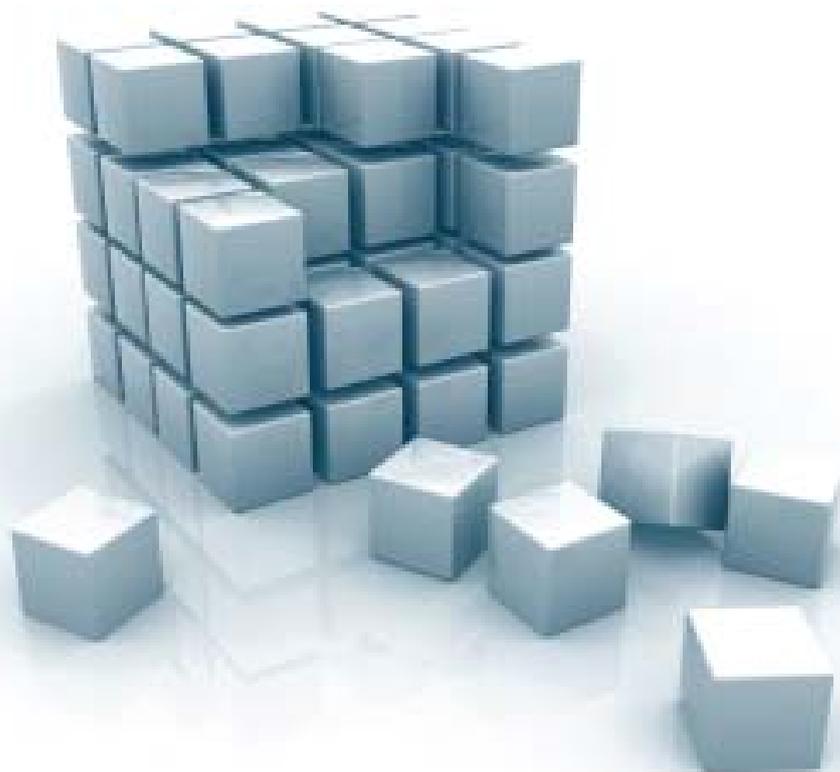
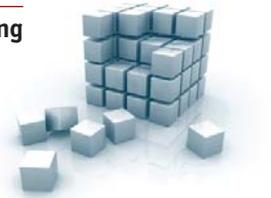


Knowledge management in manufacturing

A report from the Economist Intelligence Unit
Sponsored by Siemens UGS





Preface

The Economist Intelligence Unit surveyed 315 European executives from manufacturing industries in May 2007 about their attitudes to knowledge management. The survey and paper were sponsored by Siemens UGS.

Respondents represent a range of key manufacturing industries, including general manufacturing, information technology, telecoms, chemicals, automotive and consumer goods. Approximately 65% of respondents represent companies with revenues in excess of US\$500m. Around 50% of respondents are C-level, or board-level executives or equivalent.

Our editorial team conducted the survey and wrote the paper. The author was Sarah Murray and the editor was Rob Mitchell. The findings expressed in this summary do not necessarily reflect the views of our sponsors. Our thanks go to the survey respondents and interviewees for their time and insight.

June 2007



Executive summary

European manufacturers have long recognised that, much like their service industry peers, they find themselves competing in a knowledge economy. Companies both large and small possess vast amounts of knowledge spread across countless structured and unstructured sources, and the pace of acquisition is growing exponentially as technology facilitates the rapid exchange of information. The ability to improve processes and bring new products to the market faster and more cheaply depends on identifying, making available and applying this knowledge.

Moreover, sources of key knowledge no longer necessarily reside within the four walls of the company. As companies become more geographically dispersed and engage with a growing number of suppliers, partners and customers, vital information about processes or potential new products is just as likely to lie outside the organisation itself in the broader supply chain. The development of this complex web of relationships has made it more important than ever to establish efficient mechanisms to share knowledge and, indeed, for companies to become more aware of the extent of the information they hold.

In this report we look at the difficulties that senior executives from manufacturing industries say they experience in capturing and using institutional knowledge. We also explore some of the mechanisms—both technological and organisational—for capturing and sharing knowledge and highlight examples of best practice among companies that have successfully established a culture of knowledge exchange.

Key findings from this research include the following:

● **Companies find it difficult to capture and make use of knowledge from external partners.**

Respondents to the survey have made and expect to make significant use of outsourcing and offshoring for both design and manufacturing. While this approach has increased overall competitive advantage, kept costs down and helped companies to maintain flexibility of capacity, it has not necessarily led to better products, new intellectual property or process innovation. The approach has also brought new risks to bear on the organisation. The findings suggest that many companies find it difficult to share and capture knowledge from their external partners, and have not yet discovered how to turn the use of external partners to their advantage in terms of process and product innovation.

● **Lack of communication and a hoarding of knowledge continue to hamper internal communications.**

Common *internal* barriers to knowledge transfer include a lack of communication between functions in the company, the fact that knowledge frequently resides in unstructured sources (e.g. e-mail, notebooks), and the tendency for some individuals to hoard knowledge. To remedy some of these problems, respondents recommend courses of action including the creation of cross-functional teams and the standardisation of processes and practices.

● **Many companies do not know the extent of their IP but are gradually starting to look to external partners as potential sources.**

External partners have not yet become important sources of IP for many organisations, although most respondents expect the proportion of IP derived from external partners to increase. Suppliers are seen as the most likely source. Around half of respondents say that they do not know the true extent of IP in their organisation, suggesting



that more needs to be done to realise the full value of this asset.

● **An important goal of knowledge management is seen to be the sharing of best practice.** The main benefits of improved flow of knowledge through the organisation are perceived to be the sharing of best practice around business processes and the ability to respond more effectively to customer demands.

● **Companies must think carefully about the communication channels that best serve their objectives.** Respondents to our survey confirm that face-to-face meetings remain by far the most effective channel for communicating knowledge and information. Other channels, such as intranets, conference calls and e-mail are perceived as being considerably less effective. With many companies now collaborating across multiple teams and time zones, careful thought needs to be given to the best ways of sharing information and knowledge, especially when face-to-face meetings may not be possible.

Introduction

Since the days when coopers and blacksmiths passed expertise on to their apprentices, accessing knowledge has been a crucial part of doing business. In the 1990s, knowledge management—the idea of codifying and capturing institutional expertise—emerged as the darling of corporate strategists and external consultants. Some companies appointed chief knowledge officers to oversee initiatives focused on internet-driven technologies such as search engines and portals. The corporate intranet, in particular, was seized upon as a tool through which staff could exchange knowledge and, it was hoped, dramatically reduce duplication, accelerate production processes and foster innovation.

Ten years later, few chief knowledge officers remain and many of the expected benefits of knowledge management programmes failed to materialise due to the existence of internal silos, resistance to behavioural change and the lack of an open culture in which knowledge is shared. But while knowledge management may have had its day as a corporate fad, the issues that it was trying to address remain as important as ever. The amount of information that companies hold continues to increase exponentially, and sharing knowledge has become all the more challenging because of the complex web of relationships and partnerships that characterise most manufacturers. Moreover, knowledge remains a highly intangible asset, residing everywhere from casual e-mails and instant messages to detailed management reports and video presentations.

