

# Technology and growth at mid-sized companies

A white paper by the Economist Intelligence Unit  
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# Introduction

**S**mall to mid-sized enterprises (SMEs) that make intelligent use of ICT (information and communications technology) can gain a competitive edge within their industries. They are able to grow faster—and more profitably—than their rivals. Data integration provides all parts of the business with customised views of the same data, increasing flexibility and accountability. Applications that automate processes such as payroll, accounts payable, customer relationship management (CRM) and inventory management boost efficiency. Through networks, SMEs can communicate from any location with wireless connectivity, access geospatial information, and keep in touch with customers and suppliers from around the world.

But the benefits of technology cannot enable growth without an adequate ICT infrastructure in the country of operation. The better the infrastructure, the greater the impact of a company's technology investments on growth. To the extent the use of PCs is not widespread, broadband penetration is low and people lack the skills necessary to operate in the digital age, technology investments will have little effect on the growth of companies. Only after an adequate ICT infrastructure exists—often achieved at least partly through government policies and programmes—will businesses be able to use technology to reduce costs and accelerate revenue growth.

Of course, technology investment cannot compensate for poor leadership, flawed strategy or sub-par execution. No business can flourish without a coherent strategy and the ability to make it operational, which typically requires investments in multiple areas of the business. But given a realistic expansion plan, the combination of adequate

infrastructure and the technology required to exploit it can help companies to execute faster and more flexibly in order to reach their business goals.

This study takes a two-pronged approach to the issue of technology investments in mid-sized companies. At the macro level, how do investments in a country's ICT infrastructure facilitate the growth of both the overall economy and mid-sized companies? At the micro level, once the ICT infrastructure is in place, to what extent can technology solutions help mid-sized companies adopt industry best practices and achieve their business goals? These questions are answered using three types of research:

- An economic analysis of the effect of investment in ICT infrastructure on GDP growth in 60 countries.
- A worldwide survey of 535 senior IT, financial and management executives at SMEs on the use of technology to achieve business objectives.
- An analysis of the survey results—broken down by the best and worst performers among the company respondents—to generalise about the IT practices of firms outperforming their peers.
- In-depth supporting interviews with 20 senior executives at SMEs in the financial services, professional services, consumer goods, healthcare and manufacturing industries.

## What's unique about mid-sized companies?

SMEs are different: they have fewer resources than giant corporations, less market power and are forced to do more with less. In industries such as financial services and healthcare, they face regulatory burdens that even big companies find challenging; in the



manufacturing sector, they lack the economies of scale that help larger competitors to hold down costs. Mid-sized firms are being squeezed from all sides: larger rivals are trying to edge them out, and customers are gradually exerting their increased power in pricing and the setting of other contract terms. To respond effectively, mid-sized firms must work smarter, using their people and technology to maximum effect.

Despite these challenges, many of the executives surveyed are upbeat about the benefits of working at a medium rather than large organisation –and not just from an IT perspective. Mid-sized companies tend to focus on building a strong niche rather than trying to dominate an entire sector. At small- to mid-sized companies, executives have more control and can adapt more quickly to changing demand and the actions of competitors. Employees are closer to the business, which often results in more job satisfaction. There is less bureaucracy. Smaller groups often result in tighter personal bonds and better communication.

“Mid-sized works better,” says the head of web

communications at a US government agency. “We’re big enough to have our own IT staff of eight or nine and solid IT expertise, but small enough for someone to say ‘That’s not working’ and have it fixed.” A new member of IT staff can be “walked through” the organisation on joining. “We’re big enough too to have IT expertise in the user community [more than 300 staff], but small enough to know each individual.”

The “smaller is beautiful” argument can apply just as much in the world of cyber stores as in the traditional public sector. Stuart Rowe, managing director of play.com, a UK-based online entertainment retailer, explains: “As a smaller company we’ve got advantages over our larger competitors [such as amazon.com]. We don’t have to follow specific policies and can concentrate on the market. It gives us nimbleness and we can use IT to the fullest.” One example is enabling the public to sell its own wares on play.com. Mr Rowe also feels that large corporations are more likely to be lumbered with legacy IT systems, not to mention long-term relationships with suppliers.



## The role of ICT in GDP growth

**M**ore so than their larger competitors, SMEs depend on a well-developed local ICT infrastructure to grow quickly.

Large companies can build their own high-speed communications networks; smaller firms are more likely to depend on local Internet service providers (ISPs) and generic broadband connections. Large companies can afford to bid for scarce IT talent; smaller organisations are much more vulnerable to skills shortages. Large firms can set up specialised procurement operations and buy in bulk; smaller businesses benefit from declining IT prices, but less so.

Empirical research shows that a well-developed ICT infrastructure helps not just SMEs but overall economic growth. ICT drives growth in three ways:

- Countries that produce ICT equipment benefit from rapid productivity growth in the industry (for instance, by leveraging Moore's Law). Countries with a large ICT producing sector—such as Finland, Ireland, Japan, South Korea, Sweden and the US—have experienced faster overall GDP growth as a result. However, this effect is limited to a handful of countries.
- Among users of ICT, investment in ICT is like any other capital investment—it tends to increase the level of productivity by increasing the level of capital investment per worker (the capital intensity of the business). The economy will expand and productivity per worker will increase. Moreover, the cost of this investment continues to decline—while US consumer prices rise at 3–4% per year, hardware prices continue to fall.

- Investments in ICT allow companies to boost what economists call total factor profitability. This is the ability to make more efficient use of all factors of production—for instance, by streamlining organisational structure and internal processes, outsourcing non-core functions, improving inventory management, managing customer information more efficiently, and so on. ICT can also facilitate knowledge management and access to information that forms the basis of scientific and technological breakthroughs.

It is this last driver that resonates strongly with SMEs. The history of failed technology investments is well-known, and continues even a decade after the dot-com boom. Nevertheless, given a strong business case, investments in hardware and software can help SMEs to compete head-to-head with larger companies, while keeping the advantages of being agile, specialised and close to the customer. Examples include both revenue-generating applications such as e-commerce and efficiency-driven applications like supply chain integration and outsourcing.

### How much does ICT help?

ICT clearly helps to drive economic growth, but by how much? According to a model developed by the Economist Intelligence Unit—described in detail in Appendix 2—the contribution varies widely by country.

- For the majority of the most advanced economies, the effect is relatively small, at less than 0.1 percentage points of GDP. But in a country with an enormous GDP such as the US, the cumulative effect over time of even a small effect can be dramatic—almost US\$100bn by 2017, according to our model.



- Some west European countries, such as France and Italy, have slightly higher projected GDP growth contributions than the US. This largely reflects the role of ICT in promoting economic growth the fact that they still have significant catch-up potential in ICT adoption, especially in the retail and wholesale sectors.

- The biggest impact of ICT development on GDP growth will occur in the fast-growing emerging markets like India, China and Poland. The lack of well-developed internal ICT sectors in the poorest countries will constrain growth at first. But even in these countries, early adopters can link to users in other countries, meaning that the benefits will be substantial even at very early stages of ICT development.



## The role of ICT in company growth

**G**rowth at the company level is very different than growth at the country level. Factors that drive GDP growth do not necessarily help mid-sized businesses to grow. Nevertheless, among the executives who took the survey or agreed to be interviewed for this study, most had no doubt as to the impact of IT on the growth of their companies.

“IT has become paramount,” confirms Alan Glazer, president of AGI, a US\$50m Texan financial services company specialising in insurance for law firms and commercial construction projects. This is a sentiment echoed the other side of the globe by Hong Kong-based Alden Poon, vice-president for IT at Concord Camera, a manufacturer with revenue of US\$138m in 2006. “IT plays a very important role in Concord,” he says. “Now, we use [our ERP system] to integrate, monitor and control most business activities and performance of the company.” However, the relative importance of IT varies between different sectors—in certain professional services, for instance, its ability to have an impact on business may be more limited, where the value of business resides solely “between the ears” of employees.

A resounding 78% of survey respondents agree that IT makes their company more competitive, and two-thirds believe that it gives their organisation the flexibility to respond to market changes. The results are reflected globally. In a survey of 300 mid-sized enterprises conducted by the Information Technology Association of Canada (ITAC), 82% of respondents said that they and their senior executives believe that ICT investment is critical to business success, and 77% agreed that ICT investments will drive their firms’ productivity. “It’s clear that SMB owners don’t need much convincing of the productivity and efficiency impacts that ICT can deliver,” says Doug Cooper, chair of ITAC.

To gauge the connection between local ICT infrastructure and company growth, 535 survey participants—senior IT, financial and management executives at businesses with annual revenue between US\$10m and US\$500m—were asked a series of questions on whether and how much different aspects of the infrastructure constrained growth, including:

- broadband and wireless connectivity;
- IT staff and end-user skills;
- resistance of end-users to new technology;
- IT security applications such as firewalls and spam filters;
- hardware such as computers, peripherals and devices; and
- cost and effectiveness of software applications.

Respondents were asked to rate each category of infrastructure on a scale from 1 (not a constraint on growth) to 5 (severe constraint on growth). Although the results varied widely across countries, the rankings were fairly consistent within countries. In particular:

- The cost and effectiveness of the software applications needed to run a complex organisation represent a severe constraint.
- The cost and availability of talent (both IT staff and end-users) is also a serious constraint, as is the resistance of end-users to new technology.
- Availability of broadband is less of a constraint than the cost of broadband, which in turn is less of a constraint than the reliability of broadband.

Between one-third to two-thirds of the respondents agree that all of these areas represent moderate to



serious constraints on growth (3 or higher in the 1-5 rating scheme). Even in broadband connectivity—the category least likely to be called a constraint—one-third of all businesses agree that it is.

## How survey respondents rank ICT constraints on growth

### Software constraints

According to survey respondents, the cost and effectiveness of software applications stand out as a significant constraint on their companies' growth. Almost 70% mention cost, making it the most-cited growth constraint. About 60% are also not convinced that software applications are effective. Although software applications are also mentioned as a high investment priority, vendors who can address cost and effectiveness concerns are likely to find a receptive audience.

Much of the expense comes not from the initial purchase, but the further work and training that companies carry out to make it work for them. For instance, part of AGI's business is in providing insurance for the construction industry. "There's a lot of third-party software that works either for the insurer, or for the construction industry," says Mr Glazer of AGI. "Vendors are stuck on the features of the software and don't see the productivity issue. Some products are so complicated that they take three months to integrate."

Many view increased standardisation as a means of raising efficiency in their IT systems. "We look for standardisation across our look and feel of products and internal systems," confirms Martin Davies, managing director of Causal Capital, a Singapore-based financial services firm. "Most of our internal facilities had to be bespoke designed because no one vendor could meet our precise requirements. For us, this was not a huge cost as we have the internal resources to manage this. However, for some businesses this could be a major problem." Support

is carried out internally because of how the company approaches IT. "This has a cost downside but response upside," he says.

