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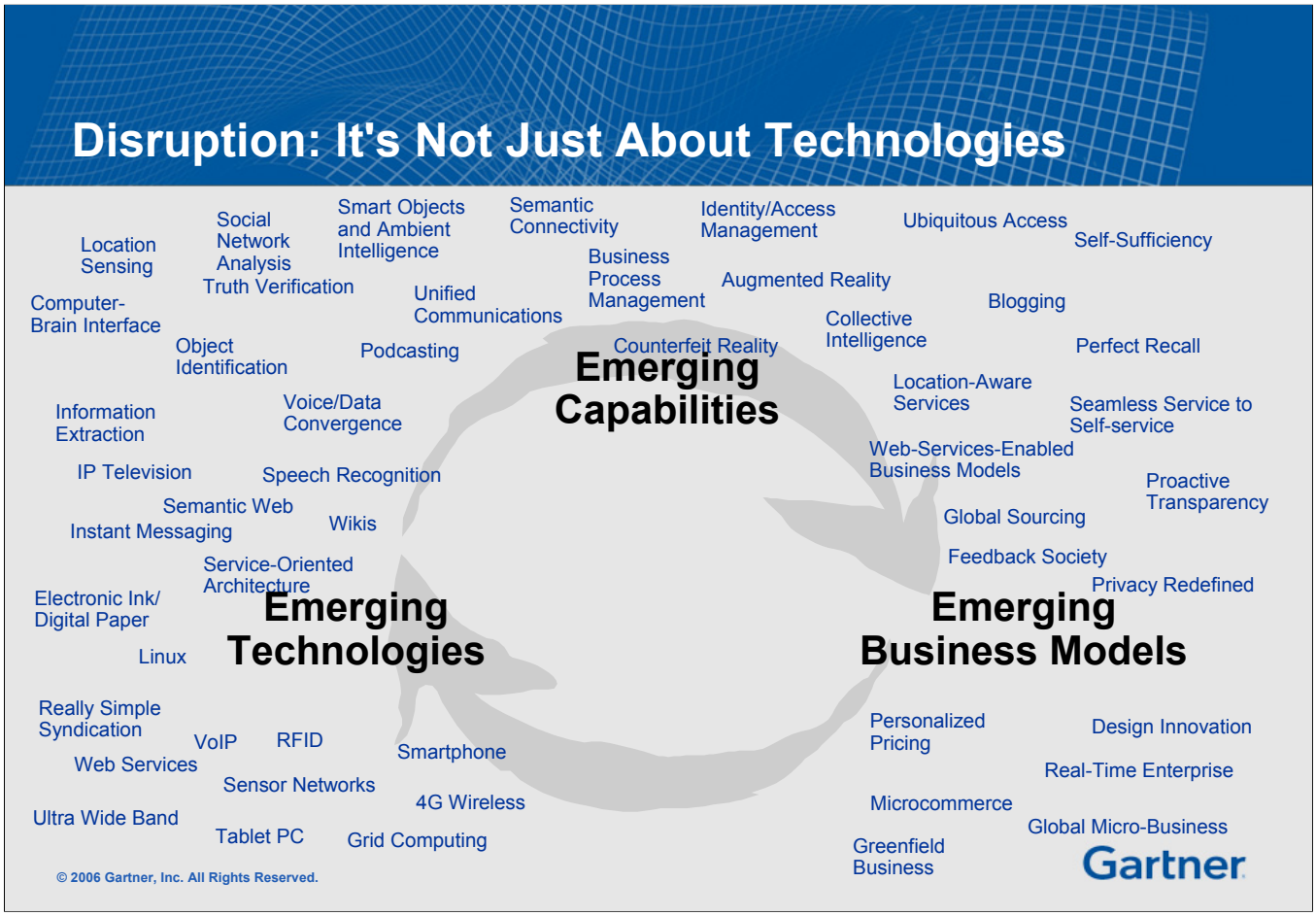

Innovation is no longer the province of a few leading-edge companies — it is the lifeblood required for the survival of any enterprise. Business and technology planners must understand how to harness the disruptive potential of technology advances through a realistic assessment of emerging capabilities and IT-enabled trends, and their impact on business and society. Planners must also acknowledge that disruptions arise not just from new technology, but also from new applications or convergence in existing technologies that drive new capabilities and new business models.

This emerging trends presentation identifies the most disruptive trends arising from emerging information technology, and assesses their potential impact on the workforce, consumers, business, government and society in the five to 10-year time frame.

Client Issues

1. Which emerging and embryonic technologies should organisations be watching?
2. What are the most disruptive trends and most significant opportunities arising from emerging information technology?
3. What are the most effective strategies and tactics for identifying, prioritising and introducing emerging technologies and trends?

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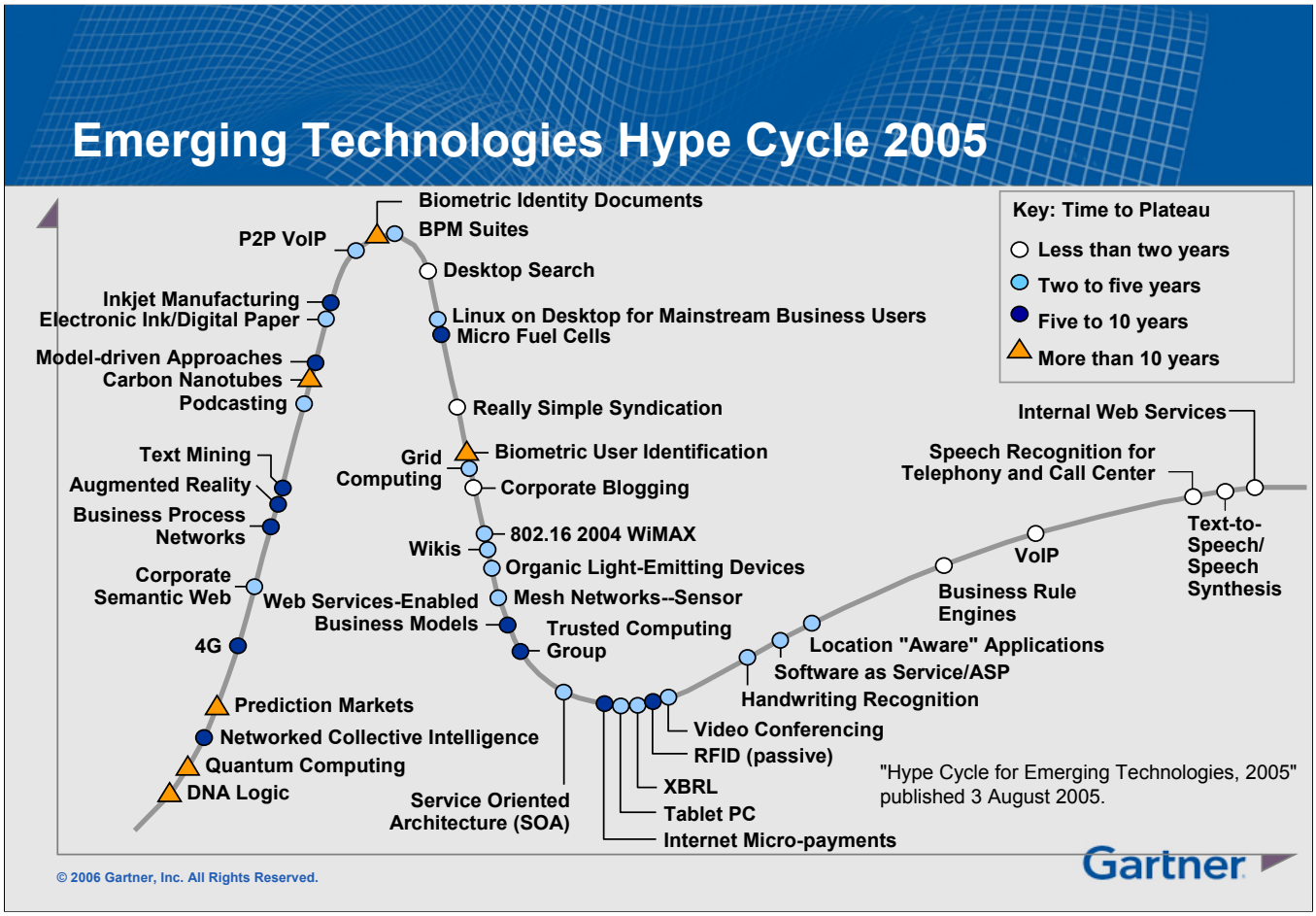
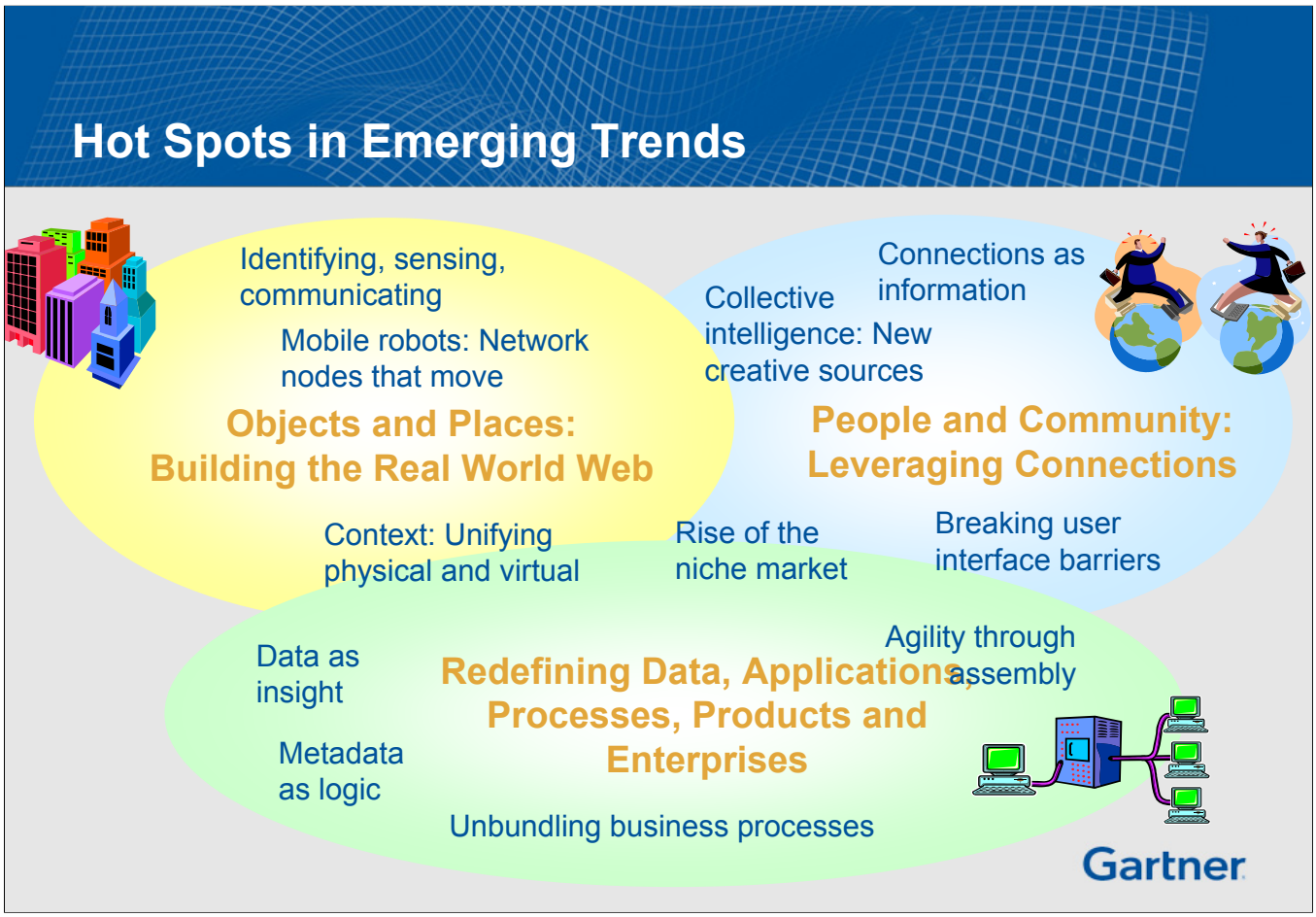