According to the respondents questioned for our survey, the most significant internal barriers to the flow of knowledge are lack of communication between functions in the company (55%); the tendency for some individuals to hoard important knowledge (52%); and the tendency for important

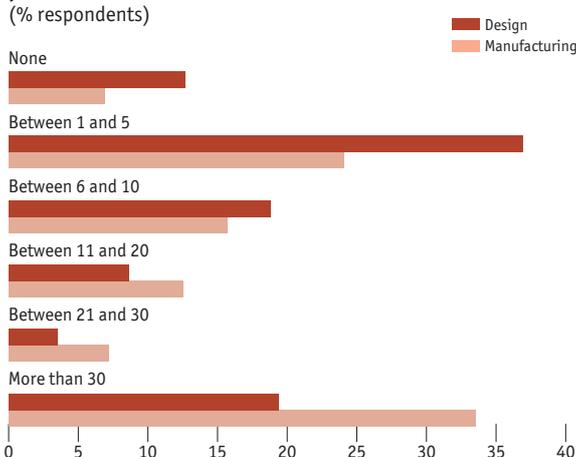


knowledge to reside in unstructured sources (51%).

At the same time, the process of capturing knowledge has been complicated by the fact that companies now collaborate with a growing number of external partners. About 20% of the respondents' organisations have more than 30 external design partners; for manufacturing, 34% have more than 30 external partners. Geographical distribution of these tasks has also become more widespread, with 15% of respondents reporting that they conduct design in more than 10 countries, and 30% that they conduct manufacturing over as broad a spread.

As companies have turned to others to supply their components and assemble their products, the institutional expertise and intellectual property seen as so crucial to product innovation and process improvement has become widely dispersed across the manufacturing supply chain. There is also a growing need to keep track of a mass of details relating to thousands of components supplied by dozens of specialist businesses around the globe. In this geographically and organisationally distributed environment, the effective sharing of knowledge and best practice has become a far more desirable goal—but also one that is much more difficult to manage.

Approximately how many external partners does your organisation collaborate with in the design and manufacturing process? Please select one in each column.



Source: Economist Intelligence Unit survey, May 2007.

Where's the knowledge?

The proliferation of communication tools has created an environment in which knowledge is spread widely, even within the same organisation. Everything from e-mails to video and audio podcasts may contain valuable sources of information.

In addition, vital knowledge often resides only in the heads of key employees. More than half of the survey respondents (51%) agree that much of the important knowledge in their organisation resides in the heads of individuals and is not documented. Should these individuals leave the company, this knowledge is simply lost and must be reacquired by remaining members of the team, often over a period of years.

Moreover, expertise is spread widely across the globe, with executives in different divisions and business units hailing from different cultures and speaking different languages. Given this complexity, companies can only start to capitalise on their expertise and intellectual property after they have established exactly where it resides. Almost half our survey respondents (47%) say that their companies do not know the true extent of the intellectual property that resides in their organisations.

Michael Burtha, president of Applied Collaborative Strategies, a performance, innovation and leadership consultancy, argues that companies should take a holistic approach to assessing the knowledge residing in their supply chains and should do so with specific goals in mind. "Do a diagnostic on it, but through a knowledge lens—and not so much to identify the knowledge but to see how knowledge exchange can be accelerated to achieve goals and objectives or relieve some pain points," he says.

An important step to accelerating the process



through which people share lessons learned and discoveries made is the standardisation of not only processes but also the procedures through which people communicate and record knowledge. Xerox, for example, established a database known as Eureka that contains instructions and tips used by engineers repairing office equipment across the globe. Before the system was developed, such knowledge could only be exchanged informally or between small groups of people at staff meetings.

As important as identifying and capturing existing knowledge is pinpointing the gaps and organising knowledge management capabilities around those gaps. “People tend to focus on knowledge management as if they were organising their closets,” says Jeanne Harris, director of research at the Accenture Institute for Strategic Change. “But it’s not about how to organise the clothing you have. It’s what clothing you need—and if you’re moving to another climate, you need different clothing.”

Identifying the missing links in the knowledge chain becomes more difficult when much of a company’s manufacturing is outsourced. With respondents split on whether offshoring and outsourcing benefits product and process innovation, there is little evidence that companies are successfully harnessing the knowledge of their external partners. The majority of respondents (64%) say they have derived less than 20% of their IP from external partners, while only 28% sees the outsourcing and offshoring of design as having a positive impact on quality of products. Over the next three years, however, the majority of respondents expect that the proportion of IP derived from external partners will increase.

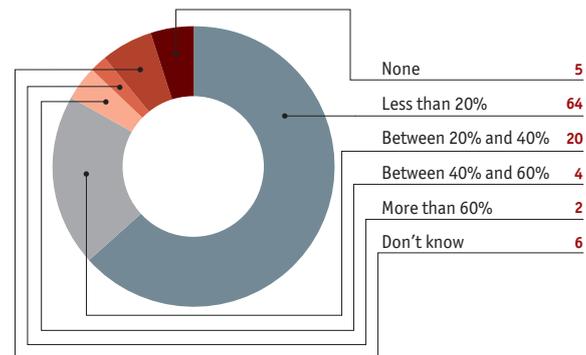
Part of the problem is that there are disincentives for suppliers and partners to share knowledge with their clients. A textile factory in Thailand, for example, might be reluctant to document and exchange detailed information about its production process with a buyer if that information would make

it easier for the buyer to then shift its production to a lower-cost country such as China.

This illustration demonstrates the need for companies to build more stable outsourcing relationships. In order for a company to benefit from its suppliers’ expertise, those suppliers must be confident of receiving continuing orders from the company. More generally, outsourcing relationships should be structured so that they are managed for mutual benefit, with the right kind of incentives put in place to encourage collaborative behaviour and knowledge sharing.

At the same time, companies that are outsourcing the design or production of their goods need to be reassured that their suppliers are not going to run

In the past three years, what proportion of your company’s intellectual property do you think has been derived from external partner organisations?
(% respondents)



Source: Economist Intelligence Unit survey, May 2007.

away with their intellectual property. Almost half of respondents (46%) agree that concerns about theft of intellectual property prevent them from sharing knowledge with external partners.

One approach is to analyse, codify and prioritise the core elements of that intellectual property. “You have to understand where those elements are and how important they are, then do things to protect them,” says Mr Burtha who, while at Johnson & Johnson, developed knowledge sharing strategies across the



group's 200 operating companies. "Maybe those are things that you don't share."

However, when outsourcing production, some knowledge sharing is both inevitable and desirable. As suppliers improve the construction and design of components and products, they learn lessons and acquire valuable knowledge. Outsourcing companies therefore need to establish mechanisms—whether technological or by setting up regular meetings and putting individuals in charge of that knowledge transfer—that allow process improvements to be tracked and documented.

