

# think:act CONTENT

Fresh thinking for decision makers

Talking shop – Reaping the benefits of the digital economy | A handful of new technologies are shaping the evolution of IT and communication | Companies in virtually all industries must rethink their strategies | Have you charted the right course to tap the vast potential ahead while minimizing risk?

## [GROWTH SEGMENTS]

*In a recent study conducted together with the German high-tech association BITKOM, we examined about 300 technologies in terms of their future growth potential and strategic relevance.*

*We think that 5 of these 300 technologies deserve special mention.*



### BIOMETRICS...

*...refers to the use of automated methods to recognize individual people by comparing physiological or behavioral attributes with electronically stored data.*

**Forecast:** The International Biometric Group reckons that the biometrics industry reached a global sales volume of EUR 1.3 billion in 2005. This figure

is expected to rise to around EUR 4.8 billion by 2010 – an average annual growth rate of 30%.

**Lead industries:** Consumer services (banks, retail, transportation), public sector

**Corporate functions affected:** R&D, Marketing & Sales

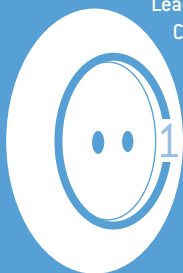
### IT UTILITY SERVICES...

*...enable flexible access to IT capacity and the associated services. The term "utility" underscores the idea that accessing IT resources should be as simple and flexible as being supplied with electricity, gas and water. In line with the distinction between software and hardware, IT utility services are split between "software as a service" (SaaS) and utility computing.*

**Forecast:** In 2005, the world's market for IT utility services reached a volume of around EUR 23.5 billion. At a projected average annual growth rate of 35%, it should grow to some EUR 106 billion by 2010.

**Lead industries:** Financial services, telecommunications, pharmaceuticals

**Corporate functions affected:** Marketing & Sales, Purchasing, Production



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### SERVICE-ORIENTED ARCHITECTURE (SOA)...

*...breaks the applications used by enterprises down into individual services. These services exist as discrete software modules that can communicate with each other directly and via a shared platform. Each service models a real business activity.*

**Forecast:** The global market for SOAs will grow from EUR 9 billion in 2006 to EUR 38 billion in 2012. That is equivalent to annual growth of 43%.

**Lead industries:** Financial services, automotive, logistics, retail

**Corporate functions affected:** All functions



### EMBEDDED SYSTEMS...

*...are programmable components that are these days built into virtually every manufactured product – from mobile phones to passenger aircraft. The software contained in these systems is normally developed to serve precisely defined functions, often has to get by with a minimum of storage and processor resources, and is designed to maximize reliability.*

**Forecast:** In light of its importance to all aspects of the manufacturing industries, our estimates put the global market volume for embedded systems at EUR 136 billion even today. Between now and 2010, this market will grow at a rate of 9% per annum.

**Lead industries:** Automotive, aviation, machinery, consumer electronics

**Corporate functions affected:** R&D, Corporate Development



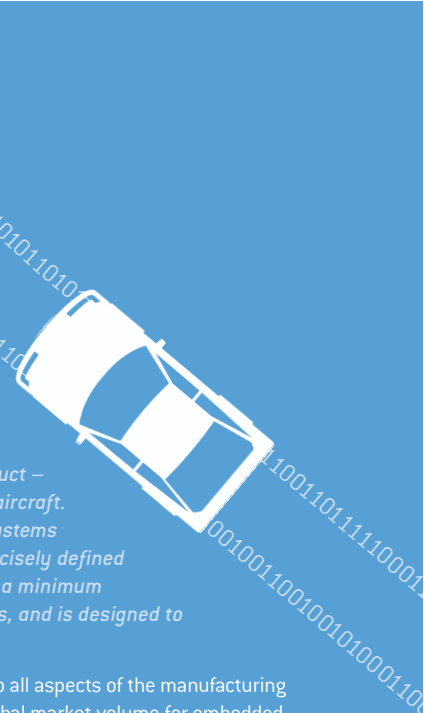
### DIGITAL RIGHTS MANAGEMENT (DRM)...

*...is the collective term for methods used to protect the copyrights and marketing rights of digital content. DRM systems are used primarily for software, digital audio and film recordings and electronic documents.*

**Forecast:** According to our estimates, the DRM industry is set to expand by 34% per annum. It will thus grow from EUR 0.48 billion in 2005 to EUR 1.55 billion in 2009.