Client Issue: Which emerging and embryonic technologies should organisations be examining for competitive advantage?

Gartner's Hype Cycle, introduced in 1995, characterizes the typical progression of an emerging technology, from over-enthusiasm, through a period of disillusionment, to an eventual understanding of the technology's relevance and role in a market or domain. The first part of the hype curve is driven by vacuous hype — mainly by the media, which speculates on the technology's prospects. The second part of the hype curve is primarily driven by performance gains and adoption growth.

Hype Cycles allow technology planners to compare their understanding of technologies' evolution against Gartner's analysis of the technologies' maturity, helping them to decide when to invest in a technology. If an enterprise launches its efforts too soon, it will suffer unnecessarily through the painful and expensive lessons associated with deploying an immature technology. If it delays action for too long, it runs the even-greater risk of being left behind by competitors that have succeeded in making the technology work to their advantage. The Hype Cycle has a simple and clear message — enterprises should not invest in a technology just because it is being hyped, nor should they ignore a technology just because it is not living up to early expectations.



Client Issue: What are the most disruptive trends and most significant opportunities arising from emerging information technology?

Three major technology trends will drive disruptive capabilities in the next five years:

• The physical world will be brought into the world of information, through emerging sensing, identification and communications capabilities built into objects and places.

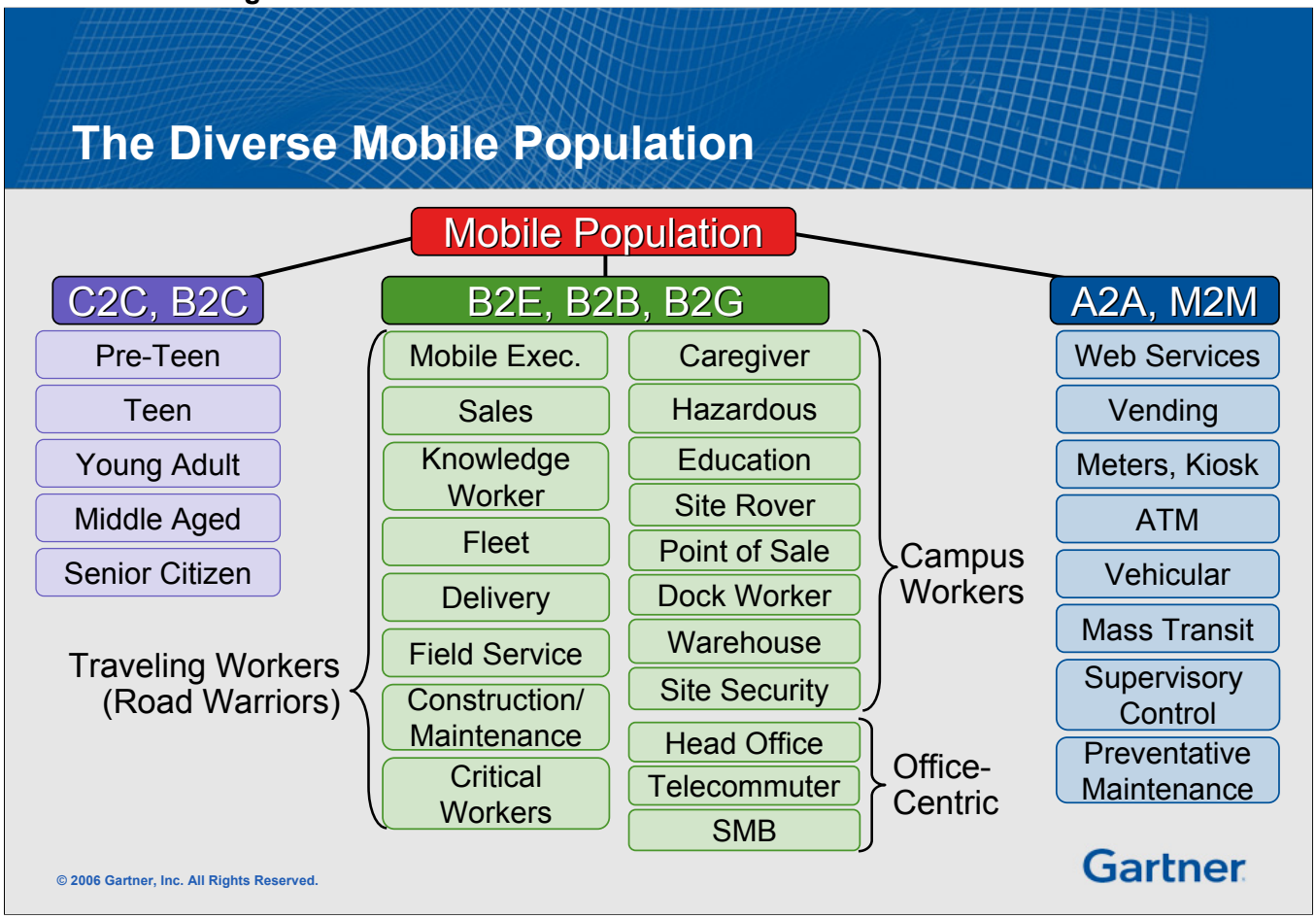
• The increasing amount of time that people spend in virtual communities will be leveraged using connections as a new information source and also as a force for new types of creation, in particular networked collective intelligence.

• The nature of information technology will be redefined from the data layer up to the way that applications, business processes are products and developed and delivered.

