

White Paper

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# Future Focus: Business Technology

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In association with



The word 'recession' is on everyone's lips, yet already there are quiet murmurs of recovery. Exactly when the economy will grow again is unclear. But recovery is certain.

Equally certain is the fact that some companies will emerge very strongly from the current economic problems. Part of their success will be down to reorganisation and improved efficiency. But most of this rapid success will be due to strategic decisions taken now.

Future Focus is a multi-media programme organised by the Telegraph Business Club to help senior personnel within medium-sized UK businesses to make inspired strategic decisions that will drive business success during economic recovery.

The highlight of the Future Focus programme is a series of full day business conferences around the UK and Ireland taking place to:

- **INFORM** - Give an expert insight into future products and technologies that are just about to have a major influence on our life and work.
- **INTERACT** - Allowing you to meet and talk with fellow business professionals and expert speakers.
- **INSPIRE** - Provide the opportunity to discuss and explore how they can be used to drive business success in the coming months and years.

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## INTRODUCTION

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If you prang your new BMW and the air bags deploy, it is now possible for some models to automatically transmit this to the manufacturers so they can alert the emergency services. If you're in hospital in Madrid and a nurse tries to administer the wrong drug, technology exists that could set off an alarm. If you buy a chop in a Norwegian supermarket, you could be told the name of the pig it came from.

These are just three out of thousands of examples of how electronic intelligence is finding its way into things that have no obvious connection with computing.

"The world is getting smarter, not metaphorically but literally," says Samuel J. Palmisano, chairman, president and CEO of IBM. "Intelligence is being infused into the way the world actually works - the systems, processes and infrastructure that enable services to be delivered and physical goods to be developed, manufactured and sold."

Take radio frequency identification, or RFID, tags. These are 'smart barcodes' that can be automatically read by machine, and they're already revolutionising supply chains in every field from groceries to health care.

In the future, says Clive Harris, chief innovation officer at IBM UK and Ireland, an even smarter kind of RFID called near field communications (NFC) should enable a wide range of new ways of doing business. It's already used for electronic payments, such as the Oyster cards with which Londoners pay bus and tube fares, and NFC chips are starting to be included in mobile phones.

Soon, says Harris, if you see a poster for a sporting event, you may be able to swipe your phone over a chip on the poster, pay for admission on the spot, and receive an electronic 'ticket' on your phone that will open the turnstile at the venue - all without any paper, postage or human intervention.

It sounds idyllic: an intelligent, interconnected world promising everything from more efficient transport systems and lower energy consumption to fresher food and better health care.

The trouble with this utopia is that the more intelligent devices you have and the more you measure things, the more data you get. Many businesses are already buckling under what Palmisano calls this “data tsunami”. Yet within three years it’s predicted that the tsunami will be 10 times as high. How will we cope?

Search engines are being streamlined to deliver only the information we want. “There’s an increasing emphasis on relevance, personalising results for specific groups of people depending on their job function,” says Robert Whiteside, UK head of enterprise at Google. Today’s search engines still need to be told what’s of interest to each individual, but in future we can expect them to learn this simply by watching how we work and who we interact with.

A decade ago, most business-critical information was generated and stored by centralised systems - production, sales, finance etc. The problem now, says Martin Sadler, a director of HP Labs in Bristol, is that much valuable information is buried in ‘unstructured’ formats such as emails, web pages or wikis. So HP’s researchers are developing ways of combing multiple information sources to create a complete picture. A sales person visiting a client could be presented with not only the client’s purchase and payment history, but comments in colleagues’ emails, opinions of the company on public blogs and even news stories from the web.

The computer that reads on your behalf is no longer science fiction. IBM’s Cobra software can help read what people are saying about a company or its products on blogs, wikis and social networking sites, and even work out whether comments are positive or negative.

Technologists are also working on ways to interpret non-verbal information. IBM is developing smart surveillance solutions that make sense of CCTV footage. If someone’s hanging around a bank cash machine but not withdrawing any money, the system could automatically alert a security guard to take a look. The technology has applications far beyond security. A retailer, for example, could analyse why some aisles in its stores are more popular than others, or how often shoppers look at an item but don’t buy it - just as online retailers can already track the movements of visitors on their websites.