In addition, ownership of intellectual property needs to be set out within the outsourcing agreement. Any supplier will, in the course of improving the design and production processes of products or components, acquire valuable information. The danger for outsourcing companies is that if, for any reason, they need to change suppliers or take back production into their own organisation, they can lose the intellectual property when the contract ends.

Mr Burke says that, while every situation is different depending on the supplier and the intellectual property laws of the country in which they operate, forward planning is essential. "You have to raise these questions, and ask: 'How can we mitigate a negative impact to the risk ahead of time and allow for flexibility when bringing back that process or re-bidding that process to another organisation without the negative impact on intellectual property?'"

Technology oils the wheels

Technology remains an important tool in knowledge management. And technology can also enhance the comfort zone for companies that want to share knowledge with suppliers and partners. Gartner, the business analyst, sees the emergence of "communities of trust", which it describes as a combination of social conventions and technical standards necessary to support expansive collaboration. These communities use systems that work across enterprise infrastructures to maintain control over information while facilitating the share of knowledge between partners in the manufacturing supply chain. Gartner predicts that the market for these communities of trust could be worth at least US\$10bn by 2012.

Technologies that enhance security in collaborative situations include applications such as identity authentication, entitlement management and enterprise rights management. In many applications, encryption is used to control who has access to information and what they can do with that information.

"It's critical to know who's doing what and who is allowed to do what," says John Burke, a research analyst at Nemertes Research, which assesses the business value of emerging technologies. "There's a critical underlying bed of applications or processes that have to be there to make companies comfortable in being more aggressive with sharing knowledge across boundaries."

With such protections in place, all manner of tools can be deployed to identify and manage knowledge. As Mr Burke points out, some of them may have been developed for other purposes. "Companies are deploying tools for data classification for purposes of compliance reporting," he says. "Those same



CASE STUDY P&G pushes the envelope

While some companies aspire to finding sources of innovation from among their networks of suppliers and business partners, Proctor & Gamble has taken the open approach to innovation a step further with its Connect + Develop initiative.

Connect + Develop is a strategy through which P&G aims to acquire at least 50% of its innovations from outside company walls. The idea is not to replace its own research and development capabilities but to have them work more effectively and reduce the time taken to bring products to market.

In addition to developing new products itself, the company looks around to identify companies that have developed proven goods, packages, technologies, business processes and engineering solutions that have the potential to be improved, scaled

up and marketed globally, either by P&G itself or through joint ventures with other companies.

The company has several means of capturing these solutions. It has a website through which people can submit ideas based on P&G's list of requirements and technology briefs. Then it uses what it calls its "intelligence search engine". This consists of a group of people located around the world who act as corporate match-makers—they assess the innovations, run them past the appropriate business unit and communicate with the companies or individuals that have developed them. The company has also created an IT platform through which it can share technology briefs with its main suppliers.

"We don't corner the market on good ideas," says P&G spokesperson Jeff LeRoy. "We have 9,000 researchers in the areas in which we work, but there are 1.5m scientists and engineers globally working in the same

field. So if we can go outside the company and find a best-in-class solution, why not do that?"

The implications of P&G's open-source approach have not been lost on other companies. Today, mechanisms are being sought to facilitate the interaction of large companies with smaller, innovative entrepreneurs. FedEx Labs, which supplements the R&D behind the products and technologies supporting FedEx's global delivery business, recently moved into EmergeMemphis, a business and IT incubator that hosts small start-up companies. The idea is that FedEx researchers can interact with developers and designers from outside the company.

With the cost of developing new products and technologies rising, these kinds of initiatives are becoming more common as companies look outside their own walls for sources of knowledge, expertise and innovation.

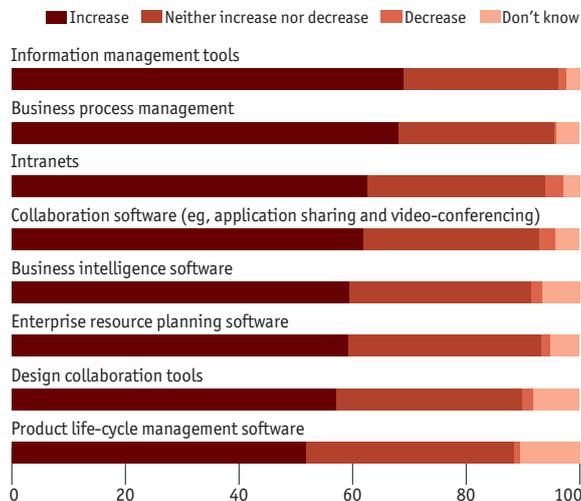
technologies can be turned to tagging content for sharing, or for its knowledge value as opposed to its business or legal value."

Another tool ripe for harnessing in the quest for corporate knowledge is e-mail, a vast repository of institutional information. Driven by compliance and governance reasons, revenues in the e-mail archiving application market are set to grow at a compound annual rate of 34.5% through to 2009, according to the International Data Corporation.

When their content is made searchable, e-mails can also be used to track down expertise, as can even more ephemeral forms of communication such as instant messaging. "I've seen some experimental software that figures out who are the human repositories of significant information in the organisation based on the flow of e-mails," says Mr Burke. "I expect to see things like that productised."

Over the next three years what change do you expect in your levels of usage in the following tools?

(% respondents)



Source: Economist Intelligence Unit survey, May 2007.



Knowledge management in manufacturing

Already well established are markets for systems such as product life-cycle management (PLM), enterprise resource planning (ERP) and business process management (BPM). In the past three years, more than 50% of companies in our survey have increased their investment in BPM and ERP as well as in collaboration software, information management tools and intranets. Over the next three years, the majority of respondents questioned also expect to increase their investment in these tools, suggesting a continued strong appetite for applications that encourage and enable the share of knowledge.

There is a trend towards greater interoperability between these technologies. While this does not mean that the functional divisions between the systems are breaking down, emerging standards for exchanging information across enterprises mean that the barriers to data exchange are being eroded.

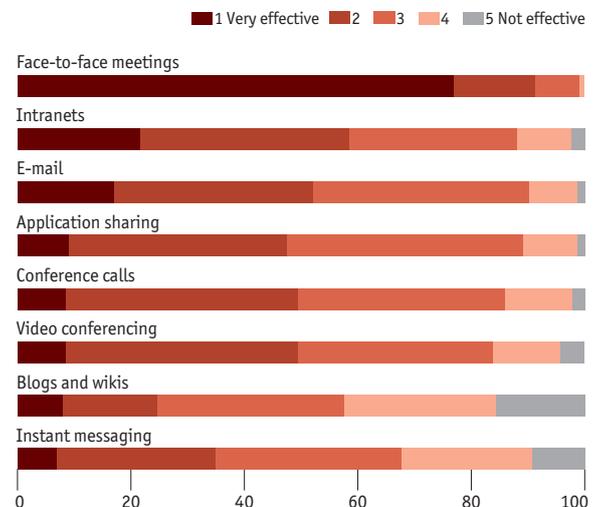
In addition, taxonomy, a means of classifying activities, roles and tasks, is driving further interoperability. "We need a vocabulary, and taxonomy helps to identify the key elements and processes of knowledge," says Mr Burtha. "The nature of the work determines the nature of the taxonomy. So you create commonality to leverage innovation."

