running inside its Firefox browser. Google Talk has a video chat plug-in for the WebRTC framework. The FreeSWITCH project (January, 2012) supports the iSAC audio codec. Doubango Telecom (May, 2012) provided an HTML5 SIP client using WebRTC. Nokia and Cisco are active. Most communications suppliers have at least rudimentary WebRTC solutions planned for 2013 and 2014.

Microsoft has gone its own way with its CU-RTC-Web API, which is outside the Standards' reliance on session delivery protocol (SDP). This may slow total adoption due to the two separate (but nominally interoperable) approaches.

Given the interest and active development support from major vendors, it is likely that WebRTC will become a platform that is more than just a vehicle for delivering compound communications for mobile devices and consumers in the short term.

User Advice: Within the next two years, major vendors and the open-source community working on WebRTC developments are likely to solve many of the initial issues required to enable communications from browsers as part of the patchwork of the HTML5 solution sets being devised at present. Beyond the next two years, there is significant motivation for a wide range of users and suppliers in very diverse arrays of communications applications to be interested in exploiting WebRTC concepts and practices, and to extend them into mainstream enterprise networking.

WebRTC uses iLBC, iSAC, G.711, and G.722 codecs for audio, and VP8 for video. Enterprises should expect that WebRTC will eventually become robust enough for use in communications applications generally. Prepare for WebRTC to be used in browser- based unified communications and collaboration (UCC), contact center and video conferencing.

A useful indication of how it may develop comes from Kaazing and its full-duplex, but asynchronous, real-time Web communications for enterprises. Its WebSocket solution uses W3C standards, but has been developed outside the HTML5 standard. It shows how Web application developments may provide communications that are necessary to support massively scalable, low-latency, real-time Web apps. Kaazing's customers use these in financial services, gaming and social networking, and in telecommunications applications.

One obvious weakness of WebRTC deployment for enterprise use, or by communications service providers, is the lack of a central player to provide a managed directory for users. That role will be diffused for some time, unless enterprises or communications service providers (CSPs) act to fill it. Expect enterprising third-party directory facilitators to emerge, but no broad mainstream adoption before 2014 to 2015.

Business Impact: WebRTC applications will become particularly useful when used as an SIP endpoint. Do not confuse the potential enterprise-grade WebRTC developments with today's use of browsers to deliver chat.

Expect communications infrastructure vendors to provide a number of versions of HTML linked to popular mobile devices and applications, initially using the common WebRTC for various media. The popular demand for bring your own device (BYOD) will encourage use of WebRTC for inter-operation and federation for tablets and smartphones.

Within contact center operations and communications-enabled business processes, WebRTC can create browser pages as real-time communications objects to be used in workflow, e-commerce and business process applications. As such, WebRTC has the potential to transform industries because no clients need to be downloaded to access communications: just click from a browser.

Similarly, WebRTC Web services applications can use a browser to create real-time video connections to other WebRTC devices or to WebRTC media servers using RTP.

Many operational technologies (OT) using thick-client or thin-client applications over limited bandwidth networks will benefit from the ability to derive and provide a rich suite of communications from a Web browser associated with their industrial applications.

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Acme Packet; Bistri; Crocodile Rich Communications Suite; Ericsson; Google; Kaazing; Microsoft; Mozilla (Firefox with Greasemonkey); Opera; Priologic Software; Pubnub; Tenhands; Thrupoint; Tokbox; Twilio; Unified Office; Vidtel; Voxeo; Zingaya

Recommended Reading: "Predicts 2013: Success in Leveraging UC Will Be Easier With a Unified IT and Business Strategy for Collaboration"

"Cool Vendors in People-Centered Computing, 2013"

"Mobile UC: Extending Collaboration to Smartphones and Tablets"

"Examining the Piece Parts of HTML5, a Multifaceted Initiative"

"Magic Quadrant for Web Conferencing"

"HTML5 to Take on New Role in Mobile App Development"

Customer-Centric Web Strategies

Analysis By: Michael Maoz

Definition: A customer-centric Web strategy (technology/business strategy) is a cohesive approach to ensuring that a website is intuitive to visitors by placing the customer at the center of the relationship. It focuses on tying the customer, prospect or partner deeply into the enterprise or organization, and it harmonizes the interaction channels.

Position and Adoption Speed Justification: A customer-centric Web starts with improvements to the website, but extends beyond it to other related engagement channels and external services, such as social networking and other forms of social media. The technologies, integrations, analyses, content, communication and business applications are designed and deployed through a collaborative effort between the business and the external customer to achieve the goal of serving customers' needs consistently with business goals. A customer-centric Web will be used to optimize advertising via email, search, location services and other online approaches.

A customer-centric Web is still an immature concept and strategy for most businesses outside online retail, where the concept is maturing. Online channel optimization (OCO) is a closely related concept. OCO is the discipline of maximizing the effect and impact of the engagement with target personae achieved over a variety of communications media.

The challenge (beyond the process synchronization required) is that the technologies are not available as a suite, but rather are cobbled together. There have been good reasons for this:

- The need to rapidly innovate because of the evolving nature of user interaction patterns

- Emerging technologies, such as real-time analytics, social networking and recommendation/ reputation engines

- Highly fragmented reporting structures for the people tasked with building Web capabilities

Creating a Web presence that draws customers in — because it is engaging, responsive, reliable and intuitive to their needs — will be a strong business differentiator.

User Advice: The rapid growth of social media and crowdsourcing techniques could lead corporate websites toward extinction. Create an inventory of tools, technologies and applications required to deliver a customer-centric Web. Appoint a project leader who has the approval of the board or CEO to run a customer-centric Web effort. Tap the community of customers, prospective customers, partners and employees as a way of uncovering the true impact and effectiveness of your website. Look for redundancies in systems and overlapping organizational responsibilities. Test ideas by measuring the impact before deploying fully.

Business Impact: The business impact is high because businesses waste a tremendous amount of money on marketing, sales and technical support as a way of overcoming the weaknesses in their websites. The desire to better control and optimize spending, and to measure costs and Web effectiveness, will drive customer-centric Web programs.

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Accenture; Deloitte; IBM; Razorfish; SapientNitro

Recommended Reading: "Predicts 2013: CRM for Customer Service and Support in the Age of the Everywhere Customer"

"Planned Research for 2013, CRM Customer Service Strategies, Processes and Technologies"

Event-Driven Web

Analysis By: Ray Valdes; Mark Driver; David Mitchell Smith

Definition: Event-driven Web refers to the use of frameworks and libraries that support a threadless, nonblocking input/output (I/O), event processing model, as opposed to thread-based or process-based approaches to handling concurrent requests.

Position and Adoption Speed Justification: Examples of frameworks and libraries include: Tornado, Twisted, Event Machine, Netty, Vert.x, GEvent and NodeJS. Not all of these are directly comparable. Tornado is a framework, while Twisted is a library. Both are written in Python, and they are often compared against each other, but they are also complementary. Tornado can be implemented on top of Twisted, for example. HTTP servers that employ this approach include Nginx.

In addition, use of browser-based event technology is increasing. Websockets is gaining visibility due to its association with HTML5, and vendors such as Kaazing and Push Technology are selling products based on browser-based eventing.

There are some high-profile sites that use event-driven tools. For example, FriendFeed developed the Tornado framework to handle high-volume Web requests in a scalable manner. Yammer, LinkedIn and eBay are using NodeJS for some of their online systems.

The criticism voiced against event-driven programming is that code can become complex, due to use of callbacks that fragment the visible flow logic.

At the same time, this approach appears to deliver on the promise of high efficiency and high performance for a given level of server hardware capacity.

User Advice: Developers should understand the event-driven programmer pattern and the difference between low-level event handling and higher-level frameworks.

Business Impact: The business impact is that event-driven libraries and frameworks have the potential to increase efficiency (use of hardware resources), improve performance (and thereby improve the user experience), and in some cases improve developer productivity (by allowing use of dynamic languages such as Python, Ruby or JavaScript, which can be easier for writing code).

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

UXPs

Analysis By: Gene Phifer

Definition: A user experience platform (UXP) is an integrated set of technologies used to provide interaction between a user and a set of applications, processes, content, services or other users. A UXP is different from a portal product in that it contains a broad collection of supporting services that typically live outside the scope of a traditional portal product. These services include portal, app/API framework, content management, search, analytics, collaboration, social, mobile and a UX framework.

Position and Adoption Speed Justification: The concept of the UXP emerged in 2009. A UXP is first and foremost a platform for enterprises to use. They may create the platform themselves or purchase it as a suite of products or as a single product. There have been early examples of UXP offerings (such as Microsoft SharePoint, Oracle WebCenter Suite, IBM Customer Experience Suite and Employee Experience Suite, Adobe Marketing Cloud and Creative Cloud, and Cisco Social); however, the UXP is in the early phases of its life cycle. There isn't even a formal UXP market yet, but it will emerge in late 2013. Vendors of suite-oriented horizontal portal products are starting to embrace the UXP, its concepts and, in some cases, the term.

The components comprising the UXP will evolve over time. For example, additional components to facilitate digital marketing will likely be added to the base definition.

User Advice: Conduct an inventory of the various tools used for presentation management and presentation-layer composition across all supported devices and channels. Determine synergies where common vendors are identified. Demand plans from your vendors for these products and determine where integration will occur. Explore UXP options for many of these tools, then build a road map and plan to adopt a UXP during the next few years.

Determine whether your needs for websites and portal sites would best be met by suite-oriented portal products/UXPs or by lean portals.

Business Impact: Tools and methodologies for delivering the user experience can be expensive. However, the biggest downside is the impact on the users who have to deal with inconsistent user experiences and a different look/feel/behavior across different sites and devices. A UXP provides significant efficiencies in developing and maintaining the user experience, and provides a consistent user experience across sites, channels and devices. The UXP will save organizations money, but the main benefit is the ability to more effectively engage users and customers.

The UXP addresses the enterprise need for a consistent, integrated, versatile and optimized approach to user interactions across a wide range of scenarios (business-to-employee [B2E], business-to-consumer [B2C], B2B, government-to-constituent [G2C] and digital marketing) and devices (PCs, smartphones, tablets and home-based devices). The preintegrated nature of UXP products means faster time to market and lower deployment costs. These cost savings are offset, to a degree, by relatively high licensing costs. Because of the large investment in money and resources required of an on-premises UXP, small enterprises and some midsize enterprises should explore cloud UXPs or lean portals as alternatives.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Adobe; Cisco; eXo Platform; IBM; Microsoft; Oracle; SAP; TandemSeven

Recommended Reading: "The Emerging User Experience Platform"

"The Ethos of Vendor User Experience Platforms"

"Who's Who in the Emerging UXP Market"

"Optimize Your Online Presence and Enhance the Experience for Customers and Users"

"A Platform Approach for Websites, Portals and Mobile Apps Leads to Faster Time to Market and Improved User Experience"

Mobile Containers

Analysis By: Ken Parmelee; Van L. Baker; Phillip Redman

Definition: Mobile containerization products provide the ability to partition, manage, secure data locally or virtually, or encapsulate HTML5 applications for distribution. Containers can promote efficiency and operations for mobile users with increased management and remote support. Developer containers are products that enable HTML5 coded apps to be deployed as native applications by encapsulating the HTML5 app within a native container. Some of these can incorporate both HTML5 code and native code to run in conjunction with each other.

Position and Adoption Speed Justification: Containers are gaining relevance due to two needs. The first is the need to manage and secure enterprise data on user smartphones and tablets. The three native containers for this need that are most common today are app-neutral (wrapping), app-specific software development kit and virtual. The second driving force is due to the growing popularity of developing apps with HTML5. For most, the drive to use HTML5 is the ability to build an application with a single code base: HTML5 (HTML/JavaScript, CSS) that can span devices, with different OSs leveraging the browser, but deployed as a native application. Coding with HTML5 allows greater flexibility for development of multichannel applications addressing a broad array of smartphone, tablet, desktop and other compatible browsers as both websites and as mobile applications. The container provides access to hardware resources and enables deployment/app management. A significant advantage of this approach is being able to dynamically deploy new versions of apps without going through the app store and packaging processes required with native apps. Developer containers are typically provided by either mobile application development platform vendors or development frameworks, and range from simple PhoneGap implementations to full-feature containers. These full-feature containers provide features typically unavailable in pure HTML5 applications, such as user identification and authentication, app testing, in-app analytics, data encryption requirements, and APIs that leverage mobile middleware solutions from the platform providers. Adoption of all of these containers has grown steadily, with a marked increase in

the last year. But adoption is still nascent. Lack of simple standards, fragmentation in the market and proprietary systems inhibit growth of this market. However, interest is at an all-time high, as companies support and secure their data and simplify application development.

User Advice: Containers are an important strategy for every company supporting corporate data and apps on both business and user-owned devices. Developer containers are an effective method of packaging and deploying HTML5 apps as native-wrapped applications. As containers mature, Gartner believes there will be more variation as a means for vendors to further differentiate their products. These containers must also keep up with native OSs and HTML5 continuing to add features and APIs. Use containers for securing corporate data and simplifying app development.

Business Impact: Using containers for security and management allows companies to establish a common security and authentication standard for mobile support. Use of developer containers can reduce development effort in multichannel application deployments, and speed agility in deployment.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Adobe PhoneGap; Antenna Software; Apache Cordova; Citrix; Good Technology; IBM (Worklight); Kony; Mocana; Nukona; Trigger.io

Recommended Reading: "Technology Overview of Mobile Application Containers for Enterprise Data Management and Security"

"Containers Have a Major Impact on HTML5 Mobile Application Development Projects"

"Mobile Application Architecture"

Multivariate A/B Testing

Analysis By: Ray Valdes

Definition: A/B and multivariate testing are systematic, statistically based, empirically driven processes designed to improve users' online experiences. E-commerce sites use these techniques widely to increase revenue by improving conversion rates. The techniques are gaining popularity in other settings, such as content-centric sites, to improve desired, measurable outcomes (such as signing up for a webinar, downloading a whitepaper or subscribing to a mailing list).

Position and Adoption Speed Justification: Although the techniques of split A/B testing and multivariate testing (MVT) are well-known and well-established in high-end e-commerce sites, low-to-midrange sites are only now starting to adopt these techniques — which places this category of technologies in the adolescent stage. Low-end, easy-to-use tools, which have emerged and gained traction in the market, include Optimizely, SubIntent, Visual Website Optimizer and Google Analytics

Content Experiments. These offerings are differentiated by ease of use, low-end pricing and (in the case of SubIntent) automated optimization (MVT on "autopilot").

More established tools for more sophisticated testing include Adobe Test&Target, IBM Coremetrics, Maxymiser MaxTEST, Optimizely and Google Analytics Content Experiments.

A/B testing refers to the testing of two alternative attributes (i.e., A versus B) of a website, application form or landing page. The variations can include changes in color, font, image, layout, wording, shape and value proposition. The analysis is conducted across a representative sample of users, which usually means testing on a live site with actual users.

MVT, a more sophisticated technique, is now supported by mid- to high-end conversion optimization tools. MVT involves a set of 10 to 12 attributes and determines which combination is more effective at driving conversions.

However, the split A/B and MVT process, although simple conceptually and operationally, has some subtleties that may trip up designers who overlook the statistical ramifications of not running a test to completion (instead making the mistake of stopping a test run when it appears that one alternative is ahead of the other). There's also a process to follow, so that tests are properly designed and executed, and the knowledge is captured. Conducting multiple concurrent tests is difficult.

User Advice:

- Establish a user-centered design process that is based on key scenarios or workflows tied to measurable business outcomes, guided by objective data about user behavior, gathered through instrumentation and analytics.

- Having done that, implement split A/B testing in key high-value scenarios as part of a systematic continuous improvement process.

- After achieving success with split A/B testing, expand the scope to MVT, initially in a small number of high-value scenarios.

Business Impact: Multivariate and A/B testing can increase revenue by improving the conversion rate, improve user satisfaction and retention by enhancing user effectiveness, and reduce the cost of self-service scenarios by improving usability.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Adobe; Google; IBM; Maxymiser; Optimizely; SubIntent; Visual Website Optimizer

Portal PaaS

Analysis By: Jim Murphy

Definition: A portal platform as a service (PaaS) is a cloud-based multitenant offering that enterprises can use to build, deliver and maintain cloud-based portals. Portals are personalized, unified points of access to relevant information, business processes and people. They use a page framework and visual component construct to aggregate and deliver a variety of content, applications and composites. A portal PaaS includes cohesive services for managing security, personalization, content and integration in the context of portals.

Position and Adoption Speed Justification: Enterprise portal frameworks can embrace the cloud in five ways (see "Five Ways the Cloud Is Rolling Into the Enterprise Portal Market"):

- Cloud-friendly portals

- Portal PaaS

- Cloud-enabled portal platforms (CEPPs)

- Private cloud internal use (using a CEPP)

- Private cloud external use (using a CEPP)

Of these, the portal PaaS represents the greatest potential value to portal customers, the highest potential for growth and the greatest risk.

Gartner customers have shown increased interest in portal PaaS options during the past year. The main appeal is faster time to market. Organizations also expect portal PaaS to facilitate portal initiatives without the unpredictably high costs of supporting data and networking infrastructure. More-intense requirements to support mobile devices and more bandwidth-intensive content, such as video, are further inciting organizations to look for portal PaaS offerings.

The portal PaaS market remains hampered by two factors:

- Horizontal portals require integration with enterprise information sources and applications, most of remain on-premises. Although there may someday be value in employing cloud-based platforms to provide interoperability between cloud-based and on-premises information and applications, an on-premises portal is more likely to support most interoperability needs today. When enterprises adopt real hybrid topology — part on-premises and part in the cloud in more or less equal measure — doing portal work in the cloud will not be as illogical, because a significant portion of resource access will be from the cloud anyway.

- Horizontal portals are also typically highly customized and, in many cases, serve as a foundation for building, deploying and delivering Web-based applications and composites. Organizations that have dealt with portal migration know that such customization can be troublesome when it's time to upgrade or replace their portal platforms. Cloud portal service providers haven't instilled enough assurance that portal customizations and applications will survive when they make upgrades to their infrastructure as a service (IaaS) or PaaS offerings,

which serve as the foundation for their portal services. Until the offerings have nonintrusive version control and customization, comprehensive portal cloud services will not take off. Thus, traditional on-premises portals will have to be redesigned for cloud deployment.

However, we are starting to see the scales tip in favor of faster portal PaaS adoption. An increase in demand is accompanying the increased confidence in and adoption of cloud-based platforms for collaboration and a wide range of business applications in adjacent areas, especially in human capital management (HCM) and CRM, which constitute important systems of record for business-to-employee (B2E) and business-to-customer (B2C) portals. The customization/upgrade obstacle is becoming a driver as vendors offer unintrusive versioning as a core characteristic of their cloud services. Meanwhile PaaS capability in development, integration and other middleware areas is offering more feasible and sustainable means to integrate and accomplish custom cloud development.

Portal PaaS has emerged, for many organizations, as the cloud part of a hybrid portal platform while the enterprise data remains on-premises. In fact, some essential elements of Generation 7 portals, including Web analytics and context awareness, have their footing in the cloud already. With time, as more data is entrusted to cloud providers, the entire portal platform will begin to move to the cloud.

Portal PaaS offerings continue to emerge. The most notable new offerings among the large vendors is SAP Hana Cloud Portal (see "SAP Hana Cloud Portal Is a Front End for SAP Innovation"). Microsoft's SharePoint Online has also seen a significant update in the wave of SharePoint 2013 updates. Specifically, a new cloud-friendly app model introduced in SharePoint 2013 supports three deployment models for apps: SharePoint-hosted (traditional on-premises), autohosted (hosted in the Microsoft cloud; offered through the app store) and provider-hosted (hosted by third parties to be consumed on-premises or in the cloud). These are geared toward allowing more sophisticated integration and development at the same time as enabling customers to deploy SharePoint in a true on-premises/cloud hybrid model.

Otherwise, organizations are finding portal PaaS offerings from vendors outside of the traditional portal establishment. Covisint offers a pioneering and long-standing horizontal portal PaaS. Its expertise is helping organizations in industries with complex supply chains — such as manufacturing, healthcare, financial services and the public sector — manage their B2B relationships. Salesforce.com continues to emerge as a viable option for cloud-based horizontal portal capability, most recently establishing an anchor for its portal-related efforts in its social-centric Salesforce Communities offering. Among other vendors to watch is eXo, an emerging portal PaaS provider based in France and expanding to other regions, including North America. Its recently announced eXo portal PaaS capabilities include a CEPP, a cloud-based integrated development environment (IDE) and eXo Cloud Workspaces — a social Internet offered as a service — which could evolve into a more thorough, enterprise-class portal PaaS.