Computers are developing sufficient intelligence to make decisions off their own bat. When a customer tries to contact an organisation, the quality of service and the choice of options they receive could be influenced by the value of their custom, as assessed by the company's CRM (customer relationship management) system, says Ian Jones, head of strategic solutions at customer service software vendor eGain. Critical factors could include not just how much they buy and how promptly they pay, but how often they complain or even how many people they know (and therefore how widely they could praise or malign the company).

Despite repeated predictions about the 'paperless office', paper is still very much with us, so it, too, is being processed more intelligently. Xerox has software that can help distinguish between, say, invoices, letters and application forms just from their general shape so they can be routed to the right department, and it can help pick out documents containing key words like "cancel my account" for the most urgent attention.

"It's not just a matter of cutting costs but adding speed," says Andy Jones, general manager at Xerox Global Services, Europe. "You want to be able to address the customer's problem before they really do cancel their account!"

Powerful tools are being developed to analyse this tsunami of information and turn it into the kind of knowledge that business people need to make decisions. This may not be just for senior managers, as in the past, but for anybody in the organisation who needs knowledge and insight to do their job better, from sales reps to help desk operators.

Crunching the numbers is something computers have always done well, but as much effort now goes into presenting the results. "People are very visual animals so visualisation of information is a big trend," says Peter Cochrane, an independent consultant and former guru-in-chief at BT. "You can get 3D colour animated graphs that roll dynamically with a time clock so you can see the way things are changing."

Multinationals and governments can hire boffins to harness all these jaw-dropping developments in 'smarter world' technology. For the rest of us there is 'the cloud'. You're going to hear a lot about the cloud, which Sadler calls "The transformational business technology for the next three years".

In essence it's a pick'n'mix goody box of IT applications and services, available on demand and at low cost via the internet. Pioneered by companies such as Google and Salesforce.com offering personal productivity or CRM applications, the cloud can already supply all a mid-sized company's core IT systems, from accounts and stock control to email and electronic commerce.

In the near future the cloud is set to expand exponentially to include services and professional expertise as well as software - ideal for mid-sized firms that don't employ their own experts such as graphic designers or electronic payments specialists.

"The cloud is going to enable collaboration on innovative projects between companies," says PoI Mac Aonghusa, chief technology officer at IBM's emerging business centre in Dublin. "You'll be able to say, 'I've got this piece of innovative work that I want to move outside the team'. There's an emerging market for tools to enable this kind of collaboration."

"Companies will potentially have much quicker access to things that aren't necessarily their core business," says Sadler. "Everything your company does could be like eBay or Amazon. If you want to get your logo redesigned or create a company magazine, you could put it out to tender in the cloud and the service will be provided at a fraction of the current cost. And if you've got a great business idea, you should be able get it to market much more quickly without having to do everything yourself."

For mid-sized firms it will be the key that unlocks the door to a smarter world.

## **A SMARTER PLANET**

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"We know the world is getting smaller, but it's also about to become a lot smarter," says Samuel J. Palmisano, chairman, president and CEO of IBM.

"Our world is becoming 'instrumented', with sensors embedded across entire ecosystems - supply chains, healthcare networks, cities, even natural systems like rivers. There will likely be four billion mobile phone subscribers by the end of this year, and 30 billion radio frequency identification tags produced globally within two years.

“Because of this, our world is also becoming interconnected, with systems and objects able to ‘speak’ to one another. Think about the prospect of a trillion connected and instrumented things - cars, appliances, cameras, roadways, even pharmaceuticals and livestock - and the unprecedented mountain of information their interaction will produce.

“New computing models can connect all these smart things with powerful back-end systems. Put them together with advanced analytics and new computing models like clouds, and you can turn mountains of information into intelligence - intelligence that can be translated into action, making our systems, processes and infrastructures more efficient, more productive and responsive. In a word, smarter.

“The world is getting smarter because it must. Consider how much energy we waste; how gridlocked and polluted our cities are; how inefficient our supply chains are; how much food we waste; how antiquated our healthcare systems are; and how we couldn’t foresee the recent crisis in our financial markets.

“At IBM we know that systems, processes, infrastructures and industries can become smarter, because we’ve looked at some of the most successful and transformative solutions that we’ve helped create and deploy with our clients. More and more businesses, institutions, cities and governments are rethinking their operations and applying instrumented, interconnected and intelligent technologies in new ways, to create smart traffic infrastructures, smart power grids, smart food systems, smart healthcare, even smart money.