Collaborating in a virtual world

With a growing proportion of executives working remotely—whether they are collaborating with colleagues or external partners—the ability to establish virtual communication channels is an increasingly important element in knowledge management. More than 80% of companies are now "virtual workplaces," according to Nemertes Research, meaning that some of their employees work away from their supervisors and workgroups.

An expanding suite of tools is emerging to facilitate collaboration between these virtual workers. While e-mails, instant messaging, virtual whiteboards, voice over IP, conference calls and desktop videoconferencing are well established, presence-aware communications allow users to identify which of their colleagues' devices—whether a mobile phone, laptop or PDA—is switched on at any time. The system will then route any communication through

Which of the following channels do you think are most effective for sharing information? Please rate on a scale of 1 to 5, where 1=Very effective and 5=Not effective.
(% respondents)



Source: Economist Intelligence Unit survey, May 2007.



CASE STUDY Speed and collaboration at Red Bull Technology

For Red Bull Technology, a company with a single product that breaks down into 7,000 parts, the ability to share information is critical. The company designs, engineers and builds the cars for the Formula One racing teams of Red Bull, which made its debut on the circuit in 2005. With a large number of highly specialist engineers and suppliers required to collaborate on this complex undertaking, the potential for extremely valuable and competitive intellectual property to be leaked or stolen means that protecting information is as important as sharing it.

Employee loyalty is crucial at Red Bull Technology, whether within the company itself or among the suppliers with which it works. "Within IT systems, you can do a lot with permissions and you can limit visibility but you rely on people to hold the whole thing together," says Matt Cadieux, IT director at the company. "So the strength of those relationships is really important."

When it comes to internal collaboration and trust, the team spirit is a strong one at Red Bull Technology, and is one that is easier to establish than it might be for a commercial automotive manufacturer or

aerospace company. In a medium-sized company of 550 people, the single, highly public goal of producing a winning Formula One car naturally unites product teams and fosters the exchange of ideas and knowledge.

When it comes to suppliers, however, the sensitivity of the information being exchanged with those suppliers means that relationship building is essential on both sides of the partnership. So Red Bull Technology's relationship with Renault, which supplies the car's engine, is structured carefully.

Members of a separate team within Renault work solely on Red Bull Technology's car. They participate in many of the key strategic meetings and, when on the racetrack, they wear the company's uniform. "So the Renault employees that are assigned to our team actually see themselves as part of that team," explains Mr Cadieux.

As well as managing the critical intellectual property that is behind the cars it produces, Red Bull Technology must also ensure the rapid design and development of products and components. The product team may need to introduce thousands of new components during each season, an unusually large volume for a relatively small company and requiring the efficient exchange of knowledge and information.

To facilitate this, the company has streamlined and standardised its product

development process to a greater degree than would be the case in aerospace or mainstream automotive companies. From the conceptual and detailed design stages to the verification and testing stages, a formal process is followed.

Behind the process is a powerful IT system. Red Bull Technology uses Teamcenter Engineering, a product life-cycle management system from Siemens UGS, to capture the mass of product data generated by the company. The technology is designed to transform product development from a series of unconnected processes to a single, collaborative one uniting information from different sources.

At Red Bull Technology, the system allows data relating to materials, components and designs for each car to be broken down and viewed on screen. "It's like an upside-down tree with a node at the top exploding into detail," says Mr Cadieux. "So you have one database and a structure that reflects the product in a way that people in the company understand and which that makes it easy to find information."

While Mr Cadieux stresses the importance of the technology as the "digital backbone" of the company's operations, he says that human collaboration and knowledge sharing is what really drives innovation and efficiency. "That's because we have one product and people have a common goal," he says.

that device. Moreover, real-time communications dashboards are now combining some of these technologies in a single interface. Some 62% of survey respondents predicted that they would increase their investment in collaboration software, such as application sharing and video-conferencing.

For companies whose employees include executives from different countries and who speak different languages, virtual communications can act as a leveller. For those whose first language is not English, the asynchronous nature of e-mail can eliminate

communication inequalities that might exist were they working face-to-face with English-speaking colleagues.

Despite growing familiarity with these tools, the vast majority of respondents to our survey (91%) continue to believe that face-to-face meetings are the most effective channels for sharing information. There is less confidence in the power of e-mails, conference calls, application sharing, blogs, instant messaging and intranets, with only half agreeing that they are effective.



Margaret Neale, professor of organisations and dispute resolution at Stanford University's Graduate School of Business, argues that to foster effective collaboration, virtual teams need to meet face-to-face in the first instance, as this is the quickest and most effective way to create the familiarity and trust essential to working remotely.

If meeting in person proves impossible, then it is important for the entire team to conduct its first meeting on the same platform. In a pharmaceuticals company studied by Prof Neale and her colleagues, teams that performed best conducted their launch meetings with the entire team either face-to-face or connecting virtually. "The closer you got to half-and-half virtual and face-to-face, the worse the team performed," says Prof Neale. "It heightens the 'us versus them' phenomenon because people that are virtual in a face-to-face group feel ignored or disrespected."

With the costs of travel rising, business trips made for face-to-face meetings should be reserved for the most strategic elements of any virtual collaboration—particularly for building relationships and trust—while routine matters can be dealt with via phone calls, e-mails or videoconferencing. Even a crisis at a production facility can be dealt with virtually if the executives responsible have visited the site on an earlier occasion and taken the time to get to know its physical layout and meet the key staff onsite.

Launch meetings should also be used to establish protocols on things such as how quickly e-mails should be responded to or in what time zone meetings should be held. Often, companies organise meetings according to the time zone of their headquarters, forcing workers on the other side of the world constantly to get up in the middle of the night. "Be careful about what makes it easy for you, but hard for everybody else," warns Prof Neale. "If your company is indeed global, it means the world doesn't necessarily revolve around headquarters or whoever the team leader happens to be."

Back to behavioural basics

The difficulties of virtual working are a powerful illustration of the fact that technology will never be the main solution to effective knowledge management. Almost half of the executives questioned in our survey agreed with this point. And given that collaboration is a function of human nature, companies need to establish organisational mechanisms to foster that quality—particularly given its value to the organisations. Executives perceive the main benefits from increased flow of knowledge (both internally and with external partners) to be the sharing of best practice around business processes and the ability to respond more effectively to customer demands.

Special projects are one way to increase communication between employees from different departments or companies in their supply chains. Areas such as health and safety as well as the application for awards can bring together staff that would not normally collaborate. Philanthropic and volunteering initiatives are also activities through which executives from diverse corners of the supply chain can be brought together—and, because a social issue is the focus of the activity, the incentive to collaborate can be powerful.

Performance management is another means of building knowledge exchange into the heart of a company's business with, for example, peer reviews or 360-degree feedback programmes. By modifying the performance management system and redefining job descriptions, companies can start to raise the profile of knowledge seeking and sharing and build it into working practices.