User Advice: Organizations should consider the cloud an integral part of their future portal initiatives, especially as they expand to user experience platforms (UXPs; see "The Emerging User Experience Platform"), employ software-as-a-service line-of-business applications, IaaS and a wide range of content and context services that can enhance their portals' utility, appeal and overall

effectiveness. However, organizations of significant size won't likely institute portal PaaS as the sole foundation for all of their portal efforts.

Most organizations should prepare for a hybrid cloud/on-premises portal strategy, which could take various forms. While there may be much variability in which aspects of portals remain on-premises and which reside in the cloud, companies must ensure that their portal technologies are equipped to accommodate a range of hybrid models.

Organizations should be cautious about adopting portal PaaS. Integration and customization could prove difficult and costly during upgrades, and providers must effectively insulate such customizations from changes to underlying PaaS offerings. Ensure that offerings support modern Web technologies like HTML5/Cascading Style Sheets 3 (CSS3) and RESTful means of interoperability.

Organizations should remain wary of customization and integration in most cloud portal service initiatives. Although they can be useful, especially for situations requiring portals as mechanisms for team and B2B integration, organizations should use out-of-the-box capabilities, including prepackaged portlets, when possible.

Business Impact: CIOs and their IT organizations stand to benefit greatly from portal PaaS as a means to respond quickly and efficiently to business needs. Portal PaaS often offers faster time to market at a more predictable cost, in line with business value, versus traditional, on-premises portal offerings.

Cloud portal services will emerge as a competitive option during the next five years. Organizations will find value in cloud portal services, whether as go-to platforms for portals or as part of a comprehensive hybrid portal strategy that includes on-premises and cloud-based portals and components.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Covisint; eXo; Microsoft; salesforce.com; SAP

Recommended Reading: "SAP Hana Cloud Portal Is a Front End for SAP Innovation"

"Five Ways the Cloud Is Rolling Into the Enterprise Portal Market"

"The Rise of Portal Platform as a Service: The Vendor View"

"The Rise of Portal Platform as a Service: The Customer View"

"Platform as a Service: Definition, Taxonomy and Vendor Landscape"

Lean Portals

Analysis By: Jim Murphy

Definition: Lean portals provide just enough capability to serve the fundamental role of an enterprise portal — a unified, personalized point of access and interaction with relevant information, business processes and people. The demand for lean portals is a response to the expanding functional breadth, and accompanying cost and complexity, of many established enterprise portal initiatives, products and vendors as they evolve into more comprehensive suites and user experience platforms (UXPs).

Position and Adoption Speed Justification: Lean denotes a portal practice and a product quality, rather than a product category. It derives from customer demand as a response to the growing functionality and complexity of many established portal platforms. Organizations seeking platforms to build and manage portals for employees, customers, partners and various other constituencies have had fewer choices as the marketplace consolidated to only a few dominant players. These players, including Microsoft, Oracle, IBM and SAP, have become increasingly complex as they add functionality (such as content management, search, social software and analytics), continue to support legacy technologies and integration methods, and, in some cases, attempt to merge an array of acquired products.

Not every customer wants big suites — big suites from big vendors cost big money, and they're a lot to swallow in volatile economic times. Although they may be versatile and comprehensive, they're also heavyweight, requiring a much heavier infrastructure, more sophisticated and costly development skills, and more care and feeding from larger IT and business organizations. The inclusion of content management, collaboration and social capabilities entails more moving parts and more room for error — not just for IT, but also for business groups, knowledge management and communications organizations, as well as for compliance and legal entities. The complexity of the broader suites often translates to far-longer project times and, in some cases, project failure. Furthermore, bigger, more encompassing platforms mean more thorough commitment to the chosen vendor, often introducing conflict with established standards for infrastructure, development, security, content management and collaboration, among other categories.

Lean portal approaches offer core portal services, including single sign-on, personalization, integration, content aggregation and presentation, in the simplest way possible. They are unburdened by any necessity to support outmoded technology. Lean portals may lack some of the extended functionality of UXPs, but they're also more likely to complement and integrate with established systems for adjacent capabilities like content management, collaboration and search. Most lean portals abandon traditional, heavily server-dependent containers (including JSR286 and Web parts) in favor of the lightweight, REST-based model of interoperability. While organizations adopting traditional, heavyweight portals or emerging UXPs may take years to avail themselves of even 20% of the full range of capabilities, organizations adopting lean portals employ 80% of the functionality they need within months.

The prime vendor beneficiaries of the demand for lean portals, and the best exemplars of the lean portal qualities in their products, include Liferay, Backbase, Drupal, DotNetNuke and eXo. The lean portal dynamic has also allowed vendors from other spaces, such as salesforce.com, to come into play as potential portal providers. In fact, even the traditional portal leaders are capable of providing platforms that accommodate lean portal demand. SAP is notable in this sense for its SAP Hana Cloud Portal (see "SAP Hana Cloud Portal Is a Front End for SAP Innovation"). Organizations should keep in mind that even the most functionally comprehensive portal platforms can be deployed in lean ways.

Portal-less portals and lean portals are complementary constructs. Both derive from customer demand for simplicity amid the complexity of more traditional portals and their providers. However, the concepts are orthogonal:

- Portal-less portals represent nontraditional, technical approaches that reduce the burden and responsibility of a portal server in delivering a personalized point of access and interaction to users. Portal-less portals rely more heavily on client-side capabilities than traditional portals.

- Lean portals, on the other hand, represent a resistance to the expanding functionality of portal suites and their UXP derivatives. That is, whereas UXPs have begun to encompass comprehensive content management, search, collaboration, social, Web analytics and mobile, among other capabilities, lean portals provide just enough functionality to perform the essential portal role. Lean portals can rely on either server-side or client-side technical methods.

Thus, portal-less portals have lean qualities, but not all lean portals are portal-less.

User Advice: Organizations looking for basic portal functionality for specific projects should consider offerings from Liferay, Backbase, Drupal, DotNetNuke and eXo.

Organizations using portal technology from larger providers may benefit from lean portal practices, employing modern lightweight, client-centric standards to ensure interoperability, low implementation costs and improved agility.

Business Impact: Many businesses, public-sector organizations and educational institutions have built successful portal deployments using lean approaches, and they report considerably lower costs and faster time to implement than traditional portals.

Organizations with mature and comprehensive service-oriented architectures and Web-oriented architectures are often in the best position to avail themselves of the simple and lightweight nature of lean portals. With much of the burden of integration, identity and access management, and business process management handled in these architectures, traditional portals are often overly complex and costly.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Backbase; DotNetNuke; Drupal; eXo; Liferay

Recommended Reading: "The Great Portal Divide: How a Rift in the Portal Market Will Impact Your Web Strategy"

"SAP Hana Portal Is a Front End for SAP Innovation"

"Four Key Aspects of the Portal's Death (and Rebirth)"

Public Web APIs

Analysis By: Gordon Van Huizen

Definition: Public Web APIs expose data, business processes and application capabilities through interfaces typically based on Web-oriented architecture (WOA) principles. Enterprises use public Web APIs to expand their reach through new delivery channels, such as third-party websites and mobile apps, as well as for quicker and simpler B2B connectivity. A number of business models may be employed, ranging from free API access to increased demand for goods and services to charging for use of premium content and valuable data.

Position and Adoption Speed Justification: Web APIs support mobile app development, drive customer engagement and extend business models. Many organizations, such as Netflix, Best Buy, Hoovers and The New York Times have seen significant success with their public API programs. However, most organizations begin their API programs with an internal focus, such as in support of mobile or multichannel development initiatives. These organizations frequently plan to extend their API initiatives to external parties as they hone their skills through experience and establish the requisite business propositions for their funding. For more on the value of Web API programs and best practices, see "Extend the Enterprise With Public Web APIs."

By 2014, 75% of the Fortune 1000 will offer public Web APIs. Web APIs are required for mobile and social applications, as well as for innovative forms of e-commerce that combine Web services and contextual information to deliver a compelling user experience.

By 2017, 50% of B2B collaboration will take place through Web APIs. Although a prominent majority of B2B organizations today still involves well-established B2B approaches such as electronic data interchange (EDI), File Transfer Protocol (FTP) and managed file transfer (MFT), the widespread adoption of the Nexus of Forces — cloud, mobile, social, and information — is helping to drive adoption of new approaches to B2B based on APIs (see "Predicts 2013: Application Development").

User Advice:

- Treat public Web APIs as a key component of your organization's business strategy. Carefully consider how these can be exploited through Web, mobile and social strategies.

- Design your public Web API according to the needs of the intended API consumer. Often this means applying the principles of Web-oriented architecture (WOA).

- Don't assume that "if we build it, they will come." Establishing traction for a public Web API requires creating developer awareness, cultivating a community of developers and tapping into nearby communities as well as making the API easy to consume via a self-service developer portal.

- Before releasing your Web API to the outside world, consider the traffic, resource and security implications for your data center. Complement your infrastructure with Web API management products and cloud services as required, and ensure that you have an adequate funding model in place for its ongoing operation.

- Put application services governance in place, including API management, prior to launching a public Web API. Also involve the enterprise architecture team and security team by, for example, taking into consideration dynamic application security testing (DAST) and static application security testing (SAST; see Testing" and "Magic Quadrant for Static Application Security Testing").

Business Impact: Public Web APIs provide the opportunity for IT organizations to become central players in helping their organizations expand top-line growth, improve service delivery, drive competitive advantage and reimagine their industries.

A wide variety of organizations have already begun to see measurable — and in some cases dramatic — business growth by leveraging APIs to encourage and support the introduction of their products, services and content into adjacent markets, new channels and new delivery contexts by third-parties. This is often done in a low-touch way, yet it can create significant new opportunities.

Enterprises of all types also benefit from using public Web APIs within their B2B partner networks by simplifying and accelerating the onboarding process and delivering earlier integration successes.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: 3scale; Apigee; IBM; Layer 7; Mashery; SOA Software

Recommended Reading: "Extend the Enterprise With Public Web APIs"

"Adopt These Six Traits of Highly Effective Web API Programs for Business Advantage"

"Designing a Great Web API"

"Govern Your Services and Manage Your APIs With Application Services Governance"

Responsive Design

Analysis By: Ken Parmelee; Ray Valdes; Gene Phifer

Definition: Responsive design (RD; formerly responsive Web design) is a client-side technique for supporting multiple design layouts. The most popular method of doing this is via CSS3 in a single Web instance that is applied to the same base code that is written in HTML5 and JavaScript. RD is rapidly gaining popularity among developers, designers, tool makers and Web platform vendors, driven in part by multichannel development to address mobile Web and app requirements, along with traditional websites, in a unified approach.

Position and Adoption Speed Justification: RD (in the original, narrow-scope sense of Cascading Style Sheets 3 [CSS3]-based adaptation) first appeared in 2010, although the broader concept of adaptive design dates back more than a dozen years. As it gains popularity, the term is starting to be used loosely to mean any website or application that adapts itself to the device form factor in which it appears, regardless of how the adaptation is accomplished. Gartner will continue to use RD in the original, narrow-scope sense of the term and use the term "adaptive design" to refer to the broader set of techniques (which can be client-side, server-side or a combination of the two). RD relies on the media_query function in order to leverage the layouts, based on styling rules such as screen size and rotation (among others). Many enterprises view RD as the answer to lowering development costs and time to deploy. To date, most implementations of RD are either hand-coded or use one of dozens of small, open-source libraries or frameworks. Open-source content management systems, such as WordPress and Drupal, with large ecosystems (including marketplaces for skins and themes), now sell about one-third of their themes in a responsive form. Major vendors such as IBM, Microsoft and Adobe are modifying tools and platforms to more fully support RD. Many mobile application development platform (MADP) vendors either conform to RD concepts or have released adaptive products in order to address the dynamic pace of mobile change. Adobe appears to be ahead of others with its Edge Reflow product, which has been demonstrated for almost one year and is about to launch. IBM has also moved aggressively with its mobile products to address RD and has released products in the Worklight platform.

User Advice:

- Consider RD as the default starting point for a decision on how to implement content-centric mobile websites across a family of form factors.

- Mitigate the limitations of RD, including performance limitations, by combining with server-side adaptive Web techniques.

- Sites with complex requirements beyond content consumption (for example, transactional sites with many screens and complex forms) require highly experienced developers or toolsets that handle much of the variation between browsers and hardware in order to produce quality sites and apps. This is most important when including mobile in an RD strategy.

- Although RD is a great approach for handling UIs across a broad range of browsers/devices, sites and apps should employ unique capabilities within given channels (for example, leveraging offline capabilities and cameras on mobile devices creates richer experiences).

- A long-term vision for design should include a full range of adaptive and contextual processing, to deliver the optimal user experience.

Business Impact: What drives this rapid adoption is the increasing cost and complexity of supporting a variety of devices with multiple form factors. Organizations need to project their Web presence across these channels and are struggling with redundancy, overlap and cost inefficiency.

RD is being driven by this increased need for a unified Web presence. The significant limitations in RD are not always perceived in the initial enthusiasm. A key limitation of RD is that it is a client-side mechanism, which means that images are transferred in full size from server to mobile device. The images are then scaled on the client-side device after data transfer (meaning that bandwidth is wasted). A better approach is to do some amount of server-side detection and conditional processing, sending already-scaled images from server to client. This goes beyond the original definition of RD, venturing into adaptation. Although RD is not a panacea, it can and has delivered significant value in many content-centric scenarios, mostly at the low end of the spectrum of requirements. Value is also beginning to be seen in mobile implementations, but these typically have used toolsets that abstract much of the complexity.

For most of 2010 and 2011, RD was implemented by leading-edge Web designers using hand-coded techniques (namely, adding rules to a style sheet that used the CSS3 media query facility).

However, in the past year, tools, libraries and JavaScript frameworks have emerged that support RD (for example, Zurb Foundation, Adobe Edge Reflow, rwdgrid, Moovweb and Usablenet). These are specialty tools, mostly from small vendors or open-source projects. The larger, more established vendors (such as IBM WebSphere, Oracle and Microsoft) are incorporating RD support into their tools and platforms. Expect RD support to be pervasive in these tools within 12 to 18 months.

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

Sample Vendors: Adobe Systems; Frameless; Gridless; Gumby; Moovweb; Responsify; Retina.js; Usablenet; Zurb

Tag Management

Analysis By: Bill Gassman

Definition: Tag management systems simplify the deployment and maintenance of JavaScript tags that are used to exchange data between online content and external applications such as analytics, advertising and personalization. One tag replaces all others, which then controls publishing of the appropriate tags. This decouples tag operations from the life cycle of online content and improves the speed of deployment and changes for tag-based products.

Position and Adoption Speed Justification: Tag management solutions, available since 2007, saw a rapid rise of market acceptance in 2012. Increased usage is due to support for more tag-based vendors, lower cost (including free from Adobe, Google and IBM) and increased awareness of the

benefits. We estimate that there are several thousand organizations with a tag management system in operation. Google Tag Manager and BrightTag have ranked in the top 100 tag trackers, published by Evidon at knowyourelements.com. For these reasons, the hype positioning has been moved to near the Peak of Inflated Expectations.

Sites that support many tags have deployed or are looking at tag managers. The growth spurt of this market, in 2012, will continue for another two to five years, as organizations find the right tag manager and get them deployed. Although Google, Adobe and IBM offer a free tag manager, these don't support the variety or degree of sophistication that the market revenue leaders do.

There are two distinct markets for nonfree tag management systems. First is the digital marketing practitioner, struggling to manage tags for multiple Web analytics products, surveys, A/B testing and recommendation engines. The second market segment is advertising publishers and buyers. Here, many tags, dozens in some cases, are placed into Web content so that cross-site user profiles can be maintained and campaign attributes tracked.

For both target markets, the value of using a tag management system is in having a central way to create, edit and publish tags, no matter where or how the content that contains the master tag is published. This means that tag quality is improved, due to better control of the management process, resulting in fewer duplicate, unauthorized or outdated tags. There is also a performance gain, which can help reduce landing-page bounce rate.

Business rules permit control of situations when tags fire, which is useful for sending conversion tags to affiliates based on attribution, firing on context-aware situations based on time and visitor profiles, or controlling third-party access to user behavior data. These controls also help to protect user privacy, by enforcing tagging policy and user opt-in choices. Additional value includes better page-load performance for the Web visitor, because they are delivered in an optimized way from specialized content delivery networks. This should help reduce landing-page bounce rate.

User Advice: Tag management is most useful when multiple tags are deployed, when custom variables are added to tags, when there are frequent changes to tag configurations, or when rules of when the tag should fire are required. Some use tag managers to capture all tag activity for later analysis of user behavior. Users of tag management include those involved with Web operations, Web analytics, marketing campaigns and Web content management, along with advertising publishers and buyers. Subscription fees range from $50 per month to more than $8,000 per month, depending on page volume and product functionality.

An ROI calculation can be done by balancing the cost of a full-time employee and tag deployment fees paid to external resources, against the value of quality tags, agility, a common data model and linking business rules to tag invocation, which can save attribution fees.

Business Impact: The impact on businesses will be increased by more sophisticated use of tags for analysis, advertising and optimization of customer-facing content and applications, leading to better business results from digital channels. Using the common data model makes it easier for developers to add metadata once to content, without having to worry about how it will be used later. Quality problems and bottlenecks in making changes to the tags and metadata that feed them

are inhibiting the use of optimization products, and excessive tag volume is slowing page loading times, leading to higher abandonment rates.

Where government regulations require better privacy protection for users, some tag management vendors offer a foundation to control what is captured.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Adobe; BrightTag; Ensighten; IBM; QuBit; TagMan; Tealium

Recommended Reading: "Tag Management Systems Bring High Value to Online Channel Stakeholders"

"Tag Management Systems Boost Website Efficiency, Quality and Results"

Context Delivery Architecture

Analysis By: Gene Phifer; Ian Finley

Definition: Context delivery architecture (CoDA) builds on service-oriented architecture (SOA) and event-driven architecture (EDA) interaction and partitioning styles, and adds formal mechanisms for the software elements that discover and apply the user's context in real time.

Position and Adoption Speed Justification: Context-aware computing involves improving the user experience for customers, business partners and employees by using the information about a person's or object's environment, activities, connections and preferences to anticipate the user's needs and proactively deliver the appropriate content, product or service. Enterprises can leverage context-aware computing to target prospects, increase customer intimacy, and enhance associate productivity and collaboration. From a software perspective, context is information that is relevant to the functioning of a software process, but is not essential to it. In the absence of this additional information, the software is still operational, although the results of the software's actions are not as targeted or refined.

The first fully context-aware technologies were horizontal portal products, which used both static and dynamic context attributes, coupled with a rule engine, to deliver relevant access to content, applications, business processes and people. Prior to portals, personalization engines exhibiting some context awareness were used to fine-tune recommendations for product purchases based on prior purchase history and collaborative filtering. The most visible recent addition of context awareness was delivered via mobile devices, most notably location-based services. Most context-enriched services are implemented in siloed, proprietary systems, where a particular person, group or business process profits from being situationally aware. To replicate, scale and integrate such systems, a new set of services, supported by an architectural construct known as CoDA will emerge.

CoDA provides a conceptual framework for solution architects that enables them to define and implement the technology, information and process components that allow services to use context information to improve the quality of the interactions with the user. The technologies may include portal products, context brokers, state monitors, sensors, analytic engines and cloud-based, transaction-processing engines. Context-aware computing is maturing relatively slowly, compared with mobile and Web design. This is natural, because CoDA will rely on those technologies to provide a stable base on which context-enriched services can be built.

CoDA will also define data formats, metadata schemas, interaction and discovery protocols, programming interfaces and other formalities. As an emerging best practice, CoDA will enable enterprises to create and tie together the siloed context-aware applications with increased agility and flexibility. For employee-facing apps in the enterprise, as with SOA, much of the pull for CoDA will come from packaged-application and software vendors expanding to integrate communication and collaboration capabilities, unified communications vendors and mobile device manufacturers. Web megavendors (e.g., Google), social-networking vendors (e.g., Facebook) and service providers will also expand their roles to become providers and processors of context information.

The CoDA style considers information, business and technology domain viewpoints. The technology domains are application infrastructure, communications infrastructure, network services and endpoints (devices). Thus, CoDA provides a framework for architects to discover gaps and overlap among system components that provide, process and analyze contextual information. A key challenge for CoDA will be information-driven, rather than technology-driven. This key challenge will revolve around what information sources can provide context; which technologies will enable that information to be provided in a secure, timely and usable manner; and how this information can be folded into processes.

