Top-10 Strategic Technologies

VI Annual Enterprise Integration Summit

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Gartner

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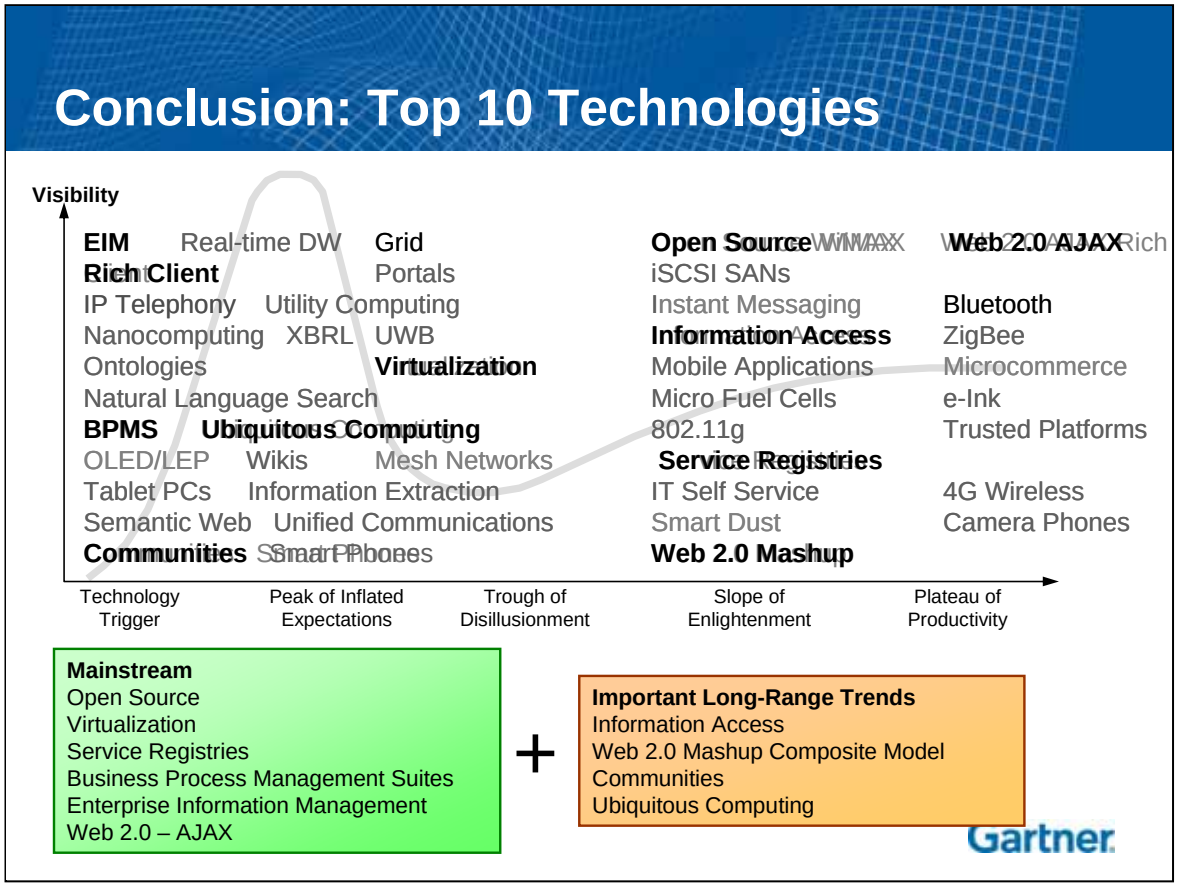

This presentation highlights important technologies that should be tracked and which represent major trends. In the next 18 months to 36 months, we will see the risks of early adoption more-clearly identified and reduced. Most of these technologies exist in some form already, but have become suitable for a wider range of uses.

In certain cases, we will split potential uses into categories, only some of which will become mature in this time frame. By focusing on those categories that will be appropriate for exploitation, high value can be extracted from the technology without waiting for the full and final maturation of all its aspects and applications. An example from software-as-a-service is the applicability of Web services internally, although cross-enterprise deployments may have to wait for the maturation of authentication and security standards.

This view of maturity is based on the Gartner concept of the Hype Cycle — that every technology and new idea is subject to distinct phases in its progress, from first elucidation to widespread market adoption. The cycle moves from the trigger or disclosure up to a Peak of Inflated Expectations, as the concept is widely discussed. Once actual use begins, the early adopters discover issues and incur failures — demonstrating that the appropriate use was poorly understood. The bad news drives an overreaction to the Trough of Disillusionment, until the real results can be sorted into best practices, pitfalls and so forth. The outcome is a climb to maturity where the new concept is well understood — in terms of what it can do and how best it should be implemented.

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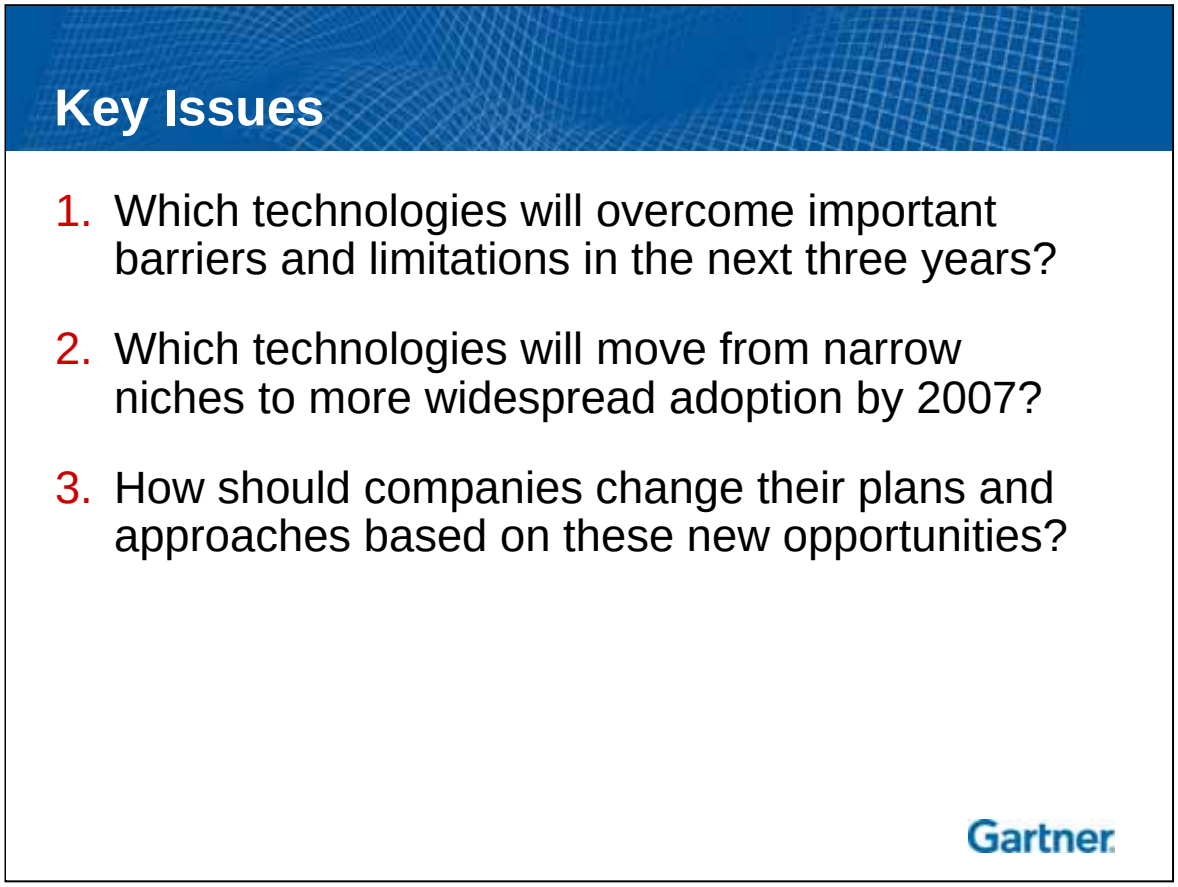

These technologies have been collected from our recent Hype Cycle special report, beginning with all the technologies that are expected to mature in the upcoming years.

This is not meant to be a comprehensive list of every technology that's ready for adoption in the near term. It certainly excludes many technologies of powerful value that have already become mature, and it has, by necessity, involved sorting through many worthy candidates that could not all be included within the limited space in this presentation.

Six of these technologies are relatively near term and mainstream, and likely to be relevant to most readers. The remaining four represent interesting strategic trends, important but perhaps not suitable for pilots or deployments in most clients in the three-year window.

For all the technologies in this list, however, companies should ask whether to include them on their action lists for research or adoption. These technologies have the potential to deliver competitive and internal value, and will be ready to use presently.