However, true collaboration and knowledge exchange is notoriously difficult to quantify so the question for companies is how to measure and reward



this intangible behaviour. A product developer, for example, might realise that by tapping into the expertise of colleagues he or she has cut two weeks out of the production cycle or knocked 10 per cent off the cost of a product. In the world of knowledge management, this is the holy grail. Mr Burtha stresses the importance of capturing and documenting what he calls this “Aha moment”. “The more you move in time away from that ‘Aha moment’, the greater risk you have of losing that moment.”

Technology can help. Using the corporate intranet, employees who experience the benefits of knowledge sharing can click a button or banner prominently placed on the home page. This will send an alert to someone who will later follow up with a phone call or e-mail to record and document what communication or knowledge exchange it was that precipitated the designer’s success in cutting the development time and cost of their product. “Again, it’s not so much the technology. It’s the process,” says Mr Burtha. “Organisations that are successful have a combination of people, process and technology and it is processes that support the efficient identification of success stories.”

Communities of practice—through which people in different departments, supplier companies, regions and ranks collaborate—are now well established. Similarly, through cross-functional teams, executives from different functions of the business can come together to commercialise a product. More than half of respondents (54%) say that one of the main factors likely to improve flow of knowledge is the creation of cross-functional teams. One example of a company that has made cross-functional teams a core element of its business practice is Harley Davidson, the US motorcycle manufacturer. Each of its product types is supported by a team consisting of representatives from design, manufacturing, purchasing and marketing. This helps the company to develop a much deeper understanding of what it is that makes its products successful.

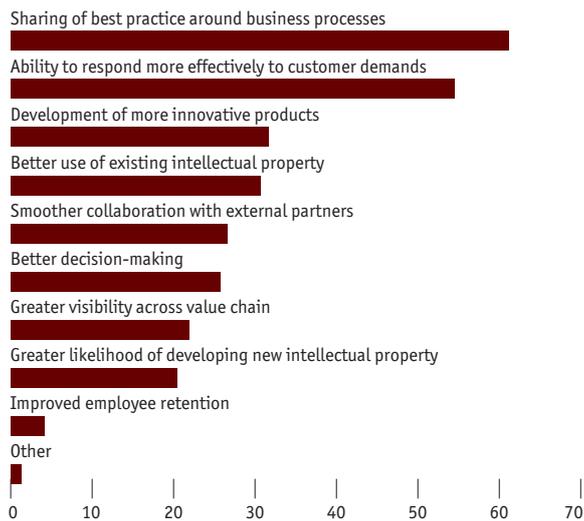
In addition, cross-functional teams should also

remain connected to others in the business so that, for example, the sales executive in a team would also be able to tap into the expertise of other sales people across the manufacturing supply chain.

Yet as companies establish their communities of practice and cross-functional teams, many overlook the fact that dozens of informal networks exist in all organisations. And while the formal organisation of a company—its structures, hierarchies and processes as documented officially and described in job titles—tends to be based on assessments of how tasks and activities will take place, the reality may be

What do you consider to be the main benefits that could be derived from the improved flow of information and knowledge within your company and with external partners?

Please select up to three.
(% respondents)



Source: Economist Intelligence Unit survey, May 2007.

quite different. Operating in parallel to the formal organisation is an informal organisation that consists of a network of relationships between employees in different departments, business units or suppliers and at different levels of seniority within the company.

“Imagine if everyone in an organisation left and was replaced the next day by people with the same educational background and basic skills but



no history of working together,” says Peter Senge, founding chairperson of the Society for Organisational Learning and a senior lecturer at MIT Sloan School of Management. “If all they had to go on was the databases, written information and IT systems, how would they do? Not well at all, because they wouldn’t have the personal experience and the relationships.”

Through social or organisational network analysis, companies are starting to track these informal relationships and actively promote them by giving people from different departments tasks to work on jointly or rotating managers so that they get to know people in different parts of the organisation or supply chain. It is these human relationships—supported by technology—that can have a powerful impact on product innovation and process improvement.

“It always is about human behaviour,” says Prof Senge. “We keep trying to find quick fixes and technology often looks like the quick fix. But we don’t want to face up to the fact that we actually have to get along, and that’s a lot more difficult.”

Conclusion

As the supply chains of manufacturing companies become ever more geographically and organisationally dispersed, corporate executives are struggling to capture the kind of knowledge and expertise—from both internal and external sources—that can foster innovation within their own organisations.

While survey respondents acknowledge that relationships with outsourcing and offshoring partners are having a positive impact on overall competitiveness, there is no compelling evidence that these relationships are precipitating a marked improvement in product innovation, quality of products or creation of new intellectual property.

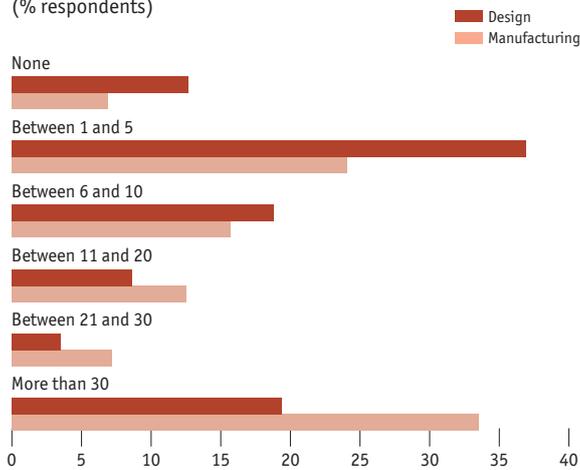
Yet there is a general acknowledgement among survey respondents that the incentive for accessing the expertise of external partners is powerful. Companies questioned believe that greater knowledge flow within their own organisations and with external partners would allow them to improve business processes and respond more effectively to customer demands.

The priority for companies, therefore, is to devise programmes and strategies—whether through setting goals, taking an open approach to innovation or building on their informal networks—that will foster collaboration and knowledge exchange both internally and externally. While such strategies pose risks such as loss of intellectual property, the greater risk is that without such strategies, the ability to innovate will be diminished, along with overall competitiveness.

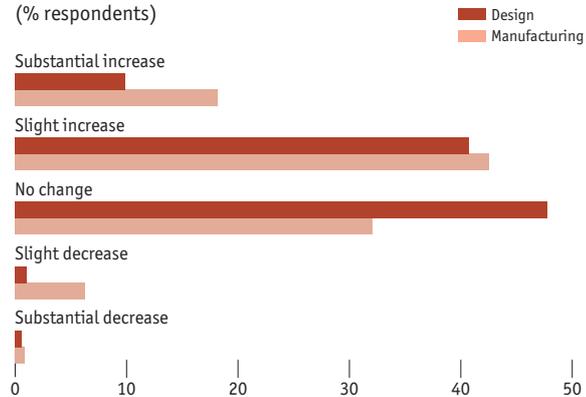
Appendix

In May 2007, The Economist Intelligence Unit surveyed 315 European executives from manufacturing industries. 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.