“In the vast majority of cases we can expect to see better productivity, greater efficiency, better responsiveness and better profitability. Businesses know they need to prepare for competitiveness and prosperity in a new economy and a new world. The latest technology and the most modern business designs and models will be a significant competitive advantage for them.”

## TOUCH AND GO

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Near field communications (NFC) technology promises to revolutionise the way individuals interact with the 'smart world' around them. It's a souped-up version of RFID (radio frequency identification), the 'smart barcode' technology that's used in everything from department store security tags to tracking goods throughout supply chains.

NFC enables two 'intelligent' devices to exchange information when they're touched or brought close together. You could swap electronic business cards with someone by touching phones, or synchronise your diary between your phone and your computer.

But as intelligence becomes embedded in the world around us, there's almost no limit to the things we could interact with. With our NFC-enabled phone we could unlock a smart hotel room, pick up information from a smart advertising poster, check the dosage on a smart bottle of pills, call the repair man when our smart washing machine conks out, check our own blood pressure and beam it straight to our doctor, or download a street plan when we arrive in a strange city. And we could pay for virtually any goods or services - as Londoners already pay for bus and tube journeys with their Oyster cards, which use NFC technology.

In Holland, grocery retailer Albert Heijn has installed a self-service sandwich and drinks counter. Busy lunchtimers can grab a torpedo roll and a bottle of pop, swipe the shelf-edge to record what they've picked up, and swipe a smart checkout point at the store exit to pay for their grub. No queuing for the punters, no bother with checkouts or small change for the retailer.

"We expect NFC to be the future of payments - 40 million people already use it in the Far East - but it provides so much more than payments," says Clive Harris, chief innovation officer at IBM UK and Ireland. NFC is already included in mobile phones by manufacturers such as Nokia, and it could become commonplace in handsets within 18 months, Harris adds.

## SURFING THE DATA TSUNAMI

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With data volumes doubling every year, search technology will need to become a lot smarter if we're to keep from drowning in the 'data tsunami'.

“Searching will have to be as customised to each user as possible,” says Craig Carpenter, vice president of marketing at enterprise search specialist Recommind. “If an IT person searches for ‘Java’ they’ll want references to the programming language; someone in Procurement will probably be looking for coffee!”

It’s relatively easy to record someone’s job function, seniority and location and start tailoring search results to match. But soon search engines could be looking at who we communicate with (e.g. by email), who we like and trust (e.g. by linking to their web pages), whose stuff we’ve read and praised, what languages we speak, and what we’ve searched on before, to build up a much more detailed profile of our possible preferences, says Carpenter.

Similar technology could work out who’s an expert on particular topics so that staff can search their organisation for expertise as well as information. And searches could aggregate information from within the organisation and outside: on the web and from subscription services such as Reuters and Bloomberg. “Siloed information does nobody any good, so people want one search that covers all the sources, although it isn’t easy,” says Carpenter.

“Search results may not be restricted to the precise terms you used because you don’t always know exactly what you’re looking for,” Carpenter adds. So a search on ‘XYZ Bank India divestiture’ might find references to any bank pulling out of foreign markets.

Even pictures, audio and video could be fully searchable. It’s already possible to tell whether a picture contains a face, or scan CCTV footage for the moment when a door opens. Before long we could be able to identify the person who’s coming through the door.

And speech recognition software from companies such as Aurix can already help pick out key words from live or recorded speech. “It’s a matter of extracting patterns from a stream of noise,” says Aurix’s chief executive, Peter Rogers. “That’s exactly what the human brain does, so this is true artificial intelligence.”

## EAR TO THE GROUND

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What do people really think about your company? What are your customers saying about your products? What's the true value of your brand? The answers are out there somewhere, and soon you'll be able to find them.

When it comes to information searching, the real technology win and source of business advantage won't be searches by individual staff, but finding information that the whole organisation wants to know, believes Kishore Swaminathan, chief scientist at consultancy firm Accenture. He calls it "searching at scale".