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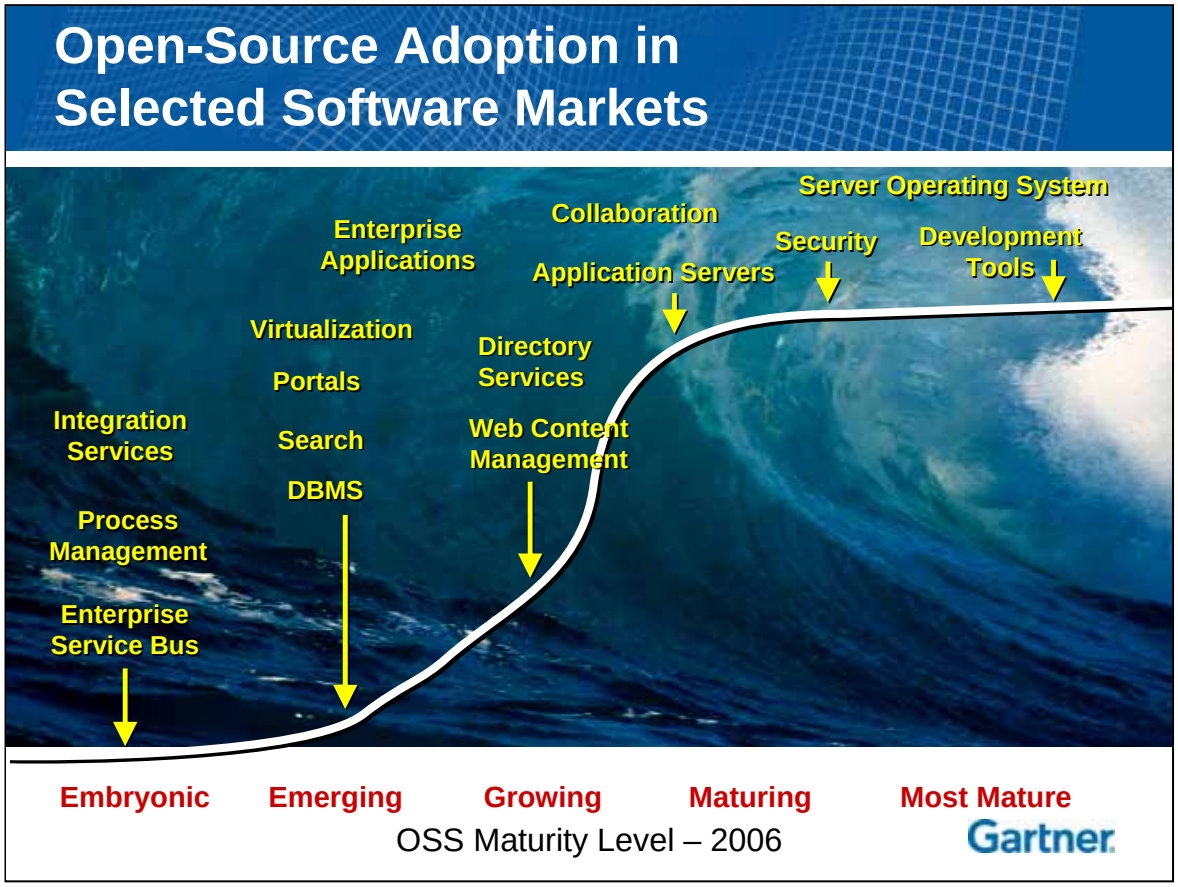
Strategic Planning Assumption: By 2010, 75 percent of open-source software will be deployed on newly created (instead of "rip and replace") IT systems (0.8 probability).



End-user adoption of open-source technology extends beyond Linux. Open-source alternatives to commercial software products are available across a wide range of markets. In general, open-source software (OSS) across infrastructure subsegments is more mature than OSS available across the enterprise application software subsegments. Consequently, OSS adoption across infrastructure segments is greater than with application segments. The relative maturity of Linux as a server operating system has already caused widespread impact on the server operating system market. Adoption of Eclipse has made a great impact on the application development tool subsegment. The application integration and middleware space has been affected by mature open-source alternatives, such as the JBoss application server and Apache Web server.

A different picture emerges when examining open-source alternatives across the enterprise application market. Here, open-source alternatives, as a group, are less mature than those available in infrastructure subsegments, thus inhibiting the adoption of open source in the application market. Taken as a group, the maturity of open source across the CRM, ERP, project portfolio management and supply chain management subsegments is embryonic. However, exceptions exist, where some open-source communities have produced more-mature alternatives than others. For example, content, communication and collaboration have yielded numerous open-source alternatives — with greater maturity levels — that are experiencing limited market adoption.

Although the maturity and adoption of open-source alternatives across market segments, such as CRM, are relatively limited, numerous open-source initiatives and commercial OSS vendors are targeting these markets. Current maturity levels do not yet reflect the potential impact of OSS on these subsegments; however, they do support the conclusion that OSS has affected enterprise application markets less than infrastructure markets. Just because a market segment (for example, enterprise applications) is at the embryonic stage doesn't mean that every single OSS project/alternative in a particular market is embryonic. The group of projects as a whole may be embryonic, but one or two may be more advanced (for example, SugarCRM and Compiere).

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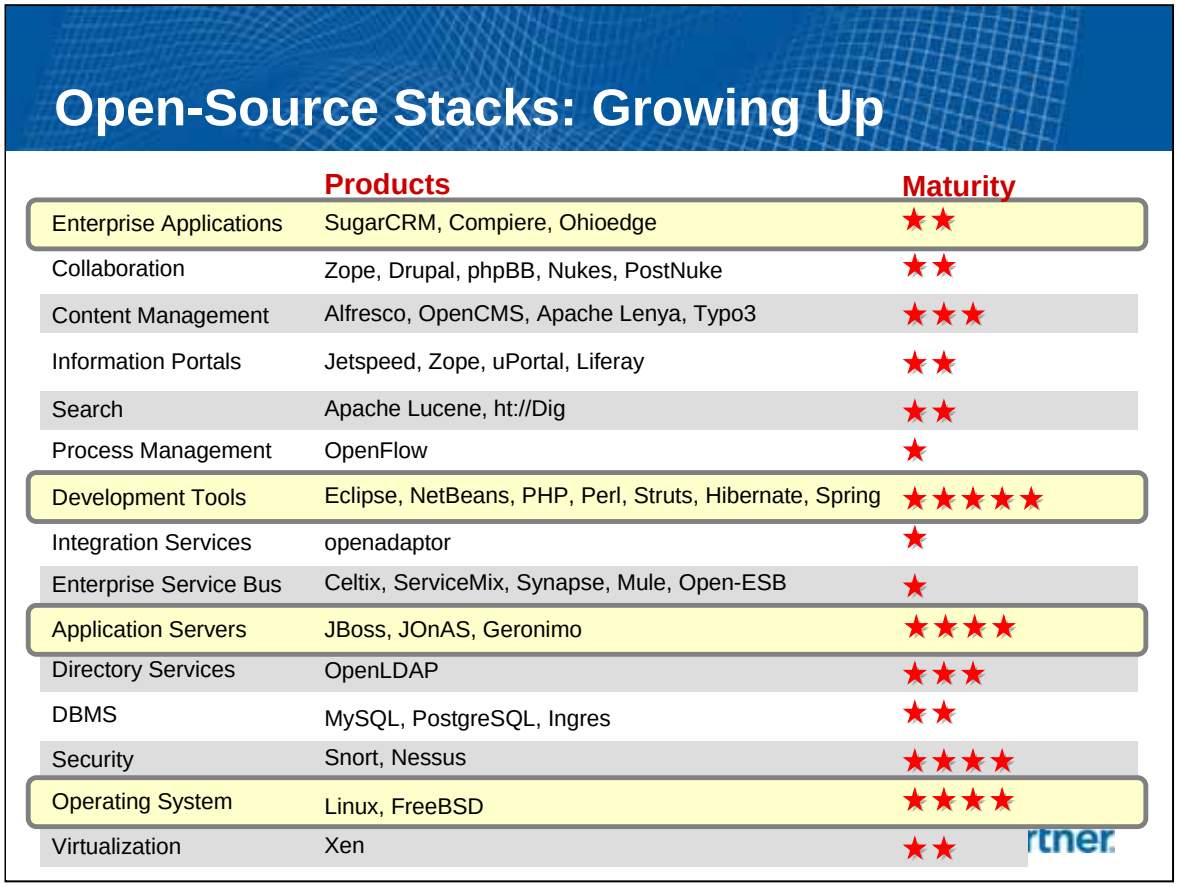
Strategic Planning Assumptions: By 2010, OSS solutions will directly compete with closed-source products in all software infrastructure and workplace application markets (0.8 probability).



To a large extent, the success or failure of a product depends on its "alignment" with successful (or otherwise) products and technologies that, together, are available as a coherent platform or solution. This is an important differentiator for mainstream products that are aligned with the solution strategies of successful platform vendors, such as IBM, Microsoft, Oracle or SAP.

The technology aggregation trend, which caused the rise of mainstream application platform suites and smart enterprise suite offerings, is also operating on open-source products. Many open-source applications mentioned in the chart above depend on and even include other open-source infrastructure servers and development tools as part of their distributions. As other open-source infrastructure pieces become mature and dependable, they serve as building blocks on which to base more user-focused technology and services (for example, relevant to the knowledge workplace). There's evidence that the cross-fertilization of different development efforts is accelerating overall development.

Today, OSS is maturing in many levels of the software "stack." Increasing numbers of IT organizations are finding open source to be a valid, cost-effective choice in many aspects of software infrastructure markets.