**Lead industries:** Media, automotive, financial services, healthcare/pharmaceuticals

**Corporate functions affected:** R&D, HR, Corporate Finance, Sales



## A MATTER OF LIFE OR DEATH

Your hand is accepted anywhere in the world as a bona fide credit card. BMW calls itself a software company. Even industrial espionage agents cannot crack your documents. The people at IT smile benignly when asked where the server room is. When a company is taken over in the morning, its systems are fully integrated before everyone goes home in the evening.

A distant future vision? Not really. In essence, some of the above statements are already present reality. Others are well on the way. The daily routine is going digital – just look at Web 2.0 and “Second Life” – and business processes are changing radically as it does so. Information and content that you used to be able to sell for good money now becomes freely available overnight. Suppliers, partners and customers can and must be integrated more deeply in the value chain. Huge volumes of data, and hence large swathes of functions that used to be strictly internal, can be outsourced at will. Hitherto distinct markets are converging relentlessly. All kinds of things are being “networked”, with all the opportunities and risks that this entails. In this frighteningly fast-paced environment, quickly spotting the strategic importance of developments in the IT industry is quite literally a matter of corporate life or death.

In numerous studies and strategy projects, we have applied ourselves to answering two pivotal questions: What technology trends will have the greatest impact on enterprises in the years ahead? And how will these trends change processes, business models and markets? We would like to share with you what we have found: five strategic dimensions of growth whose profound importance cuts straight across every industry and market.

### EMBEDDED SYSTEMS: KILLER APPS IN DISGUISE



Why does the world sit up and take so much notice when Apple launches a new product? Neither weight nor design nor the number of functions pose any real threat to rival offerings. Essentially, it is the radically new software that is embedded in the device. What made the iPod a huge seller could now, in the shape of the Apple iPhone, revolutionize the mobile phone market too. The secret? The product and its embedded software blend together so perfectly that the iPhone is ingeniously simple and intuitive to use.

It is fair to say that embedded systems have already become the key driver of product innovation. And this statement is by no means restricted to consumer electronics alone. Electronic content accounts for an estimated 90% of innovations in the automotive industry as well. Some ten million lines of software code are written into every vehicle that rolls off today’s production lines – about a quarter of the programming volume of Windows XP. What makes embedded systems so strategically important to the manufacturing industry, however, is the reliable protection they can give to intellectual property. This is especially true in high-tech disciplines such as industrial automation. Imitations may look deceptively authentic to the naked eye. Yet it is extremely rare for them to reproduce the accuracy, reliability and clock rates of the “real thing”, simply because they lack the original control software. Our project experience shows that, increasingly, decisions about embedded systems are having to be taken at top management level. The main reason is that embedded systems open the door

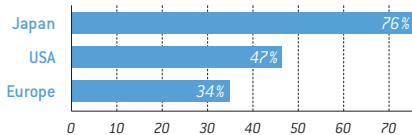
# 80%

*According to estimates by the Japanese Ministry of Economy, Trade and Industry (METI), products that contain embedded systems account for around 80% of the total value added in technology-focused sectors (machinery, industrial systems, transportation and electronics) in modern industrial economies.*

to business models and collaborative ventures that, in not a few cases, can have a major impact on the future of the company. Here again, Apple presents a fine example. It was only the link to iTunes, the commercial online platform for music downloads, that enabled the iPod to achieve a dominant market position.

➔ In dealing with embedded systems, your enterprise must change the way it thinks in order to master the growing challenges. As such systems become increasingly complex, they also become more and more vulnerable to defects, as can be seen in the automotive industry. Here, software errors are at the root of around 50% of all recall campaigns. The main thing to watch out for is absolute reliability, which is fundamental to the success of embedded systems. In practice, we have found that anything less can indeed have a negative impact on perceived product quality. If new electronic components work anything less than perfectly, your users will quickly start calling for a return to their “good old” analog predecessors. In addition, time to market is becoming an increasingly important factor in the global innovation arena. Development cycles are therefore constantly shrinking. Manufacturers that have seen themselves as hardware makers up to now must effect a strategic realignment and become software vendors. One way to do this is to standardize development platforms and operating systems. Another is to go the way of international specialization – an imperative if development lead times and costs are to be reduced. On this score, Japanese and US players evidently make far greater use of outsourcing opportunities than their European counterparts.