"Nowadays if you have a complaint about a company you don't have to contact it directly," says Swaminathan. "You can sound off on a social networking site, or make a funny video of how the company messed up and post it on YouTube. By intelligently mining this kind of information it's possible to get a good feel for a company's brand value. You're trying to put your arms around not just information but opinion and sentiment."

IBM's new Corporate Brand and Reputation Analysis (Cobra) software aims to do exactly that, trawling websites, blogs and wikis for specified keywords. It has the potential to search historical data and monitor new references in real-time, and can help distinguish between positive and negative comments. If it finds that other words or phrases often occur together with the keywords, it offers to search for those as well - a kind of artificial intelligence.

Cobra has already been used by Kraft in Australia to suss out people's attitude to Vegemite (Kraft was delighted to find the word "love" frequently associated with its product, and that people seemed obsessed with how they ate it, so it redesigned its marketing to capitalise on this. And a UK retailer launching a new product used Cobra to spot that, although people sounded positive about the product itself, they complained about a lack of information, and their friends were suggesting competitors' products as alternatives. The retailer rectified this at once by updating its own website with the necessary information.

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## BUSINESS INTELLIGENCE

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Business intelligence (BI) - joining the dots between thousands of scraps of data to create a coherent picture - is the top technology priority for chief information officers worldwide, according to analyst firm Gartner. "BI is even more important when times are tough," says Gartner's managing vice president, Ian Bertram. "It can help find bottlenecks and inefficiencies or expose areas that are profitable." He adds that ever-increasing data volumes, more regulation, and the modern emphasis on measuring business performance are all driving growth in BI.

Traditional BI systems creamed off potentially interesting data into a separate "data warehouse", but this historical approach is often too slow for today's fast-changing world.

"Real-time BI is going to become much more important," says Peter Walker, managing director of BI specialist Information Builders. He cites a leading UK fashion retailer, which performs real-time analysis on which items shoppers tend to buy in combination. This can be done for any store or group of stores within minutes of customers leaving the shop. As soon as the system spots that, say, blouse A is a hot seller with jacket B, store managers are alerted so they can display the items together.

This is "event-driven" BI: looking out for likely events, identifying them, and using this intelligence to improve efficiency or increase sales. The potential applications are manifold, says Walker, from a call centre spotting that certain types of problem are suddenly escalating, to a distributor realising that it's about to run low on stock.

The next stage, says Walker, is "predictive analytics", that uses past and present data to forecast the future. If you're launching a new product, who's likely to buy it, where, how soon, and through what channels? The answers will help you to time the launch and get your marketing right.

Event-driven and predictive BI need to analyse a complex mixture of historical and real-time data from inside and outside the company, much of it unstructured and of unknown quality. It's a challenge - but one that the information-dependent economies of the developed world will have to meet.

## THE CLOUD

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The IT industry is unsurpassed in its ability to coin the most highfaluting names for almost any piece of arcane technopiffle. So it's doubly ironic that when it devises something which is practically earth changing, the best description anybody can think of is "the cloud".

The cloud harnesses the speed and ubiquity of the broadband internet to deliver almost anything, anytime, anywhere. Instead of owning IT systems or employing expert staff, organisations can rent them, or their services, either full-time or ad hoc when required.

It's been around for years in a small way - that's why we all have Hotmail or Yahoo addresses instead of running our own miniature email servers - but the advent of broadband to both fixed and mobile users has enabled cloud services such as Google Apps or Salesforce.com to support core business applications.

As cloud services multiply, mid-sized firms could shrink or even do away with their in-house IT departments. "You don't manufacture ballpoint pens for your staff, so why are you messing about running IT?" Asks Peter Cochrane, former head guru at BT. "You can't really afford to be running your own email server, web server, application servers etc, usually at a small fraction of their full capacity. On the cloud you get the latest software, far more resilience, reliability and security protection, and the difference in speed is hardly noticeable."

"You can take advantage of many advances in technology that used only to be available to large organisations, and without worrying about a lot of the headaches," says Woodson Martin, EMEA marketing vice president at Salesforce.com.

The cloud could bring about a fundamental shift in the basic economics of business, believes Kishore Swaminathan, chief scientist at consultancy Accenture. "Any successful business today is probably not using its capital efficiently because it's building IT systems for peak capacity, most of which is seldom if ever used. But the moment capabilities can spill over from one company to another, businesses only have to worry about average capacity." Once suppliers have achieved scale across different organisations and

industries with different business cycles, they don't have to plan for peak capacity either, he adds.