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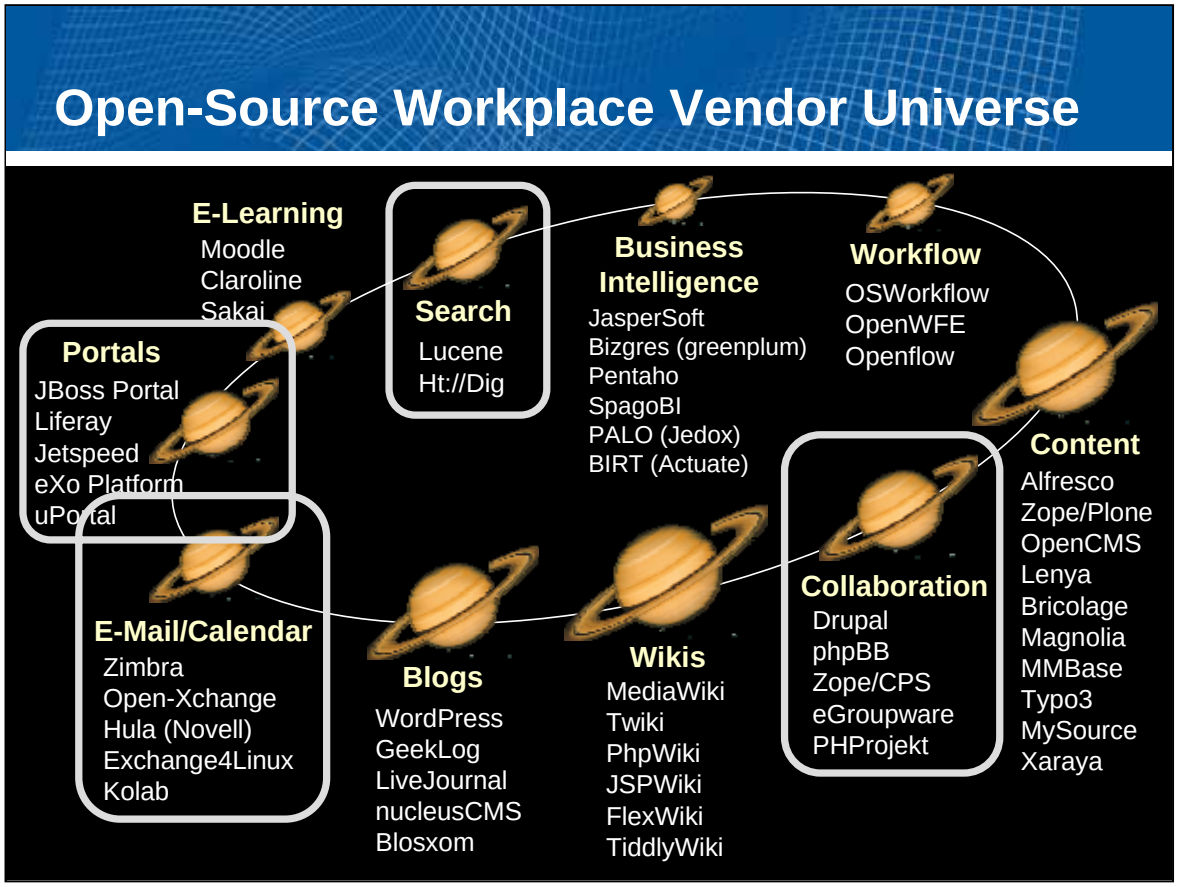
Strategic Planning Assumptions: By 2010, at least 40 percent of mainstream IT organizations will include OSS in their workplace-focused software investments (0.7 probability).



Open-source technologies for the workplace are beginning to be noticed by user organizations. This is due partly to an increase of venture capitalist (VC)-backed commercial organizations, such as Zimbra, Alfresco, JasperSoft and others. They are not only basing their products on open-source infrastructure but also are using core open-source components for messaging, workflow, search, repositories, development environments and others. Their marketing budgets are raising visibility and, more importantly, the availability of commercial backing and support is slowly removing a big obstacle to adoption.

Today, early adopter organizations are experimenting with workplace open-source technology. The main factors driving this technology are better alignment with technologies used in many organizations — such as part of a general open-source development and runtime "stack'" for Web applications; support from software vendors, such as IBM or Novell, that are including open-source products in their overall solutions; and some software vendors' release of products with open-source licenses. From the user perspective, the main attraction is flexibility and low acquisition costs. This makes open-source products for the KW appropriate only for organizations with the technical skills resources to adapt the products to fit their requirements and to counter the risk emerging from the absence of a trusted entity behind the product. General acceptance is predicated on the technical and business environment maturity to reduce the risk to a level acceptable to mainstream organizations. As more open-source applications become mature and dependable, they serve as building blocks on which to base more-user-focused technology and services (typically relevant to the workplace).

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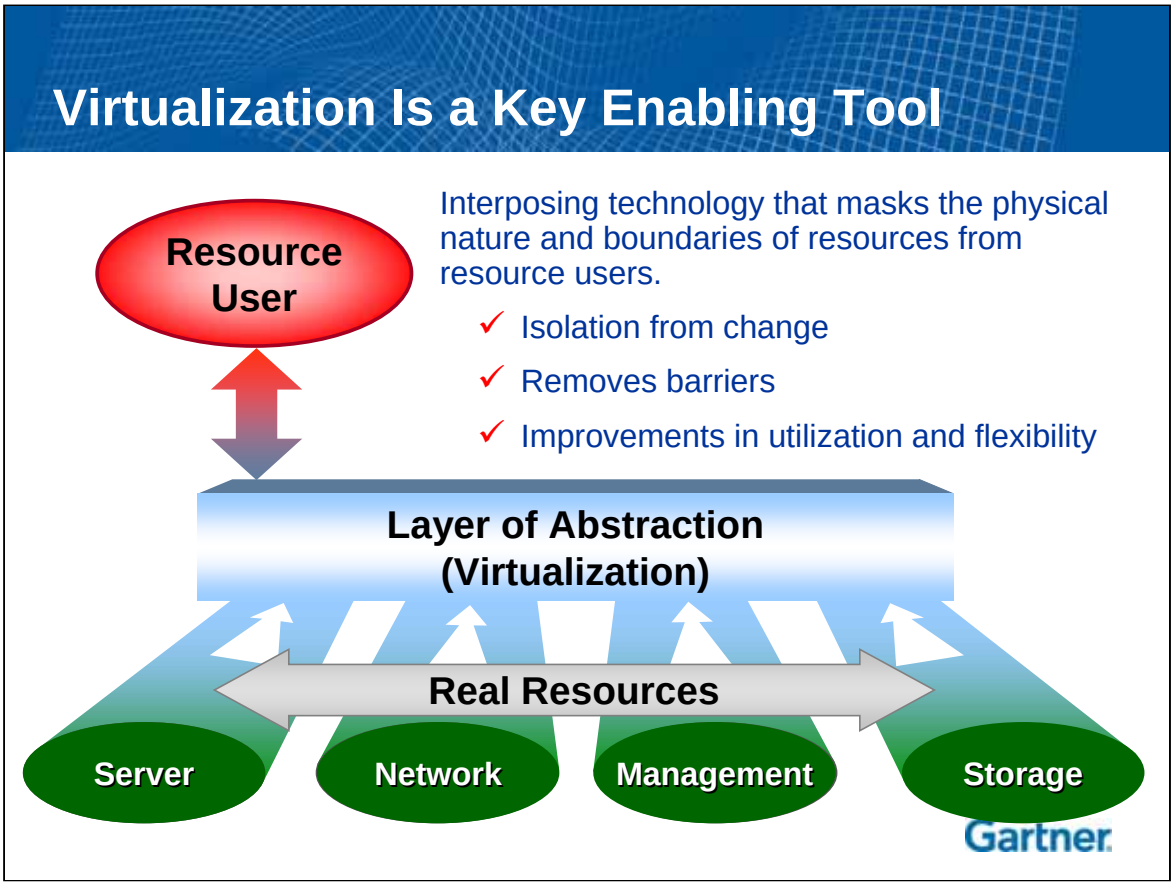

Virtualization technologies can improve IT resource utilization and increase the flexibility needed to adapt to changing requirements and workloads. However, by themselves, virtualization technologies are simply enablers that help broader improvements in infrastructure cost reduction, flexibility and resiliency. With the addition of automation technologies — with service-level, policy-based active management — resource efficiency can improve dramatically, flexibility can become automatic based on requirements and services can be managed holistically, ensuring high levels of resiliency. Virtualization plus service-level, policy-based automation constitutes an RTI.

Many of the challenges that data center managers face today are the consequence of the physical boundaries of equipment and workloads. Virtualization can allow a more-efficient packing of work onto resources and shield running systems from the consequences of changes that are made dynamically when resources must be shifted to address altered needs.

Businesses should investigate virtualization technologies as they mature, to maximize the cost, agility and service-level benefits. Automation technology that leverages the virtualized resources should also be considered. Virtualization should not be seen as a goal, but as a stepping stone and an enabler on which to build automation and a flexible software infrastructure.