Gartner introduced the term "CoDA" in 2007, based on developments in such areas as mobile communications and cloud computing. Through year-end 2013, we expect aggressive enterprise architects and project managers to weave elements of CoDA into their plans to orchestrate and build context-enriched services that rely on federated information models and delivery services.

CoDA relies on SOA as a foundation and is related to EDA, because enterprise architectures need to be agile and scalable to support context-aware computing. We expect CoDA to evolve into a new, lighter-weight style of architecture, leveraging the progress of the main context providers. It will reach the Plateau of Productivity gradually, after 2015.

User Advice: Although CoDA is an emerging architectural style, Type A organizations can benefit in the short term by applying its principles as they experiment with use of context information to improve user experiences in customer-facing services and enterprise productivity. Leading-edge organizations should begin to incorporate CoDA constructs into infrastructure and services to gain competitive advantages with the early use of context-aware computing. Type A organizations should now be identifying which information sources, external (e.g., from social software sites) and internal to the enterprise, will provide context information to a range of applications.

Build competencies in CoDA's technology domains, particularly in communications, because the migration of voice from silos to general applications will be a key transformation, opening up new opportunities to create applications enhanced by context-enriched services. Understanding mobile

development will also be key. The refinement of your enterprise architecture to include CoDA constructs assumes prior investment in SOA. Most mainstream, risk-averse organizations should not invest in building a CoDA capability; instead, they should explore the acquisition of context-enriched services through third parties.

Business Impact: Context awareness is a distinguishing characteristic of some leading software solutions and advertising services, particularly personalized advertising that targets mobile users from Apple, Microsoft, Google, Facebook and others. During the next three to five years, context-aware computing will have a large impact on Type A businesses in two areas:

- Extending e-commerce and mobile-commerce initiatives toward consumers

- Increasing the efficiency and productivity of the businesses' knowledge workers and business partners by providing relevant access to content, applications and business processes

Context-aware computing will evolve incrementally and gain momentum, as more information sources become available, and cloud-based, context-enriched services emerge. However, these will initially be siloed and will not use a standard or shared CoDA model.

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Appear Networks; Apple; Google; IBM; Interactive Intelligence; Nokia; Pontis; Sense Networks; Wolfram Alpha

Recommended Reading: "The Competitive Dynamics of the Consumer Web: Five Graphs Deliver a Sustainable Advantage"

"An Application Developer's Perspective on Context-Aware Computing"

"Predicts 2013: Context-Aware Computing"

"Drive Customer Intimacy Using Context-Aware Computing"

Portal Fabric

Analysis By: Jim Murphy

Definition: The portal fabric is a layer of abstraction that allows portals and Web resources to adapt automatically to users' preferences, interests and interaction patterns, rather than forcing them to change their behaviors based on any specific portal. The technology underpinnings of the portal fabric rely on standards for federated identity and access management, context awareness, social interaction, content interoperability, and presence awareness.

Position and Adoption Speed Justification: Demand for the portal fabric concept is growing under the pressures of social, mobile and the cloud. Several vendors are adopting the portal fabric concept; however, several factors are impeding progress, and it remains relatively obscure. Still, adoption of portal fabric practices and standards reveals some potential for greater traction in the coming years.

Today's Web users access a multitude of portals and Web resources, whether for work, banking, travel, government, shopping or news. The consumer experience is only further fragmented and complicated across a growing range of mobile alternative devices. In their efforts to more closely engage constituents and fend them off from competitors, portal, website and social platform providers have often created walled gardens, where users only get a cohesive, relevant experience when working in the vendor's confined space.

However, as portal and website providers define their roles in a more expansive, user-centric Web, most must interoperate, rather than attempt to dominate, the user experience.

The portal fabric is a set of capabilities and standards intended to provide interoperability for portal providers while allowing users to invoke applications and services into their preferred environment. Theoretically, a portal fabric would aggregate all portals and Web resources into a universal point of access and interaction, taking the form of a personal portal (or the MyPortal model).

The portal fabric allows providers to engage their constituents through highly relevant content and services informed by an expansive range of context clues, including location, time, social relationships, interests, intent and sentiment. It allows various portals and Web applications to syndicate content, data and user information with each other. It also allows businesses and other organizations to leverage existing social and business networks, rather than forcing constituents toward their own portals.

Several of the largest portal providers, including Microsoft, IBM and Oracle, are employing a portal fabric layer to unify the user experience across their expanding portfolios of portal platforms, collaboration and content management systems, social computing suites, and Web-centric business applications. Several more focused portal providers, including Backbase and Liferay, emphasize interoperability, and seek to leverage existing service-oriented architecture (SOA) to support the portal fabric concept.

However, just as demand is increasing for the portal fabric concept, several factors are impeding its progress. The portal fabric will require cooperation and standards setting from numerous parties, including software and service providers, government agencies, and customers. Large software providers sometimes compromise the fundamental requirement for interoperability by favoring their own components and software stacks. The concept requires universal, federated identity management that provides key security and personalization data. The portal fabric also requires federation across private and public networks and trust, especially for highly secure transactions. Portal and social platform standards must be adapted and more firmly established to support interenterprise scenarios. As context clues such as location and social scenarios come more strongly into play, the portal fabric must also include an architecture for context awareness (see "Context-Aware Computing and Social Media Are Transforming the User Experience"). Federation and syndication requirements are further increasing as social objects, including social identities,

activity streams and microblogs become an inextricable part of the fabric that supports user engagement. Finally, the term "portal fabric" is not widely used or understood, while the similar concept of user experience platform (UXP) is gaining momentum in the market.

User Advice: Enterprises must escalate the importance of user experience design in skills development, extending from optimizing user interfaces to providing engagement and continuity across all computing platforms.

Organizations should pay attention to evolving standards for portal, content management, and social platform interoperability and federation, and be wary of vendors that employ proprietary technologies and protocols to sell comprehensive suites. Most companies should employ SOA and Web-oriented architecture (WOA) principles as the fundamental foundation for their UXPs.

Organizations should address security, identity management and privacy policies as prerequisites to any more pervasive portal fabric initiative. Among other intricacies, the incorporation of consumer-facing portals into the portal fabric is likely to require alternative, single-sign-on approaches, such as OpenID, Facebook Connect and InfoCard. Universal, federated identity management capturing portal-centric user information will be a cornerstone of the portal fabric.

Enterprises should track the evolution of portal interoperability standards, and should leverage federated identity management as business requirements dictate. They should also press portal product vendors to implement portal fabric features as standards emerge.

Business Impact: The portal fabric concept runs counter to any single technology or service vendor's desire for domination. For both technology providers and the organizations using them, success will come to those that pursue interoperability through open, yet reliable and trustworthy, standards. Early adopters that provide aggregation of relevant nodes of the portal fabric can achieve competitive advantage in their industries. Other providers besides traditional horizontal portal players may seek this role, including consumer Web personal portal providers. Some enterprises will provide aggregation of the portal fabric, while others will expose their content and data for aggregation by others. From a user perspective, the ability to aggregate multiple portals and Web resources will result in the ability to correlate and orchestrate them into on-the-glass composites, including enterprise mashups. Finally, vendors that offer mashup-enabling technologies will serve a valuable role in transitioning enterprises from "walled gardens" to full participants in the portal fabric.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Recommended Reading: "The Portal Fabric Will Enable Each User to Be the Center of the Portal Universe"

"A Platform Approach for Websites, Portals and Mobile Apps Leads to Faster Time to Market and Improved User Experience"

"Context-Aware Computing and Social Media Are Transforming the User Experience"

Hybrid Mobile Development

Analysis By: Ian Finley

Definition: Hybrid mobile development allows developers to use Web skills and technologies to build mobile apps that can be loaded into an app store, downloaded to a mobile device and used like a native mobile app. Some hybrid technologies allow a single set of app code to run on multiple, incompatible mobile OSs and have the look and feel of a native application on each.

Position and Adoption Speed Justification: Hybrid mobile development provides a productive and cost-efficient way to build highly interactive mobile apps for the many mobile devices and OS versions in use by customers, partners and employees. While many of the games, media and social apps that are the most popular downloads on consumer app stores were developed as native apps, the popularity of hybrid development continues to increase, especially within enterprise application development groups.

Given the potentially high cost and complexity of native mobile app development, many enterprises would prefer to use hybrid mobile development whenever possible. Many enterprises have standardized on Web development as their primary way to build new customer, partner and employee applications used via PCs. With the growth of mobile device use, many have also built mobile websites using the same Web assets, skills and technologies. Hybrid development leverages these assets, skills and technologies for building compelling mobile apps that look and feel like those built via native mobile development. All the major mobile application development platform (MADP) vendors, other than Apple and Google, have responded to enterprise needs and embraced hybrid mobile development.

User Advice: When a rich mobile website will not meet business requirements, consider both hybrid and native mobile development. Hybrid development is favored when cost efficiency and broad device support are high priorities. Native development is favored in the most demanding apps, where UI reactivity, graphics performance and processing speed are of paramount importance. Keep in mind that, for more demanding apps, while hybrid development might meet the requirements, it may have no cost or productivity advantage over native development. Consider using an MADP that supports mobile Web, hybrid and native development, but don't expect a single MADP to be the best choice for all your mobile websites and apps.

Business Impact: Mobile apps built using hybrid mobile development can help enterprises improve customer engagement and employee and partner productivity and collaboration, sometimes quite dramatically.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Recommended Reading: "Web Meets Native: Beyond Hybrid"

"The Nexus Effect: Mobile Computing Alters Established Architecture Models"

Online Channel Optimization

Analysis By: Mick MacComascaigh

Definition: Online channel optimization (OCO) is the discipline of maximizing the impact of engagement with target personae achieved over a variety of online communications media. The phrase "online channel" refers to a channel of "communication" and is a collective term that includes emails, Internet Protocol TV, multiple websites, portals and various social media, search and mobile applications.

Position and Adoption Speed Justification: Initially, OCO entails the careful collection of information about particular individuals from the first point of interaction. It will typically combine this with historical and/or modeled data or business intelligence — to derive the intelligence required to decide on follow-up actions. This information is used to establish the context in which the interaction is taking place and to gain an understanding about the needs of the individual persona. The delivery of an experience that resonates with that understanding is the next crucial step. The term "optimization" pertains to the practice of modeling and measuring this interaction in terms of its intended effect, and allowing for progressive improvement of that measurement through incremental, interactive and sometimes experimental steps, such as through the use of multivariate testing. Optimization also refers to the "media mix," or extent to which you may wish to use the online channel for communications, as opposed to other media such as print or telecommunications. Critical to this discipline is the orchestration and optimization of communications across multiple channels, both on- and offline; for example, in the context of a single dialogue.

The promise of this level of capability in understanding/response has been central to Web content management and online measurement since the end of the last century. However, the then so-called "implicit personalization" always presented a challenge in terms of cost-benefit, not to mention technology and know-how. Also, the behavior and attitude of end users sometimes creates a negative backlash against such "creepy" attempts by companies to get to know them better. This will require an opt-in approach in some cases and contexts.

The individual components of OCO are, therefore, not necessarily all new. In overlapping disciplines — such as analytics, multivariate testing and recommendations — progress has been made toward improving the performance of a given website or portal. Concepts such as "user experience platform (UXP)" and "intent-driven customer support systems" also resonate well with OCO. However, OCO as a coherent discipline has only emerged recently. It has been rendered more urgent with the exponential rise in the popularity of diverse mobile and social channels. Therefore, although the term will appear fresh, the precepts of this discipline will be understood by organizations in all verticals — along with the associated benefits. Adoption rates will vary greatly and depend primarily on vertical and region, and on legal or cultural barriers to the perceptions surrounding the associated techniques. Overlapping or related terms and concepts include "Web experience management (WEM)" and "customer experience management/platform (CEM and CXM)."

User Advice: There is absolutely no requirement for a "big bang" approach when it comes to OCO. However, your initial steps will need to be made in the next six to 12 months, depending on the extent to which your online strategy is linked to the overall success of your organization.

- The first step is to quantify the effect the collective group of stakeholders wish to achieve over the online channel. As well as considering internal efficiency, you should increase the focus on overall impact.

- You will then need to assess whether your online strategy supports those organizational goals that have already been laid out.

- Adopt optimization technologies aggressively, especially testing, navigation improvements and high-level personalizations/contextualizations.

When you have made these initial considerations, you are in a better position to assess what components in your broader solution architecture will be needed in order to start on the path toward optimizing the effect of your online channel.

Business Impact: The business impact will be transformational for some organizations and very high for many others. Since optimization requires quantitative transparency with regard to the desired effect, a new era of "causality" will emerge. Marketers, for example, will have greater evidence about which actions worked and which didn't. Authors will be provided with automatic feedback on whether or not specific pages are having the desired effect, or what might be required to improve the overall impact.

OCO will also mean that decision making concerning the direction of the online channel will, necessarily, involve those leaders with a more holistic perspective in terms of client interactions. OCO transcends a website or a customer service point. The positive impact of OCO will, therefore, rely as much on the people driving the initiative as the processes and technologies supporting the ongoing optimization process.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Adobe; Bridgeline Digital; CoreMedia; Ektron; GX Software; HP; IBM; OpenText; Oracle; SDL; Sitecore; Webtrends

Recommended Reading: "Optimize Your Online Presence and Enhance the Experience for Customers and Users"

"Online Channel Optimization: Framework to Optimize Online/Offline Communications"

"Magic Quadrant for Web Content Management"

"Incorporating the Web Into Cross-Channel Customer Analysis"

Big Data

Analysis By: Mark A. Beyer; Sid Deshpande

Definition: Big data is high volume, velocity and variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making.

Position and Adoption Speed Justification: Big data is almost at the Peak of Inflated Expectations. It will become an embedded and state-of-the-art practice by 2018, and it is more likely that big data management and analysis approaches will be incorporated into a variety of existing solutions in existing markets (see "Big Data Drives Rapid Changes in Infrastructure and $232 Billion in IT Spending Through 2016").

Notably, organizations have begun to indicate that existing analytics will be modified and enhanced by big data and not replaced (only 11% of data warehouse leaders indicated they would consider replacing the warehouse with a NoSQL or big data solution as of November 2012, down from just over 20% in 2011). Practices are diverging at this point, with confusion starting to emerge regarding exactly what constitutes big data and how it should be addressed. Some very traditional vendors that have not been considered for big data solutions should be considered, and this confusion may be their entry point into the debate about which tools to use. Other vendors will simply relabel their existing products as big data and not actually offer anything new.

Beginning late in 2014 and through the end of 2015, big data will descend into the Trough of Disillusionment as conflicting concepts of what it is and how organizations can benefit from its management and analysis multiply.

There are two significant facts that will drive it into the trough.

▪ Tools and techniques are being adopted ahead of learned expertise and any maturity/ optimization, which is creating confusion.

▪ The inability to spot big data opportunities by the business, formulate the right questions and execute on the insights.

MapReduce continues to persist as the "darling" of big data processing. Even with new additions or wider use of the Hadoop project (such as HCatalog) it remains a batch solution and so has to be combined with other information management and processing technologies. Hadoop implementations require expert-level staff or system implementers.

As anticipated in 2011, attempts to combine MapReduce with Graph have followed and inadequate attempts to address other big data assets, such as images, video, sound and even three-dimensional object modeling, will drive big data into the trough. Some big data technologies represent a great leap forward in processing management, especially relevant to narrow but deep (many records) datasets, such as those found in operational technology, sensor data, medical devices and mobile devices, among others. Big data approaches to analyzing data from these technologies represent the potential for big data solutions to overtake existing technology solutions when the demand emerges to access, read, present or analyze any data.

The larger context of big data refers to the wide variety and extreme size and count of data creation venues in the 21st century. Gartner clients have made it clear that big data must include large volumes processed in streams, as well as batch (not just MapReduce) and an extensible services framework deploying processing to the data or bringing data to the process, spanning more than one variety of asset type (for example, not just tabular, or just streams or just text). Importantly, different aspects and types of big data have been around for more than a decade — it is only recent market hype around legitimate new techniques and solutions that has created this heightened demand.

User Advice:

- Identify existing business processes that are hampered in their use of information because the volume is too large. There are many information gaps that could be filled by new information types (variety) or the velocity will create processing issues. Then identify business processes that are currently attempting to solve these issues with one-off or manual solutions.

- Review existing information assets that were previously beyond existing analytic or processing capabilities (referred to as "dark data") and determine if they have untapped value to the business, making them a first or pilot target of your big data strategy.

- Plan on utilizing scalable information management resources, whether public cloud, private cloud or resource allocation (commissioning and decommissioning of infrastructure), or some other strategy. Do not forget that this is not just a storage and access issue. Complex, multilevel, highly correlated information processing will demand elasticity in compute resources, similar to the elasticity required for storage/persistence.

- Extend the metadata management strategies already in place and recognize that more is needed to enable the documentation of big data assets, their pervasiveness of use and the fidelity or assurance of the assets by tracking how information assets relate to each other and more.

Business Impact: There are three principal aspects to big data — success will be limited unless all are addressed. The quantitative aspects of big data generally do not emerge one by one. Volume, variety and velocity most often occur together. The second aspect is that innovation must be cost-effective both in costs to deploy and maintain and in terms of time to delivery — solutions that arrive too late are useless, regardless of cost.

Finally, the focus must be on increased insight by the business into process optimization from immediate automation through the development of completely new business models. Big data permits greater analysis of all available data, detecting even the smallest details of the information corpus — a precursor to effective insight and discovery.

The primary use cases emerging include leveraging social media data and combining operational technology (machine data) with back-office and business management data and further validating existing assets (increasing their "fidelity").

Perhaps the most important business benefit of big data management and analysis techniques are that analytics and decision processing can include multiple scenarios, including highly disparate

definitions and temporality of events in the data. This means that analytics can now comprise many different scenarios. Each scenario could have different starting and ending points, and differing relationships within the data and circumstantial inputs. Finally, analysts would be able to attach probabilities to each scenario and monitor many of them simultaneously.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Cloudera; EMC-Greenplum; HortonWorks; IBM; MapR; Teradata-Aster Data

Recommended Reading: "Big Data Drives Rapid Changes in Infrastructure and $232 Billion in IT Spending Through 2016"

"Big Data' Is Only the Beginning of Extreme Information Management"

"How to Choose the Right Apache Hadoop Distribution"

"CEO Advisory: 'Big Data' Equals Big Opportunity"

"The Importance of Big Data: A Definition"

Social Media Metrics

Analysis By: Carol Rozwell

Definition: Social media metrics are a style of social analytics, focused on measuring the impact of content created in Internet-based social applications, such as blogs, social media sites and product ratings. Social media metrics attempt to quantify dozens of attributes, such as comments posted, friends reached, reposts and repins. The real value comes from prime and aggregate social media metrics derived from raw counters, such as sentiment, buzz, rating, influence, exposure and virality.

Position and Adoption Speed Justification: The position for social media metrics at pre-peak is justified due to the wide adoption of metrics by those involved with social media. The breadth of metrics definitions vary by user role, metrics vendor and social application. Products for social media monitoring are improving, shifting from finding comments to better linguistic analysis of what is being communicated. However, discussions continue about the lack of value for sentiment and other social metrics, meaning some of the initial hype is already fading. The connection of social metrics to business value is still primitive. It will be approximately two to five years before the productive use of social media metrics becomes widespread. A driver for adoption is the availability of tools via software as a service models. In addition, advertisers will create ad hoc metrics to use as currency within social media advertising efforts. Metrics will not become fully standardized however, so users within customer support, product marketing and research, along with external agencies and consultants, must learn to calibrate available metrics to their environment and business goals.

User Advice: It is essential to embrace social media metrics as part of a social media strategy. Use the unique metrics to help optimize social media activity, as well as align social media metrics with other metrics already in use. Social media metrics can supply valuable attitudinal indicators higher in the purchase funnel than metrics such as click-throughs. In marketing and advertising, for example, especially on the Web channel, metrics such as unique and repeat visitors, conversations, registrations, value of sale and cost of campaigns are already appreciated, and measured within Web analytics or campaign-analysis tools. Measuring the number of tweets or Facebook page visits alone is as unconstructive as measuring Web hits.

To have long-term value, social metrics must correlate with some business value, such as:

- Triggers for customer engagements

- Optimized campaigns

- Lower-cost of sale

- Greater lifetime customer value or customer satisfaction metrics

The weaknesses of social media metrics are that they're inherently manipulable by bad actors (such as like, share, and ratings farms and bots) and therefore generally unsuitable for currency applications. Any decisions or insights drawn from them should also take into account data quality issues.