Some companies developing their own applications have found that introducing a combination of automated testing tools and a better process for definition have cut costs. IT staff costs can plummet with improved requirements and change management: companies report a halving of their software development cycle—with a better finished product.

### IT talent constraints

Effective tools and a sound set of processes are especially important for SMEs that face IT talent shortages: more than one-half of respondents say IT staff resources at their company are not adequate to meet demand. A dearth of IT skills continues to block progress for many mid-sized businesses. In fact, getting hold of IT staff with the right skills poses a problem and acts as a constraint for almost 60% of surveyed executives worldwide in achieving their aspirations. Not all are in the position of company chiefs such as play.com's Mr Rowe, who says: "We're lucky. We're one of the world's most trafficked websites and attract good people." For 29%, however, finding IT skills is "serious" to "very serious" in holding the business back.

When it comes to the cost of hiring the right IT people, only one-third of respondents do not find it a restriction to reaching goals. In other words, they can't afford them. This is especially hard for mid-sized public-sector organisations in most countries. They have to compete against private-sector salaries. In fact, part of the reason that the public sector suffers from a large number of problematic IT projects is the lack of basic skills available at the price the public purse can pay. These range from technical know-how to project management ability among the available staff.

Asked about end-user IT skills, 60% in the survey again say this is holding business back, and only 12%



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say this presents no difficulty. Cost, in terms of training and support, is surprisingly high also for end-user employees, acting as a limiting factor for most mid-sized businesses. The company secretary for a UK firm that designs, manufactures and installs process and packaging systems for the food industry, points to another issue with end-user IT skills: employees are too tied up with getting their day-to-day tasks completed to learn how to use more efficient new systems. “Asking people to keep on with their existing jobs, getting them on board [with the new system] and finding time to train is not easy,” he says. “What’s more, there’s the attitude of ‘if I can do the job in X minutes using the previous system, why not carry on?’.”

### Broadband constraints

Broadband coverage varies tremendously within countries. In some cases it covers 99% of the country; in others (Ireland, for instance) it is far lower—and inadequate. “There’s a serious lack of broadband infrastructure in Ireland,” says Jim Curran, head of research at the Irish Small and Medium Enterprises Association. “Even parts of Dublin [the capital] don’t have it yet.” This is, he believes, preventing members from “competing on a level playing field” with large companies. Slow broadband speeds in some countries can mean having to ration the use of graphics, as Asutosh Shah, CEO of Duravit India, a manufacturer of bathroom ceramics, points out. “Broadband is not offering very quick solutions,” he says.

The actual cost of broadband looms as a bigger problem: for nearly one-half of all companies worldwide this is a constraint, ranging from “moderate” to “serious” for a few. Again, broadband reliability is by no means sorted out today: 45% are troubled by this in some way or other. As expected, owing to its relative lack of maturity, WiFi scores somewhat lower on availability, cost and reliability. About 46% are not satisfied with wireless availability, and a majority complain of price and reliability issues.

### How survey respondents rank ICT constraints on growth (% respondents)



Source: Economist Intelligence Unit survey, May 2007.

### Security constraints

Over one-half of the respondents see the cost and effectiveness of their IT security measures as a moderate to severe constraint. One advantage of mid-sized companies is that they are less likely than their larger brethren to be targets and have a less sprawling network to protect; a disadvantage is that they are usually not large enough to have a dedicated chief security officer or a risk department able to formulate a coherent strategy. With IT teams already stretched, maintaining security is a significant issue for mid-sized firms, and many require sound support from a third party.



**Hardware constraints**

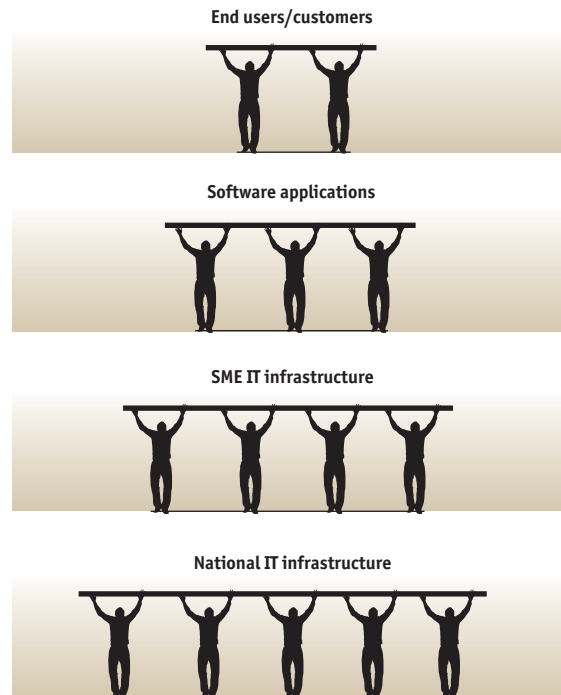
In terms of hardware devices, again most respondents find that cost is restrictive, but executives are divided as to whether reliability is something that gets in the way of business aims. However, a survey of 600 SMEs conducted in 2006 by IDC found that almost one-half of IT spend was going on hardware, one-third to software and 21% on services.

Mr Poon of Concord Camera points out what companies are up against in today’s conditions: “The challenge today is that technology becomes more complicated, in terms of infrastructure, security, variety of tools and multiple platforms.” Technical issues cover multiple platforms including hardware, software, development tools, methodology, and security standards. He adds: “Although hardware has become cheaper, the administrative and coordination effort across multiple teams and expertise becomes another hindrance for the IT organisation to react swiftly to adapt to fast-changing market situations, such as the rate of new product launches.”

**Data integration constraints**

When asked how they rate their organisation’s integration as characterised by how easily employees can assemble and analyse information across functions, business lines or locations, most companies are somewhere in the middle. Sixty-four percent of executives describe their firm’s ability to manage data across different “silos” as “moderate to fair”. Overall, however, the level of IT integration is constraining many mid-sized companies’ aims: 70% believe so, of whom 30% feel it is more than a moderate constraint. Only 6% reckon that their level of IT integration does not restrict them at all. Furthermore, analysis of the survey data shows clearly that those companies that

**Mid-sized company IT infrastructure framework: national foundations to end-users**



Source: Economist Intelligence Unit survey, May 2007.

have achieved more integration are growing faster. This is especially noticeable in firms where there is more advanced integration of data networks.

So most companies desire better integration. “It would be a great help if information access was much more open, and for example if product planning in factories all over the world could be seen,” notes Mr Shah of Duravit India. “Enhancing integration would be a big step. It would also be a major advantage to be able to extend business information to Duravit’s partners.”



## Growth strategies among mid-sized companies

Faced with these and other challenges, what are the key strategic goals of SMEs? According to our survey, enhanced quality and consistency of service are the dominant themes for mid-sized enterprises: 80% of companies rate them as either “important” or “most important”. The next most important goal is the internally focused element: more efficient operations. Other key goals include process improvements and better decision-making.

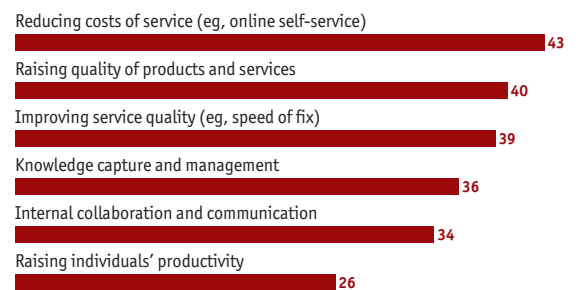
None of these goals can be achieved through ICT alone. All require a multi-dimensional strategy that integrates initiatives in finance, marketing, operations, human resources, product development and other functional areas. Indeed, the fact that many survey respondents cited software effectiveness as a key constraint on growth suggests that – for some executives at least – technology may be part of the problem.

### The need for a comprehensive growth strategy

This view of technology as one part of a comprehensive strategy is cited by Dan Plowden, CFO of the Brattle Group, an economic consulting firm with 170 employees based in Cambridge, Massachusetts. “Deals aren’t won or lost through IT,” says Mr Plowden. “It’s not in itself a source of competitive advantage. It’s an enabler, to the extent that IT lowers cost—for example allowing us to free up working capital to invest in other aspects of the business—and allows us to focus on the core business.” More than seven in ten companies rated more efficient operations as “important” or “most important”, followed by effective implementation of policy, process improvements and better decision-making.

To this end, mid-sized operations often show a

### Top five IT goals of mid-sized companies (% respondents)



Source: Economist Intelligence Unit survey, May 2007.

great deal of inventiveness in applying technologies. Among the themes for making better use of IT today is deployment radio-frequency identification (RFID) technology (which uses electronic tags for tasks such as tracking goods in the supply chain). This has been applied for better identifying and managing large numbers of paper files in US public-sector agencies. By contrast, many are using portals to create a better exchange and flow of information around the organisation, “knitting content together” as one interviewee puts it.

### IT-specific elements

In terms of IT-specific goals, our survey shows that there are two main targets: reducing service costs (for example, through online self-service) and raising the quality of products and services. Mid-sized companies have to be able to take advantage of their ability to act more swiftly than large corporations and provide specialised services at a high standard to compete against them. Two overlapping strategy goals are enhancing internal collaboration and improving knowledge management. The final area that stands out is raising productivity—true productivity rather



than simply efficiency in speeding up execution of tasks. Other goals, such as using IT to reduce headcount, rank far behind these objectives.

Of course, because of the multiplicity of mid-sized organizations' needs, many have none of these as the focal point of their IT strategy. For instance, the head of web communications at one US government agency is in no doubt: "Security is number one in our IT strategy," she says. "Our overriding concern is data security." Today literally millions of personal records can be stolen by computer hackers in one go, putting members or customers at risk and always damaging reputation or brand, with a press corps always eager to report cases and point blame.

Whatever their priorities, a clear majority feel that their IT strategy works: 60% of surveyed executives say that IT is a source of competitive advantage for them compared to their peers. One of these is Peter Barnsley, head of IT at Attraction World, a midsized European company that sells tickets to tourist attractions and theme parks around the world. "Our sector is extremely competitive," he explains. "Many of the products we sell are the same as the products our competitors sell. Often prices are very similar when comparing ourselves to others, and with this in mind IT has become a central focus of this company. We use it to drive down costs, increase efficiency and to launch products that differentiate us in the market." For example, its technology has enabled Attraction World to become a pioneer in Europe in selling e-tickets for Disney venues.

For the head of an international US-based law firm, global expansion into 18 countries simply would not have been possible without the support of IT. Currently the multiple offices are linked by a network that supplies services such as videoconferencing, document sharing, knowledge management and web training. The firm can act as a single entity with each lawyer connected, no matter which foreign city the lawyer is in. "Technology enables all of this," says the law firm head.