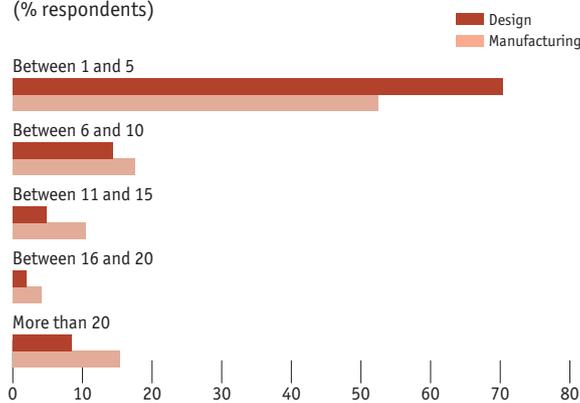
Approximately how many external partners does your organisation collaborate with in the design and manufacturing process? Please select one in each column.
(% respondents)



In the next three years, what change do you expect to the number of outsourcing and offshoring contracts that you will implement for your design and manufacturing processes? Please select one in each column.
(% respondents)



In approximately how many countries does your organisation currently operate design and production/manufacturing facilities? Please select one in each column.
(% respondents)

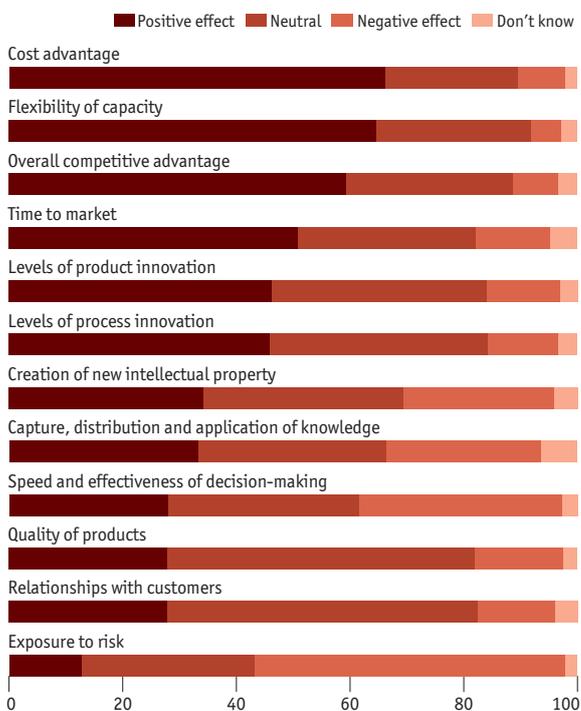


Appendix: Survey results

Knowledge management in manufacturing

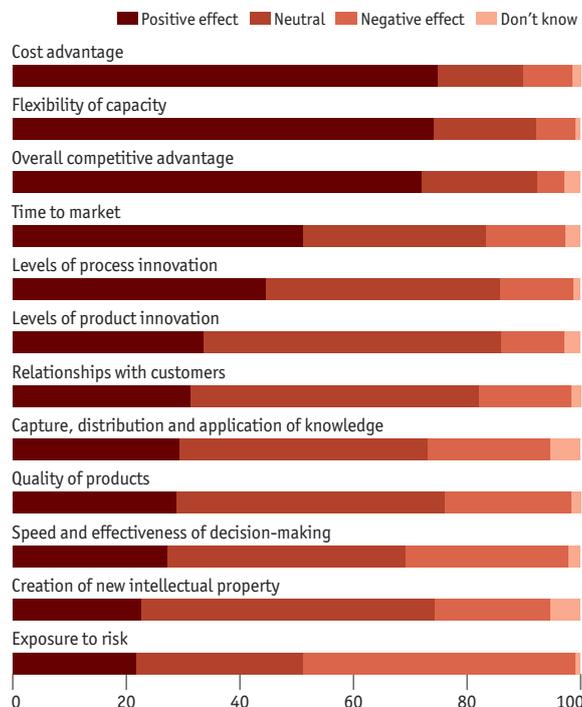
When thinking about “Design”, in your opinion does increased offshoring and outsourcing of aspects of design have a positive, negative or neutral effect in the following areas?

(% respondents)



When thinking about “Manufacturing”, in your opinion does increased offshoring and outsourcing of aspects of manufacturing have a positive, negative or neutral effect in the following areas?

(% respondents)



What do you consider to be the main benefits that could be derived from the improved flow of information and knowledge within your company and with external partners?

Please select up to three.

(% respondents)



Which of the following do you think would do most to improve the creation, distribution and application of knowledge within your organisation, and with external partners?

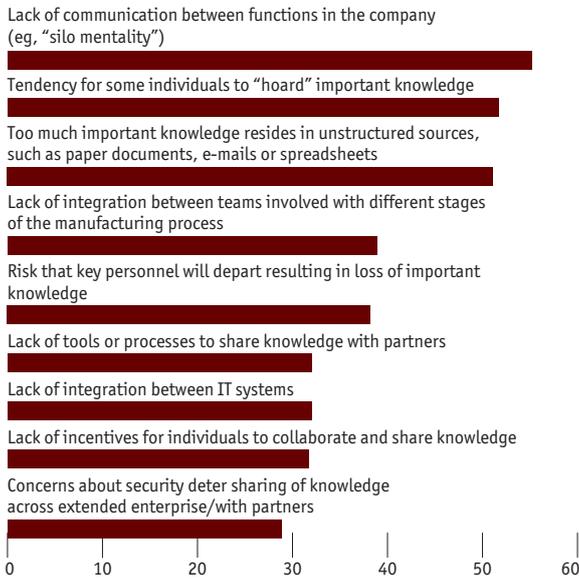
Please select up to three.

(% respondents)



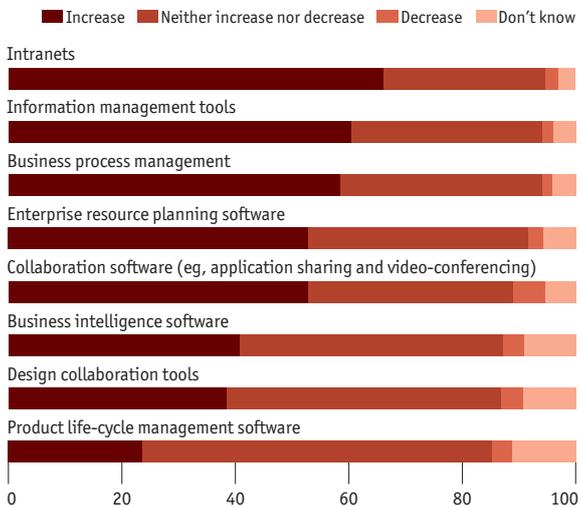
Which of the following do you consider are the most significant barriers to the effective flow of knowledge across your extended enterprise? Select all that apply.