Many of the disruptive advances of the next decade will be built on an unprecedented growth in connectivity, coupled with finer-grained treatment of the individual components — transactions, communications, tasks, or items in the real world.

Strategic Planning Assumptions: By YE06, there will be more than 3 billion wireless users, including 1.5 billion mobile users and 1.5 billion wireless-enabled machines or objects (0.7 probability).

Tactical Guideline: Enterprises investing in wireless opportunities must deeply understand their user base because of a wider variance of preferred devices, work styles, social factors and economic factors involved. A mobile user taxonomy forms a baseline to model behavior and key business processes, and to learn from pilot projects. It forms a basis for worker education and training initiatives, and provides critical insight on consumer behavior.

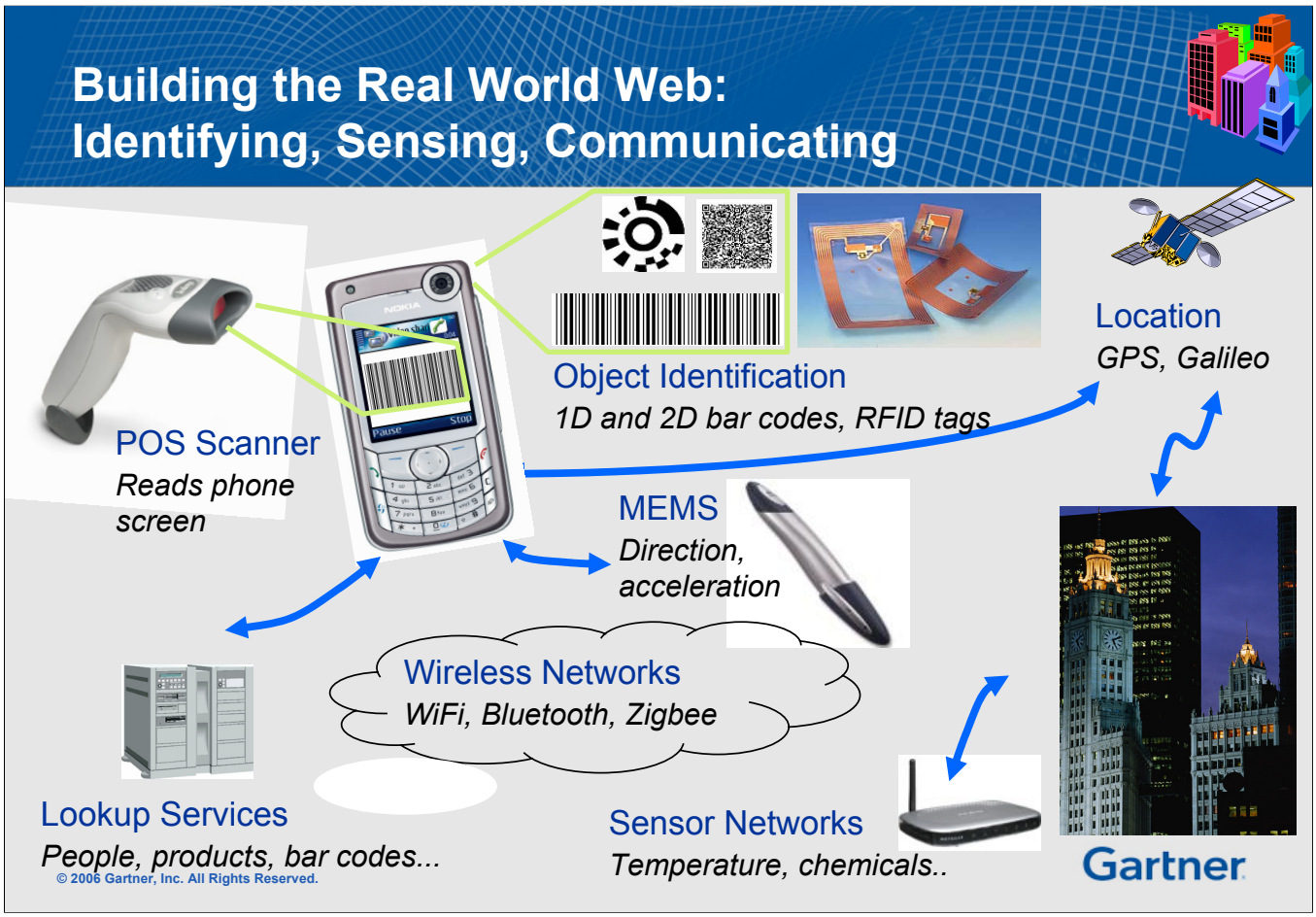


Enterprises must be aware of conflicting requirements in offering wireless capabilities to the following three classes of mobile users: 1) Business to consumer (B2C), 2) enterprise applications that focus on mobile workers and 3) opportunities to wirelessly enable machines and objects.

Enhancing the sales of products and services through mobile B2C depends on understanding age, socioeconomic trends, communities of common interest, and the creation and management of mobile voice, messaging and rich content. Venture beyond the enterprise edge to understand bottlenecks in processes that are not directly under your control. B2C opportunities abound; so the enterprise must understand the various demographics and target application bundles at each desired segment. Wirelessly enabling machines means that wireless WAN networks must provide lost cost data transport. Since 2003, and until 2006, an increasing amount of digital imaging and video will eliminate human intervention and decrease downtime. Mobile worker requirements depend on their job classification.

Action Item: By categorizing user types and benchmarking key mobile users' habits and daily workflow, you can discover patterns to 1) capture information earlier in a business process cycle, 2) avoid the need to freeze data and 3) add instrumentation to processes that previously were too expensive to monitor.

Strategic Planning Assumption: By 2015, it will be economically viable to monitor any physical object worth more than $10 and with a working life of more than one day (0.6 probability).



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Increasingly, real-world objects will not only contain local processing capabilities due to the falling size and cost of microprocessors, but they will also be able to interact with their surroundings through sensing and networking capabilities.

RFID is already driving shifts in supply chain and retail, and emerging camera-based approaches use cell phone cameras to recognize one and two dimensional bar codes. Location discovery is creating new opportunities for locating nearby service providers. Micro-electromechanical systems (MEMSs) place tiny moving parts onto a chip to sense and react to the environment.

The result of the additional sensing and connectivity will be a rapid proliferation of applications that take advantage of this "real-world Web," similar to the flood of ideas (many ill-founded, some transformational) that have surrounded the World Wide Web. Business applications will center on increasing the visibility of physical assets, including equipment, products and even people.

Action Item: Seek early tagging and sensing applications where improved visibility of items or location will avoid ongoing costs or avert undesirable events.

Strategic Planning Assumption: The volume of real-time information reaching urban consumers will increase tenfold by 2015 (0.7 probability).

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The emergence of the Real World Web will bring the power of the Web, which today is perceived as a "separate" virtual place, to the user's point of need of information or transaction.