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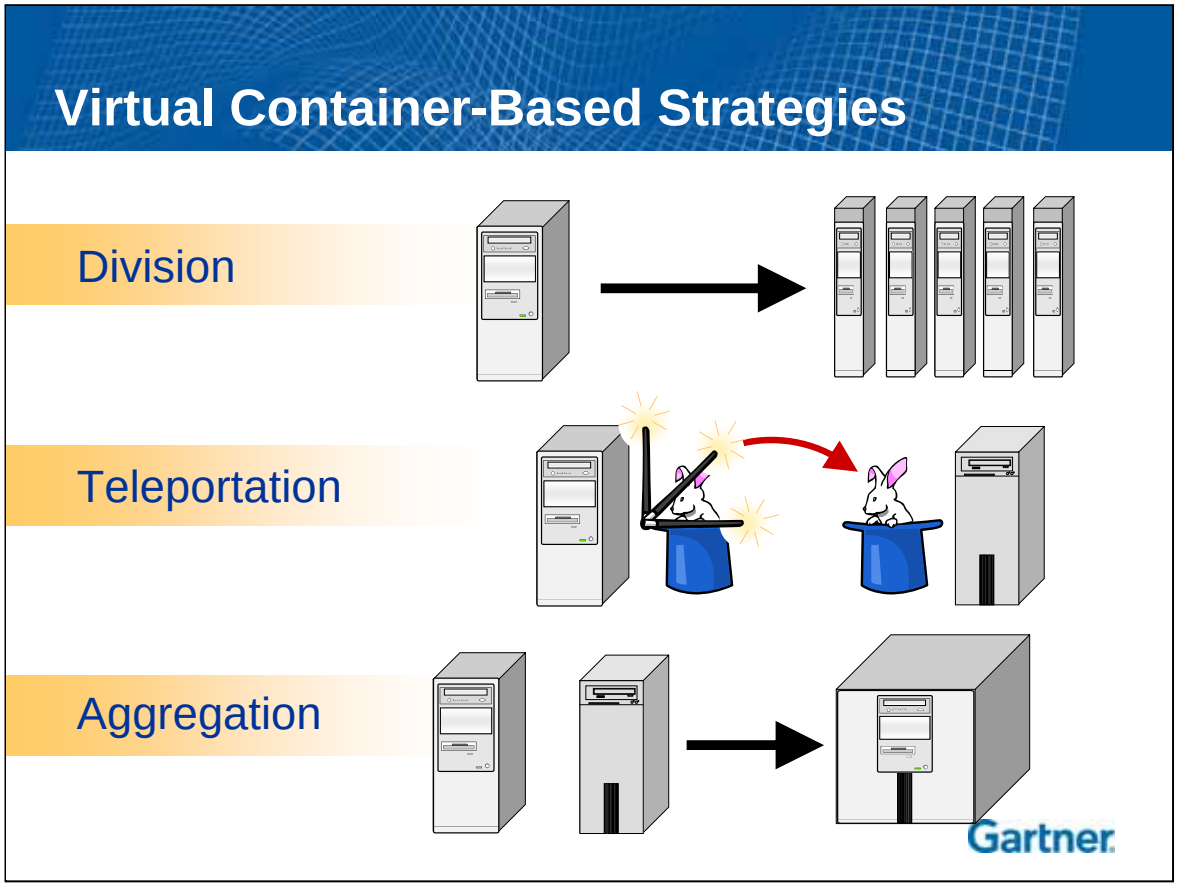

Virtualization can create some form of container that holds a workload — this can be an entire simulated server, as in a virtual partition, or it can be a portion of an operating system (OS) instance. Each approach has advantages and disadvantages. These containers decouple the needs of the workload inside the container from the boundaries of the physical assets in the data center.

A virtual machine monitor or hypervisor can "divide" a machine, making one physical box appear to be many smaller machines, each a container. The user is free to run independent operating systems and applications in each container.

Some container technology permits "teleportation" — the movement of the container from one physical box to another — while the OS and workload inside the container continue along without disruption.

Other container technology will permit a container to span multiple physical boxes. This is called "aggregation", where the workload runs as if on a single big box under one OS, but is accessing the resources of multiple discrete machines.

Division is the most common technique today, found in hardware partitions and all hypervisors or virtual machine monitors. Teleportation and aggregation are more recent arrivals that are rapidly entering the marketplace.

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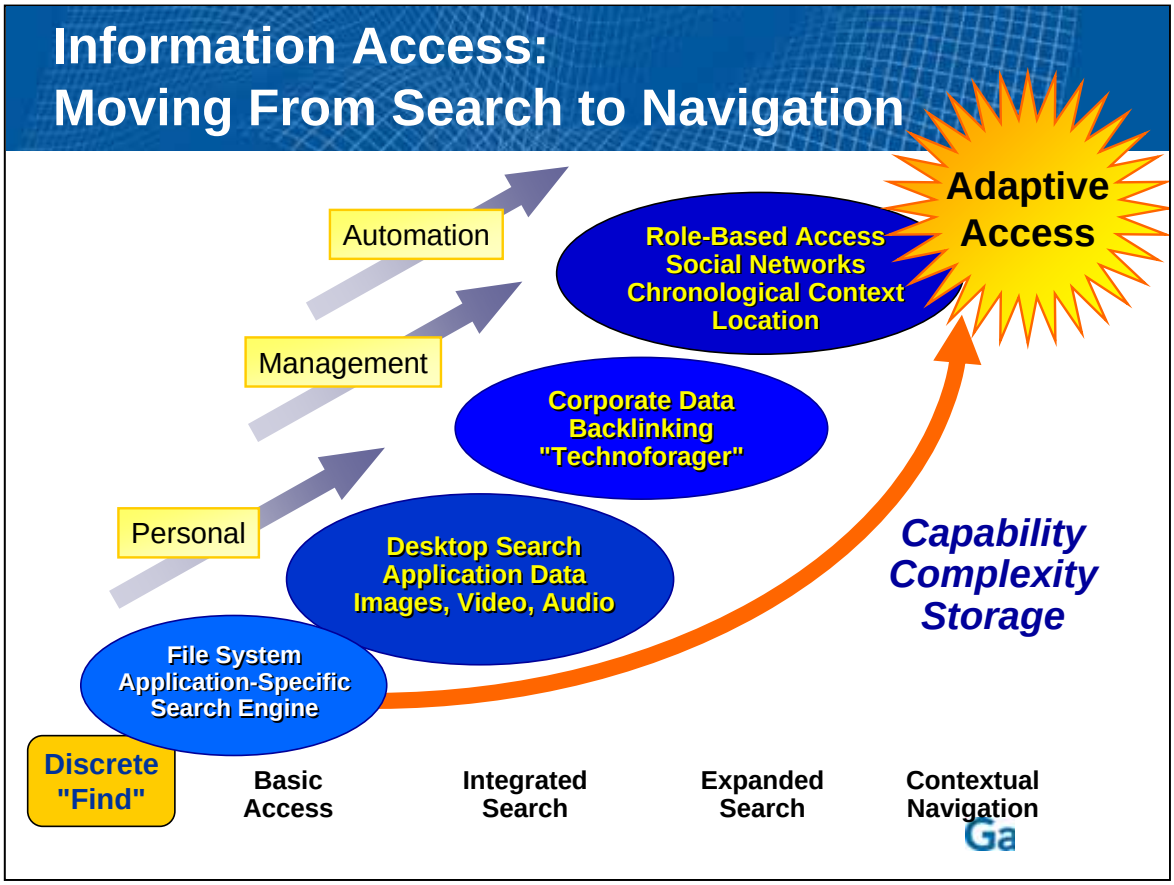

Information access is moving from discrete individual searches, often done in the context of an individual application, to a rich, integrated world where users navigate through a sea of linked information. Ultimately, interpretable information of all kinds will find its way into searchable environments. However, searches alone will not be enough to provide "meaningful" results. Classification or modeling of the information to be searched for and returned (for example, using ontologies) will also be needed to return rational results, and not just to reach all the possible sources. The application of techniques, such as backlink analysis, provides more context to the search. In the future, contextual navigation will expand, as social networks and knowledge of the user's role and current "state" in a business process are used to provide context for a particular request for information.

As the world of information access evolves, the emphasis will shift from personal empowerment to the management of information access. Information access management is driven by the enterprise's need to have more control over information access (for example, who has access under what conditions). Management of the search environment, including the ability to limit a search based on defined rules (personal or enterprise), will help address the considerable enterprise security and personal privacy issues. In the longer term, the emphasis will shift to the automation of search/navigation. In an automated world, the system proactively examines personal preferences, the business process activity being performed and other contexts to proactively serve up information that might be of value. In its ultimate incarnation, this would lead us to the world of intelligent agents and digital assistants.

Adaptive access provides secure, managed, role/context-based linkage to business processes (applications), information and other users, from any location, by any user with any device, across any connection with the appropriate information/application delivery model and user interface.