## Where money is best spent

When probed as to the best single investment—IT or otherwise—for realising their key business objectives, more than two-thirds of the mid-sized businesses surveyed cite software applications. (It should be noted that 23% of the survey respondents were IT executives.) However, executives at mid-sized businesses are of two minds on software applications. Leaders fully recognise their potential for achieving business goals and view them as the most important investment of all, but they also acknowledge that they have not yet realised that potential. Up to now they feel software applications have proven a growth constraint in terms of both cost and overall effectiveness, but this has not weakened their confidence in software applications to transform their business, as borne out by their investment plans.

After software applications comes online service (including e-commerce and e-government) as a "best bet" for investment, mentioned by just over one-half of interviewees. This has been of particular advantage to companies such as Innovax, a specialist in training and seminars for corporate strategy based in Switzerland, which is expected to earn around US\$100m in 2007. "We have developed a game from a seminar," explains Michael Akerib, CEO of Innovax. "It is now sold on the web. That has proved to be a very successful development. We're now looking at marketing it through Second Life [an online 'virtual world' site]." As Mr Curran of the Irish Small and Medium Enterprises Association also points out: for smaller businesses a website can be an especially useful tool to have up their sleeve: it disguises the size of the company and puts them on par with much larger organisations.

After software applications and online service comes a range of investments, including promotion/advertising, outsourcing and IP networking (integration of data networks). As a whole, the surveyed executives – of whom 44% were members of



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the C-suite, and 23% of whom had IT responsibilities – find that IT investment produces better returns than investments in other areas. Far more executives think so (45%) than those who disagree (17%), with 38% neutral. When asked where technology investments will have the most positive impact, these executives point to customer relationship management (CRM), knowledge management, collaboration tools, data integration and support.

### CRM

The area where executives feel technology investment would have the most positive impact on mid-sized businesses today is in customer relationship management (CRM), according to our survey data. This is also an area where large corporations have attempted to focus for some time in the quest to become more “customer-centric”. It might be thought that this drive is restricted to commercial mid-sized organisations, but this is not the case. The office systems director of a US government agency that has developed a new web service for citizens says: “We’re spending a lot of resource now on the ‘customer experience’; we contact them and ask ‘How did you like this feature?’”

Moreover, as competition has intensified for mid-sized businesses, CRM is increasingly seen as essential to attract—and retain—ever-more demanding customers, whether consumers or other businesses. “This is where the main benefit of IT is—in efficiency with customer relationships,” notes the company secretary of a UK food packaging systems maker. “That’s where IT can bring a competitive edge.” AGI is another company that has woken up to this. Its president, Mr Glazer, explains: “Internally we need to spend time on customer service and building trust. There needs to be an advocate in the client organisation, and we need to cultivate that relationship.”

For most mid-sized businesses, however, the promise of benefits from CRM is greater than the

present reality. Only a minority has been able to integrate systems to allow the much-touted “single view” of the customer across all business functions as a means of improving interaction. Even fewer use data analytics to gain knowledge of customers’ habits and preferences to develop products and services that are tailored to suit their particular requirements. There is every indication that mid-sized businesses are missing an opportunity that their larger counterparts are seizing. Numerous examples can be found today where large firms are using analysis of data on customers’ purchasing and usage habits to cross-sell and increase loyalty.

That is not to say that CRM remains by any means unreachable for many mid-sized businesses. For instance, Virgin Wines, also based in the UK, sells more than 10,000 varieties online and has developed a site centred around an interactive “wine wizard”, which uses the answers to tailor the wines it offers to each customer. As shoppers return for subsequent purchases, purchase data are used to refine each customer’s preferences and present more customised offerings on future visits and thus get more repeat purchases.

Indeed, mid-sized business can be visionary in their use of technology. A French food manufacturer, Bénédicta, has plans for getting customers to scan its products with their mobile phones, for example to get information about allergens and price offers. “Through the network we can get into direct contact with the consumer,” says Philippe Gautier, CIO of Bénédicta.

### Knowledge management

Also a means of exploiting invaluable data collected by the company—and already an important feature in corporate IT strategy—investing in knowledge management is singled out by the mid-sized business world as making a particularly important potential contribution. The larger the company the harder it gets to turn the reams of data it generates



daily into actionable knowledge. Executives often complain that although their systems are brimming with data, accessing the information they need to make informed decisions can be hugely difficult. Knowledge management tools, especially dashboards with summary, up-to-date information on company performance and the market it operates in, can be vital for supporting business decisions.

Respondents also singled out more general tools for making sense of the oceans of data they collect: warehousing, management and analytics to support operational decision-making and performance measurement.

### **Collaboration tools**

Collaboration tools are also seen as a good investment. Increasingly, companies are becoming interlinked with partners across the globe to compete effectively. For instance, virtual design engineering teams are springing up which require tools to keep track of project developments and even edit plans together in real time, across national borders. But when it comes to investing in supply chain management and regulatory compliance—both key features for many larger corporations' strategies—there is much less enthusiasm in mid-sized companies, and these come at the bottom of the wish list for technology investment.

### **Support**

A large proportion of survey participants also believe that improved IT support would have a positive effect on the business. They are right to highlight this: support service is rarely treated as a priority for IT operations, despite widespread dissatisfaction among end-users, whose work can grind to a halt if their IT system is not working. Mid-sized organizations seldom have a best practice approach to support and some are turning to an external supplier to raise the level of service, either as a "co-sourced" set-up or a full-blown outsourced relationship. Then the supplier

is accountable for the level of service—and can be penalised if it falls short.

Apart from better support, some in the survey feel that stronger online interaction with partners and customers should be a priority. The move to customer self-service remains relatively undeveloped in mid-sized outfits, whereas companies such as Dell have been using self-service to their own—and the customer's—advantage for years.

Better IT project management is seen as the answer for other companies. This is often a weak point in application development, leading to routine project delays. IT projects have a reputation for going on average 100% over time—let alone budget—often as a result of poor project management skills or the age-old lack of communication with business and IT over what the requirements are. "Project management" must extend to post-completion: many IT development projects fail at the final stage because end-users are either not adequately trained for the new system or are unwilling to embrace it.

Way down the list of ways to get more out of IT is the desire for more education from vendors and the IT channel, or to have better liaison as a whole with vendors and the IT channel. But plenty of mid-sized firms—40%—feel that financing from vendors is important to them.

Regardless of which area is targeted for investment, companies are most likely to expand either through custom-built systems or integrated suites of business products such as interlinked financial, payroll and HR packages. Mr Davies of Causal Capital believes that one of the most helpful features in his strategy is "building solutions that meet business requirements internally rather than buying off-shelf and fitting the business to the system. We also run standardisation for deployment, testing and roll out which ensures IT milestones are easy to report to often non-technical board members."

Others tend to buy in pre-packaged systems



for particular functions (such as a financial or HR package) when extending their IT. (Around one-half of businesses find the sheer variety of IT solutions now available confusing.) Few mid-sized companies take the path of purely home-grown systems. As Mr Plowden of The Brattle Group explains: “Internal application development is one of the fastest ways to get constrained to a single person.”

Finally, over three-quarters of respondents say that scalability is an important factor for deciding on new systems. Indeed, many mid-sized companies have found to their chagrin that home-grown solutions can be limited after two years, or earlier. They need the ability to scale over time and allow the opportunity to add functionality when needed. According to Mr Glazer of AGI, scalability of hardware devices is a particular challenge. “Software is evolutionary, hardware is revolutionary. A BlackBerry can be outdated in six months. Hardware investment is a nightmare.” His firm’s policy is to get an employee to test a new device for 30 days, then three more staff to test it for a further 30 days before implementing it.

### Measuring return on investment (ROI)

Over one-third of executives—39%—say that the return on IT investments is higher than they thought it would be. Indeed, the tendency to report higher than expected returns on IT investments is a characteristic of companies with higher than expected revenue and profitability.

Measuring ROI for IT is notoriously tricky, however. The ways in which this is done vary, but by far the most popular is reviewing it in terms of staff productivity, mentioned by 61% of respondents. Another widespread approach is looking at it in terms of product or service quality, followed by three other gauges, each used by more than 40% of companies: revenue generated, speed of decision-making and process/project time to completion. Last but not least is the measure of cash savings, employed by 37% of companies.

Mr Barnsley of Attraction World explains: “We have implemented a new back office system, rewritten all our websites, launched world first mobile phone websites, adopted an industry standard XML interface [innovated] taking existing models for e-commerce to new levels. Our new website strategy has paid off massively—we rank for many of our keywords on page 1 of Google, Microsoft and Yahoo search engines. In our case once we had done it once and proved that the money does follow the pain of implementation, we received further support to do things correctly after that.”



## Lessons from the top performers

One of the key findings of the survey is the fact that executives at high-performing companies tend to have different attitudes and pursue different activities than those at low-performing companies. Respondents were asked to rank their companies on a scale of ten in terms of profitability and revenue growth vis-à-vis their closest industry peers. The 91 companies ranked 1-3 were compared to the 92 companies ranked 7-10 and the top- and the bottom-ranked companies were profiled.

The results were striking. Among other characteristics, the best-performing companies in terms of revenue growth tend to:

- be more likely to engage in outsourcing;
- be more likely invest in production and distribution
- agree that IT makes the business more competitive;
- agree that the return on IT investments is higher than anticipated;
- have a high level of IT integration;
- agree investment in IT has better returns than investments in other areas;
- agree that IT gives the firm the flexibility to respond to market changes; and
- buy integrated solutions, not disparate elements.

Conversely, lower-performing firms tend in the opposite direction: to disagree that IT makes the business more competitive, have a low level of IT integration, buy disparate elements rather than integrated solutions, and so on.

Of course, correlation is not causation. It could be, for instance, that fast-growing or highly profitable companies have the ability to fund more comprehensive IT solutions, while slow-growing or unprofitable companies are so resource-starved

that their IT investments have little chance of being effective. Nevertheless, it is clear that the two groups differ across the board in the attitudes and practices uncovered in this survey.

The charts that follow show how the two groups—companies with below-average and above-average revenue growth—vary by their use of outsourcing, level of IT integration, investment plans, and agreement with various statements about the value of IT. In each case, the best performers are distinctly different from the worst performers. For each comparison, the sample size and level of statistical significance (the probability that such a result would occur by chance) is shown below the chart.

### Fast-growing firms tend to outsource more

Outsourcing is usually thought of as a way of increasing efficiency and profitability by reducing costs. But it can also have supply-chain implications, allowing companies to ramp up capacity quickly to meet demand, as well as gaining relief in tight labour markets such as the US. It is these latter implications that may account for the prevalence of outsourcing among companies with high revenue growth relative to their peers.