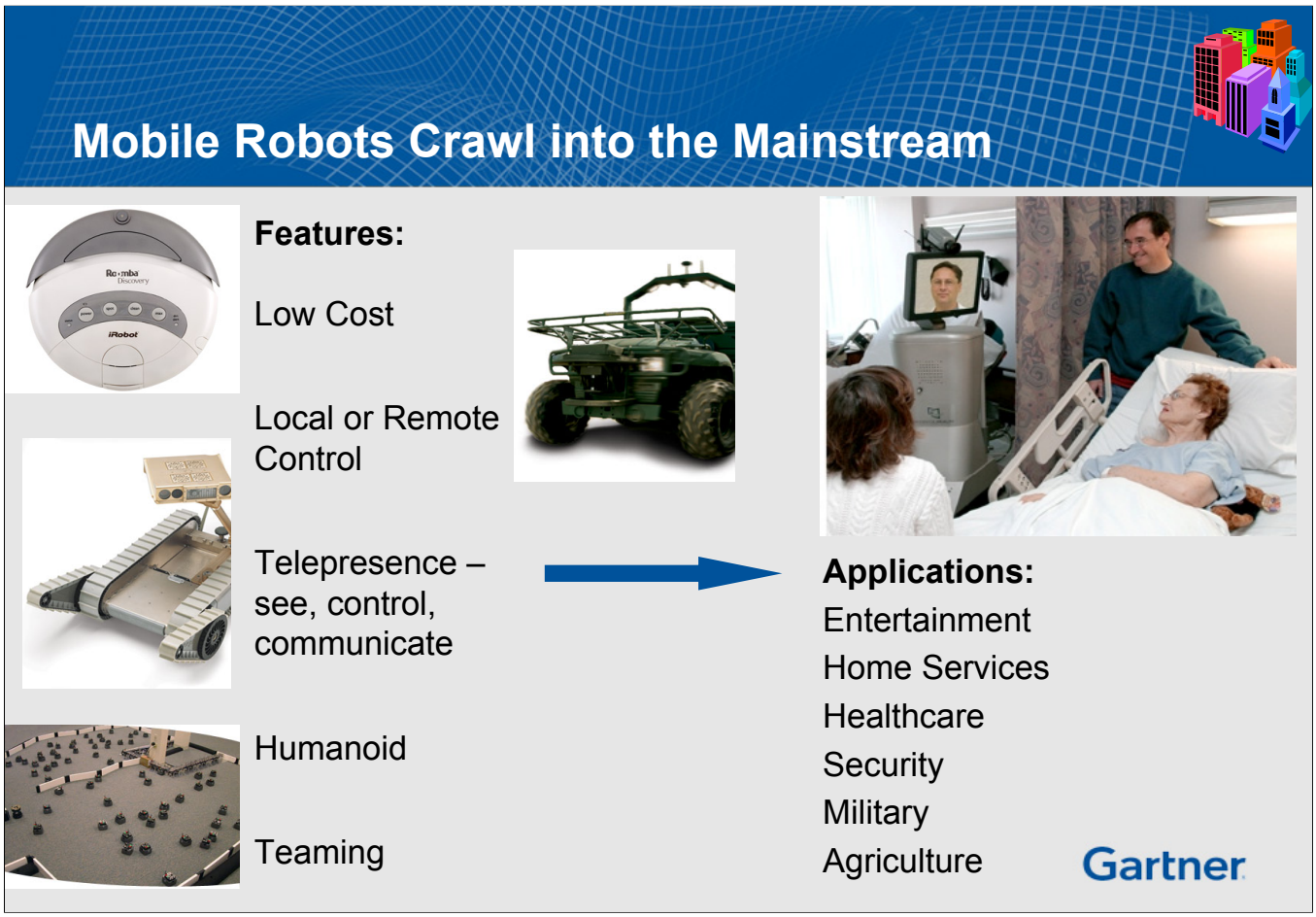
Consumer applications are likely to include convenience and security, such as eyeglasses that can alert their owners where the object was left. Electronic devices and other consumer products may also introduce "sociable" attributes such as recognizing their owner and determining when they are being held.

Companies will be able to take advantage of ongoing connectivity — for example, delivering product safety or recall alerts or additional services even after products have been provided to customers. They will also capitalize on the potential for new pricing models, such as location tracking for insurance or hourly car rental.

Augmented reality will allow the user's view of the real world to be supplemented with relevant information, such as context-specific text or graphics delivered to a heads up display or mobile device, or audio information delivered to a headset.

Action Item: Identify applications where decisions can be improved by delivering context-specific information to mobile workers or customers.

Strategic Planning Assumption: By 2015, over one million mobile robots will be attached to corporate and government networks (0.6 probability).



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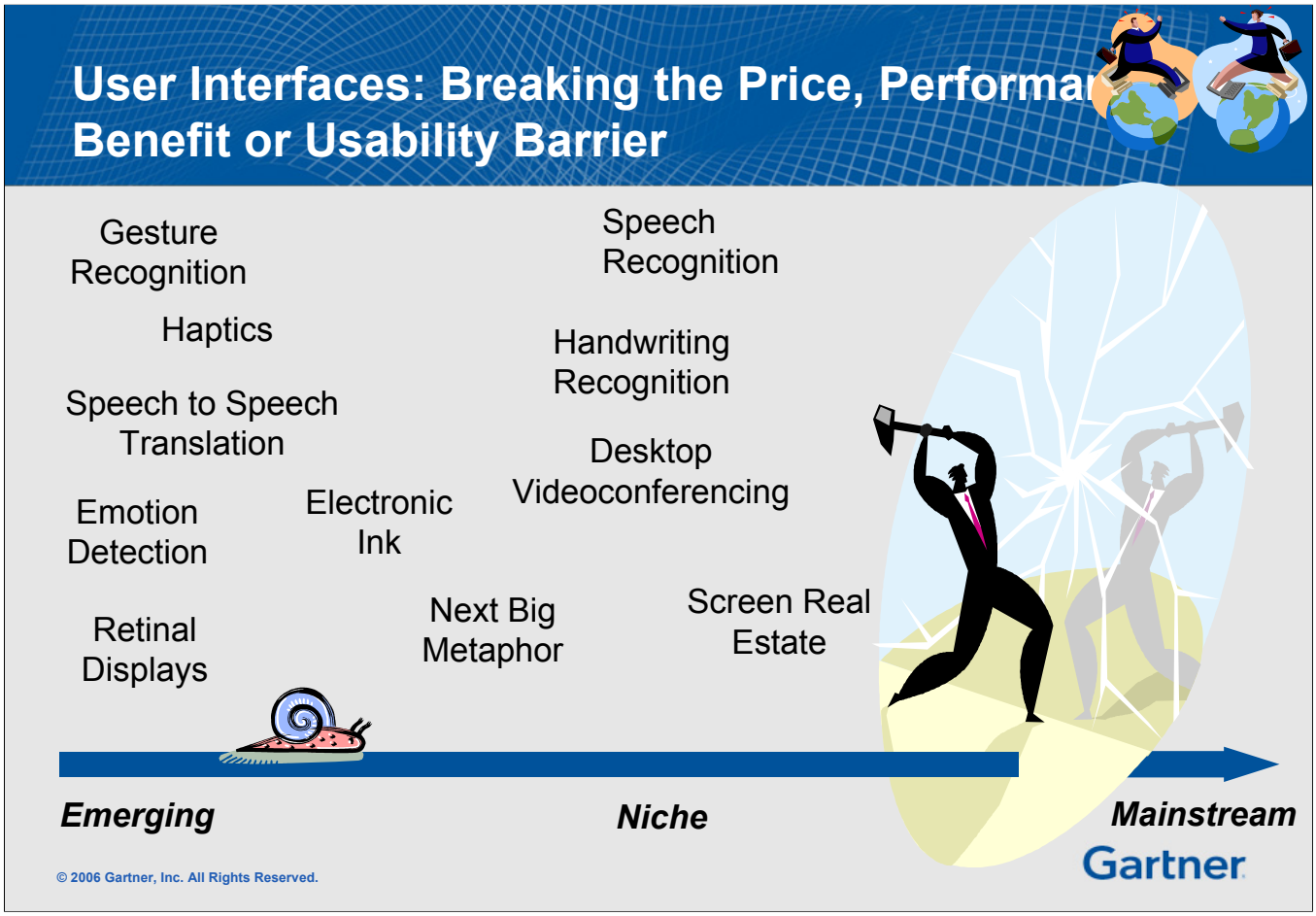
Mobile robots are starting to develop capabilities at both ends of the cost spectrum. Low-end mobile robots, such as Sony's Aibo, have been available as toys for several years. Now mobile robots are entering mainstream consumer markets by offering household services like vacuuming or lawn mowing, with built-in navigation, sensing and obstacle avoidance. At the high end of the market, Sony and Honda have developed human-looking robots that can walk, run, jump and respond to gestures and voice commands. These are still research prototypes and certainly not at commercially viable prices, but they indicate the level of physical performance and responsiveness that will be available commercially in the next decade.

Within the next decade, low-end mobile robots are likely to be used for specific cleaning and maintenance tasks in households and offices. In developing nations, where there the elderly population is growing, slightly more sophisticated models will fill a need for home help and healthcare applications. Developments may also change the economic threshold for automating low-wage tasks in activities like food preparation. Mobile robots with videoconferencing capabilities will be used in hospitals and security to improve the coverage of scarce human resources.

Action Item: Prepare for mobile robots to appear as new end points in corporate IT networks.

Strategic Planning Assumption: By 2015, the improvement in the productivity of information workers that can be attributed to increased display screen workspace will exceed 20 percent (0.6 probability).