### COMPARATIVE OUTSOURCING RATES FOR THE DEVELOPMENT OF EMBEDDED SOFTWARE



Source: METI

In 2007, we will begin to seek the answers to the question, “Which information do we trust?”

Raymond Karrenbauer,  
Chief Technology Officer, ING Insurance Americas

### BIOMETRICS: THE PASSWORD’S DAYS ARE NUMBERED



Find the right cash dispenser in Tokyo and you can watch as customers insert their card in the machine and then place their hand over it, as though they were giving it their blessing. A built-in device from Fujitsu verifies in seconds whether the vein pattern in the card-holder’s hand matches the data stored on the card itself. Feedback has been so positive that the Mitsubishi Tokyo Bank wants to install the new security system at 6,000 ATMs in future. According to the bank’s own information, 900,000 customers already use this new technology.

It is only a matter of time before biometric technologies will replace conventional authentication methods. Given the heightened need for security in the wake of the 9/11 terrorist attacks, public-sector orders alone are expected to drive very rapid growth in this market. Where people are required to authenticate themselves securely, biometric methods are vastly superior to conventional procedures. Also in the private sector, magnetic strip cards, PIN codes and passwords will no longer be enough to safeguard sensitive company data and premises as security requirements grow ever tighter. US cooperative bank Telesis Credit Union used itself as a guinea pig and tried to hack into its own systems. Within 30 seconds, the team had cracked about 80% of the passwords used in its corporate network. The strategic significance of strict security standards will increase still further as more and bigger business transactions take place with no personal customer contact whatsoever. This is especially true for e-commerce. A study commissioned by IBM in the USA found that 49% of online shoppers would feel more reassured if biometric access protection was introduced.

Moreover, one should not ignore the fact that biometric attributes are inextricably bound up with the individual person and can therefore be used effortlessly and at any time. This gain in convenience – being able to pay with nothing but a fingerprint, for example – will very likely generate fresh impetus in the retail sector.

➔ The crucial factor when introducing biometric methods is user acceptance. For instance, one reason why the hand vein scanner used at Japanese cash dispensers is so successful is that it works without physical contact. Female customers in particular reject fingerprint sensors because of concerns about hygiene. You must likewise take care to ensure that the data protection legislation in a given country is not violated by such systems. In Germany above all, that is no easy task. Finally, it is important to examine this still youthful market very carefully indeed. The mass-produced “killer application” that meets all security expectations has yet to be chosen.

#### DIGITAL RIGHTS MANAGEMENT: THE TIME-BOMB IS TICKING...

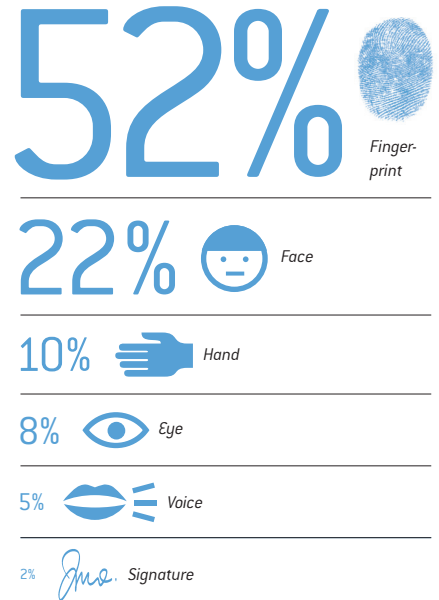


The number of cases in which companies present their figures earlier than planned has been growing of late. And the reason is the same every time. Some leak in the data exchange process has prematurely made confidential insider information publicly accessible. Damage costing millions can be wrought in seconds as a result.