(% respondents)



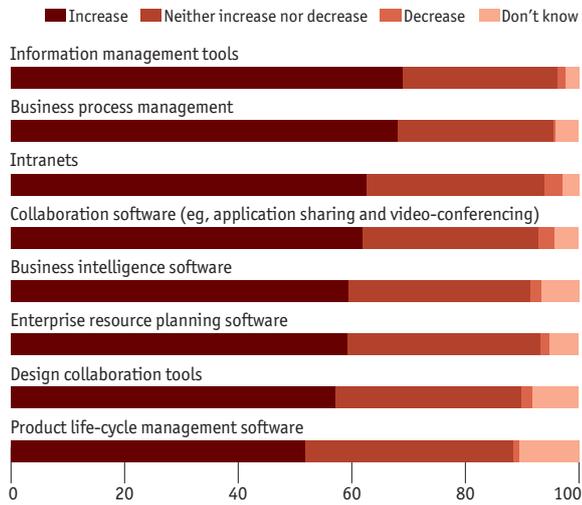
Over the past three years, what change has there been to your levels of usage in the following tools?

(% respondents)



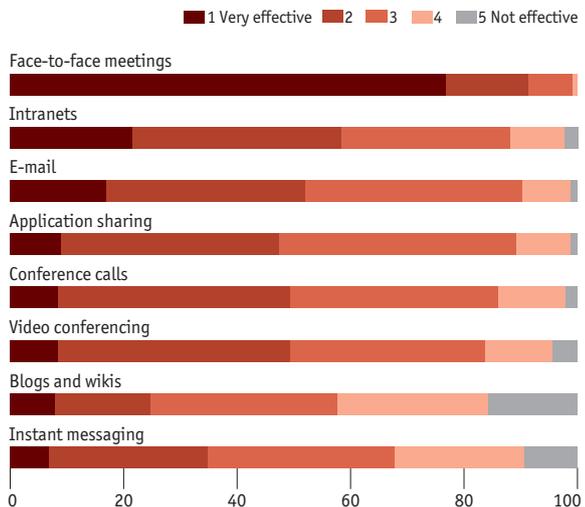
Over the next three years what change do you expect in your levels of usage in the following tools?

(% respondents)



Which of the following channels do you think are most effective for sharing information? Please rate on a scale of 1 to 5, where 1=Very effective and 5=Not effective.

(% respondents)



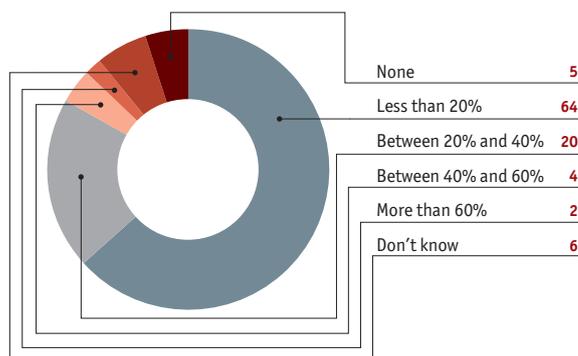
Appendix: Survey results

Knowledge management in manufacturing

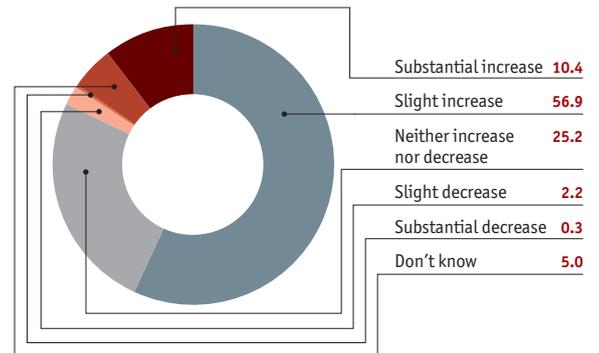
How effectively do you think your organisation manages the following aspects of knowledge management? Please rate on a scale of 1 to 5, where 1=Very effective and 5=Not effective. (% respondents)



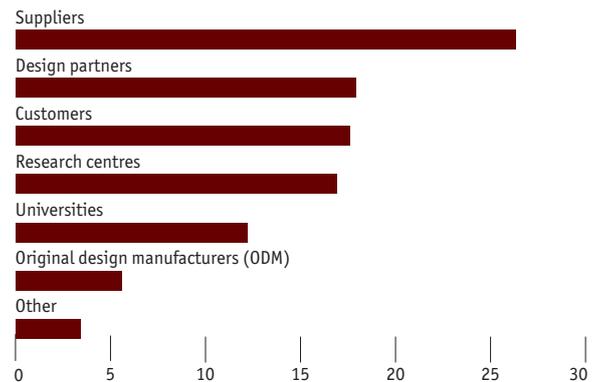
In the past three years, what proportion of your company's intellectual property do you think has been derived from external partner organisations? (% respondents)



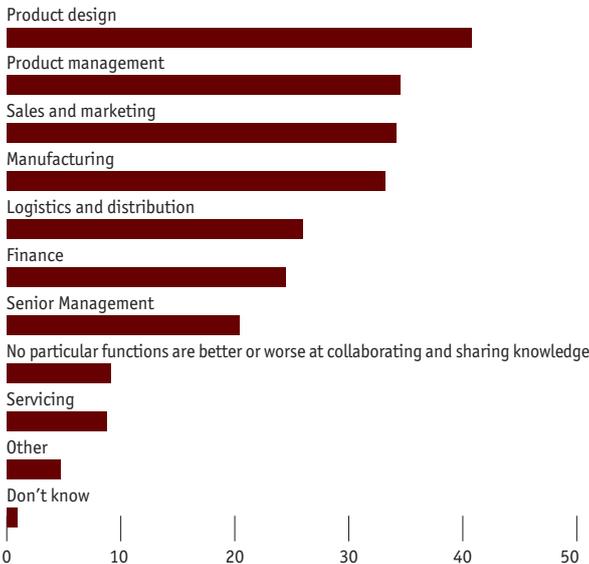
Looking ahead to the next three years, what change do you expect to the proportion of your company's intellectual property that is derived from external partner organisations? (% respondents)



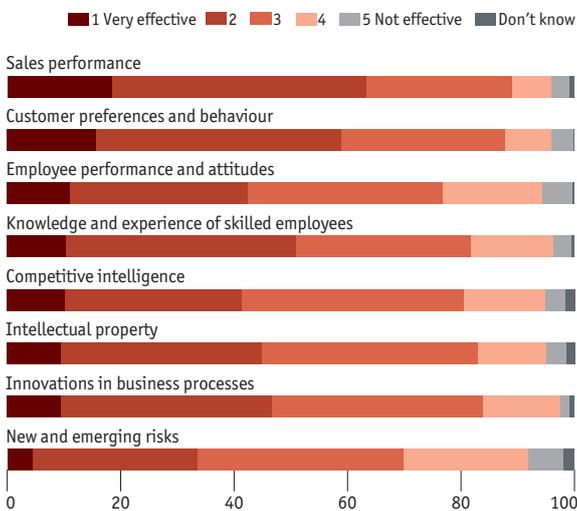
Which of the following external organisations is the most important source for your intellectual property? (% respondents)