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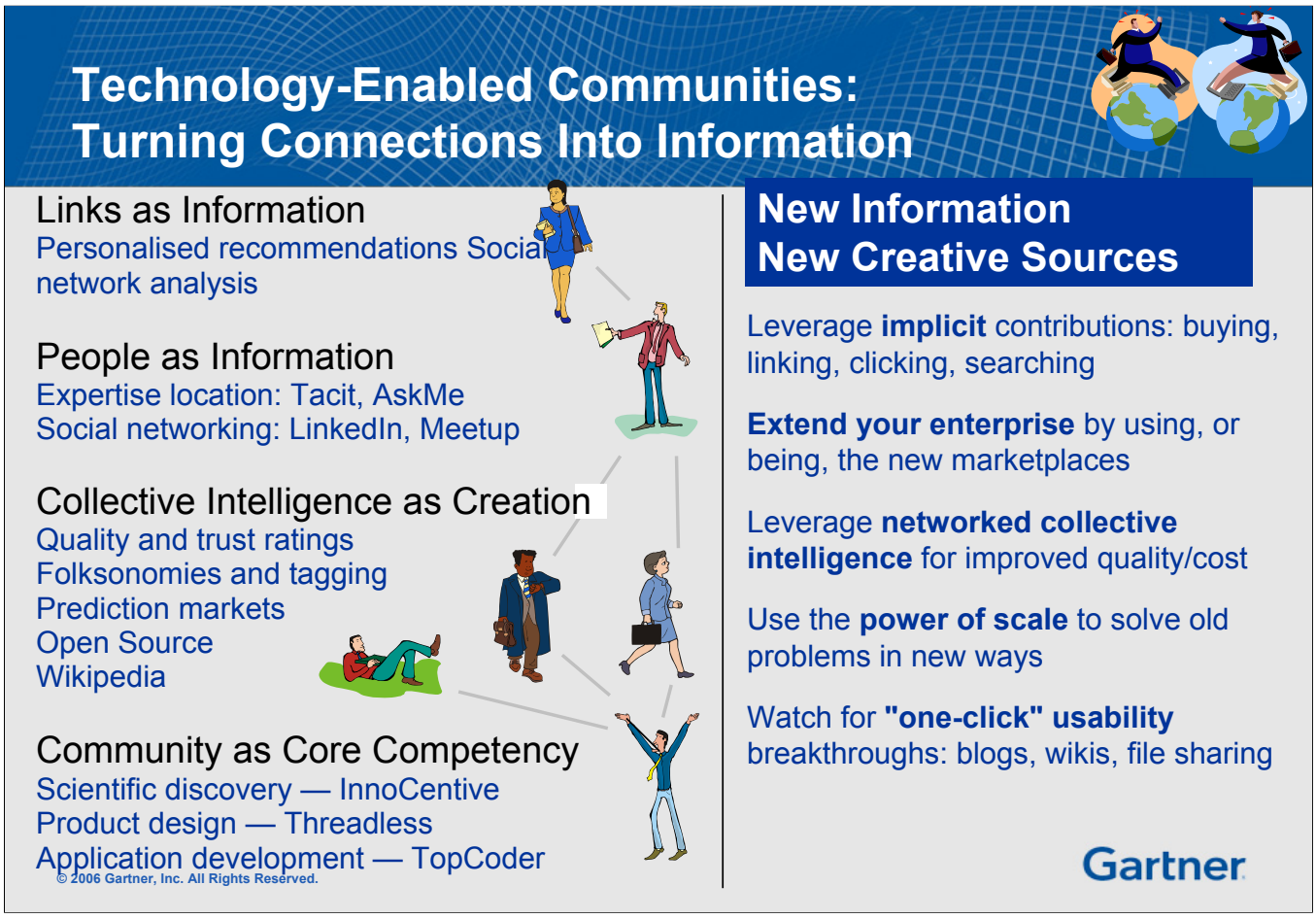
For decades, researchers into human computer interaction have attempted to create user interfaces that more closely reflect human communications capabilities. Despite impressive demonstrations of advanced interaction capabilities in laboratories — for example immersive displays and speech and gesture-based controls — no major user interface shift, or "next big metaphor," has occurred since the invention of the windows and mouse-based graphical user interface 30 years ago, and its commercial introduction by Apple over 20 years ago. Individual point solutions such as speech and handwriting recognition have been slow to move into the mainstream, although they have generated powerful niche applications in the meantime (for example, call center automation and mobile data entry).

Hardware developments on the other hand can take advantage of Moore's Law and related phenomena to drive costs consistently down. For example, large screen and multiple screen displays are poised for widespread adoption, with a potential increase in knowledge worker productivity as a result.

Action Item: Recognize that human-computer-interaction technologies are typically slow to mature and gain widespread adoption. Focus deployments on specific applications with quantifiable value, such as speech recognition in the call center.

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



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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:

• Looking for implicit patterns and information in data created as a side effect of networked interactions, such as Google's link analysis to determine Web site quality.

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

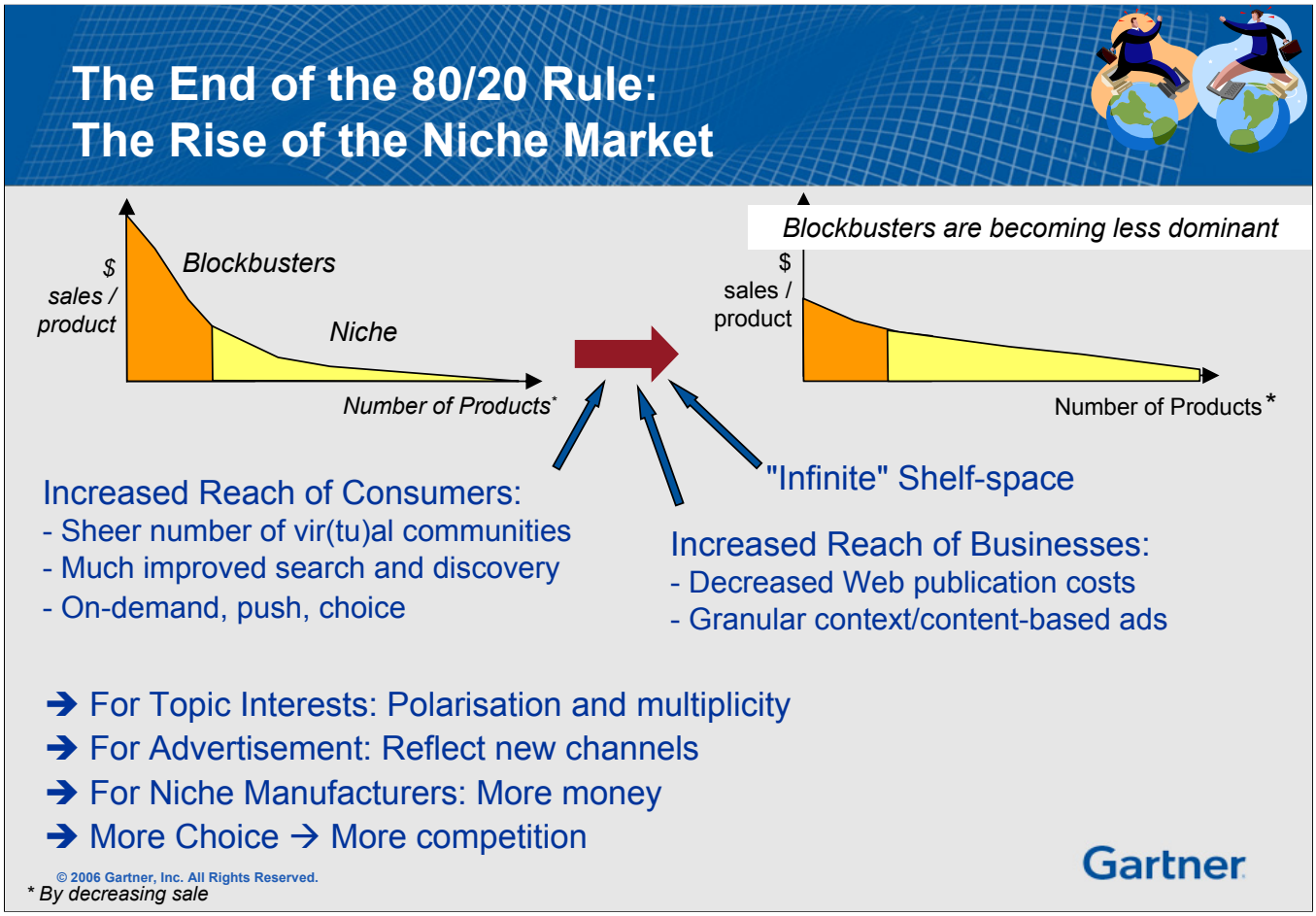
• Using networked collective intelligence to leverage small contributions from a broad community of motivated, self-selecting contributors.

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

• Watching for advances in ease of use that will remove current barriers and launch capabilities into widespread adoption.

Action Item: Take advantage of the information implicit in people-to-people connections, and of new types of community interaction that can extend your enterprise and its creative processes.

Strategic Planning Assumption: Throughout 2015, the 80 percent of low-volume niche products will experience at least two percent more compound annual growth rate than the 20 percent of blockbusters in most retail categories (0.7 probability).