This mix of economy, elasticity and scalability could be a winning combination, believes analyst firm Gartner, which places cloud computing in its top 10 strategic technologies for 2009. It's of especial interest to smaller firms, reducing barriers to entry and enabling rapid growth.

Many of the frustrations of IT involve the word "couldn't": we couldn't do this because our IT systems couldn't support it/we couldn't afford it/we couldn't hire the expertise. "Cloud" is, of course, an anagram of "could". Perhaps it's not such a daft name after all.

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## **SUPERCOMPUTING, CLOUD STYLE**

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Supercomputers are the superstars of the technological world, the smartest of the smart. They're unbelievably powerful and they eat complex problems for breakfast. But unless you're a multinational corporation or a major weather forecaster they're not the kind of thing you can afford to keep in the basement.

This is a shame, believes Vuk Trifkovic of analyst firm Datamonitor. The instrumented, interconnected world we're building will generate vast amounts of data for even the most modest-sized businesses.

Software companies such as Cloudera (whose private investors include some big-hitters from the world of IT and telecoms) are developing massively parallel ways to process and analyse loosely-structured data - or, in plain English, ways of extracting the needle from the haystack before your competitors do. But they require the kind of computing oomph that had always been beyond the reach of mid-sized firms - until the cloud blew along.

"With the cloud you could rent space on a supercomputer for a few days," says Trifkovic. "If you've ever said, 'I wish we could do that if only we had the computing power,' now you could be able to. There are a huge number of possibilities to use supercomputing power on issues that might bring you competitive advantage."

You might want to perform a complete analysis of your customer base, or recalculate all your delivery schedules every evening. You might want to simulate a clutch of new product design options without ever building a prototype, or do a risk analysis of your entire investment portfolio. You might want... well, we're not going to let all the cats out of the bag, but you get the idea.

"The companies that figure out how best to use supercomputing power from the cloud to solve business problems have the potential to really prosper," says Trifkovic.

## SAVING THE PLANET

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IT installations waste frightening amounts of electricity. According to IBM, the average commodity server rarely uses more than 6% of its available capacity and in some organisations 30% of servers are never used. Yet IT energy consumption is expected to double in the next five years.

The obvious answer is to have less hardware. The most effective solution, says Anirudh Srinivasan of analyst firm Frost & Sullivan, is "virtualisation" - partitioning a single computer into several "virtual" machines, each of which can run a separate application or system, so you don't need a new server for every new application.

Centralising data storage, removing duplicate data and compressing stored files can significantly reduce the amount of energy-hungry disk storage required, says Srinivasan. There's a trend towards replacing gas-guzzling desktop PCs, that contain motorised disks and fans, with so-called "thin clients" - basically a screen and keyboard that connects to a more energy-efficient central network. And the new generation of "multi-core" processors, that pack several microprocessors onto one chip, use little or no more energy than a conventional single-core chip.

The slimmed-down data centres of tomorrow will also be smarter, says Pol Mac Aonghusa, chief technology officer at IBM's emerging business centre in Dublin. Hardware that's only required to cover peak loads - the monthly payroll run, a surge in website activity, etc - could be powered up on demand, and building services such as heating, ventilation and air conditioning could

be integrated with IT networks so that, for example, the air conditioning could turn itself down when the computing load decreases.

“We’ve already seen savings of up to 30% in the energy cost of data centres,” says Aonghusa.

In the future, atmospheric sensors could know when it’s OK to open windows for ventilation in data centres (not too hot, not too humid etc), and short-range weather forecasts could be integrated to identify the coolest time to switch on computers for a big processing run.

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## LITTLE BRICKS, BIG IDEAS

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Nobody wants to see their brilliant business idea scuppered because “the computer system can’t do it”. Or spot a new opportunity and have to wait six months while the boffins design the necessary IT. Or struggle with a system that simply wasn’t designed to work the way they do.

In future, business people will be able to circumvent these difficulties by building their own systems, thanks to “mashups”. Mashups are built from small building blocks, like virtual Lego bricks, which are created by IT professionals but assembled by end users. If there isn’t a suitable brick, the boffins can make a new one in a few days.

