Work 4.0
How will we work
in the future?

Results of a survey of the expectations of employees and
employers in ten European countries

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Content

1 Introduction

1.1 Motivation

Digitisation has been a dominant trend in business and society for a number of years now. The use of new digital technology brings with it some far-reaching changes for companies as well as people's daily lives.

Work is one key focal point of these changes. It is a key resource for companies and is a significant factor in the lives of many people. Digitisation has great potential for upheaval in the world of work, expressed using terms such as New Work and Work 4.0. The way we work is changing. The use of new technology is not the only reason for this; it is also due to factors such as new forms of organisation or qualification requirements, most of which are the result of the former.

One aspect of this new world of work has received a significant boost from the coronavirus pandemic: remote work. That being said, employees did work from home before the outbreak. However, many companies and employees have only really gotten to grips with remote working in the past few months. This form of work organisation will be a key part of Work 4.0 in future.

Remote working alone has already shown that the reality of Work 4.0 differs for various sectors, company divisions and employee groups. For example, employees who

work in transportation, production or personal services are unable to work remotely. The scale of the change brought about by digitisation is highly diverse among workers in manufacturing industries compared to office workers. It goes without saying that the office jobs of the future will also be extremely different compared to the present day. However, the change will not be as comprehensive as in the manufacturing sector. There, the way in which humans and technology will interact in future will result in much greater changes to jobs and in turn the world of work.

That being said, the purpose of the following analysis is not simply to shine a spotlight on the topic of Work 4.0, as numerous studies have done already. Instead, it produces new findings in two ways:

—
Firstly, the analysis focuses on the employ-
ees as well as the companies.

The expectations, needs and preferences of
employees in terms of Work 4.0 can be
completely different compared to those of
employers. However, it is important for
companies in particular to be aware of
these differences. If the supply of skilled
workers shrinks in future, it will be vital for
companies to offer their employees excel-
lent working conditions. If there is a signifi-
cant difference between what employees
expect and prefer and what a company
offers, the employees might end up going
to the competition. Furthermore, it is im-
portant from a job satisfaction perspective
that an employer addresses the potential
fears of the staff with regard to Work 4.0.

—
Secondly, how employees and employers
view Work 4.0 can be linked to the cultural
background.

For example, the situation in Italy might
differ greatly from the one in the United
Kingdom. The same analysis is carried out
in ten European countries in order to gain
such insights. For example, differences can
be identified between core European coun-
tries such as Germany, France, Italy or Spain
in addition to how Work 4.0 is viewed on a
European level.

The results of the analysis are presented
below after the breakdown of the method-
ology used.

1.2 Methods of investigation

The analysis is based on a survey that was
carried out online by the market research
firm YouGov. In total, 5,278 employees and
3,654 corporate decision makers were
surveyed between 12 and 22 April 2021.
This approach makes it possible to compare
the perspectives of employees and employ-
ers as the majority of the questions are
almost identical.

This survey was also conducted in ten
European countries: Denmark, Germany,
France, Italy, the Netherlands, Norway,
Poland, Sweden, Spain and the United King-
dom. This offers insights into 'pan-Euro-
pean' attitudes and trends as well as devi-
ations from these in individual countries.
The results are essentially presented in the
same fashion. The aggregated results of the
ten countries are the focal point as a
'European' picture, and deviations and
differences between individual countries
are examined in each case.

The topic of the survey is Work 4.0. The following aspects are surveyed and examined:

- the look at individual future technologies: expectations regarding how they will shape the world of work in future, the attitude of employees towards the use of this technology and whether the technology is currently being used or set to be used in companies

- the interplay between humans and technology in the world of work in future and the related expectations and challenges

- the willingness to innovate of the working environment

- remote working: expectations and preferences as well as the advantages and disadvantages

- changing qualification requirements and further training: expectations in terms of future qualification requirements as well as attitudes and preferences with regard to further training

2 Technology of the future

Digitisation brings with it rapid techno-logical change. We are currently in the middle of the 'fourth Industrial Revolution'. New technology will shape the world of work of the future in the process:

➜ Even now, a large – and growing – share of communication and transactions takes place via digital platforms. Amazon, Facebook, Google and eBay are just the tip of the iceberg. The platform model brings different marketing sites together and is compatible with many different fields of application, from job portals and crowdsourcing websites to industry networks and shopping or sales portals.

➜ Machines, devices, materials and prod-ucts are increasingly networked in the internet of things (IoT). Data levels and physical processes are merging into so-called cyber-physical systems so that more and more machines are able to communicate with one another autono-mously.

➜ Digital communication technology and collaboration software have made it possible to work remotely, i.e. outside of the company premises. The use of this technology and software increased significantly in home offices during the coronavirus lockdown and helped keep business processes running. Experts expect the importance of collaboration software and virtual conferences to continue growing even after the pan-demic.

➜ Cybersecurity has gained immense significance in the digital era due to the growing number of web interfaces, as documented by the high number of security incidents.

➜ The increasing digitisation of all fields of business has resulted in large quantities of unstructured data. Big data analytics can leverage these treasure troves of data in order to better understand cus-tomer behaviour, for example. Predictive analytics is one important branch: its fields of application range from predict-ing machine breakdowns and the need for maintenance to optimising transport routes, resource planning and reducing bottlenecks or rates of return.