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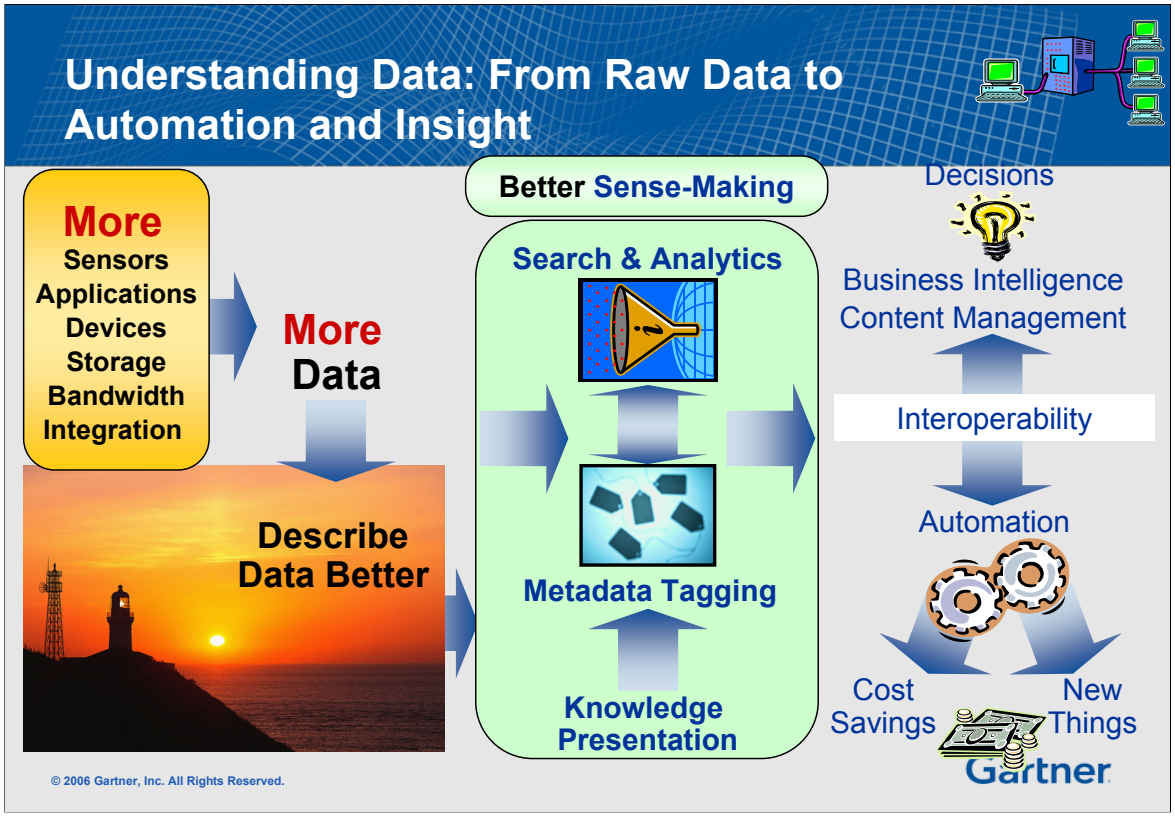
In many retail disciplines the 80-20 rule governed for a long while — approximately 20 percent of the products received approximately 80 percent of the revenue. This was due to limited shelf- and display-space and the big marketing costs that were mounting on a few widely popular channels. Now, the increasing dominance of the Internet is changing this. Consumers have dramatically more reach on the Internet through much improved search engines and discovery mechanisms (for example, collaborative filtering on Amazon and Netflix, and location-based search on Google and Yahoo). Consumers can now tap into a myriad of virtual communities, while the TV industry also moves into quasi-on-demand with personal recording devices. The resulting fragmentation means more choice and less dominance of a few channels. In addition, the Internet will increasingly provide an unlimited amount of (potentially personalized) shelf-space- removing physical constraints. Publication costs are also decreasing, allowing small vendors to make themselves heard in the appropriate corners of the Internet (through context- and content-based advertisements). This will not only impact marketing departments, but also product-designers, who can now count on having their products placed on much more appropriate channels.

Action Item: The rise of niche markets will be a phenomenon that advertisers, marketing people and product designers alike must pay attention to.

Tactical Guideline: The information overload will continue to challenge organisations for a long time to come. A strong competence in data management, metadata and analytics will be a very significant differentiator.



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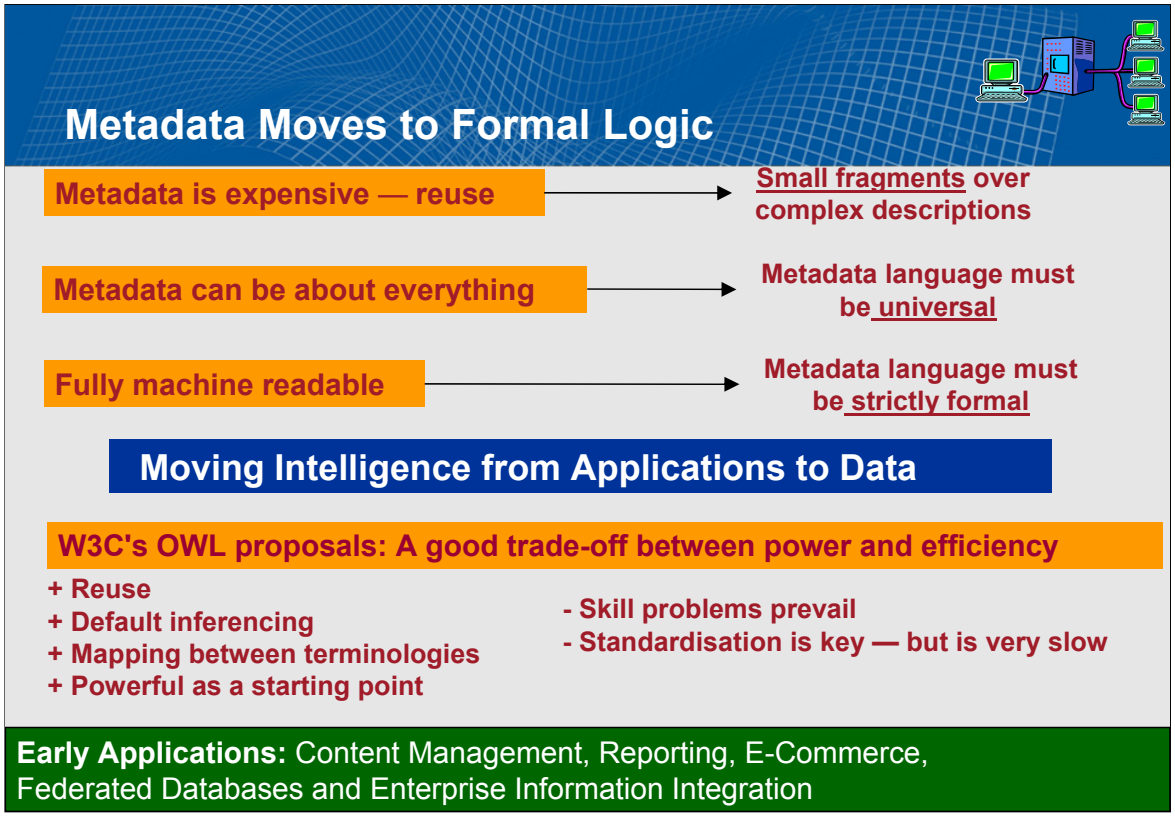
Hardware advancements have outpaced our abilities to manage the data they have generated. Data is still often raw, inaccessible, inconsistent, fragmented and hopelessly underutilized. Help is now coming from areas such as information retrieval, data mining and data integration and cleaning. Improved search and analytical capabilities increasingly cut through data more effectively. Search engine vendors, statistics companies and business intelligence vendors sift through company data stores, and on the Web, Google has had a significant impact. But mere search and analytical functions will always have their limits. However smart the algorithms are, there will always be inconsistencies and ambiguities in the data.

In all cases in which search and analytical functions are not working well enough, a complementary approach is to organize data better and augment it with metadata (data that describes data). Metadata makes it much easier for machines to process and interpret the data automatically. Enterprises will experience a renewed focus on metadata during the coming decade, which will drive better search and better analytics, and ultimately drive better decision making, automation and consequentially, cost savings.

Strategic Planning Assumption: Through at least 2008, W3C's OWL will be the best available industry standard for semantic specifications (0.7 probability).



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For any one metadata approach to succeed in the ambitious task of better machine understanding there are three basic requirements:

Reuse: Despite some limited progress in the automation of extracting metadata from data (for example, text categorization and information extraction) the acquisition of the majority of the required metadata is very expensive. It is therefore critical that metadata can be shared and reused not only within organizations, but also across supply-chains.

Generality: Metadata — in its generality — can be very complex and literally be about anything. Any metadata language must be fairly universal.