“Mashups allow business people to assemble the bricks into a single user interface that supports what they do in their everyday job,” says Eric Guilloteau, chief executive of mashup specialist Corizon. “Instead of lengthy, big-bang projects you get small, iterative, incremental projects that are more flexible and more relevant to the business. It’s also at least 50% faster than conventional development techniques and the results are 50% cheaper to maintain.”

You can see a simple example at iGoogle, where you can mash up assorted tools and feeds to create your own desktop, but much more elaborate applications are starting to be built. Guilloteau cites a project where call centre agents at BT, faced with the nightmare of navigating 12 separate systems when customers called with broadband problems, mashed up a way of linking these into a coherent whole. This increased the number of problems resolved on the spot by 20%, a huge business saving.

"Mashups are a real thing of the future, because they let you quickly 'mash up' different sources of existing information to create something new," says Darren Adams, messaging and collaboration leader at IBM. This could include a mix of data from within the business - on customers, sales, products and services, for example - with external information such as maps and news feeds. The results could provide new business insights or highlight new opportunities, simply by combining existing data and standard components.

If that sounds glib, consider this. Shakespeare spoke the same language as his contemporaries. But by arranging the words in a new order, and coining new words when existing vocabulary didn't suffice, he created something absolutely unique. Exactly like a mashup.

## **PUTTING USERS IN CONTROL**

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One of the principal complaints about conventional IT systems is that they fail to reflect the true needs of the business - often because they were specified and built by senior managers and technicians who didn't fully understand how the people on the ground actually work.

The answer will be to involve the actual users much more closely in system development, says Phil Gilbert, president of business process management specialist Lombardi Software. Instead of the system telling people how to work, the people at the sharp end will tell the technicians how they want it to work, using technologies similar to social and business networking communities like Facebook and LinkedIn.

"It turns the notion of how you improve business processes upside down, and I think it will be the biggest change in business process management during the next three years," says Gilbert.

Lombardi has measured the benefits of business process automation, which it says can reduce reworking - doing tasks again because someone made a mistake, the data was incomplete, etc - from 40% to 5%. Half of this is due to involving end users in system development, says Gilbert.

“Business process” is a wide-ranging definition. “People are getting worried about the volume of email they receive,” says Gilbert. “But a huge amount of it is actually ad-hoc processes, such as, ‘Read this document, comment on it, and get back to me by Thursday.’”

If the system knew what you did, how senior you were, who you were working with, who your company’s experts were on a certain topic etc, it could potentially second-guess the likely recipients, so you’d only have to click on the ones you wanted. You could also specify a deadline for reply, how often to send a reminder, who to route the document to if the original recipient was away, etc.

Before long IT systems could even be able to identify possible new processes emerging and suggest that these are also formalised and automated, says Gilbert.

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## THE OFFICE OF THE FUTURE

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The average office is full of technology, from IT and telephone networks to air conditioning and access controls. Today they’re separate, but soon they could be able to communicate - with each other and with the human beings they serve - potentially enabling major gains in productivity, economy and energy efficiency, says Marie Puybaraud, director of global workplace innovation at building systems specialist Johnson Controls.

A chip in your mobile phone will open the security doors, track your whereabouts in case a colleague needs to find you, even let you pay for lunch in the canteen. The average office space is only occupied for about half the working day, so it’s unlikely you’ll have your own permanent desk. Instead the building management system could check your diary when you arrive and book you one for the hours you need.

To save you getting backache, says Puybaraud, the desk and chair could automatically adjust to suit your size and shape, either by measuring you on the spot, or because the system already knows your vital statistics. A camera on the computer screen will check your eyes - both to verify your identity (your irises are more unique than your fingerprints), and to ensure you’re not straining them. If you are, the room lighting could automatically adjust.

When you pick up the phone or touch the desk, your temperature and pulse could be monitored to check whether you're getting hot or stressed - both of which are bad for your productivity as well as your personal comfort.

The environment could also benefit. If the system knows a room is empty it could turn off the lights and heating; if it's been empty all day, the cleaners could be told not to clean it. Users could be told their personal environmental footprint and given advice on how to reduce it (like not printing too many documents or leaving their computer on when they go to lunch).

"We're not talking about buildings in isolation any more," says Puybaraud. "You need to think about a building in relation to people and the way the space is being used."

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