Up to now, Digital Rights Management (DRM) has gained ground primarily in the media industry, where it is used to solicit fair payment for digital content. The media industry was too slow to provide comprehensive protection for its copyrights – partly because it failed to grasp the strategic dimensions of developments in IT. As a result, it is now missing out on revenues of an estimated EUR 3.5 billion per annum. In future, however, the application of DRM in other industries will also come up for discussion. Especially in automotive engineering, finance, healthcare, pharmaceuticals and the public sector, the need to reliably protect digital documents is rapidly gaining in importance. The relevant technologies are currently being bundled under the term enterprise DRM (EDRM). And it is these technologies that will at last empower companies to exploit the full benefits of international specialization. Like biometrics in the realms of personal authentication, DRM is far superior to conventional ways of protecting digitally stored content. With this approach, protection is built into the file itself. The actual protective mechanisms are almost infinitely variable. Specific settings can prescribe that a document can only be opened in a certain person's mailbox, say, or that content is visible only for a limited period of time.

➔ The need to create workable EDRM environments poses problems to many firms. Like other companies, you too will understandably want to introduce one wall-to-wall system that, at a stroke, protects every last file and will also accommodate all future requirements. Such systems quickly become too complex and too expensive, however. That in turn can jeopardize the entire project. In most cases, it makes better sense to split DRM projects into discrete modules, and to begin by trying out data exchange processes within restricted user groups. Particularly where heavy protection is needed, there is the danger that even the intended addressees will be unable to open documents. This can happen because “unau-

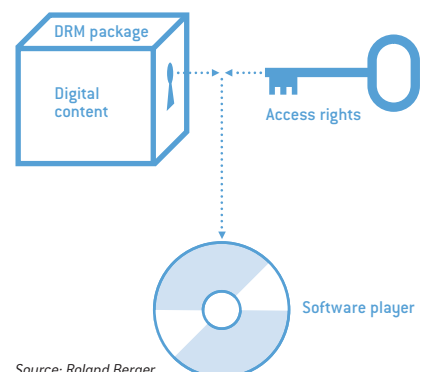
#### THE LEADING BIOMETRIC TECHNOLOGIES BY GLOBAL MARKET SHARE



Sources: International Biometric Group; Roland Berger

#### HOW DRM SYSTEMS WORK

Data from the content server is “packed” in DRM systems. This data can be read only if the users are assigned the required access rights (keys) through a license server. This process is repeated for each and every read operation to avoid data protection becoming undermined.



Source: Roland Berger

# 10-20%

*Calculations by the market researchers at Gartner Group indicate that most companies significantly oversize their IT infrastructures. According to Gartner's data, only 10 to 20% of available capacity actually gets used.*

thorized" search programs are installed on their computers, for instance. Prior to enterprise-wide roll-out, you must also engage in intensive testing. This is necessary because the practicalities of handling have to be attuned to specific business processes. For example, it may be necessary to decide whether a certain level of protection has to stay with data once it is copied from an Excel spreadsheet to the clipboard. Once workable solutions have been found, decisions will frequently have to be taken in your boardroom. Examples include exactly what company data should be protected automatically in future, or what you want to do with sensitive data that is already archived.

## IT UTILITY SERVICES: SAVINGS AND BENEFITS



When Marc Benioff began marketing a web-based customer relationship management application and announced the "end of software" in 2000, he was ridiculed. Today, his company [salesforce.com](http://salesforce.com) boasts some 27,000 customers and, according to its own forecasts, posts annual sales just shy of half a billion dollars – and that on the home turf of incumbent heavyweights such as SAP and Oracle.

Any business that wants to stand up to global competition must be able to respond swiftly and flexibly to ever shorter technology cycles and pronounced fluctuations in demand. And then there is the fact that today's firms experience fundamental change far more frequently. They plunge into new lines of business, merge, and sell off or outsource whole units in rapid succession – ideally accompanied by commensurate IT resources in each case. This is precisely where IT utility services come in. The services provided are scalable and charged on a pay-per-use basis. The customer company doesn't have to buy the hardware or software. Given the growing cost pressure in many industries, this whole subject area is extremely important to top management. Estimates by the Gartner Group market research organization suggest that IT utility services can save a company between 10 and 30% of its hardware costs – and as much as 30 to 60% of the associated personnel expenses. Using utility services can yield more benefits than just greater flexibility and lower costs, however. This is true especially when a service provider makes applications available on a central server, a model known as "software as a service" (SaaS). This arrangement allows partner companies up and down the value chain to access the same programs and even the same databases. As a result, even more money can be saved on updating customer and order data or inventory lists, say. Again, Gartner estimates that by 2010, the average firm will source 30% of its software as services.