Business Impact: Social media metrics are beginning to displace traditional brand metrics and measurement methodologies such as surveys and focus groups. These are designed to measure brand recall, brand preference, and purchase intent that have historically supplied proof-points for brand advertising campaigns (in contrast with sales promotion).

Using social media metrics will improve the yield of social media initiatives by indicating what is working (and what is not). Social media metrics have the most impact in vertical industries and departments where social media has an impact. Business-to-consumer companies in retail, consumer product goods, finance and government are early adopters. Marketing, advertising, customer support, product management and research are departments where social media and social media metrics will have the most benefit. Those that tie social media metrics to process and establish a feedback loop of social activity decisions to business value will see the best results.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Adobe; Attensity; IBM; Nielsen; salesforce.com; SAS

Recommended Reading: "Social Media Makes Marketing Metrics More Meaningful"

"Cut Through the Social Media Noise for Better Branding and Digital Marketing"

"Use Gartner's Social Business Program Maturity Model to Plan Your Next Move"

"The Concise Social for CRM Vendor Guide, 2013"

Gamification

Analysis By: Brian Blau; Brian Burke

Definition: Gamification is the use of game mechanics and design to drive engagement in a target audience for nongame purposes to achieve a target business outcome. Many types of games include game mechanics, such as points, challenges, leader boards and incentives, that make playing games enjoyable. Gamification applies these game mechanics to motivate the audience to higher and more meaningful levels of engagement. Humans are "hard-wired" to enjoy games and have a natural tendency to interact more deeply in activities framed in a game construct.

Position and Adoption Speed Justification: Gamification is used to change behavior, develop skills or drive innovation. Some examples of gamification's many uses include customer engagement, education, employee performance, innovation management and healthcare. While the concepts behind gamification are not new, its first use in 2007 coalesced specifically around using game mechanics derived from video games. Today, gamification is gaining traction in the enterprise. But its current "sweet spot" is the consumer market, which has the most deployments and gamification is integrated into marketing campaigns, customer loyalty programs, product design of mobile apps and services, and is intended to increase customer interaction and engagement. The fastest-growing segment of gamification is internal-facing enterprise uses, in which it is deployed to increase employee engagement in areas like training, innovation management, collaboration and employee performance. This trend is set to accelerate as larger vendors, such as salesforce.com, begin to integrate game mechanics and analytics into their software offerings.

Early adopters, such as consumer brands and services, and mobile apps, show that gamification has had significant positive impact on user engagement rates when applied in a suitable context. However, gamification also has significant challenges to overcome before widespread adoption occurs. Designing games is no easy task — during four decades of video game development, many games have failed despite developers' best intentions. A basic level of game mechanics (points system, leader board, achievements, awards or basic challenges) is often not enough to sustain increased engagement, as incentives and rewards must be aligned to motivate the target audience. Gamifying activities represent another challenge, one that requires careful planning, execution and iteration. Overcoming these challenges will require successive integration of gamification in a wide variety of consumer and enterprise scenarios.

User Advice: Gamification can increase user interactivity and change behaviors, resulting in greater user engagement. When fun is built into the interaction model, users are more likely to continue to engage. Gamification has many uses that target consumers, customers, employees or any other defined audience, and it impacts many areas of business and society.

Organizations planning to leverage gamification must clearly understand the target audience they intend to engage, what behaviors they want to change, what motivates the audience and maintains their engagement, and how success will be measured.

Gamification technology comes in three forms:

- General-purpose gamification platforms delivered as software as a service that integrate with custom-developed and vendor-supplied applications

- Purpose-built solutions supplied by a vendor to support a specific usage (for example, innovation management or service desk performance)

- Purely custom implementations

Organizations must recognize that simply including game mechanics is not enough to realize the core benefits of gamification. Making gamified solutions sufficiently rewarding requires careful planning, design and implementation, with ongoing adjustments to keep users interested. Designing gamified solutions is unlike designing any other IT solution, and it requires a different design approach. Few people have gamification design skills, which remains a huge barrier to success in gamified solutions.

Enterprises trying to encourage new employee behaviors can use gamification as motivation. Organizations are beginning to use gamification as a mechanism to inspire and reward new initiatives, and to recognize contribution and participation that augments and furthers the purpose of their businesses and their customer communities. Implementing gamification means matching player goals to target business outcomes to attract and sustain a deeper level of interactivity, relationship or engagement with users.

Business Impact: Gamification techniques can be used in a wide range of scenarios to enhance product and service strategies. Its use is relevant, for example, to marketing managers, product designers, customer service managers, financial managers and HR staff, whose aim is to bring about longer-lasting and more-meaningful interactions with customers, employees or the public.

Although gamification can be beneficial, it's important to design, plan and iterate on its use to avoid the negative business impacts of unintended consequences, such as behavioral side effects or gamification fatigue.

User engagement is at the heart of today's "always connected" culture. Incorporating game mechanics encourages desirable behaviors, which can, with the help of carefully planned scenarios and product strategies, increase user participation, improve product and brand loyalty, advance learning and understanding of a complex process, accelerate change adoption, and build lasting and valuable relationships with target audiences.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Badgeville; BigDoor; Bunchball

Recommended Reading: "Technology Overview for Gamification Platforms"

"Business Model Games: Driving Business Model Innovation With Gamification"

"Gamification: Engagement Strategies for Business and IT"

"Best Practices for Harnessing Gamification's Potential in the Workplace"

"Gamification: The Serious Side of Games Can Make Work More Interesting"

Context-Enriched Services

Analysis By: Anne Lapkin

Definition: Context-enriched services are those that combine situational and environmental information with other information to proactively offer enriched, situation-aware and usable content, functions and experiences. The term denotes services and APIs that use information about the user to optionally and implicitly fine-tune the software action with better situational awareness. Such services can proactively push content to the user at the moment of need, or suggest products and services that are most attractive to the user at a specific time.

Position and Adoption Speed Justification: Context enrichment refines the output of services and improves their relevance. Since Gartner began covering this topic more than six years ago, context-enriched services have gone beyond simple scenarios (for example, one category of context information such as location) to more complex services that use several categories of context information (for example, location, group behavior and purchase history) to further refine the output. The majority of current implementations are consumer facing, in mobile computing, social computing, identity controls, search and e-commerce — areas in which context is emerging as an element of competitive differentiation. Enterprise-facing implementations, which use context information to improve productivity and decision making by associates and business partners, have slowly begun to emerge, primarily in offerings from small vendors (see "Context-Enhanced Performance: What, Why and How?"). While personalization is not a new concept (portals have used a level of personalization for many years), context-enriched services extend that model further by including a vastly increased number of data points about an individual from a wider variety of sources.

The focus on big data has created a favorable environment for the development of context-enriched services. Many big data use cases are focused on customer experience, and organizations are leveraging a broad range of information about an individual to hyperpersonalize the user experience, creating greater customer intimacy and generating significant revenue lift. Examples include:

- Walmart — Whose Polaris search engine utilizes social media and semantic search of clickstream data to provide online customers with more-targeted offers (leading to a 10% reduction in shopping cart abandonment).

- VinTank — Which analyzes over 1 million wine-related conversations each day, to predict which customers will be interested in specific wines at specific price points, and combines that with location information and alerts wineries when a customer who is likely to be interested in their wines is nearby.

- Orbitz — Which has utilized behavioral information from user history and search to develop predictive patterns that would increase hotel bookings by presenting users with hotels that more closely match their preferences. This project resulted in an addition of 50,000 hotel bookings per day — a 2.6% increase (see "Orbitz Worldwide Uses Hadoop to Unlock the Business Value of 'Big Data'").

Context-enriched services have moved significantly forward this year, from a pre-peak 10% position to post-peak 5%. We expect that the continued focus on big data analytics will drive significant movement from now to 2016. Because of the dramatic increase in context-aware computing as a big data use case, we are revising the "time to mainstream adoption" downward — to two to five years.

User Advice: IT leaders in charge of information strategy and big data projects should leverage contextual elements sourced both internally and externally for their customer-facing projects. In addition, investigate how you can leverage contextual services from providers such as Google and Facebook to augment your existing information.

Business Impact: Context-enriched services will be transformational for enterprises that are looking to increase customer engagement and maximize revenue. In addition, context enrichment is the next frontier for business applications, platforms and development tools. The ability to automate the processing of context information will serve users by increasing the agility, relevance and precision of IT services. New vendors that are likely to emerge will specialize in gathering and injecting contextual information into business applications. New kinds of business applications — especially those driven by consumer opportunities — will emerge, because the function of full context awareness may end up being revolutionary and disruptive to established practices.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Apple; Facebook; Google; Microsoft; Sense Networks

Recommended Reading: "Orbitz Worldwide Uses Hadoop to Unlock the Business Value of 'Big Data'"

"Predicts 2013: Context-Aware Computing"

"Context-Aware Computing Is the Next Big Opportunity for Mobile Marketing"

"An Application Developer's Perspective on Context-Aware Computing"

"Drive Customer Intimacy Using Context-Aware Computing"

UX Tools

Analysis By: Brian Prentice

Definition: UX tools are the software products used to automate steps through a UX process. These products include, but are not limited to, those for wireframing, prototyping, and persona management.

Position and Adoption Speed Justification: UX tools are not new. In fact, wireframing and prototyping tools like those from Balsamiq, Axure, iRise, Omnigraffle, Mockingbird, Mockflow are well established and deserve to be positioned at the Plateau of Productivity. We even see well-established UX tools from established providers like Microsoft (Expressions Blend Studio) or Apple (Interface Builder in the XCode product suite). There is also some overlap with requirements elicitation and simulation tools, although usage has changed.

The UX tool market is reshaping as the result of an emerging shift from UX as a services engagement to the services surfacing as products. Products like UX360 from TandemSeven are indicative of this trend. One component of the product is Persona Modeler — a way to capture, evolve and manage persona descriptions in a highly structured way. Turning this from a component of a services engagement to a component of a product suite means persona management can span multiple projects. These types of activities would have once been considered part of a service providers "secret sauce."

Once the dam breaks, we expect more design agencies to be automating greater portions of the UX process and going to market as software providers. Additionally, ongoing innovation in UX process will be driven with software creation in mind as it becomes a central plank for these new UX tool providers to differentiate themselves in the market. Added to this is a slew of other UX tools; for example, there are tools for design evaluation (e.g., Usabilla, AttentionWizard), synthetic eye-tracking (e.g., Inspectlet), user testing (e.g., Webnographer) and A/B testing (e.g., Monetate), to name a few, which will all be brought to bear to create better, more consistent UX design processes.

This upending and expanding of the UX tool landscape is the reason this technology profile has move into a pre-peak position. The market is still nascent and the hype levels are low. But we expect great awareness and interest in these types of products to pick up due to the growing interest in UX in enterprises along with their penchant to seek new tools and technology as an early step in any response to new trends.

User Advice: UX tools are only as good as the practitioners that use them and the UX processes that they're working within. Enterprises should not be seeking to acquire these products as the basis to improve UX in their organization. They should, instead, seek to revise their approach to software development and skills as the basis for improving UX, and then apply these products where required. Design agencies committed to a professional services-based strategy must recognize that a growing part of the UX design process is beginning to be automated through software. They should innovate business models and delivery methodologies to avoid the forces of commoditization negatively impacting their business.

Business Impact: The most pronounced impact from the increasing scope of UX tooling will be on the design ecosystem. This includes dedicated digital design agencies, high-end Web developers, and the digital/UX design teams found in advertising agencies and traditional IT system integrators.

Ongoing automation will drive greater efficiency that can drive higher margins. However, automation also erodes competitive differentiation. UX tools will put increased pressure on design agency management to stay competitive in an already hyper-fragmented market. Enterprises today will see less impact, as the scope of in-house UX design work is still nascent.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Apple; Axure; Balsamiq Studios; iRise; Microsoft; TandemSeven

Recommended Reading: "The Impact of Mobile and Social on User Experience Design Metaphors"

"Take These Four Steps to Implement a Value-Driven, User-Centered Design Process"

"Best Practices for Driving Business Value Through Usability and User Experience"

"Rethink the Presentation Layer to Simplify the User Experience You Build"

"Who's Who in the Emerging UXP Market"

Semantic Web

Analysis By: Joe Bugajski

Definition: Semantic Web is a means for making written thoughts machine-readable, using Web technologies that link concept definitions to corresponding words.

Position and Adoption Speed Justification: Today's Semantic Web is not your older brother's Semantic Web. It is improved through reduced scale and a focus on practical applications in healthcare, finance and other industries. Tim Berners-Lee first described the Semantic Web in 2000. He envisioned a "Web of documents" that consisted of tags and links embedded in documents, Web pages and data structures, allowing information to be machine-readable and understandable. Today's Semantic Web uses some of the technology standards developed for the original Semantic Web to solve specific problems in big data analysis and message interoperability. Moreover, the view of semantic information management expanded significantly into classifications of semantic styles (see "Hype Cycle for Big Data, 2013").

Semantic Web uses an array of Web technology standards (W3C.org) and industry-specific standards. They include HL7 (HL7.org), XBRL GL, Financial Industry Business Ontology (FIBO), and formats and languages (for example, XML, Resource Description Framework [RDF] and Web Ontology Language [OWL], and Ontology Definition Metamodel [ODM/], respectively). These and other standards define information meaning and interrelationships, and connect Web components to one another.

A major advance in the vision of the Semantic Web has been the explosion of social networking and social tagging, with sites like Facebook, YouTube, Myspace, Flickr, Wikipedia and Twitter. The "social graph" generated by semantics tagging forms a "giant global graph" first described by Berners-Lee. However, social graphs are in closed and controlled platforms that fall short of Berners-Lee's vision of an open, interoperable Semantic Web.

The term "linked data" has been used recently as a synonym for Semantic Web. The name change, led by W3C, is an effort to bring some sanity to the world of tagged data and the relatively responsible acceptance of RDF as an operable and useful standard for specific industry domain communication challenges, such as:

- Enterprises are learning how to mine their corporate libraries to extract intellectual property, legal case management, prior research findings and other such information that helps them solve today's problems. Some content dates many years and includes both electronic and nonelectronic records.

- Other enterprises are revisiting their data to see whether they had conducted research or pursued product development that is relevant to what they're investigating today. This is to learn from the earlier work, but also to avoid pursuits that may lead to failure or suspended projects, as they have in the past.

The effort to leverage the wisdom of the crowd via analysis of big data is moving forward. Vast amounts of information lie buried beneath mountains of data that the collective rapidly creates and re-creates. If the data contains tags and ontological relationships, data becomes accessible for analysis using Semantic Web technologies, such as Google's adoption of semantic search.

In addition, proprietary schemes like Facebook's have superseded open standards like Friend of a Friend (FOAF), and have themselves been challenged by competing initiatives, such as Google+. The result is technology fragmentation — which is in opposition of the vision embodied by Semantic Web, and it is data that is not portable and has interoperability problems.

Although most linked data projects represent a subset of Berners-Lee's original vision (note: A W3C staff member used the term linked data, not Semantic Web, during conversations with Gartner), a few projects advance the original Semantic Web concepts, such as:

- DBpedia — Extracts structured data from Wikipedia

- FOAF — Describes social connections

- GoPubMed — Provides semantic search for life sciences

Semantic Web is a wonderful vision, albeit unachievable, that has necessarily fallen short of the hype. It may be considered dead as a practical technology set. In place of Semantic Web, and driven by some of its technologies, are practical and realistic domain applications.

User Advice:

Develop talent.

- Identify personnel grounded in linked data technologies (for example, RDF and OWL). Hire engineers and business analysts experienced in developing with ontology frameworks (for example, ODM). Set aside budget and personnel time to train staff in linked data technologies.

- Employ new technology introduction and change management to inject linked data into projects, and adopt a culture of properly governed and well-defined semantics.

- Augment staff with boutique consultancies that have significant experience building ontological and domain standards.

Employ domain and linked data standards for internal glossaries and dictionaries.

- Look for industry semantic standards driven by large organizations in financial services, life sciences, healthcare, library sciences, defense and government.

Build linked data into projects.

- For new Web projects, build and use domain-specific glossaries (for example, FIBO or XBRL GL). Assure compliance with ontological standards and linked data technologies. Adapt industry standard glossaries for internal use.

- For big data projects, adopt well-defined vocabularies and ontologies that derive from industry ontologies and linked data standards. Whenever possible, use vocabularies designed for, and used by, small groups and communities (for example, business partners or suppliers).

Business Impact: Delivering information across the Web, with machine-readable and interpretable semantics, can enhance application and site interoperability. It helps automate information discovery. It produces contextually relevant searches and search options that are difficult or impossible without rich semantic information. In addition to tagging data elements with basic vocabularies (for example, tagging items to identify personal and organizational information), linked data ontologies enable creation of sophisticated concepts, enabling systems to infer relationships across datasets that were not defined explicitly. This improves the quality of content management, information access, system interoperability and database integration.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Google; IBM; Microsoft; Mondeca; Ontoprise; Oracle; Reuters; SAS; SchemaLogic; Thetus; TopQuadrant

Recommended Reading: "Hype Cycle for Big Data, 2013"

"The Nexus of Forces Is Driving the Adoption of Semantic Technologies, but What Does That Mean?"

"Top Actions for Healthcare Delivery Organization CIOs: Attack Semantic Interoperability by Steps"

"Information Management in the 21st Century Is About All Kinds of Semantics"

Sliding Into the Trough

Portal-less Portals

Analysis By: Jim Murphy; Gene Phifer

Definition: Portal-less portals provide a personalized interface with relevant information from multiple sources, without using traditional portal server software. Approaches to portal-less portals vary and include rich Internet applications (RIAs), mashup platforms, Web content management systems and social software platforms. Most portal-less portals exploit modern Web-oriented architectures (WOAs), REST-based interfaces and widgets to offer a simple, yet flexible, path to interoperability.

Position and Adoption Speed Justification: Although enterprise portal frameworks and platforms constitute the established approach to building websites and Web applications across a range of scenarios, portals are becoming easier to build without traditional portal products. The portal goal of a single, personalized point of access to enterprise information, processes and people is no longer the sole domain of established horizontal portal vendors and technologies. RIA platforms and Ajax technologies, enterprise mashup assembly platforms, Web content management systems with portal-like features, open-source frameworks and components, and social networking approaches are offering new means toward the same ends, and often without the complexity, heavy infrastructure and long implementation times of traditional portal products.

Vendors focusing on portal-less portal scenarios are often small, relatively inexpensive and lightweight, characteristics that favor open source. A few larger vendors offer portal-less portal capabilities in the context of other software categories, such as content management, business intelligence or social software. Many portal-less projects, in fact, don't involve a specific vendor or product, but are accomplished by developers employing open-source Web frameworks and widgets.

The attraction toward portal-less portals (see "Get Ready for the 'Portal-Less' Portal") is largely the result of frustration with stagnant or failed portal projects and initiatives. Too many portal projects have failed or grown stagnant, falling short on user adoption and delivering few measurable business results. Business units and end users in many organizations have come to view established portal products as restrictive, requiring heavy IT involvement and intervention whenever they want to add an application or make a change. Rather than being a facility for delegating administration and putting control into the hands of business units and users, too many portal projects have come to represent an IT bureaucracy. In the meantime, business users and consumers have not only seen the alternatives, but also sometimes use them more often than any enterprise-deployed portal.

However, there remain several weaknesses with portal-less portals, compared with longer-standing traditional portal products and platforms. Portal-less portals rely more heavily on WOA than many traditional portal platforms, which tend to offer a great variety of front-end means of integration. Thus, WOA is a prerequisite for effective and extensible portal-less portals. While widgets are decidedly more simple today than standards-based portlets or Web parts, without firmly established standards, they may also be less capable and sophisticated when it comes to features like interportlet communication, supporting granular levels of security and advanced personalization.

Portal-less portals and lean portals are complementary constructs. Both derive from a customer demand for simplicity amid the complexity of more traditional portals and their providers. However, the concepts are orthogonal:

- Portal-less portals represent nontraditional, technical approaches that reduce the burden and responsibility of a portal server in delivering a personalized point of access and interaction to users. Portal-less portals rely more heavily on client-side capabilities than traditional portals.

- Lean portals, on the other hand, represent a resistance to the expanding functionality of portal suites and their user experience platform (UXP) derivatives. That is, whereas UXPs have begun to encompass comprehensive content management, search, collaboration, social, Web analytics and mobile, among other capabilities, lean portals provide just enough functionality to perform the essential portal role. Lean portals can rely on either server-side or client-side technical methods.

Thus, portal-less portals have lean qualities, but not all lean portals are portal-less.