#### Outsourcing by fast- and slow-growing companies

(% of respondents)



n = 153; significant at less than 1%

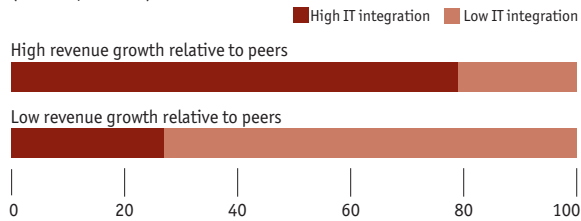
Source: Economist Intelligence Unit survey, May 2007.



## Technology and growth at mid-sized companies

### IT integration among fast- and slow-growth companies

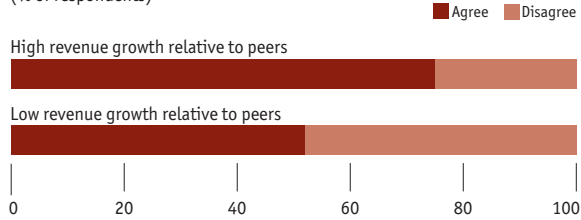
(% of respondents)



n = 162; significant at less than 1%.  
Source: Economist Intelligence Unit survey, May 2007.

### Response to statement "We should invest more in IT integration" by fast- and slow-growth companies

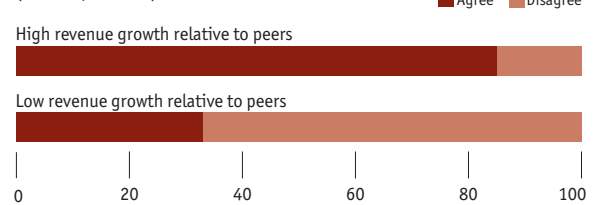
(% of respondents)



n = 169; significant at less than 1%.  
Source: Economist Intelligence Unit survey, May 2007.

### Response to statement "The return on IT investments is higher than we thought it would be" by fast- and slow-growth companies

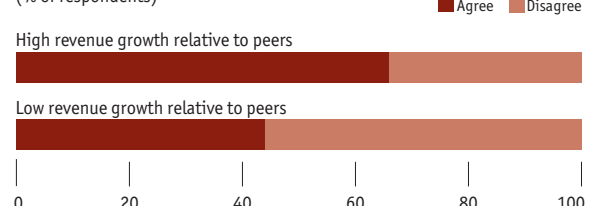
(% of respondents)



n = 165; significant at less than 1%.  
Source: Economist Intelligence Unit survey, May 2007.

### Response to statement "IT produces higher returns than investments in other areas" by fast- and slow-growth companies

(% of respondents)



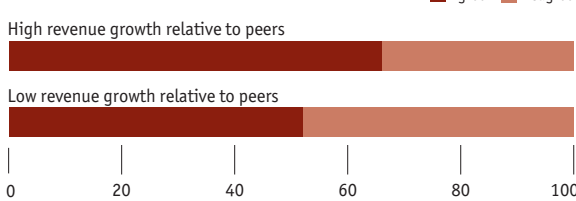
n = 165; significant at 2.1%.  
Source: Economist Intelligence Unit survey, May 2007.

## Fast-growing firms tend to focus on IT integration

According to the survey, companies with high revenue growth tend to be more integrated and more willing to invest in integration than those with low revenue growth. This makes intuitive sense, since meeting additional demand requires strong ties among the processes behind customer support, sales, production, finance and others. Companies that focus on IT integration recognise the need to co-ordinate these processes and have embarked on a journey to do so, even if they have not yet been completely successful. The subset of fast-growing companies also indicated a higher than average willingness to invest in software.

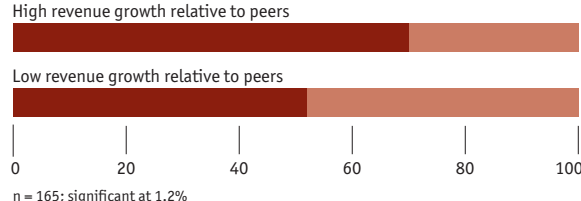


**Response to statement “We should invest more in sales, marketing and distribution” by fast- and slow-growth companies**  
(% of respondents)



n = 165; significant at 4.7%  
Source: Economist Intelligence Unit survey, May 2007.

**Response to statement “We should invest more in plant and equipment” by fast- and slow-growth companies**  
(% of respondents)



n = 165; significant at 1.2%  
Source: Economist Intelligence Unit survey, May 2007.

## Fast-growing firms tend to see high returns on IT investments

Growth begets bottlenecks; capital investment removes them. Respondents from high-growth companies tend to focus not on capital investments in general, however, but investments in IT, marketing and (among manufacturing companies in particular) plant and equipment. Specifically, participants say that the returns on IT investments are higher than they had anticipated and higher than returns on other investments. They also say that IT investments give their companies a competitive advantage and help make their companies more flexible.

## Fast-growing firms are more willing to invest in production and distribution

Finally, the high-revenue-growth subset of companies tend to be more willing to invest in two non-IT areas of the business: sales, marketing and distribution; and plant and equipment. Neither should be surprising for this group of companies, since the ability to produce and distribute product are common bottlenecks among high-growth companies.

Not all companies are equally willing to invest in plant and equipment, however. The results above are skewed by the results in the manufacturing and consumer goods industries, which are much more

biased than others towards investments in production capacity.

The results are similar for the best-performing companies in terms of profitability. Respondents from these companies:

- are more likely to engage in outsourcing
- find it relatively easy to assemble and analyse information across silos;
- agree that IT is a source of competitive advantage;
- agree that the return on IT investments is higher than anticipated; and
- prefer to buy integrated IT solutions, not disparate elements.

All of the characteristics listed above are significant at the 5% level. In other words, the differences between high and low performers would only have a one in 20 chance of occurring if there were no difference between them. It seems clear, therefore, that companies with superior performance tend to value IT investments—and data integration in particular—more highly than those with sub-par performance.



## Differences among industries

The survey and interviews focused on five industries: manufacturing, life sciences, consumer goods, professional services and financial services. All businesses need certain basic applications—payroll, finance, human resources—regardless of industry. But increasing specialisation has driven the creation of entire classes of software tailored for the needs of particular industries. Different industries have different priorities in terms of investing for growth, and many of these differences surfaced in the survey.

Some of these differences are obvious: manufacturers tend to emphasise investing in plant and equipment, while the other industries do not. And supply-chain management is a focus in manufacturing and consumer goods, but not in financial and professional services. In terms of investments in technology, the following industry-specific findings emerged.

### Financial services

Overall, executives in mid-sized firms in the financial services sector are more satisfied with their IT than average, but not necessarily with their IT staff. “IT people are the most conservative in the company,” says one interviewee from this industry. “They’re more interested in saying ‘No!’” Financial services firms are especially adamant about using IT to fulfil the business goals of raising quality of services and products, and also cutting costs, and generally feel less constrained in developing their IT than other sectors. They are keener also to invest in CRM, but have less faith in integration to make better use of IT. They rely less on support from the channel and are more upbeat than most on the benefits of IT, such as boosting their competitiveness and responding to

market changes.

They are less likely, however, to buy integrated solutions (54% compared with the average of 64%). By contrast, scalability is significantly more important for this fast-growing industry—87% agree that this is an important factor for deciding on new systems, compared with the mid-sized average of 78%.

Financial services firms also highlight the importance of investing in software applications to enhance risk management capabilities, managing compliance and reaching customers over the Internet.

### Consumer goods

A remarkable 92% of consumer goods companies believe that IT makes their business more competitive, and it is the sector that feels it gets most benefit from the flexibility afforded by IT to respond to market changes. Again IT scores highest in terms of how e-business/online transactions are revolutionising its business (74% agree) now that increasing numbers of consumers are buying wares online as a matter of course—and trust the security of presenting their charge card account details. It follows then that analysing customer details emerges as the main goal driving consumer goods companies’ IT strategy—in complete contrast to all other sectors. (They are also very eager to get finance from vendors.)

Of all the differences, the single greatest differentiator is the focus on supply chain and procurement applications. Most manufacturing, healthcare and, to a lesser extent, consumer goods firms live and die by the reliability and efficiency of their supply chains; for financial and professional services companies, the supply chain is almost an afterthought.



## Healthcare, pharmaceuticals and biotechnology

In a highly regulated industry it comes as little surprise that compliance issues are an important feature driving healthcare organisations' IT strategy than in most sectors, except for financial services—which also comes under heavy regulatory pressure. This industry too places noticeably more emphasis on data warehousing, management and analytics, almost on par with CRM. There is more concern than elsewhere that IT staff resources at these companies are not adequate to meet demand, but there is a great reluctance to buy off-the-shelf packages for their applications on which human life may depend. They are, however, keen advocates of integrated suites of business products, and they rate higher than any other sector (except for consumer goods) in terms of interest in e-business.

## Professional services

Internal collaboration and communication are especially important for many professional services companies in driving their IT strategy. As a result, they are the biggest supporters by far of collaboration and knowledge management tools. They also feel strongly that better integration of existing applications would lead to improved use of IT in their company. "There are great systems for professional services, and for localisation," says Mr Plowden of The Brattle Group. "But there isn't a clear set of products that can 'do both'. We need to be able to string together multiple applications."

## Manufacturing

Manufacturers also focus on improving collaboration and communication, as well as tools to support operational decision-making, cost analytics, and procurement and outsourcing decisions. "One of the key elements [of our IT strategy] is to strengthen our competitive advantage, such as cost leadership and customer service," confirms Mr Poon of Concord Camera. Of the five industries, manufacturing places the highest emphasis on IT integration as a basis for growth. It also gives the strongest support for IT training to encourage more effective use of technology in the firm. Manufacturing companies are particularly reseller-dependent and, by the nature of their work, the least enthusiastic about e-business and online transactions. Manufacturers are also least likely to foresee their IT investment increasing; instead, they focus on plant and equipment investments as the key to growth.

## The public sector

The public sector attaches the same importance to software applications as the private sector, as the best area to invest in to realise key strategic objectives. But for the applications themselves, there is far more priority given to knowledge management in government, and also in data warehousing. Nearly two-thirds of government bodies worldwide feel that better integration is the best way to encourage more effective use of IT. As expected, a larger percentage than in commercial organisations find that IT resources are inadequate for meeting demand (58%).

"We use outside IT contractors for discrete jobs," says one US government agency IT interviewee. "We avoid having to re-train our own staff." The public sector is less satisfied in general with return on investment from IT—just 28% believe it is higher than they had expected.