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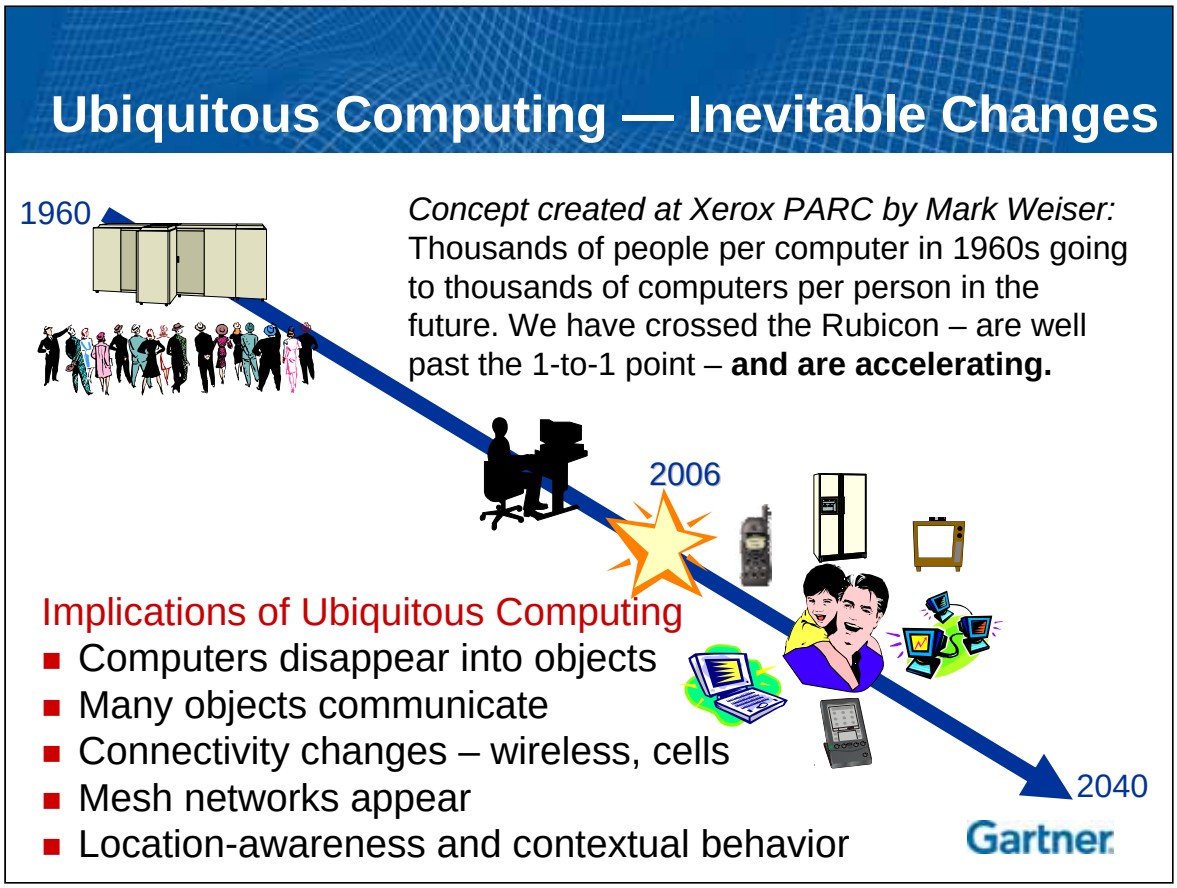

The work of Mark Weiser and other researchers at Xerox's PARC paints a picture of the coming third wave of computing — one where computers surround us, yet are invisibly embedded into our environment. The nature of the future is foreshadowed in the works of Donald Norman and others who demand that the design of a machine be tailored to the human. Norman's seminal book, "The Design of Everyday Things," articulates principles for human interfaces that make machines more usable and less intrusive than before. The vision of the third wave is the relegation of computers to hidden roles, exposing only enough technology to fit the need. Computers in cars are hidden behind steering wheels and simple buttons; in the future, most computers will be equally transparent.

Ubiquitous computing requires connectivity among all these systems. Connectivity will be achieved with a mixture of wired and wireless technology — the wireless leaves on the wired tree existing as short range mobility enablers (for example, Bluetooth) and access points where wiring is inconvenient. Cellular approaches reuse bandwidth spatially to permit the huge aggregate bandwidth requirements to be carried on a naturally limited spectrum of radio frequencies.

As computers proliferate and as everyday objects are given the ability to communicate with RFID tags and their successors, networks will approach and surpass the number of nodes that can be managed in traditional centralized ways. Mesh networking is a self-assembling, self-managing and self-healing approach to networks that overcome this problem of scale to permit the huge networks of objects that will exist in the future.

Location awareness, and the ability to use computers where they lie instead of transporting your own, enable powerful new services and accessibility. Even in the world of carried computers, many are moving among multiple portable computing devices — PDAs, cell phones and laptops.

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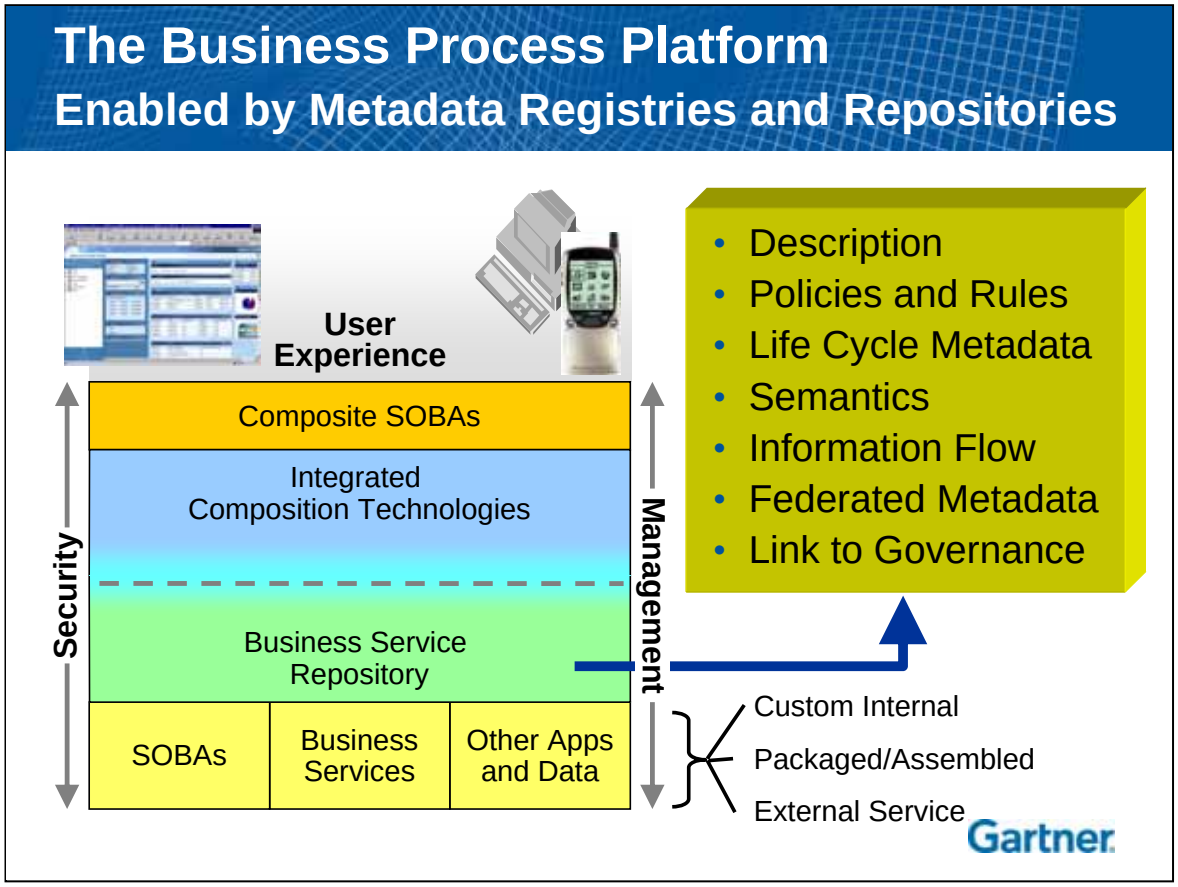
Strategic Planning Assumption: By 2008, SODA, SOBA, Web services, orchestration tools and business process fusion will coalesce, requiring businesses to define their own business process platforms (0.8 probability).

Strategic Planning Assumption: By 2008, the business services repository will emerge as a primary enabler to business process composition and the BPP (0.9 probability).



Service-oriented architecture (SOA) enables software to be defined as independent services that can be "composed" into operational systems. The business process platform (BPP) enables companies to develop business-oriented architectures to enable process development. The composition process is driven largely by mapping the use of services within a business process — known as process orchestration. The services are generally assumed to already exist as components delivered within new service-oriented business applications (SOBAs) or accessed from an external source. In addition, existing applications may be segmented and components wrapped to create service interfaces, so these legacy systems can be exploited within the composition platform, or new services may be developed from scratch to meet unique needs. Services will be managed and stored in a repository together with rules for maintaining their integrity (the repository may also point to external services, acting in that case as a registry). The composition process also looks out to the user experience and the way in which the functionality is delivered (typically via multiple channels and alternate device types). Management and security mechanisms must still span the repository, composition platform and user experience. The creation of this new framework for delivering applications is generating new families of integrated products and technologies from middleware, platform and application companies. In turn, this is creating new areas of competition and collaboration between technology suppliers. The result for businesses will be the reconstituting of their application software as a BPP, delivering greater flexibility in running the business.