User Advice: Of course, alternatives to long-established portal architectures, although undeniable in their appeal to end users, raise challenges. First, organizations must ensure that new efforts are aligned with business goals and existing systems, while mitigating risk. Second, organizations must prevent alternative approaches from creating yet more information and process silos. Third, organizations must avoid subverting value propositions ingrained in portal initiatives, such as delegated administration, portlet standards implementations, directory integration and ready-to-use portlets for common applications. Organizations should consider portal-less portals part of their portal and broader UXP strategy.

While small vendors are making progress in the market, the portal-less portal idea is not entirely lost on the more established portal providers. Even the largest and most established portal vendors, such as Microsoft, Oracle, SAP and IBM, have portal-less portal qualities, if not direct capabilities, although they're often underplayed in light of the more traditional portal approaches. In addition to seeking portal alternatives, organizations should, therefore, dig deeper toward understanding their providers' portal-less portal capabilities.

Business Impact: Given the right conditions, some companies can benefit greatly from portal-less portals. Organizations with relatively simple access to many disparate systems and resources, and those that have a thorough service-oriented architecture or WOA foundation in place, can use portal-less portals to provide useful user interfaces far more quickly than traditional portal approaches. Given the right conditions and scenarios, portal-less portals can offer faster time to

market, more satisfying user experience and more direct business value than traditional portal platforms.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Adobe; Backbase; DotNetNuke; Drupal

Recommended Reading: "A Platform Approach for Websites, Portals and Mobile Apps Leads to Faster Time to Market and Improved User Experience"

"The Emerging User Experience Platform"

"Get Ready for the 'Portal-Less' Portal"

Cloud Office Systems

Analysis By: Tom Austin

Definition: The cloud office systems (was cloud collaboration services) product category incorporates cloud collaboration services and adds content creation, communication, social and coordination services, data access and customizable, extensible platforms that can be integrated with other systems. Most users adopt a subset of capabilities beginning with email. The term "Microsoft Office" refers to a specific set of products from Microsoft; the broader term "cloud office systems" is a generic label. Microsoft Office 365 and Google Apps for Business are two examples.

Position and Adoption Speed Justification: Microsoft and Google have been investing very heavily to drive enterprises to their own office system services provisioned from the cloud. There are many other service providers in this space, and while some offer a very broad suite (such as IBM Smart Cloud for Social Business), there are hundreds of others that provide more narrowly-defined, cloud-based subsystems that are either relatively free-standing in the cloud (such as basecamp.com) or integrate with one of the very broad offerings (for example, RunMyProcess).

Service providers have been creating the appearance of significant momentum in this segment, with advertisements and press releases implying total success. However, as is typical in the early stages of a hyped market segment, actual penetration trails the expectations the ads try to set. We estimate that a little over 8% of the total potential market for cloud office systems has moved as of 2Q13. That sounds small but it reflects 50 million users (a very large number already) because the total potential market, today, is huge (630 million users).

The office system market — including cloud and on-premises alternatives — is growing, we estimate, to over 1.1 billion users by 2022. For more details about market sizing and growth rates, see "New Developments in the Cloud Office System Market." That same research also elaborates on:

- **Benefits.** These include lower net cost (particularly for smaller enterprises); greater agility (by virtue of faster availability of new features); lower overheads (that is, replacing capital investment requirements with operating expenses, smoother cash flow and fewer dedicated IT resources required); easier provisioning; greater reliability and security (particularly for smaller organizations); and improved user experience and financial incentives offered by the service providers.

- **Drawbacks.** These include higher net cost (particularly for larger enterprises); other strategic priorities (office systems have not been the forefront of most IT organizations strategic priority list for decades); security; compliance and regulatory concerns; integration with other on-premises systems; complexity; unmanageability (despite various governors available to buyers, ultimately, the service provider controls the rate of evolution); inflexibility; functional deficiencies; asymmetry between cloud and on-premises variants; hidden costs; immaturity (including support, management, administration and reporting); and general, overall concerns about risks.

- **Adoption rate.** We expect this will accelerate by the end of 2014, with the market growing to 273 million users in 2017 (33% of the larger total potential market) and 695 million users in 2022 (60% of 1.158 billion).

User Advice:

- IT leaders must avoid yielding to self-serving vendor migration pressures. Move when and if appropriate and pit Google and Microsoft against each other. Movement to cloud office systems is not inevitable for everyone. We expect one third of the market is not going to move there for the foreseeable future.

- Most larger enterprises can be comfortable waiting at least until the "early majority" period (2015) if they will migrate. However, enterprises of any size with an imminent need for a major overhaul or replacement of existing office systems, and small or midsize businesses in general, should plan to move more quickly.

- Resist supplier pressure to commit to new, long-term contracts. Test whether their offers are for their benefit or for your own.

- Where it makes sense, run pilots with multiple cloud office system providers. These pilots should involve your internal customers, not just IT. Large enterprises (those with 10,000 or more potential users) should consider exploiting multiple vendors' offerings and avoiding lock-in where ever possible.

- Consider the significant cost-savings arguments made by both Google (for Google Apps for Business) and Microsoft (for Office 365), but look carefully to discover the cost-related risks as well. A move to the cloud may be a financial one-way trip.

Business Impact: Although the expected growth in movement to cloud office systems services will have wide implications for the industry as a whole, it will have a moderate to low impact on individual organizations. For some, the benefits will obviate the drawbacks. For others, the opposite may be true. Every enterprise is different. Although the cited benefits should enable enterprises to

provide more employees with access to these services, they will not suddenly enable large shifts in business practices or new capabilities.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Google; Huddle; IBM; Microsoft; salesforce.com; Thinkfree Office; Zoho

Recommended Reading: "The Cloud E-Mail and Collaboration Services Market"

"Google Apps for Business: Leading with Gmail"

"Explore Microsoft's Office 365 Plans and Suite Options Now in Advance of IT Operations Inquiries"

Online Product Recommendation Engine

Analysis By: Penny Gillespie

Definition: Product recommendation engines provide algorithmically derived links to digital content for use on multiple touchpoints (e.g., Web, mobile, email). Algorithms can be configured to bias recommendations based on context, such as similar items viewed or placed in a shopping cart, stock-on-hand, price affinity, product affiliations, user geography and time of day. Recommendations can also be made in conjunction with predictive analytics, based on past behavior of other customers or content written by other customers.

Position and Adoption Speed Justification: Product recommendations have grown significantly in popularity, fueling adoption growth well beyond high-end retail sites. Most e-commerce platforms include some form of product recommendations, and many e-commerce platform providers have partnered with vendors offering this technology (rather than attempt to build it themselves) to offer their clients a richer suite of e-commerce solutions and personalization capabilities. Increasing the distribution channels of this technology to e-commerce platform providers has also led to its more rapid adoption.

Research suggests that product recommendations made by identifying affiliated products (e.g., accessories, related parts, spare parts, replacement parts) can be especially powerful. Meaningful product recommendations can change a customer's perception of a seller from being product-centric to solution-oriented, which is more valuable to customers and increases both satisfaction and spending. Customers often seek solutions when making purchases, but may not be aware that they are purchasing something less than a solution.

For example, when a customer purchases a part for equipment or a gift, the customer is seeking a solution — either to fix broken equipment or to provide a present for a special occasion. A customer is not likely to realize that the part being purchased requires a special tool for installation or that the gift being purchased will not work properly without a second component (e.g., a toy that requires a

battery), unless the customer is appropriately advised. Another example using fashion and other soft goods would be presenting not only the item for which the customer was searching, but including a full ensemble of products that either best accompany or showcase the product being searched. Not only does this display products in a more-meaningful manner, it can entice customers to make additional purchases — similar to what can be done in an offline store.

Likewise, if the products being purchased are high value and will be frequently used, recommending a spare or replacement part could be desirable and could prevent future issues for the buyer. This increases the value of the buyer-seller relationship and the transaction.

Although online seller merchandisers may be able to indicate product affiliations using their merchandising tools, these product recommendation engines expand beyond the merchandiser's definition of product affiliation to the customer's definition. Product recommendations engines track, monitor and analyze how actual customers are viewing, linking and purchasing items. These engines also enable the automated promotion of certain inventory such as new arrivals and best-sellers. Merchandisers are also able to recommend and promote slower-selling products and higher-margin products.

Evolving uses of this technology include customer service resolution recommendations, such as driving an FAQ application, greater ties with customer and transaction information from back-office systems, as well as context-aware computing. Some systems even take the weather forecast into account.

Product recommendations technology's movement to the middle of the post-peak/trough region of the Hype Cycle is due to online sellers embracing the technology and e-commerce platform providers serving as a new distribution channel for these, often smaller, technology providers. We estimate a two- to five-year speed to plateau adoption, continuing to lag behind Tier 1 retailers, which have been the most advanced users of this technology.

User Advice: Start planning on incorporating this technology. As its popularity continues to increase, it will become a requirement for selling. Start with an ROI calculation to see if an uplift of 5% in website revenue — a conservative, but realistic, result — will justify the cost. Dedicate at least one full-time resource to learn and operate the tool, and to train others to work with the rules that bias the recommendations. Develop an attribution model with a test control that takes into account how many people would buy an item anyway, or make use of the feature if it is built into the product.

Once the basic skills are mastered, consider adopting the more advanced features of inventory and margin data integration to promote slower-selling or higher-margined products. Relevancy is key. Incorporate A/B testing and monitor the recommendations to ensure that they are resonating with customers.

Exercise prudence and good judgment in making online product recommendations, which may be perceived differently than offers made via email or postal service. A fine line exists between helpful recommendations and breaching someone's privacy. Online shoppers are likely to be less tolerant of nonrelevant content, suggestions and offers, as well as be more cognitive of perceived breaches of privacy (believing that an online offer is less likely to be random than an email offer).

Learn a few lessons from Target, which developed a sophisticated model for identifying pregnant females, bragged about its abilities and specifically targeted these women online — sometimes even before the pregnancy had been announced with what was disguised as random offers in an attempt to gain their loyalty early in their pregnancy. The NY Times revealed Target's tactics last year (see "How Companies Learn Your Secrets," 16 February 2012). Likewise, understand the rules and regulations on privacy in the countries in which business is being conducted. Some countries, such as those in the European Union, have much stricter rules on privacy, which could affect the ability of organizations to fully use recommendation engines.

Business Impact: The potential is high when the technology is used wisely. Most organizations with which we have spoken are realizing a 2% to 5% increase in revenue, with some outliers significantly above that. As the algorithms improve, along with better adaptation to context, segmentation and integration with back-end systems, the customer experience will also improve, which is likely to yield even higher results.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Adobe; Baynote; Certona; Monetate; MyBuys; RichRelevance; SAS

Social Analytics

Analysis By: Carol Rozwell

Definition: Social analytics is the process of collecting, measuring, analyzing and interpreting the results of interactions and associations among people, topics and ideas. These interactions can occur in virtual social environments used in the workplace, in internally- or externally-facing communities, or on the social Web. Social analytics is an umbrella term that includes a number of specialized analysis techniques, such as social filtering, social network analysis, social channel analysis, sentiment analysis and social media analytics.

Position and Adoption Speed Justification: The desire to find meaning in the myriad of sources of social information available on the social Web, as well as inside the workplace, is spurring interest in social analytics. There are huge volumes of data that appear in a variety of forms and this contributes to the complexity of the analysis.

Veteran social software vendors have added tools for social analytics to their collaboration applications that measure adoption and growth to provide an understanding of community dynamics. Analytics vendors are adding tools for social analytics to their applications that provide an understanding of online community and popular social media dynamics. The addition of social data makes individual behaviors, content and interactions visible. Although social analytics is by no means a mature technology, there are well-identified use cases that explain its value.

User Advice: Organizations should ensure that their initiatives are positioned to take advantage of social analytics to monitor, discover and predict. Knowing what questions to ask and then having a plan about what to do with the information uncovered are critical components of getting value from social analytics. Some enterprises will be content to simply monitor the conversations and interactions going on around them. Enterprises with social software platforms that provide social analysis and reporting can use this information to assess community engagement. They can also easily monitor what is being said about the company, its products and the brand using simple search tools or more sophisticated sentiment analysis applications.

The results of social analytics (for example, discovered patterns and connections) can be made available — often in real time — to the participants of the environment from which the data was collected to help them navigate, filter and find relevant information or people. Other enterprises will mine the social analytics data, actively looking to discover new insights using a wide range of business intelligence applications. At this time, the use of social analytics information for predictive purposes is a largely untapped source of value. However, marketing and product development teams express great interest in this capability.

In many organizations, social analytics applied to external activity (for example, sentiment analysis across the Web) will be sourced by marketing professionals and others (such as the legal department, product development and customer support). In those cases, the IT department needs to play a leadership role in orchestrating a coordinated set of activities across departments to, for example, minimize duplication of effort, ensure coordination between efforts and standardize taxonomies.

Business Impact: Social analytics is useful for organizations that want to predict trends based on the collective intelligence laid open by the Internet. For example, a biopharma researcher could examine medical research databases for the most important researchers, first filtering for the search terms and then generating the social network of the researchers publishing in the biopharma's field of study. Similarly, social analytics could be used by marketers who want to measure the impact of their advertising campaigns or uncover a new target market for their products. They could look for behaviors among current customers or among prospects that could enable them to spot trends (deterioration in customer satisfaction or loyalty) or behaviors (demonstrated interest in specific topics or ideas).

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Attensity; BuzzLogic; IBM; News Patterns; salesforce.com; SAS; Trampoline Systems; Visible

Recommended Reading: "Cool Vendors in Analytics, 2013"

"Cool Vendors in Content and Social Analytics, 2013"

"Advanced Analytics Enables Real-Time Business Optimization"

Augmented Reality

Analysis By: Tuong Huy Nguyen; CK Lu

Definition: Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects. It is this "real world" element that differentiates AR from virtual reality. AR aims to enhance users' interaction with the environment, rather than separating them from it.

Position and Adoption Speed Justification: The original hype around AR was driven by the interest and proliferation of mobile devices and geolocation services. Recent focus has shifted to vision-based identification AR. This technology supplements location-dependent AR and provides additional use-case scenarios. A growing number of brands, retailers, manufacturers and companies in various verticals have shown interest in, or are using, AR to enhance internal and/or external business processes. Since the hype around AR has died down from previous years, it has allowed more companies to look beyond the initial hype to explore AR's potential to provide business innovation, enhance business processes and provide high value to external clients.

AR will play a role in mobile contextual interactions, and will be particularly powerful for:

- Discovering things in the vicinity

- Presenting real-world objects of potential special interest

- Showing a user where to go or what to do

- Providing additional information about an object of interest

A number of factors continue to hinder AR adoption.

- Gimmicky AR campaigns that add little value and use AR for the sake of the technology itself

- Rigorous device requirements restrict the information that can be conveyed to the end user

- Privacy concerns for both location and visual identification-based AR

- Data costs for always-on connectivity

- Standardization for browsers data structure

User Advice:

- **Communications service providers:** Examine whether AR would enhance the user experience of your existing services. Compile a list of AR developers with which you could partner, rather than building your own AR from the ground up. Provide end-to-end professional services for specific vertical markets, including schools, healthcare institutions and real estate agencies, in which AR could offer significant value. A controlled hardware and software stack from database to device will ensure a quality user experience for these groups. Educate consumers about the impact of AR on their bandwidth, to avoid being blamed for users going over their data allowance.

- **Mobile device manufacturers:** Recognize that AR provides an innovative interface for your mobile devices. Open discussions with developers about the possibility of preinstalling application clients on your devices and document how developers can access device features. Build up alliances with AR database owners and game developers to provide exclusive AR applications and services for your devices. Secure preloading agreements and examine how you could integrate AR into your UIs or OSs.

- **AR developers:** Take a close look at whether your business model is sustainable, and consider working with CSPs or device manufacturers to expand your user base; perhaps by offering white-label versions of your products. Integrate AR with existing tools, such as browsers or maps, to provide an uninterrupted user experience. Build up your own databases to provide exclusive services through AR applications. Extend your AR application as a platform that individual users and third-party providers can use to create their own content. Explore how to apply AR, through different applications and services, to improve the user experience — with the aim of predicting what information users need in different contexts.

- **Providers of search engines and other Web services:** Get into AR as an extension of your search business. AR is a natural way to display search results in many contexts.

- **Mapping vendors:** Add AR to your 3D map visualizations.

- **Early adopters:** Examine how AR can bring value and ROI to your organization and your customers by offering branded information overlays. For workers who are mobile (including factory, warehousing, maintenance, emergency response, queue-busting or medical staff), identify how AR could deliver context-specific information at the point of need or decision.

- **Brands, marketers and advertisers:** Use AR to bridge your physical and digital marketing assets and drive increased engagement with your user base. For example, use AR in printed ads and catalogs to let consumers visualize things such as furniture or appliances in 3D in their home, or trying on clothes and accessories. Beware of campaigns that use AR just as a technology gimmick.

Business Impact: AR is used to bridge the digital and physical world. This has an impact on both internal- and external-facing solutions. For example, internally, AR can provide value by enhancing training, maintenance and collaboration efforts. Externally, it offers brands, retailers, marketers and the ability to seamlessly combine physical campaigns with their digital assets.

CSPs and their brand partners can leverage AR's ability to enhance the user experience within their location-based service (LBS) offerings. This can provide revenue via set charges, recurring subscription fees or advertising. Handset vendors can incorporate AR to enhance UIs, and use it as a competitive differentiator in their device portfolio. The growing popularity of AR opens up a market opportunity for application developers, Web services providers and mapping vendors to provide value and content to partners in the value chain, as well as an opportunity for CSPs, handset vendors, brands and advertisers.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Catchoom; GeoVector; Google; Layar; Metaio; Mobilizy; Nokia; Qualcomm; Tonchidot; Total Immersion; Zugara

Recommended Reading: "Top Recommendations to Prepare for Augmented Reality in 2013"

HTML5

Analysis By: David Mitchell Smith; Ray Valdes

Definition: HTML5 is the next logical step in the development of HTML, the language that has been used primarily to create websites. However, the term HTML5 is often used to mean more than the formal specification — e.g., better thought of as "the modern Web" (see "HTML5 and the Journey to the Modern Web"). HTML5 is the proposed specification for the next generation of HTML. It is important because it brings to the Web many of the rich Internet application (RIA)-like capabilities that have required additional software (e.g., plug-ins).

Position and Adoption Speed Justification: As its visibility has increased, HTML5 has garnered extremely charged opinions. The opinions range from "HTML5 will make everything else (especially Flash) irrelevant" (see "HTML5 and the Future of Adobe Flash") to "It will take more than a decade for HTML5 to be ratified, so we don't need to pay attention to it until then." The reality is, as usual, somewhere in between, and is time- and scenario-dependent.

HTML5 is not one thing. At one extreme, the hype and aura around the term can lead to using it to mean one particular feature (e.g., video). At the other extreme, treating HTML5 as if it is one large, inseparable entity can lead to a "wait until it's done" approach, which will be a bad choice for most companies. HTML5 consists of many components, including video, canvas, audio and offline capabilities. Other modern Web capabilities, such as JavaScript and Cascading Style Sheets (CSS), are closely related and often grouped together.

HTML5 usage and stability will be driven by desktop and mobile use scenarios, and there will be different drivers for both environments. There are different use cases for HTML5 in mobile. There is increased interest in hybrid architectures where HTML and other Web technologies are used. However, the result is wrapped and installed technology, rather than accessed through a browser, which greatly contributes to the confusion. A case in point is the highly publicized, much misunderstood criticism of HTML5 by Mark Zuckerberg, co-founder and CEO of Facebook, when Facebook adjusted its strategy. Facebook changed some use of HTML5 within its already hybrid strategy, further emphasizing optimized native approaches but not abandoning HTML5. The ensuing arguments about HTML5 triggered a strong response from Sencha, with it developing an HTML5-based Facebook clone to demonstrate HTML5's capabilities for this type of app. This battle, which played out in the trade press, has significantly contributed to positioning HTML5 to where it is today.

HTML5 implementations within browsers have a big impact on the usage and acceptance of the technologies. While the pace of innovation has increased, the issues around compatibility and browser diversity have also increased.

User Advice: For developers:

▪ Become familiar with the components of HTML5, and the browsers that support them.

▪ Continue to develop Web technology skills, and expect to leverage them in mobile application development.

▪ Adjust your strategies for HTML5 to take into account its multiple use cases, including mobile hybrid architecture.