## Conclusion

IT is an enabler of growth, but by itself it is not sufficient to drive growth. Technology is one part of a multi-dimensional strategy that encompasses financing, human resources, product development, production and distribution. It can help to knit together disparate elements of a company's operations and help a strategy to succeed. The key is using technology to help implement strategy through more efficient and effective processes, better use of information, improved productivity and better service.

Having said this, however, there is no doubt about the fundamental role IT plays in keeping SMEs going and fuelling business growth around the world. Discussions with executives at mid-sized companies across different geographies also show that many are forming creative plans for developing their IT usage. Much of it, as expected, involves further exploiting the Internet to their advantage, but they also realise that security and risk considerations are important features to get right in order to allow scope and flexibility for more open communication with partners and customers.

As just one example, Mr Akerib of Innovax is planning to create a large database able to audit web forums and blogs to extract and summarise information for company seminars. However, in developing IT, commonsense advice comes from Mr Rowe of play.com: "We use IT to provide what the customer wants—and don't put it in because it's the latest piece of technology. It's got to be about what we want the customer to experience." A flexible, well-integrated and secure IT infrastructure holds the key to raising profitability as well as improving the

customer experience.

True, many SMEs have found the price of running software applications a constraint on growth. As the survey showed, it is the single most-cited challenge among mid-sized companies. However, costs will decline as tools and processes improve. In fact, their zeal for investment in software applications is undiminished: the top areas for investment are CRM, knowledge management, collaboration tools and IT support.

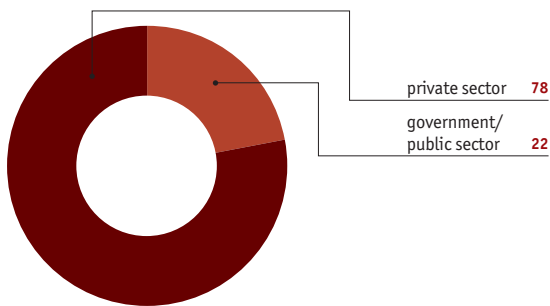
Availability of IT know-how—both of technology professionals and end-users—is a serious impediment across the world, and can blight companies' plans. Better training is obviously required, but there are ways around this such as outsourcing to a third party, or saving resource by making more use of the web to get staff and customers helping themselves. And while opinion is sharply divided about using the services of third parties, the survey results show companies with the fastest revenue growth and greatest profitability are also the ones that make greater use of outsourcing.

SMEs are under constant pressure from larger competitors, but they are also able to exploit the weaknesses of big corporations. In particular, SMEs can develop opportunities faster and steal the march, and can concentrate on specialist products and services that are out of range for the monolith. The strategies that firms employ to grasp these opportunities encompass every aspect of corporate life, from HR to marketing. But there is little doubt that the task of developing a competitive business can be made easier through effective use of IT.

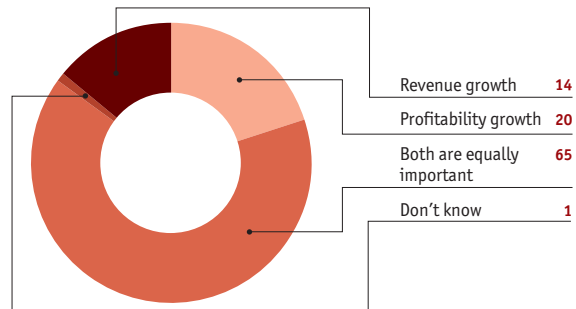
## Appendix 1: Survey results

In May 2007 the Economist Intelligence Unit conducted a survey of 535 senior executives worldwide on the impact of technology on their organisational objectives. Our sincere thanks go to all those who took part in the survey. Please note that not all answers add up to 100%, because of rounding or because respondents were able to provide multiple answers to some questions.

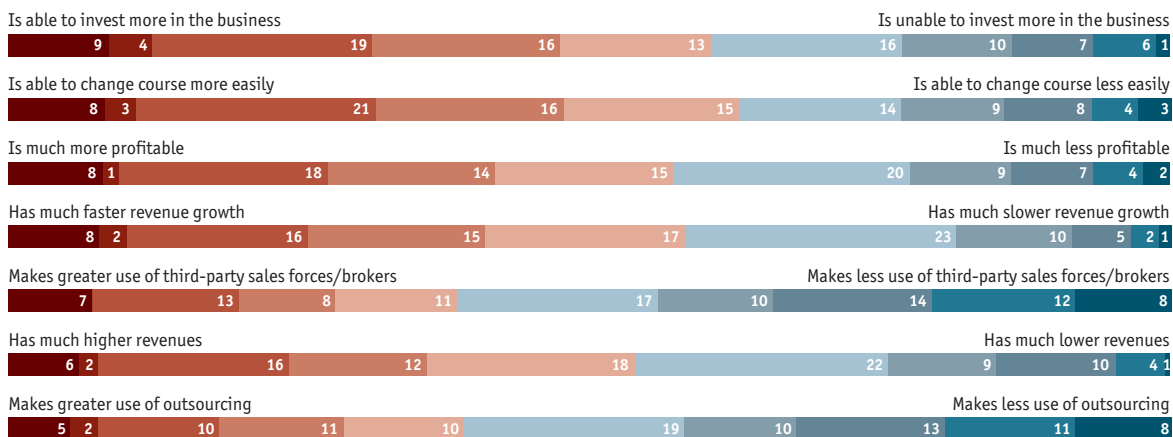
**My organisation is in the:**  
(% respondents)



**Which of the following business goals is most important to your company?**  
(% respondents)



**Compared to its closest industry competitors, my company:**  
(% of respondents)

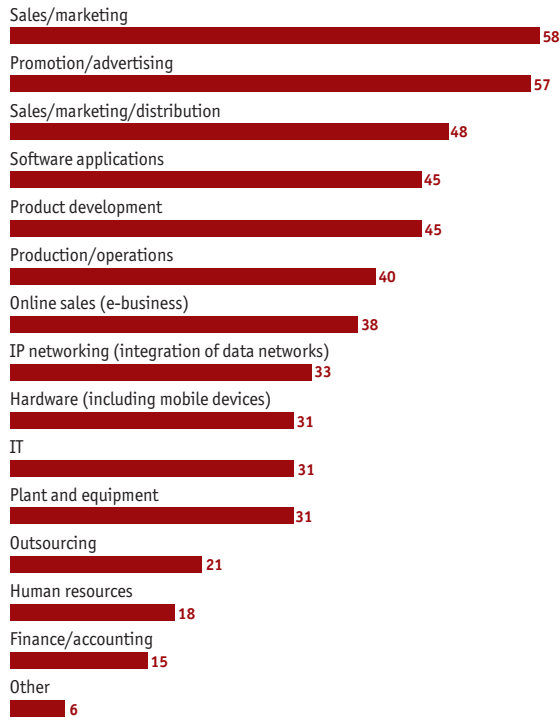


## Appendix 1: Survey results

### Technology and growth at mid-sized companies

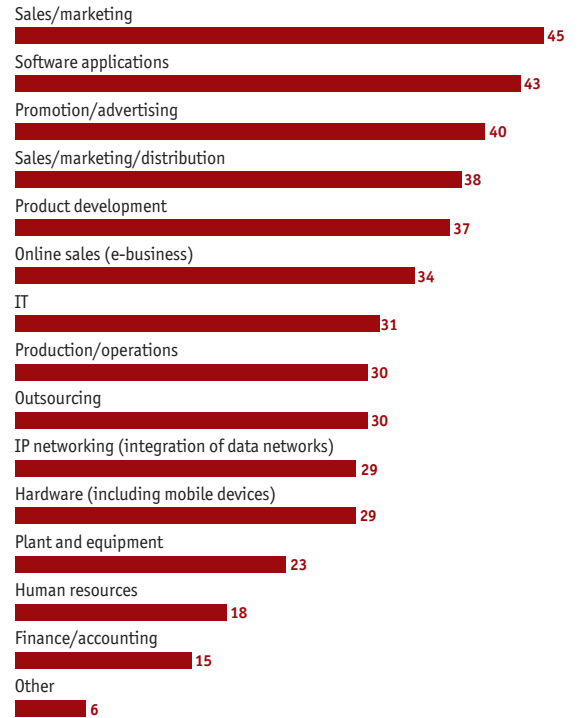
#### Where do you think your company should invest in order to increase revenues? Select all that apply.

(% respondents)



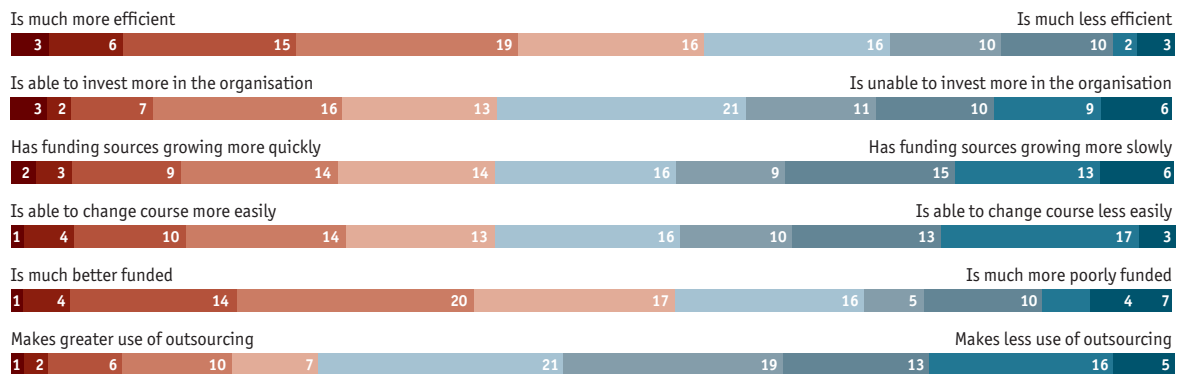
#### Where do you think your company should invest in order to increase profitability? Select all that apply.