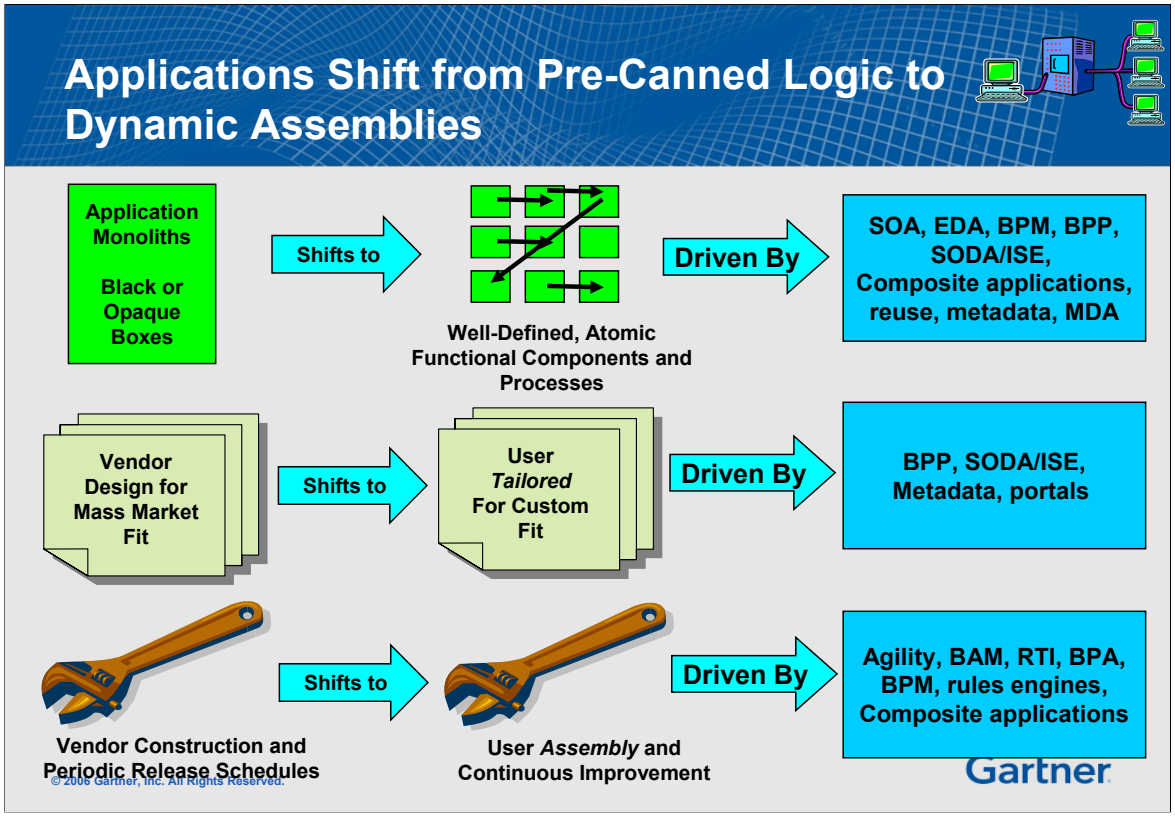
Machine interpretability: Since automation is one of the goals, the metadata language must be fully machine readable (strictly formal).

These requirements led various consortia (Defense Advanced Research Projects Agency [DARPA], the European Community) and then finally the World Wide Web Consortium (W3C) to develop Web Ontology Language (OWL). W3C's OWL is seen by many industry experts as a good compromise between power of expressiveness, reuse, ease-of-use and computational efficiency.

Action Item: Evaluate OWL as a leading candidate for metadata descriptions using formal logic.

Definition: The traditional view of "application" as defined and understood by both vendors and end-users for the past 20 years, will be obsolete by 2010 (0.8 probability).

Definition: "Application" shifts from being "what you buy" to "what you do with the software assets under your control, whether home-grown or purchased."



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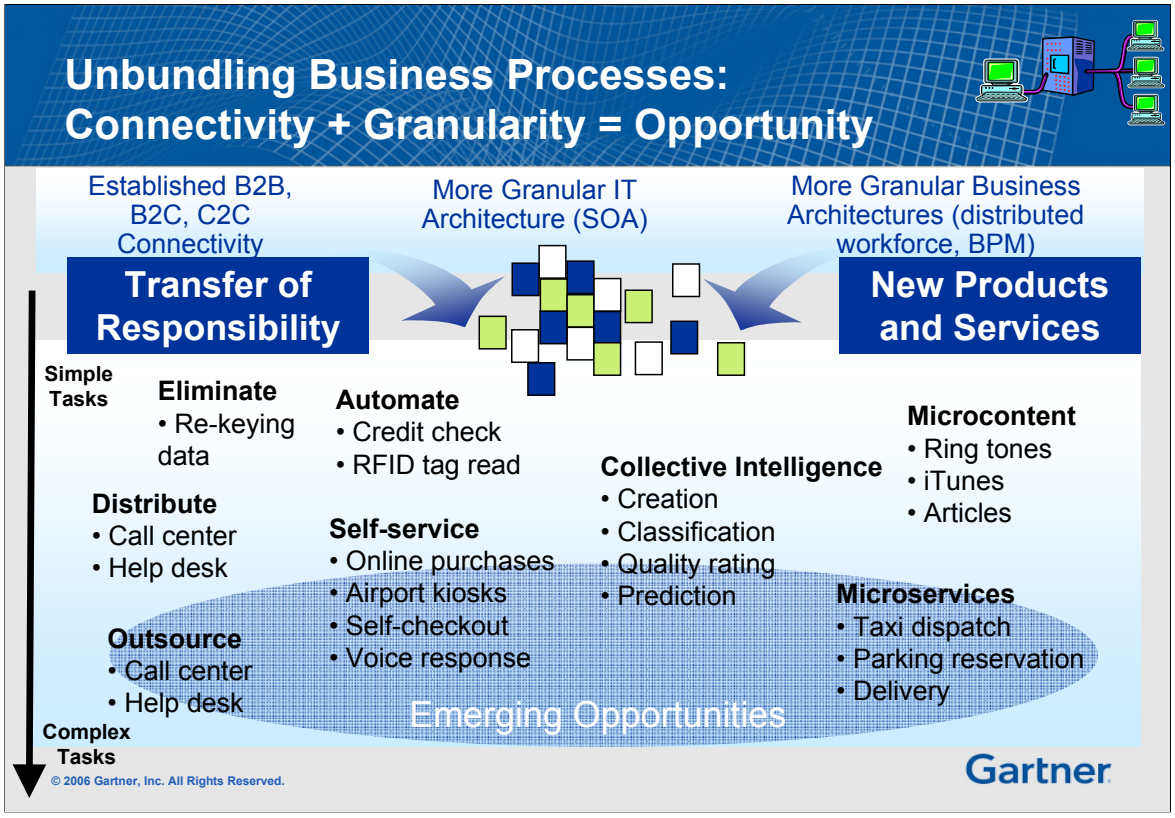
A critical shift in the concept of "application" is well underway. Once end-users stopped creating all their own monolithic applications, applications became vendor constructed monoliths — mass market focused bundles of black-boxed or opaque (minimal application process interface exposure) functionality, delivered on a vendor-specified release schedule. With the advent of new technical capabilities (for example, integrated service environment [ISE], business process management suite [BPMS] and real-time infrastructure [RTI]), new architectural models (for example service-oriented architecture [SOA] and event driven architecture [EDA]) and overarching concepts such as Agility, the application is being recast.

The black box of monolithic business logic is being cracked open, exposing access to smaller components or services (for example, SOA based). Each of these components or services is individually able to participate in a larger "composition" of application logic using business process management (BPM) and ISE/SODA process-centric concepts, driven by needs unanticipated by the original creator or vendor. Vendor-mandated and delivered design is being replaced with organic design principles driven by the end-user enterprises incorporating concepts of business process platform (BPP), and ISE/SODA, often blending cross-vendor functionality into new, one-off system designs. Finally, the traditional vendor construction-release cycle is being augmented with a user driven approach to continuous improvement, driving change based on systems level and application level feedback derived from monitoring and performance information offered by business activity monitoring (BAM), RTI, business process analysis (BPA) and BPM. The overarching shift is one of increased agility for the end users, and a de-emphasis of the traditional, pre-defined application as an entity in its own right.

Strategic Imperative: Examine how the smaller granularity of tasks and interactions will provide you with more flexibility in internal processes and external relationships.