Business Impact: While usage of HTML5 as part of the Web continues to increase, some of that use is not in pure Web scenarios (e.g., mobile hybrid). Therefore, business strategies need to account for app store monetization and distribution strategy issues. As with many technologies, especially on the Web, interest is occurring primarily outside the enterprise sector — i.e., among progressive Web designers and mobile application developers. Web developers are starting to design around new elements in HTML5, such as canvas, offline mode and video. Developers of RIA-based sites that rely on Adobe Flash and Microsoft Silverlight need a strategy that relies less on those technologies. Mobile developers are increasingly interested in HTML5 as part of multiple cross-platform strategies, including pure Web and hybrid approaches.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Adobe; Apple; Facebook; Google; Microsoft

Recommended Reading: "HTML5 and the Journey to the Modern Web"

"Flash, Silverlight and the RIA Dilemma in a World of HTML5"

"Browser Vendors' HTML5 Strategies Are Not the Same"

"HTML5 and the Future of Adobe Flash"

Web-Based Office Productivity Suites

Analysis By: Michael A. Silver

Definition: Office productivity suites are generally collections of basic productivity applications for tasks such as word processing, spreadsheet creation and presentation graphics. Traditionally, suites such as Microsoft Office and OpenOffice are thick-client applications that require significant maintenance on users' PCs. The Web paradigm enables personal content creation and editing support services to be provided, using a rich-client experience that does not require explicit delivery and maintenance of the software on individual PCs by the enterprise.

Position and Adoption Speed Justification: Although some products in this market also offer hosted email, here we consider only the productivity functions, such as word processing and

spreadsheets. Office productivity products have been available on the Web for more than five years. These applications generally do not approach the level of functionality of full-function, fat-client suites (such as Microsoft Office); however, they usually provide a useful, but smaller, function set. Google Apps for Business (GAB) is being adopted, largely for Gmail, but customers usually experiment with Google Docs for certain users. Microsoft's Office 2013 includes a new version of Office Web Apps that maintains good compatibility with Microsoft Office, but with a much smaller feature set than the installed fat-client version. Also, Apple just announced iWork for iCloud (June 2013), though few details are available. Online products can be free for consumers, but organizations usually need to license a larger offering that includes their use.

Individual users have been using free, consumer-grade versions to augment, rather than replace, functionality in traditional office suites (such as for real-time collaboration) for years. Offline functionality has been limited, but features continue to be added by all vendors, sometimes on a weekly basis. Many vendors offer some type of Web-based productivity suite, with IBM Docs (finally released, but with a relatively small but growing feature set), and Zoho as additional examples. As functionality improves, Web-based office productivity applications may make the traditional versions of Microsoft Office relatively less important, as users rely on the fat-client products for less time each week. However, mobile applications for smartphones and tablets have also started to emerge and users today seem to prefer a richer app experience and need the offline functionality. In many cases, the Web-based applications are used in addition to traditional products like Microsoft Office and few, if any, organizations have been able to eliminate Microsoft Office entirely. Customer interest in mobile applications may slow the growth of Web-based products.

User Advice: Web-based products are not an adequate replacement for Microsoft Office for all users, and will not be anytime soon. However, some users do not need the richness of Microsoft Office (or other full function thick-client suites), and for them a Web-based product may suffice. The critical issue is determining who can survive with Web-based tools, who requires installed Microsoft Office, and whether the complexities involved in supporting Web-based suites and locally installed versions of Microsoft Office simultaneously are worthwhile. The biggest problem for every non-Microsoft office suite is compatibility, and specifically visual fidelity with Office. Alternative products often change the way documents look and users may have to go back and reformat documents to repair any problems that were introduced. Google Docs will challenge installed versions of Microsoft Office in organizations that select Google to host email and where a substantial proportion of users can get their jobs done without Microsoft Office and don't need perfect visual fidelity. Additional features of Web-based products, including ease of co-authoring (a major feature of IBM Docs, but not discussed for iWork), could help attract users away from traditional suites.

There are four areas to test regarding user segmentation. Web-based suites may suffer compared with installed versions of Microsoft Office in feature richness, roundtrip fidelity, extensibility and offline operation:

- **Feature richness —** Users that require a large number of features or the more advanced features of Microsoft Office may not be able to run an alternative product.

- **Roundtrip fidelity —** With any alternative product, every time a document is edited with a product other than the one in which it was created, visual inconsistencies will be introduced.

- **Extensibility —** Many organizations run multiple applications that integrate with Microsoft Office. Office is a development platform, and few independent software vendors integrate with alternative office solutions.

- **Offline operation —** Web-based products offer varying degrees of offline capability. Users that are not deskbound will require offline capability (or ubiquitous network access) before a Web-based product can replace Microsoft Office.

Audit the degree to which other applications (such as CRM and ERP) provide Microsoft Office macros or integrate with Office to facilitate interacting or integrating with those applications via an Office tool. Determine what Office application user segments do not require the use of those functions.

In many instances, use of Web-based office suites by organizations is closely tied to moving email to the cloud, because vendors that supply one usually provide the other, often in a packaged bundle. Organizations with access to these products should consider if they can suffice for some users. However, it is not likely that all users can be moved from Microsoft Office, so organizations that try to run Web-based office products will likely run a mixed-product environment.

Whether or not there is organizational interest in Web-based office products, realize that end-user experimentation with these tools is taking place. Give your users guidelines on practicing safe experimentation (whether at work or not) with Web-based and mobile applications. Encourage them to share their findings with you, including their best and worst practices. Appoint a champion of freeware (and software as a service) to track these trends, and ensure that the enterprise experiments with and implements such software where appropriate.

Business Impact: A new generation of productivity applications could significantly change how users collaborate on projects, and how organizations pay for, deploy and manage office productivity services. Web-based products provide access from a greater variety of devices, and organizations may be able to offload the maintenance of these applications.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Adolescent

Sample Vendors: Apple; Google; IBM; Microsoft; Zoho

Recommended Reading: "Toolkit: Segmenting Users for Alternative Office Productivity Software"

"Microsoft Office: Buy It or Use It From Office 365 'in the Cloud?'"

"When to Consider Alternatives to Microsoft Office"

"Google Upsetting Microsoft's Cloud-Office System Ambitions"

Cloud Computing

Analysis By: David Mitchell Smith

Definition: Cloud computing is a style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies.

Position and Adoption Speed Justification: Cloud computing is still a visible and hyped term, but, at this point, it has clearly passed the Peak of Inflated Expectations. There are many signs of fatigue, rampant cloudwashing and disillusionment (for example, highly visible failures). Although cloud computing is approaching the Trough of Disillusionment, it remains a major force in IT. Users are changing their buying behaviors, and, although they are unlikely to completely abandon on-premises models or buy complex, mission-critical processes as services through the cloud in the near future, there is a movement toward consuming services in a more cost-effective way and toward enabling capabilities not easily done elsewhere.

Although the hype has peaked, there is still a great deal of hype surrounding cloud computing and its many relatives. Every IT vendor has a cloud strategy, although many aren't cloud-centric. Variations, such as private cloud computing and hybrid approaches, compound the hype and demonstrate that one dot on a Hype Cycle cannot adequately represent all that is cloud computing.

The hype around cloud computing is shifting as the market matures. It has moved from cost savings to being about the business benefits organizations would realize due to a shift to cloud computing. Organizations have realized some disappointment about the cost savings and are likely to experience some of the same related to business benefits.

User Advice: User organizations must demand road maps for the cloud from their vendors. Users should look at specific usage scenarios and workloads, map their view of the cloud to that of potential providers and focus more on specifics than on general cloud ideas.

Vendor organizations must begin to focus their cloud strategies on more specific scenarios and unify them into high-level messages that encompass the breadth of their offerings.

Cloud computing involves many components, and some aspects are immature. Care must be taken to assess maturity and assess the risks of deployment. Tools such as cloud services brokerages can help.

As user organizations contemplate the use of cloud computing, they should establish a clear understanding of the expected benefits of a move to the cloud. Likewise, organizations should clearly understand the tradeoffs associated with cloud models to reduce the likelihood of failure. Benefits and tradeoffs should be well-understood before embarking on a cloud computing strategy.

Business Impact: The cloud computing model is changing the way the IT industry looks at user and vendor relationships. As service provisioning (a critical aspect of cloud computing) grows, vendors must become providers, or partners with service providers, to deliver technologies indirectly to users. User organizations will watch portfolios of owned technologies decline as service portfolios grow. The key activity will be to determine which cloud services will be viable, and when.

Potential benefits of cloud include cost savings and capabilities (including concepts that go by names like agility, time to market and innovation). Organizations should formulate cloud strategies that align business needs with those potential benefits.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Amazon; Google; Microsoft; salesforce.com; VMware

Recommended Reading: "Agenda for Cloud Computing, 2013"

"The What, Why and When of Cloud Computing"

Mobile Web Applications

Analysis By: David Mitchell Smith; Ian Finley

Definition: Mobile Web applications are applications that run on a standard Web server in conjunction with a mobile Web browser. They typically use HTML and Ajax (and, increasingly, HTML5 components). Rich, mobile Web applications have usability roughly equivalent to rich Internet applications (RIAs), and native mobile applications when designed specifically for mobile form factors.

Position and Adoption Speed Justification: Enterprise interest in mobile Web applications has decreased due to their limitations, including:

- They require a good network connection.

- They can't access all the capabilities of popular mobile devices.

- They sometimes have UI performance issues.

As the standards for HTML, JavaScript and CSS evolve to better support mobile devices, and mobile browsers become more powerful, the functional gap between mobile Web, Web hybrid and native apps will close and mobile Web applications will climb out of the Trough of Disillusionment.

User Advice: Invest in mobile Web technology and skills. Investments in mobile Web technology and skills can be leveraged to build mobile websites, Web apps and Web hybrid apps.

Consider mobile Web applications when reach and cost are key requirements. There are many issues to consider when choosing between a Web, hybrid or native app, but mobile Web applications can satisfy the requirements of many, if not most, mobile applications and they generally require less investment to build and maintain. Consider other approaches only when a mobile Web application won't meet your business requirements.

Business Impact: Mobile Web applications can dramatically improve engagement with and productivity of customers, partners and employees. Mobile presence has become a critical

requirement for reaching consumers and, increasingly, business users. Online strategies must increasingly take into account user expectations for a rich, native mobile application experience, as well as the need to reach more platforms. A mobile Web application is a good way to achieve both.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: BlackBerry; Google; Microsoft; Netbiscuits; Sencha; Usablenet

Recommended Reading: "Magic Quadrant for Mobile Application Development Platforms"

"HTML5 and the Journey to the Modern Web"

Web 3.0

Analysis By: Gene Phifer

Definition: The term "Web 3.0" is applied by some as the next era of the Web, and is usually associated with existing items like Semantic Web technologies. The current wave of Web technologies doesn't represent the revolutionary changes required for a new era of the Web. There is likely a Web 3.0 in the future, but the technologies being cast as such today are not it.

Position and Adoption Speed Justification: Web 2.0 was a significant shift from prior eras, and thus warranted a numbering system. However, the next era of the Web will be more of an evolution than a revolution. Applying the term Web 3.0 to a singular technology is incorrect. Therefore, Web 3.0 as it is currently cast will be obsolete soon.

Although Web 2.0 innovation experienced a relative spike, the Web will evolve steadily during the next five to seven years, making radical shifts more difficult to pinpoint, and minimizing the possibility of another step-function change, such as Web 2.0.

The next generation of the Web will focus on the expansion of the social Web, the Semantic Web, the programmable Web, the mobile Web, the global Web and the real-time Web. It will also encompass "the Web of things," where there are direct connections between the online world and the physical world. These changes are long-term, multifaceted, multidimensional and infrastructural, and, therefore, will occur in a much longer time frame than the rapid explosion of innovation that occurred with Web 2.0; see "The (Not So) Future Web."

Additionally, the increasing fragmentation of devices used to interact with the Web will make Web 3.0 unlikely. With the addition of contextual awareness, it is likely that many people will move from sharing the same Web to favoring their personalized views on specialized devices.

Jockeying for the Web 3.0 position will only increase confusion and hype, decreasing the odds of any one prediction emerging as the successor to Web 2.0. The most current attempts to apply the Web 3.0 label are with mobile computing, adding to an already-confusing panoply of vendors.

Despite being inappropriate and ineffectual, the Web 3.0 term may persist because of the popularity of the Web 2.0 term, because Web 2.0 technologies and approaches are seeing broad adoption in enterprises, and because vendors are always looking to sell the next big thing.

User Advice: IT leaders should not adopt, promote or search for meaning in the term Web 3.0. The term will remain confusing and ineffectual. IT leaders must recognize the shortcomings of the term Web 3.0 and concentrate on extracting business value from existing and emerging Web technologies, practices, products and services. Look for Web 2.0 to develop along an evolutionary path — Web 2.1 and Web 2.2 would be more appropriate to use than Web 3.0.

Business Impact: Danger surrounding the hype of a catchy term, such as Web 3.0, arises from its tendency to consume mind share. Business and IT leaders risk being distracted by Web 3.0 mania before realizing the potential benefits of current and emerging Web technologies.

Benefit Rating: Low

Market Penetration: Less than 1% of target audience

Maturity: Mature mainstream

Recommended Reading: "The (Not So) Future Web"

Cloud/Web Platforms

Analysis By: David Mitchell Smith

Definition: Cloud/Web platforms use Web technologies to provide programmatic access to functionality on the Web, including capabilities enabled not only by technology, but also by community and business aspects. This includes storage and computing power. We use the terms "Web platform" and "cloud platform" interchangeably, as well as the merged term "Web/cloud platforms." They have ecosystems similar to traditional platforms, but the concept originally emerged as a result of market and technology changes collectively known as "Web 2.0."

Position and Adoption Speed Justification: The use of cloud/Web platforms is happening first in consumer markets. As further adoption of all the cloud service layers increases, use and maturity will evolve. Enterprise use of Web-based capabilities, such as Amazon Simple Storage Service (Amazon S3) and Amazon Elastic Compute Cloud (Amazon EC2), has begun as well. Public APIs are also gaining traction and are part of the overall phenomenon.

The cloud/Web platform is not the same as platform as a service (PaaS). According to the National Institute of Standards and Technology (NIST), PaaS refers to the middleware layer in cloud architectures. The cloud/Web platform is broader and employs a more accurate use of the term "platform" as a relative term (see "NIST and Gartner Cloud Approaches Are More Similar Than Different"), and is applicable at all layers of cloud architecture. Our use of the term "cloud/Web platform" predates the PaaS term and current cloud terminology, but is consistent with it.

Cloud/Web platforms will serve as broad, general-purpose platforms; however, more specifically, they will support business flexibility and speed requirements by exploiting new and enhanced forms

of application development and delivery. Web platforms reuse many of the capabilities and technologies that have been accessible on websites for more than a decade through browsers by adding programmatic access to the underlying global-class capabilities. Reuse is occurring via services, and is being delivered via Web-oriented architecture (WOA) interfaces, such as representational state transfer (REST), plain old XML (POX) and RSS. In addition to the capabilities of Web 2.0, these platforms provide programmatic access to cloud computing capabilities. The public API phenomenon has taken WOA beyond consumer markets (e.g., Twitter) into enterprise scenarios.

User Advice: Web platforms and related phenomena have affected consumer markets, and enterprises should evaluate this growing space as an appropriate extension to internal computing capabilities. The use of Web platforms drives and is driven by the use of WOA, which enterprises should adopt where appropriate, along with simple interfaces, such as REST, POX and RSS (wherever possible), to exploit the interoperability, reach and real-time agility of the Internet.

Business Impact: Web platforms can be leveraged as part of business solutions, and will form much of the basis for the next generation of interest in the virtual enterprise. Web platforms can decrease barriers to entry, and can deliver substantial value for small or midsize businesses that cannot afford to build and maintain capabilities and infrastructures (examples include Amazon Web Services [including S3 and EC2], salesforce.com's Force.com, Google's App Engine and Microsoft's Azure Services Platform). Note that the term "cloud/Web platform" is broader than, and includes multiple layers in, cloud computing terminology (e.g., infrastructure as a service [IaaS], PaaS and software as a service [SaaS]), and the use of the term "platform" is different from the term "PaaS."

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Early mainstream

Sample Vendors: Amazon; Google; Microsoft; salesforce.com

Recommended Reading: "Web Platforms Are Coming to an Enterprise Near You"

"NIST and Gartner Cloud Approaches Are More Similar Than Different"

Content Integration

Analysis By: Gavin Tay

Definition: Content integration refers to the consolidation of enterprise content, that is typically dispersed throughout enterprises in a myriad of repositories, into a single view. Integration tools may sit above these repositories as data integration middleware, or above workflow and business process management systems, to provide a unified interface with federated content.

Position and Adoption Speed Justification: Content integration and content migration were previously referred to as a single correlated entity. While content integration has become obsolete before reaching the Plateau of Productivity, content migration has progressed toward the Slope of Enlightenment. As vendors in these respective categories are very different, each category has been dealt with separately.

The vast majority of enterprises have multiple content repositories. Customized interfaces dominate, along with commercial connectors and adaptors to link them. Many enterprise content management (ECM) suites use connectors, examples include IBM's Content Integrator which federates within the IBM portfolio, EntropySoft, which had OEM agreements with IBM and EMC (Documentum), but was acquired by salesforce.com.

However, the long-term prospects for custom connectors are limited, partly due to the difficulty of maintaining them and partly due to the emergence of Web services and representational state transfer APIs. Other integration options, such as the Java Specification Request (JSR) 170/283 standard did not take off.

There is a potential impact from content management interoperability services (CMIS), the most important industry-sponsored standard, which has gained the support of IBM and Alfresco, but has yet to emerge with most of the other major ECM vendors. Many enterprises are also considering using user experience platforms (UXPs), portals and federated or contextual search, as options for the virtual consolidation of frequently-used content at different levels of abstraction.

User Advice: Enterprises have looked beyond JSR 170/283 and Web Distributed Authoring and Versioning (WebDAV) which is very old to integration architectures from vendors such as IBM, Oracle (Context Media) and Adobe, and to third-party offerings such as those of T-System's Vamosa. Most system integration partners also have toolkits to connect the products they support with multiple repositories and business applications such as ECMG, who has built connectors.

Enterprises should pick content management vendors that have standardized and easily accessible repositories. Longer term, the focus should be on CMIS version 1.1, which was approved as a standard in November 2012 by the Organization for the Advancement of Structured Information Standards (OASIS). As with all standards in their infancy, it will take a while before all vendors become compliant. The preliminary aim with CMIS is to provide information sharing across CMIS-enabled repositories, but the value may ultimately increase by allowing those repositories to coexist, even as they feed search engines, portals and UXP applications with more information at lower cost and with less complexity. One immediate benefit may be a single view into content repositories via a CMIS-enabled "content client" that is richer than what has typically been delivered by ECM vendors. Mobile-enabled CMIS applications or browsers have not gained as much traction even as organizations look to bring their content and connectivity out into the field.

Business Impact: Content integration technology was slated to have improved interoperability between a company's content, its content-centric processes and related data. Despite this promise, the ECM market underwent consolidation itself and so these tools became increasingly unnecessary. Many of the content integration solutions were subsequently acquired by these large ECM vendors, to fulfill interoperability among their own solution offerings and those of the newly acquired solutions, but are not being resold for use on their own.

Connecting content to structured data and to end users in a more engaging manner has taken over, but has many implications for commercial applications, with content analytics becoming an alternative to hardwired integration approaches. As a result, this will support both governance and cost-reduction initiatives by optimizing information assets for availability.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Mature mainstream

Sample Vendors: Adobe; Alfresco; Autonomy; EMC; IBM; OpenText; Oracle

Recommended Reading: "New Information Use Cases Combine Analytics, Content Management and a Modern Approach to Information Infrastructure"

"The Emerging User Experience Platform"

Social Software Suites

Analysis By: Nikos Drakos

Definition: Social software suites encompass a broad set of capabilities such as user profiles, groups, content sharing, discussions, wikis, blogs, microblogs, activity streams, social tags, social bookmarks, content rating and social analytics. Social software suites facilitate, capture and organize free and open interactions among individual users.

Position and Adoption Speed Justification: As the popularity of related consumer social software the awareness of socializing technology is high within businesses, there is pent-up demand from workers using consumer products for work activities and a willingness from business managers to use these tools to help them boost the performance of their workers. However, we also see apprehension from those responsible for security, compliance, enterprise architecture and risk management in general.

On the supply side, options available for business use are maturing rapidly as new vendors establish themselves in the market and as every enterprise vendor delivers a social software suite. The movement from point tools such as blogs and wikis, to integrated suites has brought some relief, as well as high expectations. We still see many organizations paying too little attention to the work that needs to be done — beyond technology deployment — to achieve the expected business results.