(% respondents)



#### Compared to similar government/public sector entities, my organisation:

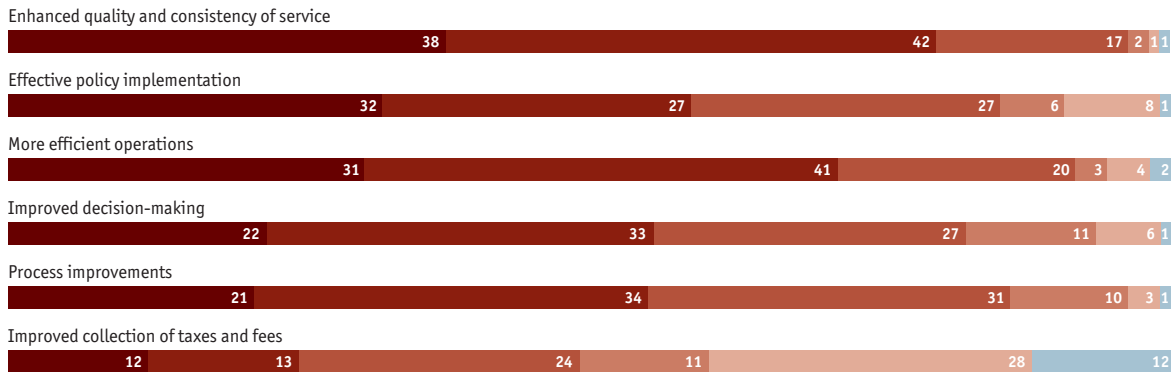
(% of respondents)



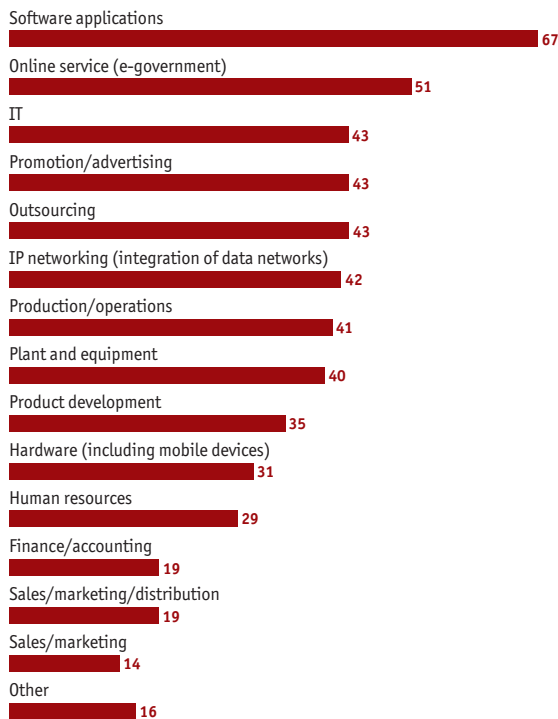
**Please indicate how important each of the following goals are in terms of importance to your organisation.**

(% of respondents)

■ 1 Most important ■ 2 ■ 3 ■ 4 ■ 5 Least important ■ Don't know

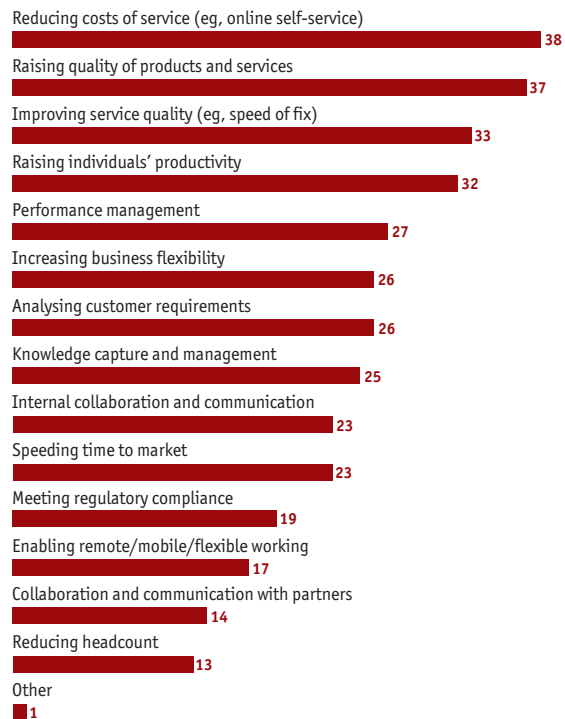


**Where do you think your organisation should invest in order to realise the most important objective ranked in the previous question? Select all that apply.**



**What are the main goals driving your organisation's IT strategy? Select up to four.**

(% respondents)



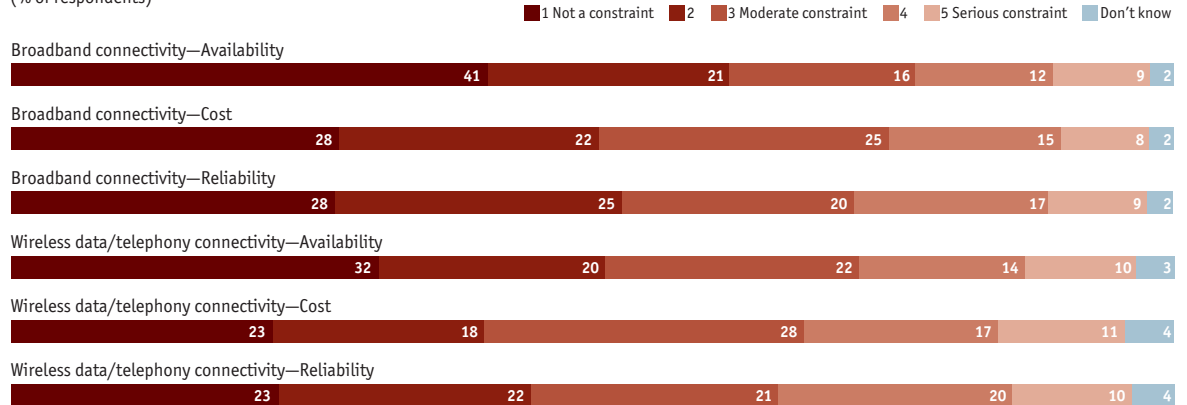
## Appendix 1: Survey results

### Technology and growth at mid-sized companies

#### In your location, how would you rate connectivity in terms of constraining your organisation from reaching its objectives?

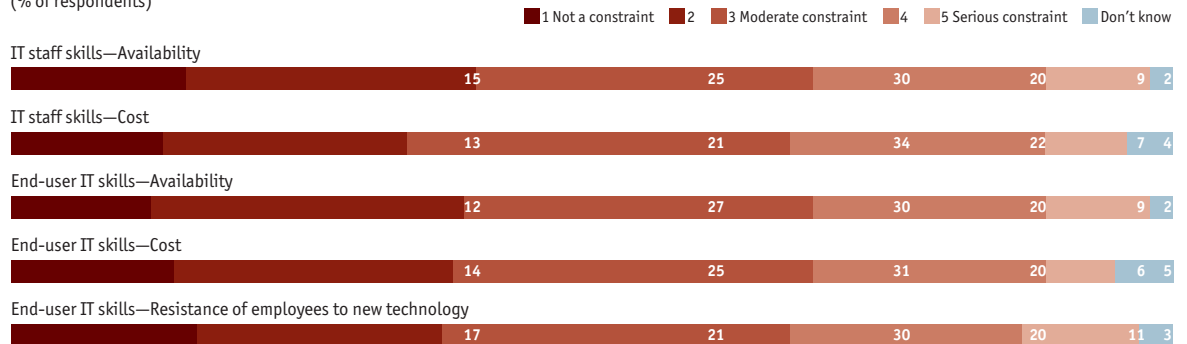
Rate on a scale of 1 to 5, where 1=Not a constraint and 5=Serious constraint.

(% of respondents)



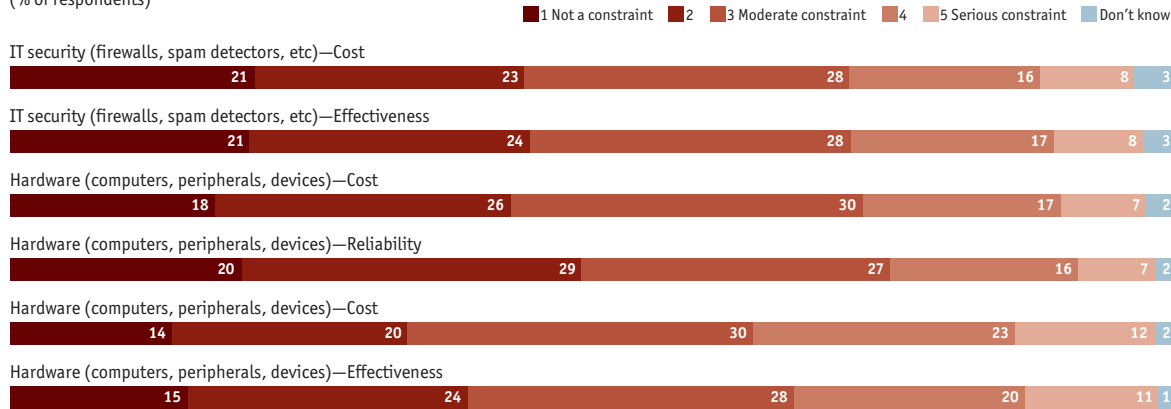
#### In your location, how would you rate the IT skills and attitudes of your employees in terms of constraining your organisation from reaching its objectives? Rate on a scale of 1 to 5, where 1=Not a constraint and 5=Serious constraint.

(% of respondents)



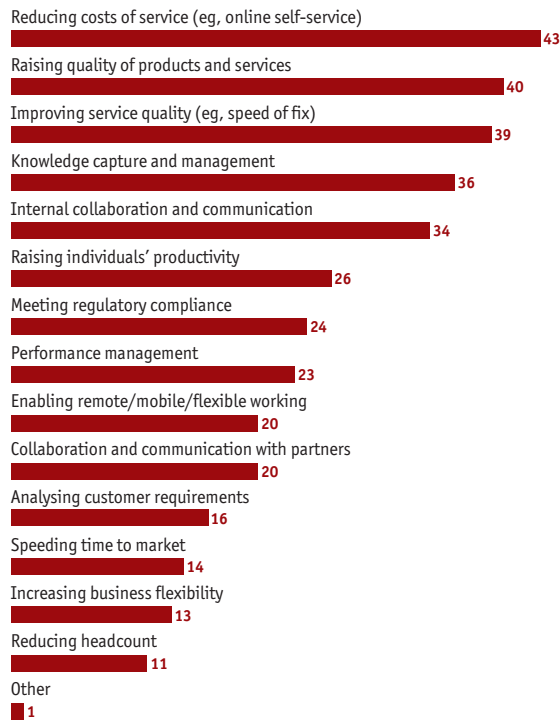
**In your location, how would you rate hardware and software in terms of constraining your organisation from reaching its objectives?** Rate on a scale of 1 to 5, where 1=Not a constraint and 5=Serious constraint.

(% of respondents)



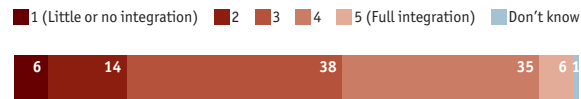
**What are the main goals driving your organisation's IT strategy?** Select up to four.