User Advice: Users should seek an integrated platform of a business services repository and composition technologies to enable the BPP.

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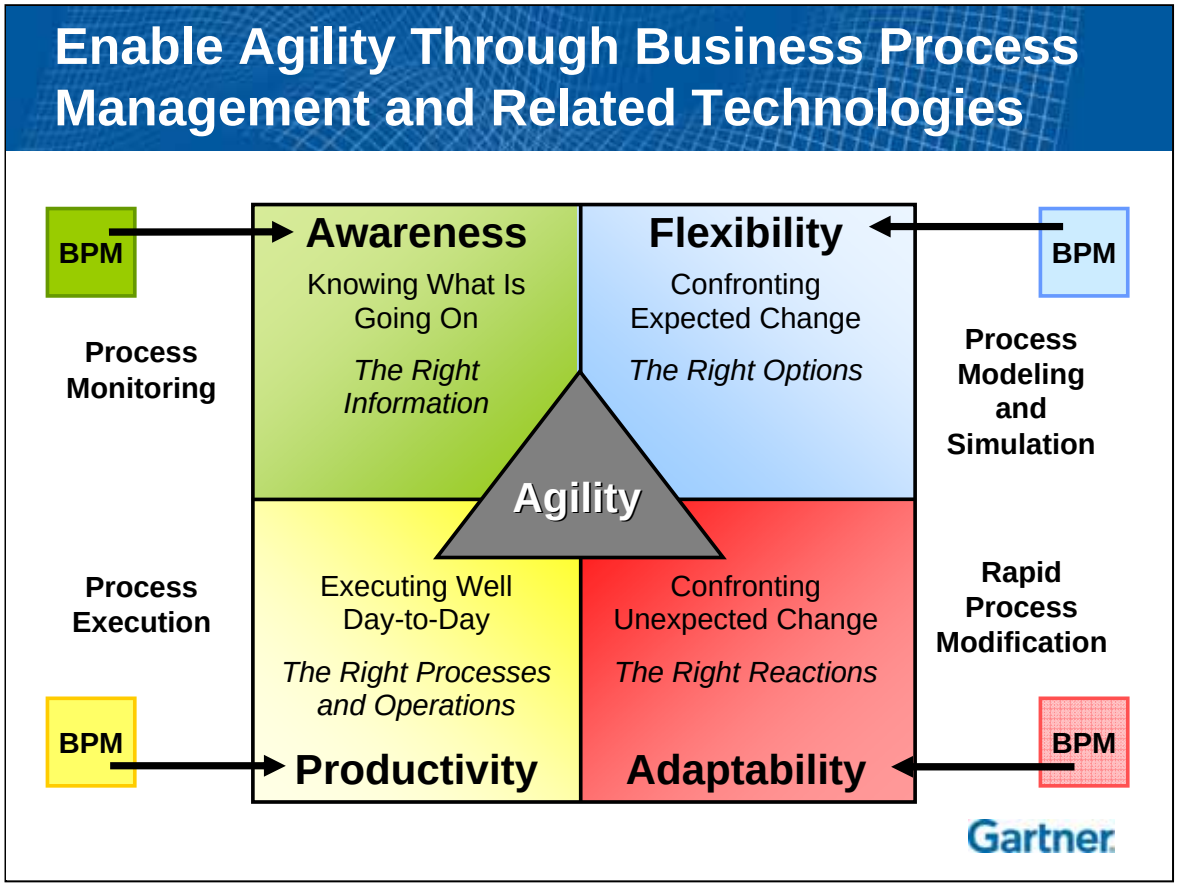
Definition: Agility is the measurement of an enterprise's ability to respond efficiently and effectively to all levels and types of change.



Business process management (BPM) is an ancient concept and a new technological/managerial innovation. All prudent business owners have "managed" their business. However, starting around 1999, what it meant to apply technology to the explicit management of business processes changed rapidly. BPM in 1999 meant "business process modeling" and referred to only a portion of what we now consider BPM technology. The most prevalent technology for the execution of explicit processes in 1999 was found in the world of workflow. In 2000, Gartner began writing about BPM as business process management and linked it with a phenomenon that was happening in the application integration market: vendors adding a process layer to their integration brokers. We further saw that the dyad of workflow equals "integrating people into a process" and BPM equals "integrating systems into a process" was not sustainable as two separate markets. The workflow world and the application integration world responded with partnerships, mergers and acquisitions and internal R&D to create a market of BPM products that could bring process modeling, execution, human and systems-level integration, and monitoring into a single offering. Although there were bumps in the road (for example, application integration vendors faltering on the quality of human participant support), by 2004, BPM was well-established, with more pure-play (specialist) BPM vendors than the market could sustain. 2006 sees the traditional technological definition of BPM giving way to BPM as a management practice, and BPM pure-play and related vendors (for example, integration suite vendors) morphing into business process management suite (BPMS) vendors — a superset of BPM functionality for real-time process support.

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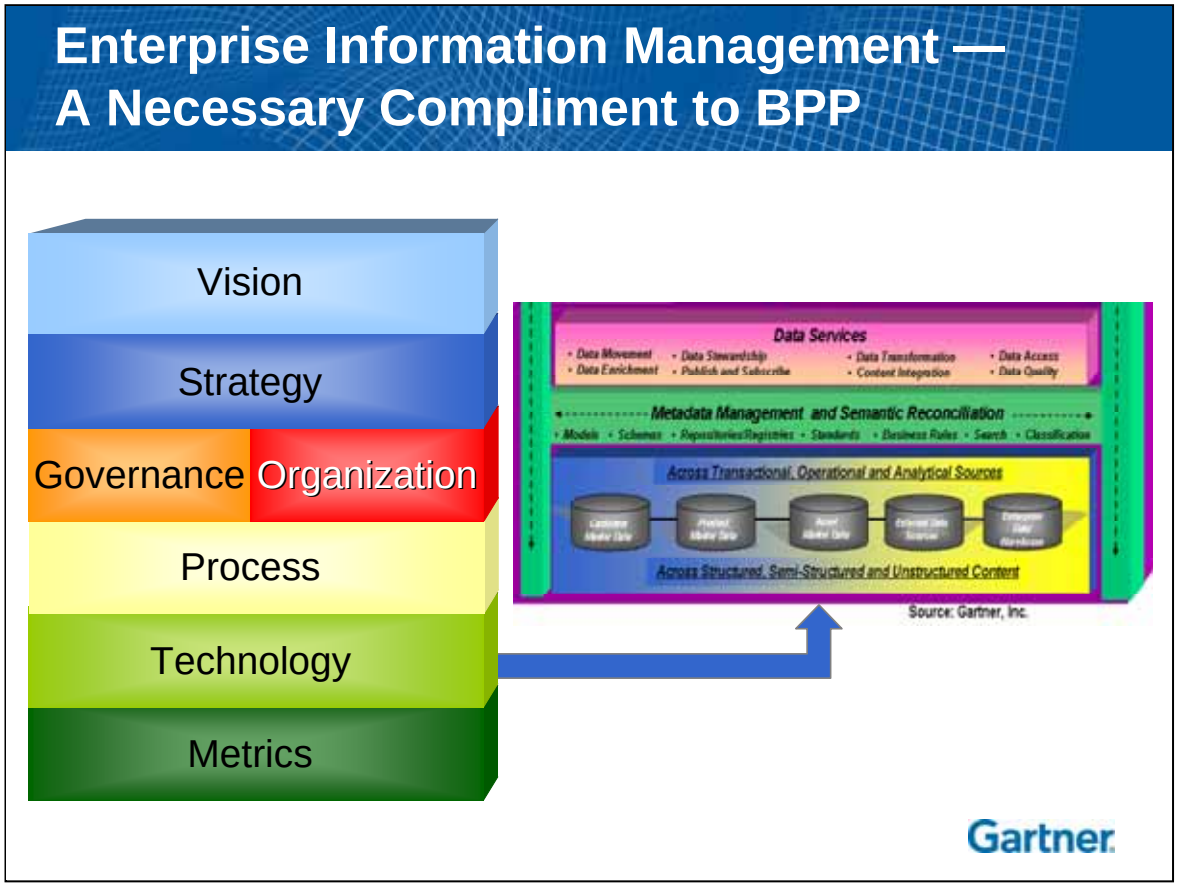
Strategic Planning Assumptions: Through 2007, 20 percent of Fortune 1000 companies will deploy an enterprise-level EIM strategy in support of an SOA (0.7 probability). Through 2008, those organizations that adopt EIM will increase their chances of success in SOA by 70 percent (0.8 probability).



As the march toward service-oriented architecture (SOA) continues, a focus on information architecture is required. SOA is about extreme decoupling — decoupling data from process, application from interface and application from server. Accordingly, the success of SOA depends on knowing where information is (strategic management of metadata), how to connect to it (data integration platform) and the authoritative sources of information (master data management). SOA demands more from information architecture than previous development approaches. An agile company needs enterprise information management (EIM).