Some products focus more on internal users, with an emphasis on integration with existing infrastructure, business applications and other enterprise requirements (such as auditability and compliance). Others place more emphasis on extranets, with support for secure information transfer between organizations, or target closed or open external customers or user communities, with good support for large-scale deployments, consumer engagement and management of untrusted content (such as moderation and spam filtering). Certain vendors provide a technology platform, while

others provide a full-service approach, including strategy, implementation, administration and content moderation services.

User Advice: Early implementations should focus on the usability of the technology and on "low-hanging fruit" in terms of business value and relevance. In later stages, the focus should shift to dealing with volume (for example, in terms of information handling or participant interactions), on spreading awareness of what has worked and what has not, and on linking the social interactions and social context captured in social software suites with relevant business activities.

IT managers should resist user demands to simply install social software tools without thinking through how they'll be used. Given the broad range of use cases and activities that can be supported by social software suites, they should be prioritized with respect to business value when it comes to deployment.

Many early deployments have failed, been ignored or slowly withered, because they lacked a clearly defined and appropriate purpose. Deployments should incorporate several elements, including ease of use, identification of the right context, exposure of connections, appeals to self-interest and visible management support. Before investing in social software suites, IT and business managers should understand where this will fit in the context of existing workplace applications and practices: for example, in project completion, decision making, knowledge capture and diffusion, accelerating innovation, strategic alignment, customer support, or employee engagement.

Business Impact: Social software adds persistence to otherwise transient informal interactions among participants. Valuable information is created, shared and refined through self-selection, social incentives and decentralized control, rather than by top-down resource allocation and mandates. We expect social software to be relevant in connecting individuals to communities of interest and practice, as well as stimulating multidisciplinary collaboration that involves communication, exploration, innovation, creativity, discovery, knowledge capture and training.

The benefits are likely to come from behavioral changes (for example, information sharing, discovery and capturing informal ideas). This means that success depends on an outcome-oriented change management program. Evidence of successful social software deployments is growing, but not yet widespread. The risk of organizational culture clashes, privacy issues and questions about worker productivity and content quality, highlight the need for caution.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Acquia; Atlassian; Atos (blueKiwi); Cisco; Google; IBM; Igloo Software; Jive; Microsoft; Moxie Software; NewsGator; Novell; OpenText; salesforce.com; SAP; Socialtext; Telligent; Tibco Software; VMware

Recommended Reading: "Magic Quadrant for Social Software in the Workplace"

"Maturity Model for Enterprise Collaboration and Social Software"

Web Experience Analytics

Analysis By: Edmond Jeannot; Robert Hetu

Definition: Web experience analytics are analytics tools that measure various aspects of retailer commerce sites, including websites and mobile sites, to help ascertain customer sentiment. They include analytics tools, such as page load times and shopping cart abandonment rates, as well as more complex tools, such as multivariate A/B testing, interaction sequence and navigation tracking, and sentiment indexes.

Position and Adoption Speed Justification: Web experience analytics tools vary in maturity. The more direct measures, such as page load times, are now relatively mature, while other measures, such as sentiment indexes, multivariate testing, information clarity measures and customer satisfaction, are starting to emerge. It is important that it is not only how customers engage that is captured, but why they behaved as they did. Critical improvements can be made if this is understood, with the Web experience molded to what the customers wish to experience. Sophisticated options, such as neuromarketing, measure consumer brain activity while consumers are engaged in shopping activities.

User Advice: Web experience analytics help multichannel retailers improve the customer experience on their websites. Using these analytics, retailers can adjust elements of their commerce sites, such as rich-media applications, navigation and flow paths, and shopping aids to suit changing consumer tastes and preferences for e-commerce sites. Multichannel feedback technology should look to provide retailers with an assessment of their customers' cross-channel shopping experiences.

Deploying straightforward measurement tools, such as page load times and shopping cart abandonment measures, is the first step, since they provide the key basic performance measures in how customers are engaging. The second step is to determine why customers are engaging as they are, with the view to significantly improve the overall customer experience. Consumers rapidly tire of generic offers and inflexible processes. Competitor offerings are continuously evolving, and the speed of improvement is high. Multichannel retailers run a significant risk of losing transaction conversion and customers if they do not respond appropriately Measures such as multivariate testing can be valuable tools for retailers in migrating toward a more personalized presentation of their website. The emergence of sentiment analysis and social media monitoring tools can give retailers insight into where changes are needed to ensure customer retention. Retailers should still confirm findings over time, rather than make sudden changes that may run a greater risk of alienating customers.

Business Impact: When used appropriately, these tools can lead to improvements in the customer experience and increased customer engagement in the e-commerce and mobile commerce (m-commerce) channels. In addition, these tools can help retailers identify the right combination of media elements and applications that persuade consumers to purchase more. Finally, these tools help to maintain a high degree of customer satisfaction, and play a critical role in customer retention and loyalty.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Google; IBM Coremetrics; IBM Tealeaf; Oracle; SAP; SAS; Teradata

Recommended Reading: "An Overview of the Strategic Technology Map for Tier 1 Multichannel Retailers"

"Information Innovation Powers Customer-Centric Merchandising"

"Integrating Analytics With Customer-Centric Merchandising"

Climbing the Slope

Content Migration

Analysis By: Gavin Tay

Definition: Content migration refers to the process of consolidating and transferring content, its related metadata, user permissions, compound structure and linked components that are stored permanently in one or more enterprise content management (ECM) repositories, to a new environment. During the migration process, enterprises typically choose to cleanse content management repositories by archiving old and outdated content.

Position and Adoption Speed Justification: Gartner previously dealt with content integration and content migration as a single correlated entity, but the two have evolved in different ways and there are big differences in their vendors; therefore, this profile deals specifically with content migration.

Many organizations continue to have a myriad of content repositories that employ hybrid content architectures featuring a linked repository of records. However, the ECM market has consolidated, forcing organizations to consolidate or move away from old environments that are no longer supported. As a result, investments in migration technologies to move content to a subsequent ECM system or to the cloud have risen sharply.

Content migration to ECM alternatives uses connectors for the one-time, one-way transfer of large volumes of content currently stored on file servers or in obsolete repositories, most often as part of upgrades to Microsoft SharePoint. Migration tools are occasional and typically one-way bulk loaders, although they are increasingly becoming more granular in approach.

User Advice: Enterprises should pick content management vendors that have standardized and easily accessible repositories. At present, migration tools that support the movement of large volumes of content from expensive or poorly managed network drives or end-of-life repositories to newer technologies, such as those in the cloud, are the biggest story in the market and can add immediate value.

Evaluate the opportunity to employ in-house IT expertise with the acquisition of such migration tools or to hire a system integrator that would use its own migration frameworks. Using in-house staff

may absorb the cost involved, but using external expertise should ease the rigorous efforts required. It is essential to realize that investment in a migration tool will be short-lived once the migration has been completed, and that such expenditure would be better allocated to the improvement of evolving content governance or an organizational taxonomy driven by business outcomes.

Business Impact: Content migration technology can accelerate a migration process overall, facilitate content availability, and provide a single view of a single source of truth for customer, employee or organizational informational assets. This can be done by enabling volumes of stored content to move from legacy silos to more strategic — and more often consolidated — repositories. Of considerable interest now is the pushing of information — and users — toward cloud platforms such as Microsoft Office 365/SharePoint Online, Google Apps and IBM SmartCloud, even as hybrid content architectures try to manage the security risks associated with the integration of public cloud or hosted repositories (as they have done with hosted email).

Content migration tools have improved significantly during the past year to cater for on-premises-to-cloud migrations. However, the nonexistence of standards and uncertainty of service availability make cloud-to-cloud migrations complex, though few organizations are embarking on such an effort today. Highly regulated industries such as financial services, health sciences that typically account for all their content will benefit from a stringent, auditable, yet automated migration process using content migration tools. Organizations that have conducted an inventory of all their content repositories and found that less than half their content is outdated or casual should not waste their IT budget on such purchases.

Benefit Rating: Moderate

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

Sample Vendors: AvePoint; Axceler; Casahl Technology; Dell; Metalogix; MetaVis Technologies; T-Systems (Vamosa); Tzunami

Recommended Reading: "Strategic Best Practices for SharePoint 2013 Migration"

"Use Five Practical Steps to Revitalize a Business-Driven Taxonomy"

"Content in the Cloud"

Web-Oriented Architecture

Analysis By: Daniel Sholler

Definition: Web-oriented architecture (WOA) is a substyle of service-oriented architecture (SOA) that leverages Web architecture. It emphasizes the generality of interfaces (UIs and APIs) via five fundamental generic interface constraints: resource identification (e.g., uniform resource identifier [URI]), manipulation of resources through representations (e.g., HTTP), self-descriptive messages

(e.g., Multipurpose Internet Messaging Extensions [MIME] types), hypermedia as the engine of application state (e.g., links) and application neutrality.

Position and Adoption Speed Justification: WOA has dominated Web user-to-application (U2A) implementations for years. It is frequently used for Internet B2B and has experienced some intraenterprise application-to-application (A2A) implementation successes. Many enterprises are engaged in implementing or seriously considering WOA in addition or as an alternative to WS-*. The WOA style was initially used by many services delivered by major Web service providers (for example, Amazon and Google), but today, we see enterprises of all sorts building WOA-style APIs to enable access from business partners and customers and to enable mobile use of their Web-facing resources. Thus, WOA is moving through the Hype Cycle as architects and developers explore and employ it for enterprise applications. It often is referred to as representational state transfer (REST), or RESTful, as these constraints are the fundamental constraints of the REST architectural style.

Approaches for Web-oriented architecture can be seen in nearly all cloud services and as capabilities associated with many on-premises application packages. Mobile interactions are driving a large increase in the use of these package capabilities, and custom-made software is being enabled to interact using WOA approaches as well. We expect that this approach will reach the plateau in a relatively short time frame. The manifestations of this architectural change in many instances are RESTful Web APIs. Growth in these APIs has also driven demand for API management technology.

User Advice: Application architects should use WOA principles to design APIs and use these principles combined with Web technology for any APIs that are intended to be consumed outside traditional enterprise software.

Business Impact: Significant increases in the shareability and extensibility of SOA due to WOA's emphasis on application neutrality and hypermedia-oriented interface design should result in faster application integration, an overall decrease in the cost and effort to modify applications and systems, and an increase in the planned and serendipitous reuse of services.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Recommended Reading: "SOA Overview and Guide to SOA Research"

"Tutorial: Web-Oriented Architecture: Putting the Web Back in Web Services"

"Reference Architecture for Web-Oriented Architecture"

"Understanding and Applying the Design Differences Between WS-* Based Architecture and Web-Oriented Architecture"

"WS-I or RESTful Web Services: When, Where and Why"

"Best Practices for RESTful APIs"

"Developing the Enterprise Solution Architecture: Architecting Solution Patterns"

Web Customer Service Suites

Analysis By: Michael Maoz

Definition: Web customer service (WCS) suites provide customer-facing, service-enabling technologies via multiple Web and mobile phone channels (excluding voice). They support assisted channels, such as email response management systems (ERMSs), Web chat and collaborative browsing, as well as unassisted channels, such as knowledge management for self-service, virtual assistants, multimodal communications, video service and social channel interactions.

Position and Adoption Speed Justification: Seldom does the introduction of a WCS channel face customer adoption issues. Often, the adoption problems lie within the organization, which is not ready to expose its data and systems to an external audience for self-service or does not have the staff ready to deal with customer issues that might be posted on a social network or other channel. Therefore, internal adoption efforts should focus on organizational readiness, data preparation, expanding staff competencies and developing WCS business processes. Functionality is expanding as WCS vendors' maturity increases, with some WCS vendors starting to cross over into the telephony and contact center space to capture more channels. The technology is mature, and the ROI in the business case is focusing on moving services to a less-expensive channel.

User Advice: Spend time building your knowledgebase for use across multiple WCS channels (such as self-service, Web chat, virtual assistants and ERMSs). Spending on best-of-breed, single-Web-channel customer service solutions (excluding voice) is in the minority (18%), with most vendors' and buyers' spending moving toward multichannel, suite-based approaches (82%). When looking at a single-channel business requirement, focus on the ultimate multichannel, multifunction solution, and procure a multichannel product suite that enables a phased channel implementation approach. When looking at a multichannel solution, focus on a solution that can be integrated with your established technology choices. Set realistic expectations, and dedicate staff to only a few channels at a time, before starting the rollout of the next channel. Link this to customer-centric Web strategies.

Business Impact: Cost reduction and increasing the number of customer access points are the primary business drivers for WCS deployments. WCS assumes that the customer is interested in Web self-service. Once self-service is engaged, the customer could escalate the problem to an assisted contact center channel. The benefits associated with the deployment of WCS channels are call avoidance, reduced average handle time, increased channel availability and customers helping each other in hosted communities, all of which reduce the cost of service. When procuring a WCS vendor's solution, get access to all the functionality of the suite. If you are only implementing, for example, an ERMS as a first stage, then the additional channels can be implemented from the same vendor at a later stage, alleviating the necessity for costly and difficult integration with point-based solutions. WCS suite technology will affect lead management (marketing), sales automation,

customer service and self-service. It will also expose new channels to a new market, enabling the engagement of different clients.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Avaya; eGain; Genesys; Interactive Intelligence; Kana; Moxie Software; Oracle RightNow CX Cloud Service

Recommended Reading: "Best Practices for Customer Self-Service Framework"

"Magic Quadrant for CRM Web Customer Service Applications"

"CRM Web Customer Service Application Framework, 2012"

Composite Applications

Analysis By: Ross Altman

Definition: A composite application orchestrates independently developed programs, data and devices to deliver a new set of application capabilities that none of the established applications could deliver on its own. Each resource accessed by a composite application uses a different data model. In most cases, the composite application supports user interactions beyond those provided by the leveraged applications. In other cases, a composite application may act as a service. Some composite applications are built by leveraging other composite applications.

Position and Adoption Speed Justification: As the requirements for new applications proliferate, the appeal of leveraging and extending existing applications, rather than implementing new ones, is attractive as a means to reduce the time to deployment for integrated solutions and services. Organizations in various industries have been developing composite applications for decades, mostly in conjunction with the implementation of service-oriented architecture (SOA; see "Understanding and Measuring the Business Value of SOA"). More recently, composite applications have been built on top of APIs and API management solutions (e.g., Apigee and Mashery), increasingly in support of mobile apps.

Leveraging existing applications and data sources to build composite applications reduces development costs and frees development resources to work on pressing projects. Reusing applications and data sources to enable composite applications also helps improve data and process consistency (see "The Advantages, Economics and Value of Reuse" and "MDM, SOA and BPM: Alphabet Soup or a Toolkit to Address Critical Data Management Issues?").

A large percentage of transformational applications are composite applications, and that percentage will grow in the next four to five years. By 2015, 80% of operational applications that have a transformational impact on the business will be compositions (see "Going Forward, Most

Transformational Applications Will Be Composite Applications"). It should be noted, however, that many composite applications will be situational and opportunistic in nature.

While the skills required to build and support composite applications are different from those to build monolithic, stand-alone applications, the business benefit of integrating business functionality from multiple parts of the organization (or multiple organizations) cannot be matched by building another stand-alone, monolithic application (see "How Do Composite Applications Deliver Value to the Enterprise?").

Until recently, composite application development was too complex and technically challenging for all but the most proficient IT organizations. A decade's worth of IT investment in SOA, however, now enables developers to readily leverage functionality in enterprise systems and packaged applications. Web services make consumer-oriented functionality more readily accessible. The emergence of cloud-based applications and Web APIs, as well as the increasing use of SOA and API management to enable B2B integration, has facilitated the development of applications that bridge enterprise boundaries. Also, the proliferation of middleware like enterprise service buses and SOA gateways, as well as cloud-based API management services, has significantly reduced the cost and risk associated with the development and deployment of composite applications.

User Advice: Adopt composite applications to leverage established application assets, reduce development costs, accelerate application deployment and leverage readily available cloud services. View composite applications as the most effective way to realize the intrinsic value of high-level trading partner collaborations and to enable the development of mobile apps.

Prior to designing a composite application, project leaders should carefully evaluate how to suitably address design challenges, including middleware selection and semantic reconciliation, as well as management, security and governance (see "What Is Composite Application Governance?," "How Much Should You Invest in the Governance of Your Composite Applications?" and "Using SOA Gateways for Secure SOA Communications").

Also, while departmental developers outside of central IT can use readily available model-driven composition tools and high-productivity application platform as a service (aPaaS) cloud services to deliver composite applications, IT and business executives should not expect business users to do the same via mashups (see "End-User Mashups: Overpromised, and Barely Delivered").

Business Impact: The benefits of building composite applications (especially when they are built using SOA) will translate into higher-quality applications, and lower costs to develop and maintain them. More significantly, the ability to compose applications that include partner and cloud services and Web APIs will represent substantial opportunities for building systems with greater reach, more efficiency and more relevance to users.

Composite applications support business requirements by enabling organizations to improve the effectiveness of their sales, purchase and support operations by reaching customers, suppliers and employees through varied integrated channels (such as the Internet, call centers, digital TV, mobile devices, self-service terminals and kiosks). Composite applications make it possible to increase operational and decision-making efficiency by supporting one integrated view of critical business

entities — such as customers, suppliers, products, patients and taxpayers — whose data is typically scattered across databases and applications.

Composite applications can help improve efficiency and customer satisfaction by streamlining and integrating business processes. This capability represents the segue between the functionality of composite applications with the role of business process management and improvement efforts.

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: GT Software; IBM; InterSystems; Kapow Software; Magic Software Enterprises; Microgen; Microsoft; ObjectBuilders; Oracle; OutSystems; Progress Software; SAP; Software AG; Tibco Software

Recommended Reading: "Q&A: What Should IT Leaders Know About Composite Applications?"

"Going Forward, Most Transformational Applications Will Be Composite Applications"

"How Do Composite Applications Deliver Value to the Enterprise?"

"Understanding and Measuring the Business Value of SOA"

"What Is Composite Application Governance?"

"How Much Should You Invest in the Governance of Your Composite Applications?"

"End-User Mashups: Overpromised, and Barely Delivered"

"The Advantages, Economics and Value of Reuse"

"MDM, SOA and BPM: Alphabet Soup or a Toolkit to Address Critical Data Management Issues?"

Native Mobile Development

Analysis By: Ian Finley

Definition: Native mobile development primarily uses the mobile OS vendor's mobile application development platform (MADP). In order to increase the popularity of the devices using their OS, every mobile OS vendor provides a standard MADP that enables developers to build apps for their OS. Apps developed with these native MADPs, commonly called "native apps," have little or no portability to other mobile OSs, but have direct access to the unique features of that specific OS.

Position and Adoption Speed Justification: Native mobile app development moved quickly through the Hype Cycle and is now reaching maturity. Tens of thousands of developers have developed hundreds of thousands of native apps for today's dominant mobile OSs — Google Android and Apple iOS. Many enterprise application groups have built at least one native mobile

app, but few have built large numbers. The tools, processes and skills involved in native mobile development have remained relatively stable for several years, but we may see new generations of native mobile development emerge and pass through the Hype Cycle if the mobile OS landscape changes dramatically (e.g., if Microsoft is successful with Windows 8 or Windows Phone 8).

Despite enterprise IT investments in mobile Web and Web hybrid mobile development, native mobile development remains a very popular option for building mobile applications. Many of the most popular downloads on consumer app stores were developed as native apps. Given the low rates of mobile app success, many developers choose native mobile development to eliminate any chance that a Web or hybrid approach would limit their ability to build a compelling app. Most major MADP vendors have responded to market pressure and support native development in some fashion.

User Advice: When a rich mobile website will not meet business requirements, consider both Web mobile hybrid and native mobile development. Web hybrid mobile development is favored when cost-efficiency and broad device support are high priorities. Native mobile development is favored in the most demanding apps, where UI reactivity, graphics performance and processing speed are of paramount importance. Keep in mind that for more demanding apps, while Web hybrid mobile development might meet the requirements, it may have no cost or productivity advantage over native mobile development. While most native apps are developed using the MADP provided by the mobile OS vendor, consider using a MADP that supports mobile Web, Web hybrid and native mobile development to improve cost-efficiency and productivity. However, keep in mind that, just because an MADP supports different types of mobile development, it's unlikely to be the best choice for all your mobile websites and apps.

Business Impact: Mobile apps built using native mobile development can help enterprises improve customer engagement and employee and partner productivity and collaboration, sometimes quite dramatically.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Web Widgets

Analysis By: Jim Murphy

Definition: Web widgets are reusable, stand-alone Web applications that can be embedded into third-party sites by any user that has appropriate rights of authorship. They don't require site-specific compiling or giving control of the site to the party providing the widget. Widgets use REST-based APIs to communicate with Web-accessible resources.