(% respondents)



**How would you rate the level of IT integration at your organisation?**

(% of respondents)



**How would you rate your organisation's IT integration as characterised by the way employees assemble, analyse and present information that cuts across functions, product/service lines or locations?**

(% of respondents)



**To what extent does your organisation's level of IT integration, as characterised by the previous two questions, represent a constraint on your organisation's ability to meet its objectives?**

(% of respondents)

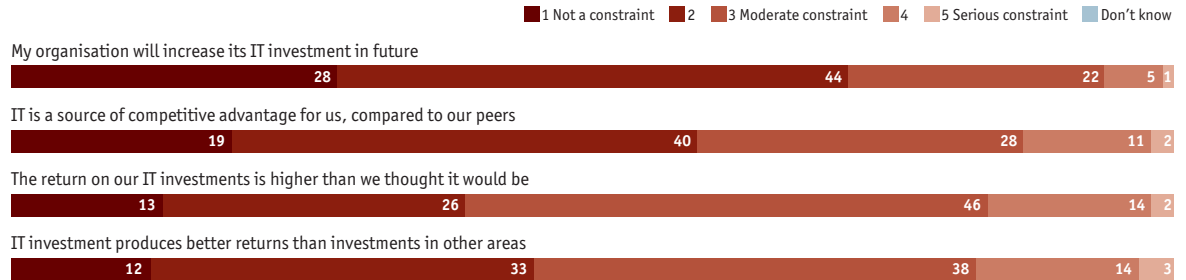


## Appendix 1: Survey results

### Technology and growth at mid-sized companies

Please indicate the extent of your agreement or disagreement with the following statements.

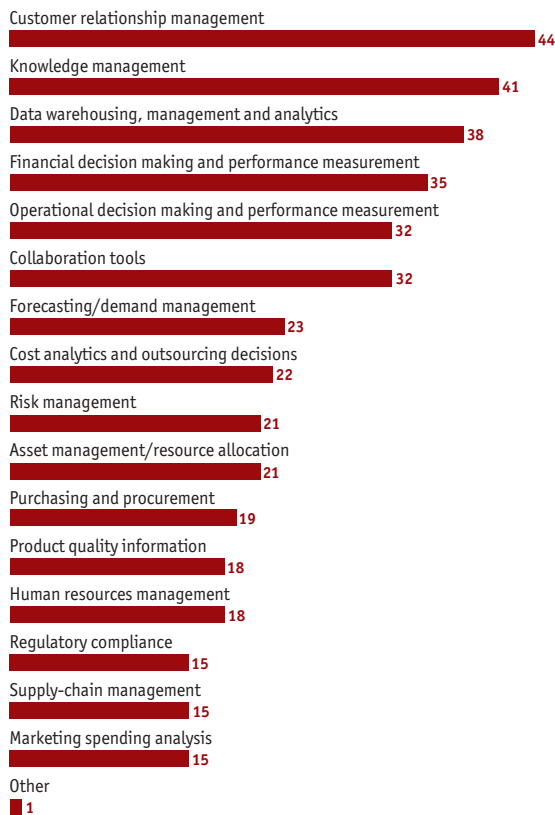
(% of respondents)



In which areas do you believe technology investments would have the greatest positive impact on your organisation?

Select up to five.

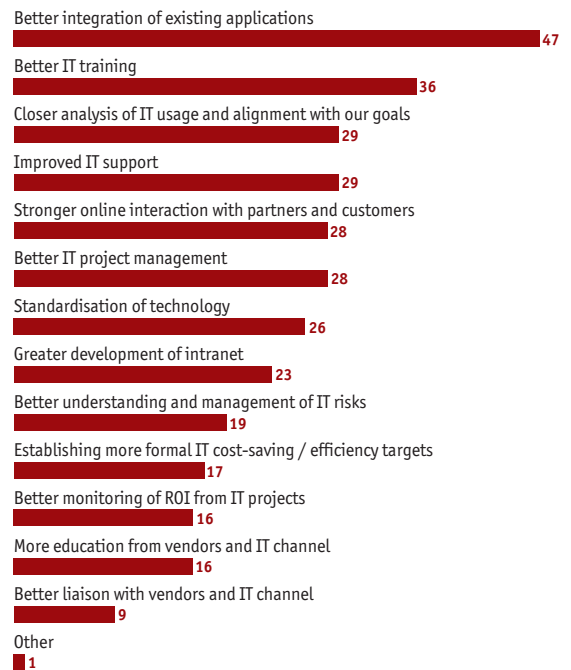
(% respondents)



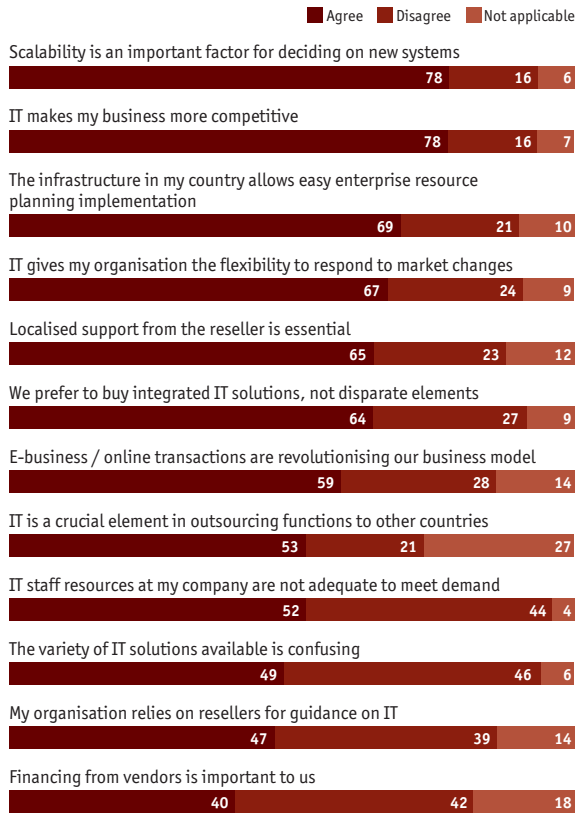
Which factors do you think would encourage more effective use of technology in your organisation?

Select up to four.

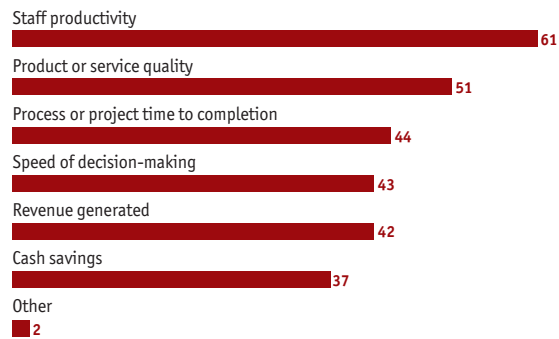
(% respondents)



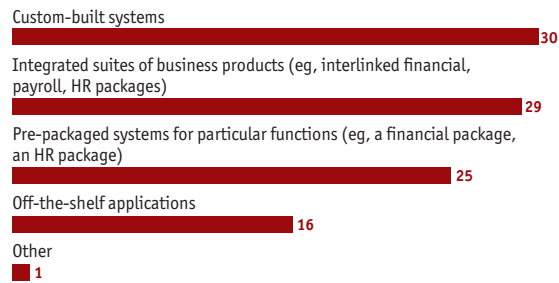
**Please indicate whether you agree or disagree with the following statements regarding IT at your organisation.**  
(% of respondents)



**Which of the following does your organisation use to measure returns on IT investments?** Select all that apply.  
(% respondents)



**When expanding its use of technology, which of the following is closest to your organisation's typical approach?**  
(% respondents)

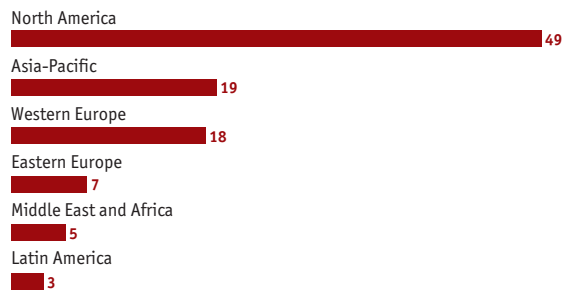


## Appendix 1: Survey results

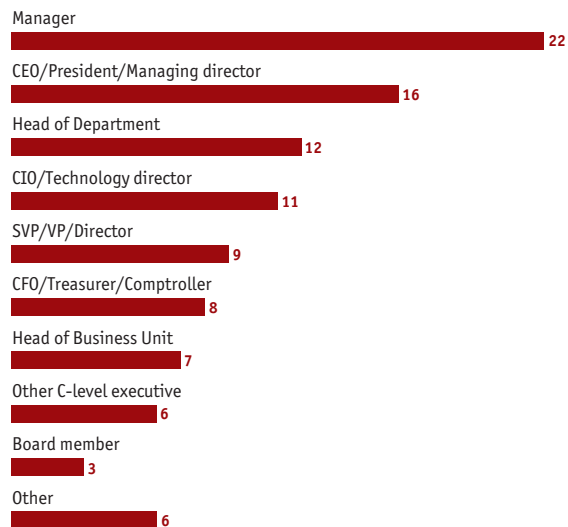
Technology and growth at mid-sized companies

### About the respondents

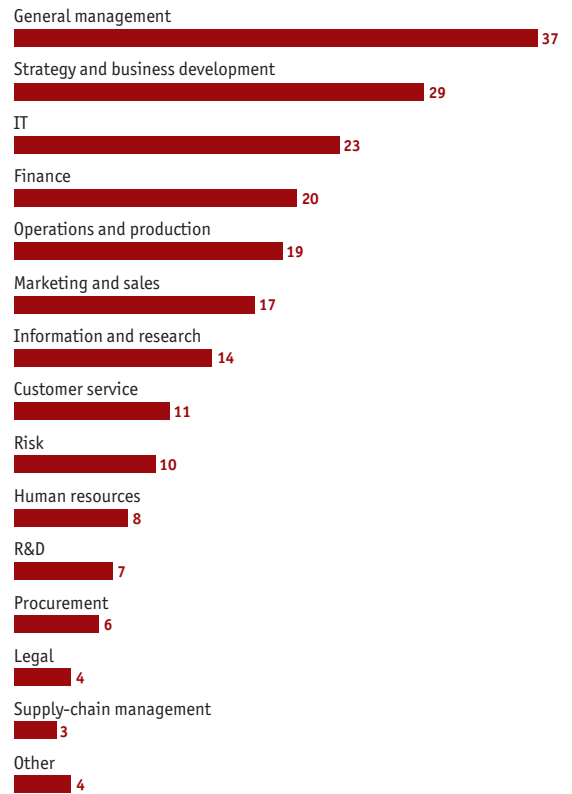
#### In which region are you personally based? (% respondents)