Building an SOA without an EIM strategy will significantly lower the response to business process choreography. One of the main benefits of SOBAs will be lost. Developing Web services and SOBA will be more expensive because each point will have to verify semantics, requiring more development time and money. The alternative is to remove the function whereby the semantics being referenced are checked. This can be done by creating a single semantic blanket companywide, so that when a new service or application stack is added, the semantics are already assured and managed by the blanket. This removes the overhead at the service level, but adds a cost for the blanket. More importantly, the required level of agility, the flexibility in being able to assemble and reassemble process through dynamic orchestration, can be achieved. An EIM layer across all repositories accessed by SOBAs will mean that service choreography can operate faster because it doesn't have to worry about semantics.

Action Item: Develop an enterprise information management system to complement your SOA initiatives.

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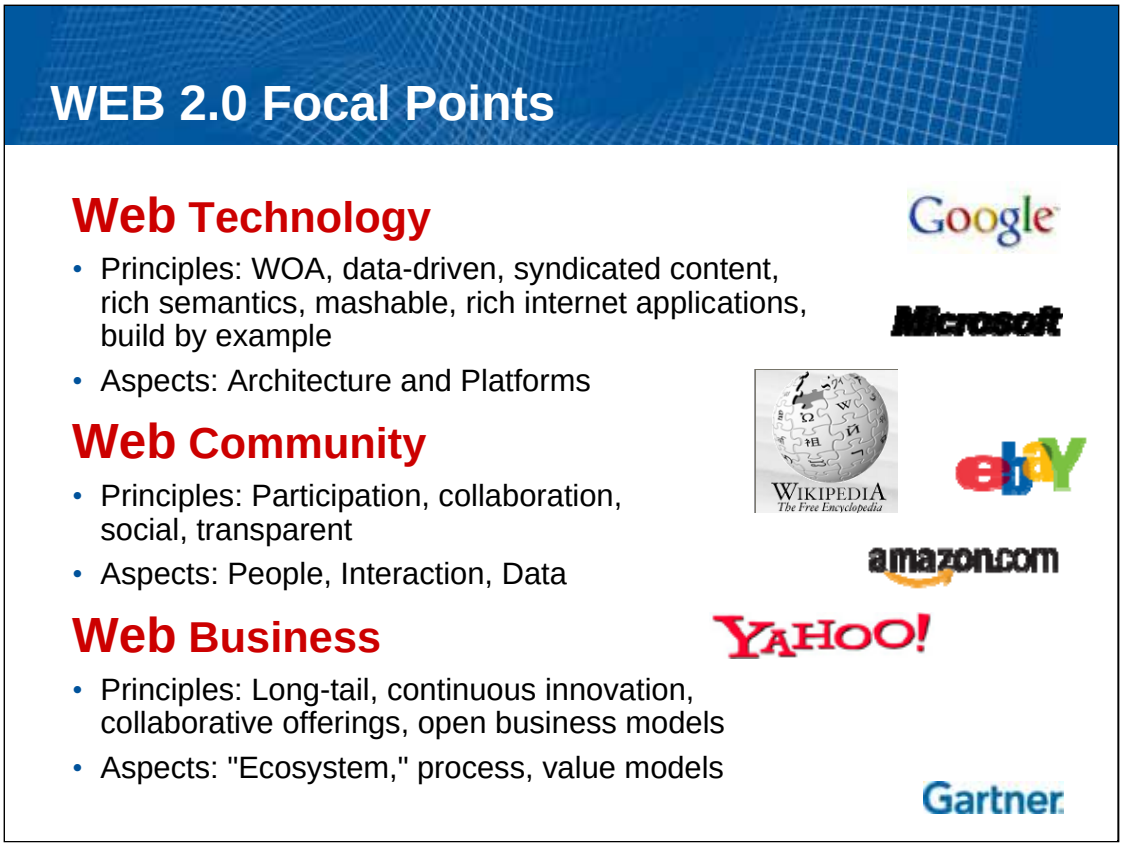
Strategic Planning Assumption: Through 2008, the majority of Global 1000 companies will adopt technology-related aspects of Web 2.0, but fail to adopt the social and participatory community dimension, and the result will be minimal business impact (0.6 probability).

Strategic Planning Assumption: By year-end 2009, 70 percent of periodically published corporate information will be offered in a standard syndication format, such as RSS or ATOM (0.8 probability).



Technology Aspects

- WOA (for example, IFaP, REST, POX, WS*, modular, embeddable, distributable), Data-Driven (for example, XML, BPEL), Syndication of content (RSS/ATOM), Rich Semantics (eRDF, RDFa, microformats, Semantic Web, Semantic Reconciliation, Metadata), Mashable Applications (Remix and scripting, PHP, Javascript), Build by example (show source, cloning), Rich Client (just fast enough just in time, Ajax, Offline Ajax, Flex and Microsoft), Persistent Web (Caching, streaming, managed client, "Web on client")
- Web Platforms: Capabilities-based ecosystem, expose content/logic/interface/model via WS*, POX, REST, remix model for composite applications, software as a service (tech aspect), RSS

Community Aspects

- People: Blogs/podcasts, wikis, personal mashups
- Interaction: Open-source development, social networks, community ratings, collective intelligence, Community service and support, collaborative content creation
- Data: Tagging, "folksonomies," user-created content, data about users

Business Aspects

- Ecosystem: Delivering business process as a service to be remixed (the business side of mashup), viral marketing, syndication
- Process Models: Customer/community dependencies, business of remix, information replaces relationships as key ingredient
- Value Models: Pricing models (usage, subscription, derivative/commission, revenue sharing), micropayments, advertising models (impression, intent, conversion)

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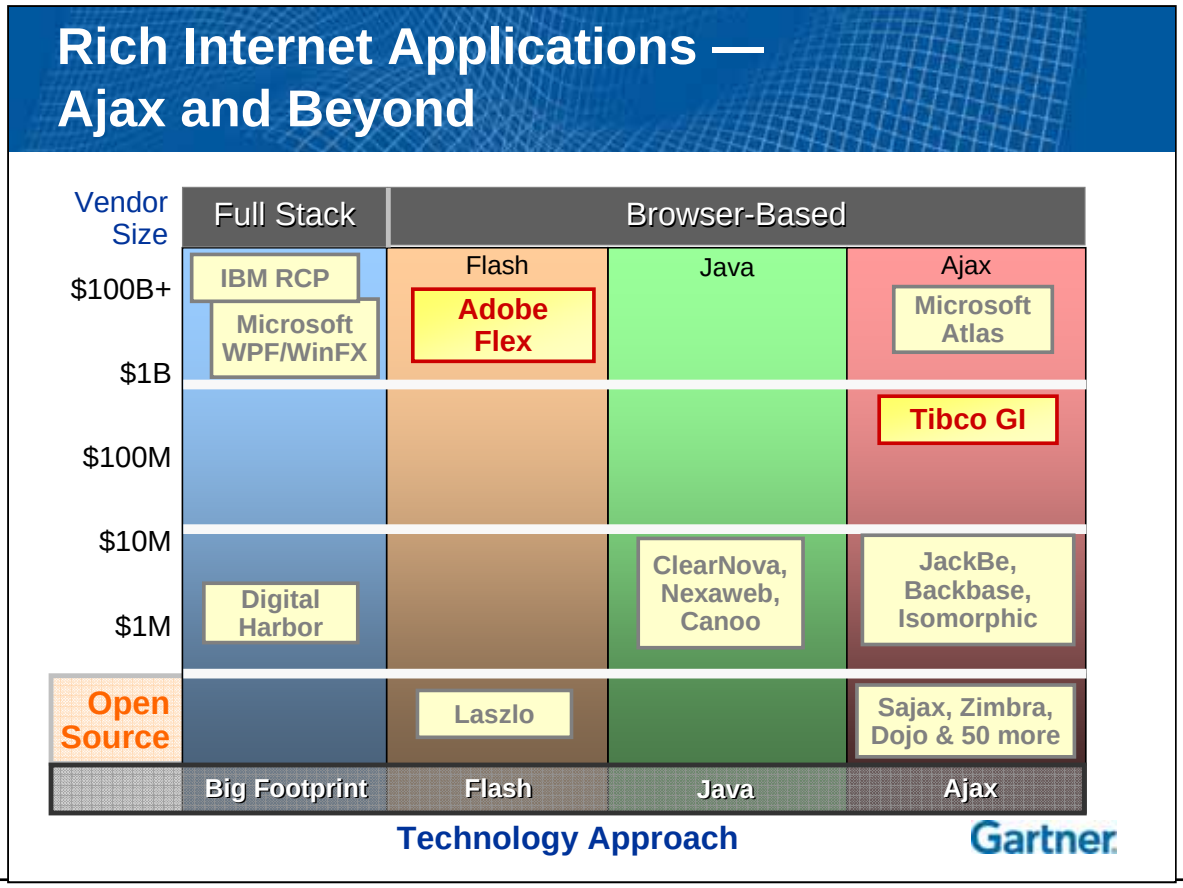
Strategic Planning Assumption: By year-end 2008, more than 90 percent of public Web sites that have more than 100,000 visitors per day will be using some form of Ajax technology (0.8 probability).