Position and Adoption Speed Justification: Web widgets have been available on the consumer Web since 2002, and they were almost exclusively a consumer Web phenomenon until 2006. Since then, enterprises have garnered value in building Web widgets to extend marketing, sales and

service presence. Web widgets are used to provide simple, self-contained and platform-independent applications that support user experience trends like the shift toward apps (see "The App and Its Impact on Software Design") and citizen development. Web widgets are also proving useful in supporting hybrid (Web/native) mobile apps.

In an enterprise context, Web widget use is often provided through a portal framework, with widgets constituting a lighter-weight form of portlet for many enterprises. However, horizontal portal platforms are not prerequisites for Web widget use, and widgets are finding their way into other applications and platforms, including Web content management systems, collaboration platforms, social software, business intelligence dashboards and open-source Web frameworks. In some cases, vendors with comprehensive portal, content management, collaboration and social suites are leveraging widgets to provide interoperability among their applications and services.

Web widgets constitute a relatively simple way to create and distribute reusable user interface (UI) components. They also serve as a basis for mashups and other front-end application composites. Because Web widgets are self-contained, visual and easily manipulated, business and end users can employ them to compile and share their own mashups and dashboards.

Web widgets have thus far resisted most efforts at standardization. A few vendors have sought to promote their own approaches, but the lightweight, interoperable and user-centric nature of Web widgets urges an open approach. Open Social and World Wide Web Consortium (W3C) have emerged with promising efforts, spanning both the consumer and enterprise markets. Broader Web standards, such as HTML5 and Cascading Style Sheets 3 (CSS3), as well as nascent Web component efforts, will undoubtedly play a role in the evolution of Web widget standards.

Developer use of Web widgets is already widespread, but few organizations have devised a cohesive strategy for their management. Web widgets will provide a simple, yet vital means of enhancing interoperability, scaling development efforts and improving user experience amid the Nexus of Forces — mobile, social, the cloud and information — driving the Web's evolution.

User Advice: Employ widgets as part of an overall user experience platform strategy. In addition to providing a simple mechanism for developers to integrate Web-accessible resources, organizations can delegate widget building and distribution responsibilities to citizen developers and power users.

Organizations should be wary of widespread and uncontrolled widget use. They should define their own simple guidelines for how and when to use widgets versus other components. Assess and monitor widget use. Effective governance can ensure consistency and compliance, while providing the flexibility that brings business innovation and agility.

Business Impact: Widgets can help extend the appeal and usefulness of portals and websites without adding a huge burden for developers. In many cases, organizations can employ Web widgets to help delegate tasks like page composition and customization to business owners and even end users. Web widgets enable enterprises to expose data, functional features and branding to consumers on the public Web. Enterprises can also use Web widgets to expose elements of their Web presence and managed communities to public Web community environments, such as Facebook and Twitter.

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Google; IBM; Microsoft; Netvibes; Pageflakes; Yahoo

Consumer Web Mashup Tools

Analysis By: Jim Murphy

Definition: Consumer Web mashups are lightweight, composite applications built using consumer Web-based mashup infrastructures and consuming publicly available consumer Web resources. A Web mashup is a Web page or application that combines data, presentation or functionality from two or more external online sources.

Position and Adoption Speed Justification: Consumer Web mashups have lost considerable momentum just as they neared the Plateau of Productivity. Several factors are disrupting further progress. Social standbys like Facebook and Twitter, with their activity streams, are largely replacing My Yahoo, MSN and AOL-style single page, widget-based interfaces that often serve as the backdrop to consumer Web mashups. Indeed, Google announced that it will retire its iGoogle platform in November 2013 in favor of a more socially oriented and pervasive Google+.

Mashups gained their initial momentum on the consumer Web. They began as content and Web application aggregation and access points — or dashboards — largely providing personalized portals geared for end users. They typically use only a thin layer of JavaScript aggregation code on the client side while leveraging Web APIs, Web widgets, XML feeds, screen scrapings or other components.

Today, thousands of consumer Web mashable components (or mashables, often in the form of widgets and gadgets) exist, and users of consumer portals, such as My Yahoo, MSN, AOL, Amazon and Netvibes, leverage them to offer services to end users. ProgrammableWeb and Mashable provide an overview of the consumer Web mashups available. Some enterprises have found that they can provide quick production value for simple, low-risk projects and applications.

Consumer-oriented Web mashups live on as organizations adopt cloud-based infrastructure, platforms and applications, and look to invoke more consumer-oriented services and information sources to enhance their websites, portals and composite applications. Mobile, social and consumerization trends, in proliferating the potential destinations for content and services, are also increasing the desire on the part of organizations and their technology providers to create open, public and consumer-accessible APIs. However, despite steady growth in publicly accessible APIs, relatively few have been exposed in consumer Web mashups.

User Advice: While the consumer Web mashup hype may be dissipating, many organizations would do well to adopt some of the principles: providing publicly accessible information and services, and putting a measure of control into the hands of Web users and consumers. More

fundamental API-level services may offer a more comprehensive foundation for availability in the context of a more mobile and social Web.

Enterprises looking to leverage consumer Web mashups for enterprise needs should be wary about their limitations and risks. Few consumer Web mashup infrastructures provide security or governance functionality, and consumer Web mashups don't provide connectivity to on-premises applications and content repositories.

Business Impact: Consumer Web mashups may serve as demonstration tools to expose business leaders to mashup or composite application scenarios.

Benefit Rating: Low

Market Penetration: 20% to 50% of target audience

Maturity: Legacy

Sample Vendors: Google; Microsoft; Netvibes; Yahoo

Federated Portals Across Vendor Families

Analysis By: Jim Murphy

Definition: Portal federation allows portal components, applications and content, often in the form of portlets, to be produced in one portal environment, instance or server, and consumed in another portal framework or instance. Portal federation is a means of integrating portals, sharing resources across portal deployments and providing a unified experience for end users. Portal federation across vendor families describes this interoperability among products from various portal vendors.

Position and Adoption Speed Justification: The demand for federation among various portal products and vendors continues to grow, but the mechanisms and techniques to address the demand are in flux. Organizations with internal portal initiatives want federation across vendor families as a result of two overriding factors.

- First, they typically have portal products from more than one provider, and each of these products is uniquely established or strong in a certain role. For example, many organizations use one portal centered on business applications and processes (such as SAP NetWeaver or Oracle WebCenter), one portal for general-purpose knowledge and content management (such as Microsoft SharePoint or Oracle WebCenter Interaction), and one portal for customer or citizen engagement (such as OpenText Portal [formerly Vignette Portal] or Liferay Portal). In many cases, organizations use cross-vendor portal federation to support the transition from one portal platform to another.

- Second, organizations seek to provide a unified portal experience for employees, customers, partners and citizens across these portal products and vendors. Federation proposes to allow organizations to exploit the strengths of many portal platforms without compromising the desire for uniformity.

Cross-vendor portal federation also holds appeal for organizations seeking integration with the portals of external partners, customers and affiliated organizations.

Web Services for Remote Portlets (WSRP), often referred to as the go-to standard for portal federation, is most useful in scenarios that require maintaining the branding of portal services. However, the circumstances requiring a WSRP approach are relatively rare. In addition, established portal vendors offer varied support for WSRP. Large-vendor product expansion into adjacent areas (such as content management, collaboration and social computing) is, in some cases, hampering progress toward portal federation across vendor families. Vendors expanding beyond portals to more-comprehensive user experience platforms (UXPs) are, in some cases, less supportive of federation, with increasingly competitive solutions from rivals. That is, while many large vendors are supportive of schemes wherein their portals can be treated as consumers more often than they can be treated as producers of portal services. Lean portals from smaller vendors, on the other hand, because of narrower product scope and less account control, are typically more supportive of portal federation, whether they're to be treated as producers or consumers.

WSRP has lost momentum as the primary mechanism for portal federation across vendor families, but that hasn't prevented organizations from succeeding with other approaches. Inside organizations, where the branding of portlets is not likely a requirement, portal architects are employing more fundamental API-level approaches, including REST. These typically offer more flexible and less vendor-dependent means of ensuring interoperability than federation through WSRP. Organizations also increasingly employ content management interoperability services (CMIS), in conjunction with federated search, as a mechanism to support federation among portal products.

User Advice: Portal architects and developers seeking to federate portals across vendor families should consider WSRP as a means to syndicate and evoke portlets and portal components with branding intact. However, organizations should look more broadly to integration approaches, such as those based on REST or plain old XML (POX), and should consider other emerging standards, such as OpenID and CMIS, for more versatile integration requirements.

Use a selective, rather than indiscriminate, approach to portlet federation. That is, identify and prioritize federation of portlets only when they provide value beyond the effort required to rewrite or adapt them for cross-portal use.

Most enterprises should focus federation approaches at the foundational level, rather than solely through portlets and gadgets. Many organizations have effectively used enterprise service buses (ESBs), business process management (BPM) and more integration-focused approaches to achieve deeper portal integration than federation can accomplish.

Consider allowing multiple portal platforms to access the same content and apps using CMIS, rather than trying to use the same portlets across vendor families.

Business Impact: Federation across portals from different vendor families:

- Enables users to access the resources exposed by those portals without having to log in to multiple portal interfaces

- Provides complete interoperability across portals, without developing custom integration code and replicating user profiles across multiple portal directories

- Allows organizations to syndicate or distribute pluggable portal services to customers and partners

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: IBM; Liferay; Microsoft; OpenText; Oracle; SAP; Tibco Software

Entering the Plateau

Web Analytics

Analysis By: Lisa Kart

Definition: Web analytics is a market of specialized analytic applications used to understand and improve online channel user experience, visitor acquisition and actions, and to aid optimization efforts in digital marketing or intranets. Products offer reporting and segmentation capabilities, analytical and performance management, historical storage, and integration with other data sources and processes. The tools are used by marketing professionals, advertisers, content developers, customer service and support, and the website's operations team.

Position and Adoption Speed Justification: The maturity of this market reflects more complete adoption and better use of the products compared with last year. Over the next few years, there will be new opportunities at the high end of the market, but that market innovation is just emerging. More than 90% of the addressable market is using some form of Web analytics tools. Google reports more than 10 million registrations and at least 200,000 active users of its free Google Analytics product, and there are more than 20,000 customers of the leading fee-based products. While most organizations use one or more Web analytics service, less than 50% of the addressable market is using advanced functions, such as customer-based segmentation, data warehousing and exporting user activity events into search engine marketing, targeted email, banner advertising and content management engines.

Globally, Adobe, IBM and Webtrends lead in terms of market revenue. Teradata and SAS have niche businesses at the high end for multichannel, and some vendors with big data technology, such as Anametrix, are chasing opportunities. Other vendors with small market share among enterprises are gaining minor traction, such as KISSmetrics, Mixpanel, ClickTale, iJento and open-source offering Piwik. Deployment skills and processes are inhibitors to this market, with big gaps between leading and trailing-edge use cases. Delivery of Web analytics solutions continues to be predominantly (more than 90%) software as a service (SaaS) rather than in-house products. For example, Webtrends has discontinued selling its on-premises solution.

User Advice: Most enterprises with a website have a reporting package, but many receive less than the potential value from the tools. The degree to which the initiative should be improved is related to the strategic and potential value of an enterprise's website. Business users should be the primary users of the tools, with support from the IT organization in the areas of instrumentation, data integration, process management and complex report generation. A business executive champion is important to drive the analytic culture. Ensure there are sufficient skills, create a training program that teaches employees how to use the products in their role, promote success, and use consultants (external or from a vendor) to overcome technology hurdles in using the tools. If you are still using log files rather than JavaScript tags for instrumentation, or running on-premises, your choices are becoming increasingly limited. Begin to explore the value of tagging, mindful of user and data privacy issues. If not already doing so, start using the tools to analyze the impact of A/B or multivariate testing. Analyze users by segments, including those using mobile devices and social channels. Find opportunities to integrate cross-channel data, such as online data with the call center or point of sale. Be aware of potential challenges with incorporating big data sources, which may be more complex and require real-time integration across on-premises and SaaS platforms. For advanced enterprises, start building a user experience management ecosystem that blends analytics with search, context, social networking, content management, CRM master files and automated outbound marketing.

Business Impact: The business impact of Web analytics is in measuring and evaluating the effectiveness of the Web channel for customers or employees. Investing in Web analytics is becoming more indispensable as part of an overall digital customer strategy (because of the significant implications for marketing or service-delivery-oriented enterprises) and anywhere the Web channel is strategic. The core process is to collect, analyze and monitor customers' behavioral activities on websites and on social and mobile applications. A view into what is and isn't working helps optimize the digital channels. The impact of search engine advertising, email campaigns, cross-sell or upsell targeting, social media activity, and customer service effectiveness can be measured and refined through Web analytics. Customer data can be gathered and incorporated into personalized and context-rich content for marketing campaign decisions (such as profitability analysis and segmentation) and leveraged for every interaction channel in a campaign management strategy. Subscriber behavior can be analyzed to identify satisfaction issues and potential churn candidates. Intranet sites can be analyzed to determine the effectiveness of information sharing.

It is not uncommon for the business metrics of Web channels to double over baseline benchmarks within six months of starting a Web analytics program. It takes as long as three years to achieve advanced skills, at which point a continuous improvement process should be in place.

Benefit Rating: Moderate

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Sample Vendors: Adobe; Anametrix; comScore; Google; IBM; SAS; Teradata; Webtrends

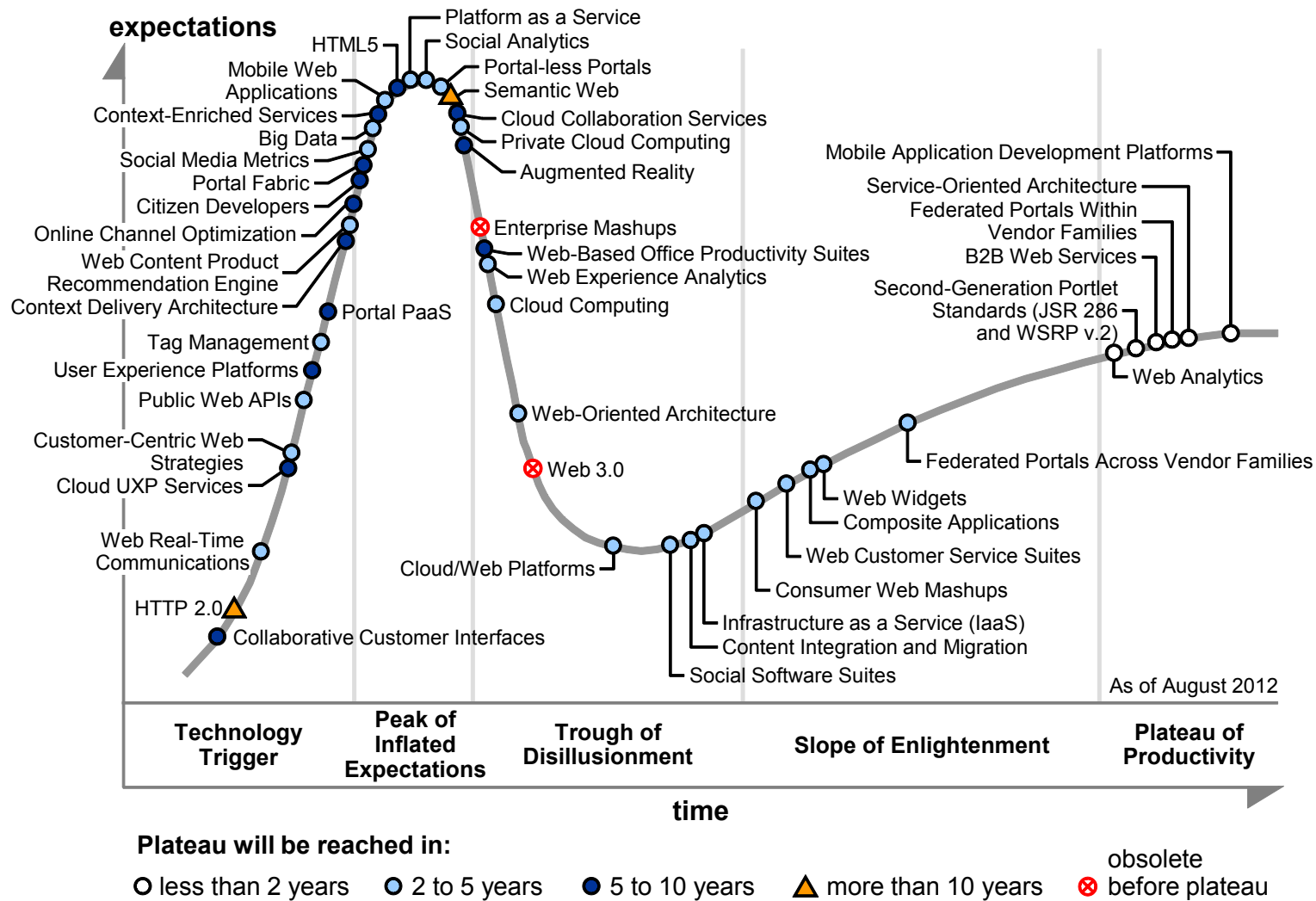**Recommended Reading:** "Tag Management Systems Bring High Value to Online Channel Stakeholders"

"Web Analytics Help You Deal With Mobile Visitors"

"How to Find a Web Analytics Provider"

"Incorporating the Web Into Cross-Channel Customer Analysis"

Appendixes

Figure 3. Hype Cycle for Web Computing, 2012

expectations

Platform as a Service
Social Analytics
HTML5
Portal-less Portals
Mobile Web
Applications
Semantic Web
Context-Enriched Services
Cloud Collaboration Services
Big Data
Private Cloud Computing
Social Media Metrics
Portal Fabric
Augmented Reality
Citizen Developers
Online Channel Optimization
Web Content Product
Recommendation Engine
Enterprise Mashups
Context Delivery Architecture
Web-Based Office Productivity Suites
Portal PaaS
Web Experience Analytics
Tag Management
Cloud Computing
User Experience Platforms
Public Web APIs

Mobile Application Development Platforms
Service-Oriented Architecture
Federated Portals Within
Vendor Families
B2B Web Services
Second-Generation Portlet
Standards (JSR 286
and WSRP v.2)
Web Analytics

Customer-Centric Web
Strategies
Cloud UXP Services

Web-Oriented Architecture

Web 3.0

Federated Portals Across Vendor Families

Web Widgets
Composite Applications
Web Customer Service Suites
Web Real-Time
Communications
Cloud/Web Platforms
Consumer Web Mashups
HTTP 2.0
Infrastructure as a Service (IaaS)
Collaborative Customer Interfaces
Content Integration and Migration
Social Software Suites

As of August 2012

| Technology Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity |

time

Plateau will be reached in:

○ less than 2 years   ◐ 2 to 5 years   ● 5 to 10 years   ▲ more than 10 years   ⊗ obsolete before plateau

Source: Gartner (August 2012)

Table 1. Hype Cycle Phases

Phase	Definition
Innovation Trigger	A breakthrough, public demonstration, product launch or other event generates significant press and industry interest.
Peak of Inflated Expectations	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the technology is pushed to its limits. The only enterprises making money are conference organizers and magazine publishers.
Trough of Disillusionment	Because the technology does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
Slope of Enlightenment	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the technology's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
Plateau of Productivity	The real-world benefits of the technology are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
Years to Mainstream Adoption	The time required for the technology to reach the Plateau of Productivity.

Source: Gartner (July 2013)

Table 2. Benefit Ratings

Benefit Rating	Definition
Transformational	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
High	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
Moderate	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
Low	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (July 2013)

Table 3. Maturity Levels

Maturity Level	Status	Products/Vendors
Embryonic	▪ In labs	▪ None
Emerging	▪ Commercialization by vendors Pilots and deployments by industry leaders	▪ First generation High price Much customization
Adolescent	▪ Maturing technology capabilities and process understanding Uptake beyond early adopters	▪ Second generation Less customization
Early mainstream	▪ Proven technology Vendors, technology and adoption rapidly evolving	▪ Third generation More out of box Methodologies
Mature mainstream	▪ Robust technology Not much evolution in vendors or technology	▪ Several dominant vendors
Legacy	▪ Not appropriate for new developments Cost of migration constrains replacement	▪ Maintenance revenue focus
Obsolete	▪ Rarely used	▪ Used/resale market only

Source: Gartner (July 2013)

Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Understanding Gartner's Hype Cycles"

More on This Topic

This is part of an in-depth collection of research. See the collection:

- Gartner's Hype Cycle Special Report for 2013

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