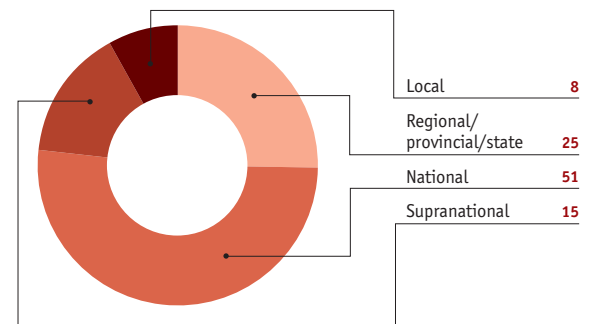
#### Which of the following best describes your title? (% respondents)



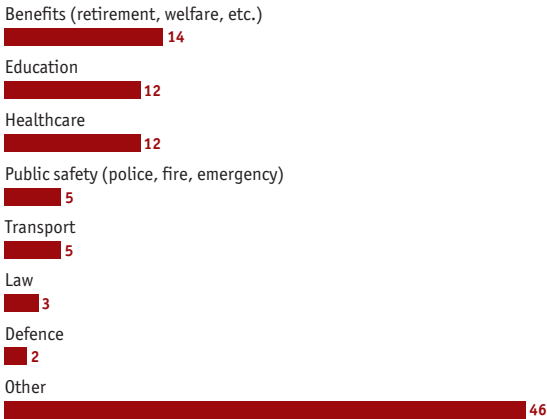
#### What are your main functional roles? Please choose no more than three functions. (% respondents)



#### How would you characterise the level of your government/public sector organisation? (% respondents)



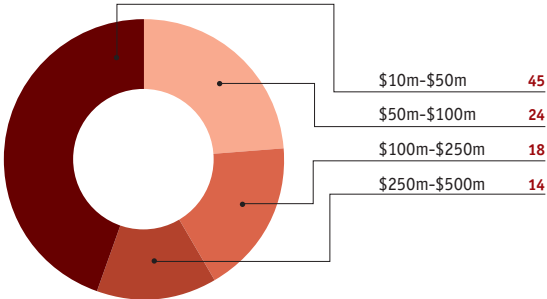
**What services does your government/public sector organisation provide?**  
 (% respondents)



**What is your primary industry?**  
 (% respondents)



**What is your organisation's global annual revenue in US dollars?**  
 (% respondents)



## Appendix 2: The impact of ICT on economic growth

The model uses a set of variables capturing demographic and structural developments and changes in the policy settings. ICT development is represented in the model as the natural logarithm of an index, on a scale of 1-10, with 10 meaning the highest level of ICT infrastructure and usage.

For 1990 the index is measured simply on the basis of fixed telephone lines per 1,000 population. From 2000 a more sophisticated measure is constructed, reflecting the very rapid development of ICT. The composite ICT index is based on ten indicators. Six indicators are quantitative and rely on our forecasts of fixed-line telephone penetration (lines per 100 population); mobile telephone penetration (subscribers per 100 population); the stock of personal computers (PCs per 100 population); Internet users (per 100 population); the number of Internet servers (per million population); and broadband penetration (per 1,000 population). In addition, there are four qualitative indicators from the Economist Intelligence Unit's e-readiness assessment. These include the quality of Internet connections, the development of e-business, the development of

online commerce and the exposure of the population to the Internet (Internet literacy). Each of the ten indicators is transformed into an index scaled 1-10. The composite ICT index is an average of these ten component indices. Our ten-year forecasts for the effect of ICT development are calculated by comparing our baseline forecasts with the projections obtained under the assumption that the composite ICT index remains unchanged from the current level over the forecast period.

### Definitions of variables

The dependent variable is the average annual growth in real GDP per head, in the 1970s, 1980s and 1990s, measured at national constant prices.

Apart from the ICT variable (see main text), the independent variables include:

- The natural logarithm of GDP (adjusted for purchasing power parity, PPP) per population aged 15 to 65, expressed as an index with the US=1. Effectively, this measures the potential for convergence, which is the greater the further a country lags behind the leading nations.
- The natural logarithm of the mean years of schooling of the population aged over 15 at the start of each decade. This variable is used to approximate the effect of the quality of the labour force. Missing values for some countries are filled in on the basis of an equation relating mean years of schooling (where available) to gross primary school enrolment ten years previously, and to secondary and tertiary enrolment ratios five years previously.

### Methodology

The Economist Intelligence Unit's long-term growth model examines the link between real growth in GDP per head and a large set of growth determinants. The regressions are based on cross-section, panel data for 86 countries. The base period is 1970-2000, split into three decades: 1971-80, 1981-90 and 1991-2000. The estimation is conducted on the basis of a statistical technique called Seemingly Unrelated Regressions. The regressions, which have high explanatory power for growth, allow us to forecast the long-term trajectory of real GDP per head for sub-periods up to 2030, on the basis of demographic projections and assumptions about the evolution of policy variables and other drivers of long-term growth.

## Appendix 2: The impact of ICT on economic growth

### Technology and growth at mid-sized companies

Country	GDP growth 2007-17 <sup>1</sup> % per year	ICT contribution to GDP growth <sup>2</sup>		Country	GDP growth 2007-17 <sup>1</sup> % per year	ICT contribution to GDP growth <sup>2</sup>	
		Percentage points	Nominal impact in 2017 in USUS\$bn, 2006 prices <sup>3</sup>			Percentage points	Nominal impact in 2017 in USUS\$bn, 2006 prices <sup>3</sup>
South Korea	4.17	0.04	3.29	Austria	2.14	0.15	5.00
Sweden	2.56	0.05	1.84	Argentina	3.73	0.15	3.20
USA	2.68	0.07	97.48	UK	2.44	0.16	38.31
South Africa	3.09	0.07	1.70	Belgium	1.97	0.17	6.68
Hong Kong	4.07	0.07	1.30	Ecuador	3.07	0.17	0.70
Sri Lanka	5.18	0.07	0.20	Czech Republic	3.29	0.17	2.47
Norway	2.38	0.08	2.62	Ireland	3.82	0.17	3.87
Denmark	2.34	0.09	2.45	Malaysia	5.23	0.17	2.50
Canada	2.69	0.09	11.33	France	1.97	0.18	41.20
Switzerland	1.91	0.10	3.72	Italy	1.28	0.19	36.40
Finland	2.30	0.10	2.10	Spain	2.22	0.19	23.42
Venezuela	2.77	0.10	1.88	Greece	2.42	0.20	6.30
Thailand	4.45	0.10	2.12	Iran	3.27	0.20	4.09
Egypt	5.40	0.10	1.12	Vietnam	6.39	0.20	1.27
Netherlands	2.78	0.11	7.46	Israel	3.95	0.22	3.13
Australia	2.84	0.11	8.55	Slovakia	4.94	0.23	1.26
Saudi Arabia	3.79	0.11	3.79	Philippines	5.06	0.23	2.71
Taiwan	3.93	0.11	3.79	Kazakhstan	6.73	0.23	1.79
Azerbaijan	7.60	0.11	0.22	Portugal	2.38	0.24	4.78
New Zealand	3.30	0.12	1.28	Algeria	5.49	0.24	2.66
Colombia	3.35	0.12	1.59	Hungary	3.19	0.25	2.79
Brazil	3.40	0.12	12.91	China	7.20	0.25	66.91
Peru	4.26	0.12	1.16	Poland	3.89	0.27	9.39
Chile	4.96	0.12	1.70	Nigeria	4.84	0.31	3.66
Turkey	4.68	0.13	5.00	India	6.75	0.34	31.09
Indonesia	5.47	0.13	4.61	Bulgaria	3.88	0.35	1.12
Germany	2.03	0.14	40.02	Ukraine	5.15	0.37	3.82
Mexico	3.24	0.14	11.72	Romania	4.17	0.41	5.07
Singapore	4.39	0.14	1.82	Russia	4.09	0.42	41.87
Japan	1.25	0.15	67.15	Pakistan	5.73	0.46	6.07

(1) GDP growth for the first half of the forecast period is taken from the Economist Intelligence Unit's medium-term five-year forecast which incorporates some cyclical fluctuations. The forecasts for 2012-17 are taken directly from the long-term growth model.

(2) The GDP growth contribution of progress in ICT development is calculated as the difference between long-term GDP growth projections based on our forecasts for ICT development, and the long-term forecast based on the assumption that no progress will be made on ICT development.

(3) The impact in 2017 of progress in ICT development gives the difference in the GDP level in 2017 (at 2006 prices, to exclude the impact of inflation) between the scenario assuming ICT improves along our baseline forecast, and the scenario with no progress.

Source: Economist Intelligence Unit.

## Appendix 2: The impact of ICT on economic growth

### Technology and growth at mid-sized companies

- The natural logarithm of life expectancy at birth at the start of each decade. This variable also enters the equation in squared form, to capture diminishing returns to increases in life expectancy.
  - Updated Sachs-Warner index of openness as the fraction of years during each decade in which a country is rated as an open economy according to the following four criteria: (1) average tariff rates below 40%; (2) average quota and licensing coverage of imports of less than 40%; (3) a black-market exchange-rate premium that averaged less than 20%; and (4) no extreme controls (taxes, quotas, state monopolies) on exports. Openness boosts growth by raising the potential to exploit economies of scale and comparative advantages and allows learning from more advanced economies.
  - The average share of trade (exports and imports of goods and services) in GDP, lagged by one decade to deal with the endogeneity of growth and trade.
  - Index of institutional quality (on a scale of 1-10) that is an average of five sub-indices of measures of the rule of law, quality of the bureaucracy, corruption, the risk of expropriation and the risk of government repudiation of contracts. Forecast values are based on corresponding indicators from the Economist Intelligence Unit's business environment rankings.
  - The average government savings ratio in each decade (current government revenue minus current government expenditure) expressed as a share of GDP. This captures both government investment and crowding out of private investment through high non-investment spending by the government.
  - An index on a scale of 1-10 of regulation of product, credit and labour markets. For forecast periods, the composite index is based on seven indicators from three categories of our business environment rankings model: from policy towards private enterprise (ease of setting up new businesses, freedom to compete, price controls); from financing (openness of the banking system, financial market distortions); and from labour markets (restrictiveness of labour laws, wage regulation).
- Other variables included are the difference between the growth rate of the working-age population (aged 15-65) and the growth rate of the total population; the average annual rate of change of the terms of trade in a given decade; the share of the exports of primary products in GDP at the start of a decade; the percentage of the land area within a country that has a tropical climate; and a variable capturing whether a country was a colony before 1945.

Whilst every effort has been taken to verify the accuracy of this information, neither The Economist Intelligence Unit Ltd. nor the sponsor of this report can accept any responsibility or liability for reliance by any person on this white paper or any of the information, opinions or conclusions set out in the white paper.

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