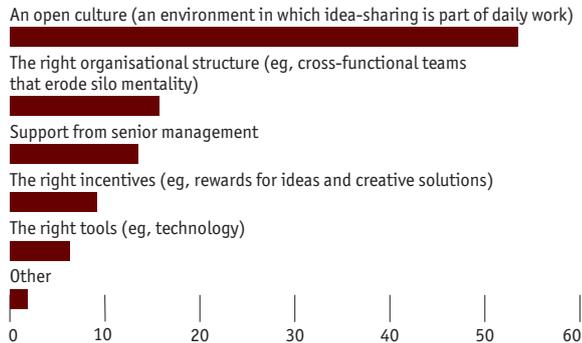
Which of the following functions within your organisation do you think are most effective at collaborating and sharing knowledge with other functions? Please select up to three.
(% respondents)



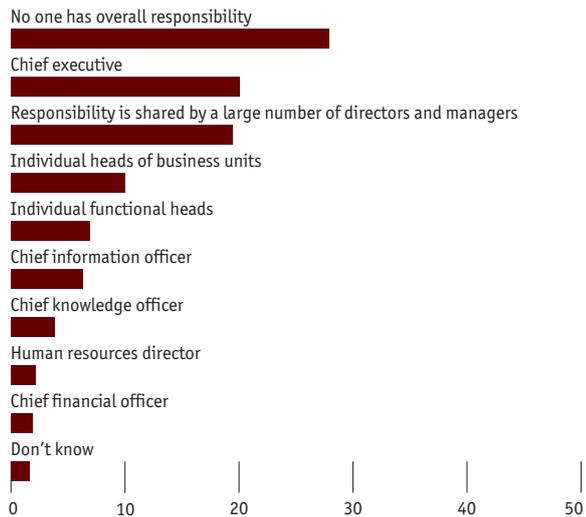
How successfully do you think your company captures and exploits the following types of information? Please rate on a scale of 1 to 5, where 1=Very effective and 5=Not effective.
(% respondents)



What is the single most important factor in encouraging the sharing and capture of knowledge in your organisation?
(% respondents)



Who in your company is responsible for promoting collaboration and sharing of knowledge in your company? If no one has specific responsibility for this, please select "No one has overall responsibility".
(% respondents)



Appendix: Survey results

Knowledge management in manufacturing

Please indicate whether you agree or disagree with the following statements.

(% respondents)

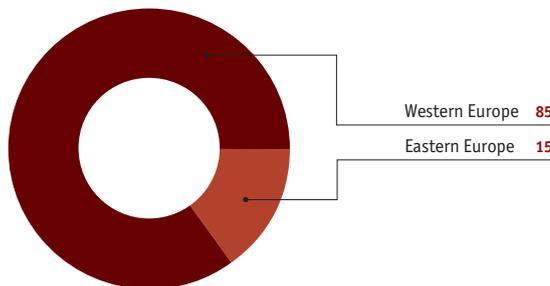
■ Agree ■ Neither agree nor disagree ■ Disagree



About the respondents

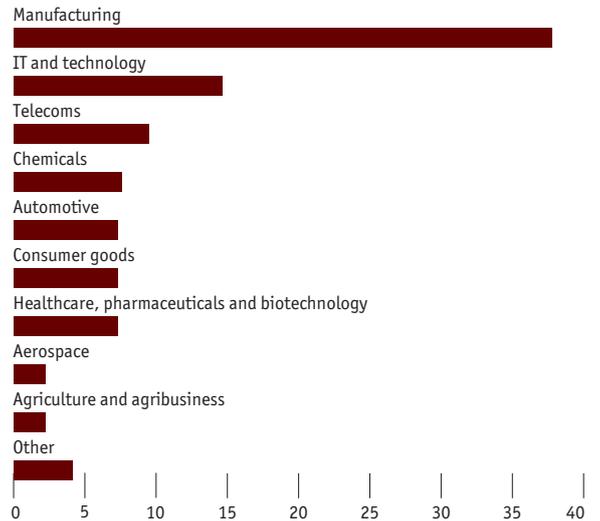
In which region are you personally based?

(% respondents)



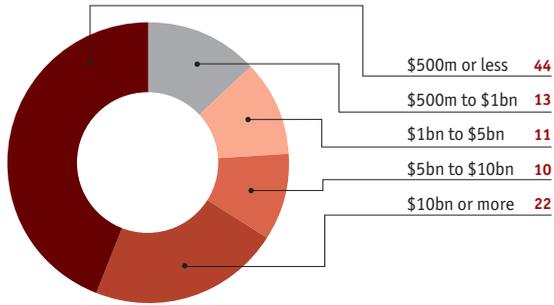
What is your primary industry?

(% respondents)



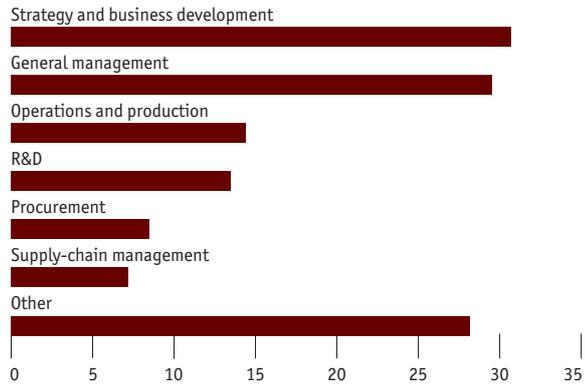
What are your organisation's global annual revenues in US dollars?

(% respondents)



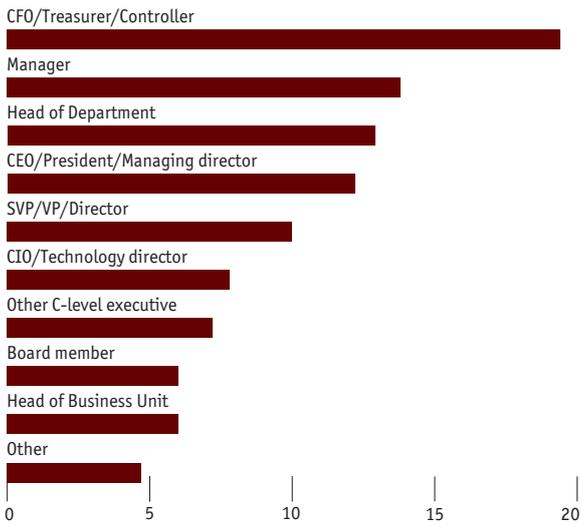
What are your main functional roles?

(% respondents)



What is your title?

(% respondents)



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.

LONDON
26 Red Lion Square
London
WC1R 4HQ
United Kingdom
Tel: (44.20) 7576 8000
Fax: (44.20) 7576 8476
E-mail: london@eiu.com

NEW YORK
111 West 57th Street
New York
NY 10019
United States
Tel: (1.212) 554 0600
Fax: (1.212) 586 1181/2
E-mail: newyork@eiu.com

HONG KONG
60/F, Central Plaza
18 Harbour Road
Wanchai
Hong Kong
Tel: (852) 2585 3888
Fax: (852) 2802 7638
E-mail: hongkong@eiu.com