Strategic Planning Assumption: By year-end 2008, more than 80 percent of new Web applications will rely on client-side JavaScript explicitly through snippets and widgets or implicitly through declarative XML models (0.7 probability).



Many choices exist for application developers selecting rich Internet application (RIA) technologies and platforms. These choices are made, in large part, on the package's technical merits and on closeness of fit to application requirements. Beyond this, organizations consider other factors when selecting RIA technology. Often, the selection process is as follows: First, create an inventory of the entire spectrum of RIA choices — as complete and lengthy a list as possible. This list numbers 10 or more, and perhaps more than 50, if one includes all open-source Ajax toolkits. From that long list, some organizations will remove items, such as Zimbra and Dojo, because they have a policy — whether right or wrong — against the use of open source. Other organizations will cull the list by removing any vendor with less than $10 million in annual revenue, thereby eliminating from consideration vendors such as JackBe, Backbase, ClearNova and Canoo. Another criterion used for filtering is to remove any technology that has not been in production at least 12 months (thereby removing Atlas, WPF and WCT/RCP). The result of this process is that, today, many enterprise RIA decisions involve a two-way faceoff between Adobe Flex and Tibco General Interface. Having reached this point, some organizations will move forward with one of these. Others will adopt a wait-and-see stance, preferring to delay selection until offerings from IBM and Microsoft are mature. In the meantime, developers add Ajax snippets and widgets, often without management awareness.

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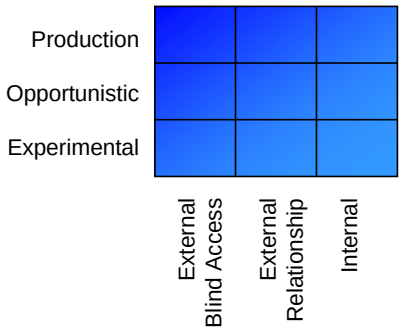
Strategic Planning Assumption: By year-end 2008, 75 percent of enterprise software providers will have a Web-based software-as-a-service delivery model that includes Web APIs to create mashups (0.7 probability).

Strategic Planning Assumption: By 2010, Web mashups will be the dominant model (80 percent) for the creation of composite enterprise applications (0.7 probability).

Mashups: Web-Centric Composite Applications

Salesforce.com + maps.google.com = Smashforce

How and Where Applied



Today

- Opportunistic mashups
- Developer-centirc
- Mashups for new offerings

Future

- Enterprise mashups
- End-user friendly
- Mashups for personal applications

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A mashup is a Web site or Web application that combines content from multiple sources into a single integrated presentation. A mashup uses a variety of public interfaces, including APIs, Web service calls, JavaScripts and Web feeds (for example, RSS and Atom) to source the content. The term was inspired by a similar use of the term in pop music, where it refers to the practice of creating a new song by assembling purloined parts of other existing songs. A rich community is growing on the Web, experimenting with mashups based on APIs from eBay, Amazon, Google and host of other companies. Examples include.

•Google, Microsoft and Yahoo provide map APIs that have resulted in mashups of data and geography that, in turn, drive traffic and advertising.

•Amazon Web Services (AWS) provides access to platform and product data. As of the fourth quarter of 2005, it reportedly had more than 120,000 developers and over 975,000 active seller accounts with many using AWS.

•Amazon, Google and others provide a variety of infrastructure services that can be incorporated into mashups. For example, Amzaon simple queue service offers what it claims is a reliable and scalable hosted queue for buffering messages between distributed application components.

•Smashforce is Salesforce.com's code name for it Ajax Web services toolkit. Salesforce is one of the first application software vendors to offer enterprise developers toolkits for this style of Web services.

•FedX and UPS provide shipping services that can be incorporated into a mashup.

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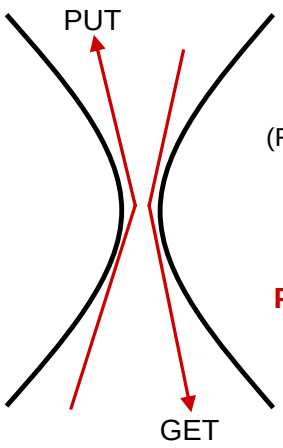
Strategic Planning Assumption: By 2010, WOA will account for 60 percent of SOA development in the enterprise (0.7 probability).

Strategic Planning Assumption: By 2008, leading users will adopt strategies for moving from the paradigm of the Internet/Web as a strategic information communication medium to a strategic information processing, persistence, sharing and analysis medium (0.8 probability).

Mashup Enablers: WOA, Syndication, Scripting and Data-Driven Architecture

- The secret to the Web's dramatic interoperability ("mashability") is its narrow waist: a small number of uniform operations known as REST
- WOA = SOA+WWW+REST
- Fundamental REST Principles:
  - Universal identification of resources:
  - Manipulation of resources through representations
  - Self-descriptive messages and uniform intermediary processing model
  - Hypermedia as the engine of application state
- Extensibility through Scripting



Identifiers: URI

Formats: XML,
(For example, XBRL, Accord, RSS, ATOM OpenSearch)

Protocols: HTTP
(For example, WebDav WSAP WS-TRANSFER)

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"The name "Representational State Transfer" is intended to evoke an image of how a well-designed Web application behaves: a network of Web pages forms a virtual state machine, allowing a user to progress through the application by selecting a link or submitting a short data-entry form, with each action resulting in a transition to the next state of the application by transferring a representation of that state to the user." –Roy Fielding

While REST is an architectural style that is well known and hotly debated in the developer blogsphere, it is relatively unknown to enterprise ITO management. This is unfortunate because if you strip away the rhetoric and misunderstanding surrounding REST, it is clear that the principles emphasized by REST are precisely those that made the Web the phenomenal success that it is. Simply put, REST describes the Web as a full-blown application architecture, not just a GUI architecture or a transport architecture.

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2001 Strategic Planning Assumption : By 2010, 70 percent of the population in developed nations will spend 10 times longer per day interacting with people in the e-world than in the physical one (0.6 probability).

2006 Strategic Planning Assumption: By 2015, more than 100 leading companies will have made or saved at least $10 million due to collective intelligence (0.6 probability).

Technology has enabled many new types of communities, as well as new ways for communities to collaborate, which, in turn, has created new sources of information and new styles of creation. Organizations can take advantage of technology-enabled communities by:

•Extending their enterprise boundaries to new sources of talent, even for their core competencies — for example, through "bounty" sites, such as InnoCentive and TopCoder

• Using networked collective intelligence to leverage small contributions from a broad community of motivated, self-selecting contributors

• Taking advantage of the massive scale of worldwide network connectivity to trigger new approaches to difficult problems

• Identifying and leveraging "lead users" (see "Democratizing Innovation" by Eric von Hippel) who can contribute in a major way to design innovation.

Action Item: Take advantage of new types of community interaction that can extend your enterprise and its creative processes.

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The Top 10 Technologies

The Top 10 Technologies

Open Source

Virtualization

Information Access

Ubiquitous Computing

Service Registries and Repositories

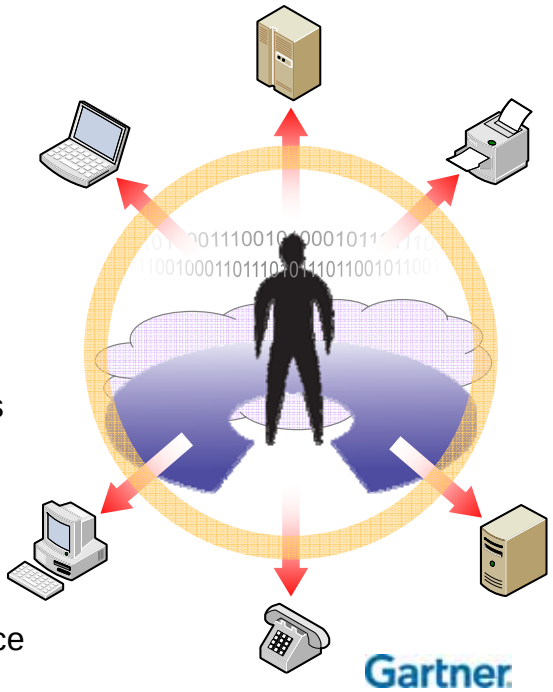
Business Process Management Suites

Enterprise Information Management

Web 2.0 – AJAX Rich Clients

Web 2.0 - Mashup Composite Model

Communities and Collective Intelligence



The 10 technologies discussed in this presentation are potentially strategic and valuable to many corporations. They are all partially immature today, but will mature enough for widespread use in the next 18 months to 36 months. In many cases, maturity will occur only for a subset of the technology or for well-defined applications with full maturity for more-general use lagging beyond the three-year window.

This selection provides a pointer to 10 very interesting technologies, but does not represent a complete list of technologies to be evaluated and potentially used. For a longer-range and more-comprehensive view, we recommend the complementary set of presentations at Symposium: Emerging Trends and Technologies.

These 10 opportunities should be considered in conjunction with many proven, fully-mature technologies, as well as others that did not make this list, but can provide value for many companies. For example, real-time enterprises (RTEs) providing advanced devices for a mobile workforce will consider next-generation smartphones to be a key technology, in addition to the value that this list of 10 might offer.

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