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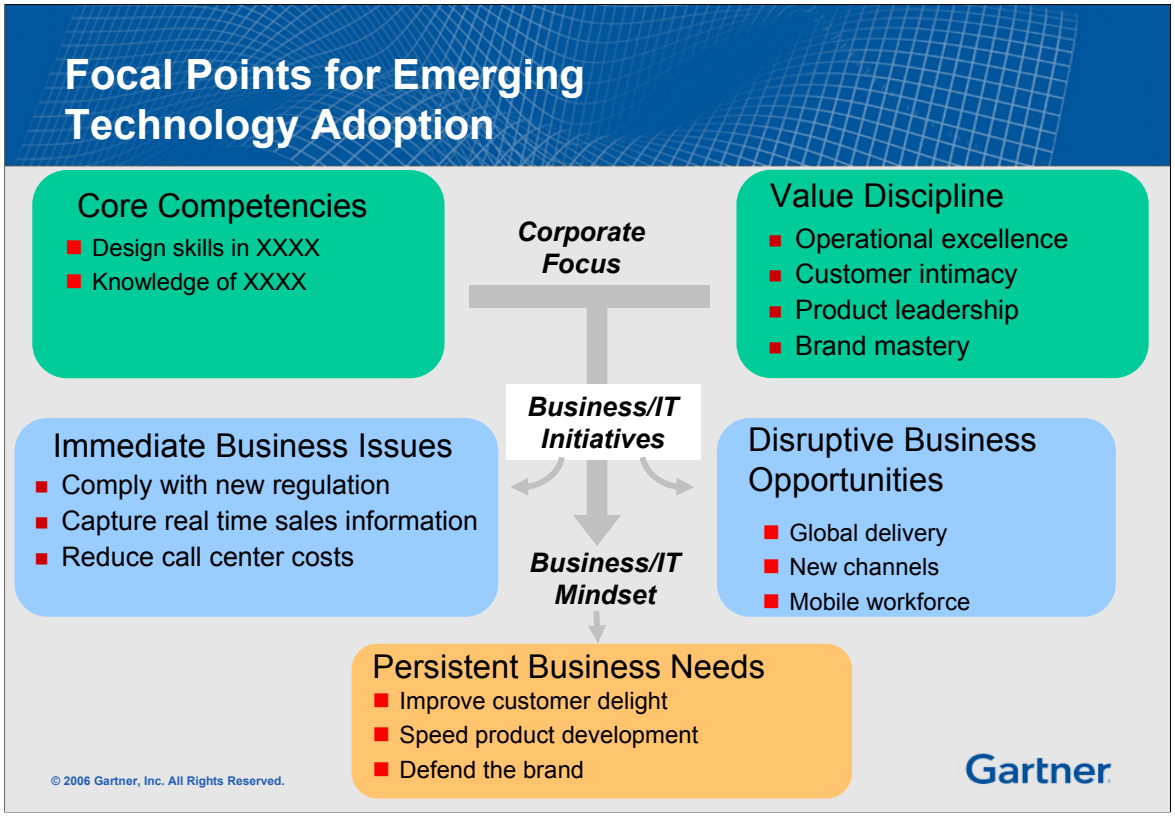
One of the most significant high-level trends driven by IT is the ability to address all kinds of business problems — interactions, transactions, tasks, processes, applications, relationships — at a much smaller level of granularity than has been possible in the past. The modularity of service-oriented architecture, together with digital infrastructures for B2B and B2C commerce, are decreasing the cost and increasing the ability of breaking apart traditional processes into smaller chunks, which can then be re-examined to optimize their delivery options.

Emerging opportunities are arising, in particular, from the ability to let consumers take on more responsibility for activities that have traditionally been performed by companies. The first of these were the self-service applications which eliminated the need for a customer service representative through self-service kiosks and check-outs. We anticipate the next round to be focused on specialized activities that can be packaged in such a way that they can be conducted either by customers (for example, equipment diagnosis) or others in the supply chain (for example, a repair shop performing claims adjustment).



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To compensate for the additional risk and cost associated with emerging technologies and trends, innovation initiatives need to focus on where they can make a major difference.

Many organizations focus their strategic growth around an understanding of their core competencies — deep expertise in technical, process, or scientific domains that can be expanded and leveraged into new products and services, and may be expressed as the company's "value discipline" — the single focal point that defines the company's identity, such as Nike's product leadership or Wal-Mart's operational excellence.

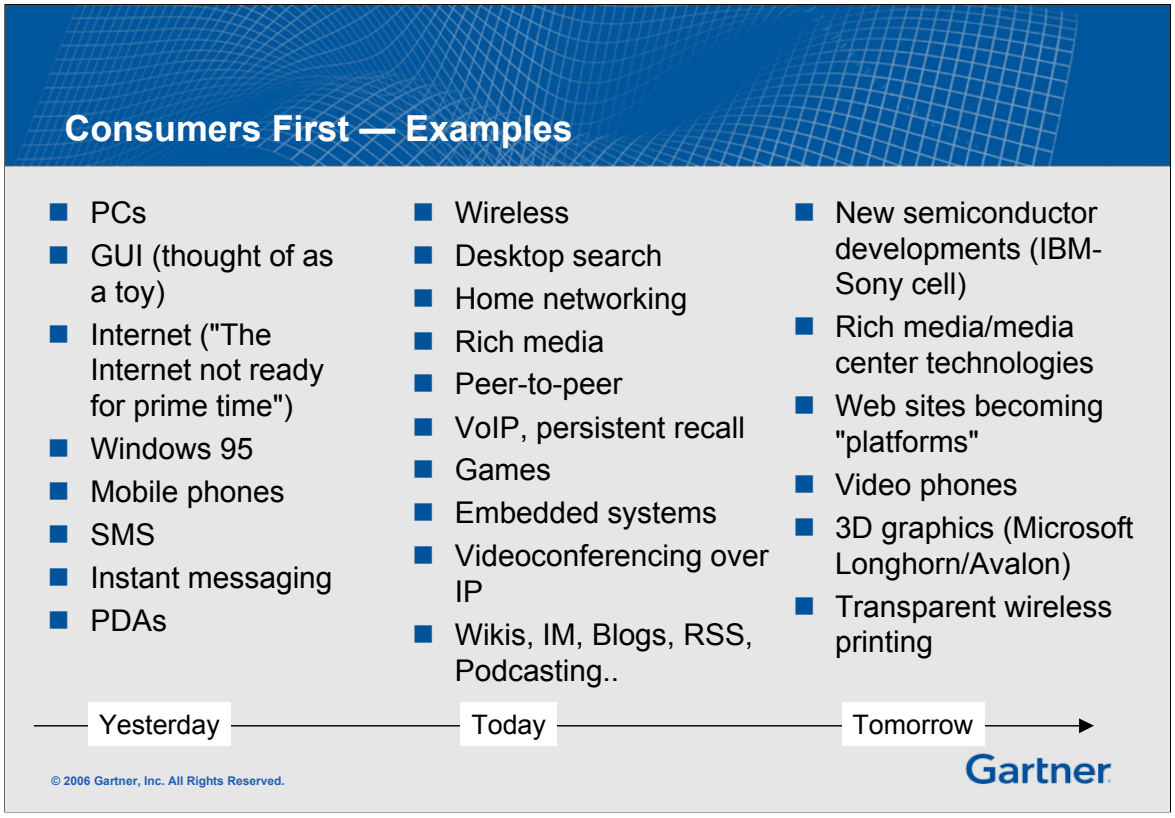
These areas of corporate focus drive three major ways of directing innovation initiatives:

Immediate business issues are reactive initiatives that the company needs to address to retain their current competitive position. In less aggressive organizations they may dominate emerging technology initiatives.

Disruptive business opportunities will affect most players in an industry or business segment. Introducing them at the right time in the right applications can radically improve existing operations with new products, services or methods.

Persistent business needs align closely with the core competencies or the value discipline — they are the areas where a company constantly strives to improve their solutions. These objectives will never be fully resolved. However, even incremental gains against these objectives can improve competitive positioning.

Strategic Planning Assumption: Between 2007 and 2012, the majority of new IT technologies that enterprises adopt will have their roots in the consumer market (0.8 probability).



Yesterday's miracle is today's normal, which will be tomorrow's inferior.

Many technologies introduced in the past and have found acceptance in consumer markets, only to be ignored by enterprises. Dismissing graphical user interfaces (GUIs) as toys and the Internet as "not ready for prime time" are classic examples. The trend continues today with technologies such as Instant Messaging and games. If history repeats itself, we are ignoring important technologies today that will have impact on all enterprises in the future, including 3D graphics, rich media and consumer-oriented Web sites (for example Amazon and eBay) as platforms.

Most products targeted for consumer markets will have a direct impact on those markets, as well as secondary effects on others, most notably enterprise IT. As a reader of Gartner research, you have the potential to be affected by this trend in two ways. The first way is through the eventual impact of consumer technology on IT. This tends to be a longer-term phenomenon, not obvious at first glance. The second way is as a result of being an early adopter of new consumer technologies — as a recognized technology expert and as a resource within your circle of influence. Gartner clients are often influencers in enterprise IT as well as in early adopter (and mainstream) consumer markets.

Recommendations

- Examine the disruptive potential from the real-world Web in linking objects and places to the information universe.
- Leverage insights from new types of data and metadata, including people to people connectivity, and the creative potential of networked collective intelligence.
- Examine how finer grained applications, processes, products and services can transform the operations and growth of your company.
- Identify the focal points for innovation in your company — where will the risk be justified?
- Balance top-down initiatives to identify and select high impact opportunities with managed anarchy experimentation for personal productivity technology.

"Thus, the task is not so much to see what no one yet has seen, but to think what nobody yet has thought about that which everybody sees."

Arthur Schopenhauer, 1788 - 1860

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