"Since the industrial revolution, we have seen numerous examples of infrastructure technology, such as steam engines, electricity, telegraph, telephone systems and highway systems; and it is my argument that IT falls into that category."

*Nicholas Carr, former executive editor of Harvard Business Review*

➔ Bear in mind that a transition to IT Utility Services will lead to structural changes in the IT organization. If you migrate to utility models on a piecemeal basis and without making the necessary preparations, be prepared for a rude awakening! Situations can quickly arise where your in-house IT unit no longer has the required access rights, but where no-one with the relevant knowledge is currently available at the service provider. It follows that you must know exactly what resources and service levels are needed. When choosing an IT service provider, it is important to closely examine whether the company is really able to deliver full service. One significant factor can be a global network of service staff that can quickly resolve problems arising at any of the user company's sites worldwide.

Before you sign the contract, every worry about data security and system performance must also have been cleared up to your complete satisfaction. In addition, you should also know exactly how much it costs to provide these services in house before signing on the dotted line. It is not unusual to find that a full-scale IT audit is needed up front.

## SERVICE-ORIENTED ARCHITECTURE (SOA): A BIG BANG IN THE SYSTEM



“Harrods”, the famous British department store, has been striving to deliver excellent service to its customers since 1834. In the real world, the policy works well to this day. The advent of the digital age gave rise to certain problems, however. Customer information was entered concurrently at too many places. Address data for one and the same person contained inconsistencies. Coordinating direct marketing activities thus became an impossible task. Now, the venerable store is implementing a completely new service-oriented software architecture.

As globalization has advanced, corporate structures and processes have been completely transformed over the past ten years. Flexible integration and removal has become a critical success factor. Departments such as R&D, Purchasing, Production and Sales are increasingly regarded as bundles of loosely connected functions whose processes can be mixed and matched in varying permutations. IT infrastructures – especially those originally designed to fit the silo mentality of long-defunct departments – sometimes have a hard time keeping up with such permanent metamorphoses.

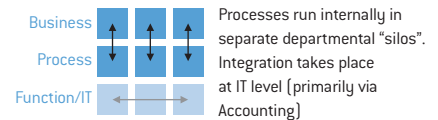
Accommodating incessant change in business processes is at the core of the service-oriented architecture concept. Put simply, SOAs are not about configuring programs for specific applications. They are about breaking business processes down into individual components and mini-programs that can themselves then be mixed and matched in any way.

Which is precisely why they are so useful. SOAs align IT processes with a company's real business processes better and more quickly. Seen from this angle, they are more of a management issue than a purely IT issue. True, potential savings of between 2 and at most 10% can be realized on the IT side. Yet the benefits accrue to the entire enterprise. Processes that are less complex, more flexible and facilitate rapid responsiveness are a vital ingredient in keeping a company competitive. IBM reckons that two-thirds of SOA customers use these new technologies to tap into new business.

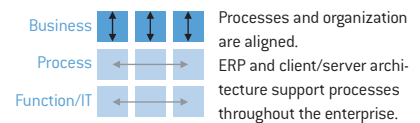
➔ The potential benefits of a service-oriented architecture are evidently immense. However, if you go ahead with hasty, ill-planned implementation, you can expose your firm to just as many risks. SOAs are not a one-size-fits-all solution to every IT problem. Nor will the investment pay off for every company. The decisive issue is whether the flexibility you gain by using the new architecture measurably contributes to business performance. Only then can you truly justify the usually considerable expense of migration. An SOA roll-out must therefore line up with a coherent, long-term IT strategy that itself dovetails with your company's strategic objectives. Again, a thorough process audit is an essential prerequisite. Not even the most advanced IT infrastructure can remedy the negative consequences of defective or inefficient processes.

## SOA – THE ENTERPRISE-WIDE INTEGRATION OF IT, PROCESSES AND BUSINESS

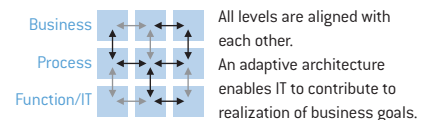
### Vertical functions 1970–1990



### Horizontal functions 1990–2000



### Integrated functions 2000–2015



Source: Siemens SBS, Roland Berger

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