➜ With cloud computing, infrastructures and workloads can be outsourced to third-party computing centres. One-off purchases of hardware or software are replaced with scalable services. Clouds already see widespread use and are a driver of the digitisation process.

➜ Artificial intelligence simulates intelligent behaviour and makes decisions on the basis of data with little to no human intervention. Machine learning is a key

potential application. In machine learning, computer programs improve their performance independently by building up experience. Self-learning machines are already able to perform certain tasks as well as human workers – sometimes even better.

➜ Machine learning has led to great progress in automated pattern analysis and pattern recognition, e.g. of language, writing or faces. Even chatbots are based on this technology as it facilitates communication with a digital application in a natural language (this is known as natural language processing). All of these applications can perform tasks that were traditionally performed by workers.

➜ Augmented reality, mixed reality and virtual reality are types of computer-assisted reality. Virtual reality completely masks reality and replaces it with artificial three-dimensional worlds. In contrast, augmented reality retains the real environment in principle and adds supplementary digital information in the form of text, images or videos. Mixed reality is a hybrid form where physical and digital objects coexist and interact with one another. The applications are very much on the rise and offer lots of new opportunities, including in terms of communicating with customers, education and further training, real-time assistance with complex work steps and the virtualisation of prototypes in the planning phase.

➜ A blockchain transparently documents transactions, which is important in terms of rights management or when networked machines place orders autonomously (these are known as smart contracts). It is a decentralised digital register (a distributed ledger) that is administrated by a community of users and updates itself continuously. This means that the system is largely secure against manipulation. However, the technology is still in its fledgling stage.

➜ Digitisation also makes more flexible production techniques possible such as additive manufacturing, where layers of materials are built up to create products or components (i.e. 3D printing). This makes it possible to create complex geometric structures and manufacture extremely small batches cost-effectively.

➜ Mobile and autonomous robots move independently in their environment using sensors, actuators and artificial intelligence. Unlike traditional 'stationary' industrial robots, autonomous robots are not limited to a few preprogrammed operations, but rather are able to co-operate with human workers with a degree of flexibility.

➜ Even autonomous driving can be attributed to mobile robotics in a broader sense. Its development is highly advanced and it has proven itself in numerous tests. However, numerous technological and legal hurdles have to be overcome before fully autonomous vehicles can be brought onto the market.

Potential application companies must first research the potential applications of drastic innovations, derive new business models from them and adapt their internal organisational structures. This raises the question of what relevance employees and companies attribute to the aforementioned technology, how far the corporate implementation process has progressed already and whether it is being accepted by employees. It also allows us to draw conclusions as to whether the innovations tend to be 'top down' or 'bottom up' in nature, i.e. whether they are introduced by the management or demanded by employees.

2.1 The expected relevance of innovative technology to everyday work

The changes to the world of work sparked by the 'fourth Industrial Revolution' are already in full swing. It is therefore interesting to see how workers perceive these changes and what new technology, in their opinion, will be of relevance to their professional futures. According to the results of the survey, over two-thirds of employees in Europe expect cybersecurity to shape their world of work in future (68 per cent), followed by digital platforms (63 per cent) and digital communication and collaboration software (60 per cent). A relatively large proportion also agree with cloud computing (47 per cent) and IoT applications (46 per cent). In comparison, employees tend to think that autonomous vehicles, additive manufacturing techniques (3D printing), autonomous robots and augmented, mixed or virtual reality will be of less relevance to their professions. There is an extraordinary lack of enthusiasm about the future potential applications of blockchain technology (see image 1).

However, employee expectations as to the future relevance of this technology vary from job situation to job situation, with the larger differences being between office workers and non-office workers (see image 2).

Image 1: Expected relevance of future technology to the respondent's own profession

Proportion of answers in %

■ Important　■ Not important　■ Not applicable in my job
Remaining percentage: Don't know / NA

Cybersecurity
Digital platforms
Digital communication technology / collaboration software
Cloud computing
Networked and communicating machines / devices (Internet of things)
Big data / (predictive) analytics
Artificial intelligence / machine learning
Pattern analysis and pattern recognition (e.g. language, writing, faces)
Chatbots / natural language processing
Augmented reality / mixed reality / virtual reality
Autonomous robots
Additive manufacturing techniques (3D printing)
Autonomous vehicles
Blockchain

0%　70%

Whereas the former subgroup expects digital technology to have a significant impact on their world of work, the proportion is much lower in the latter subgroup. In our survey, the workers whose jobs do not involve much or any office work at all predominantly work in the following sectors: health and care services, education, retail, industry, transport and distribution, hospitality and leisure.

In a country comparison, employees in Italy, Poland and Spain generally attach the greatest importance to the influence of future technology on their profession. In contrast, employees in the EU core coun-

Image 2: Varying evaluation of future technology depending on the job situation

Proportion of employees in %

■ Office workers　■ Non-office workers
Only employees who see a certain technology as important to their profession

Autonomous vehicles
Blockchain
Additive manufacturing techniques (3D printing)
Autonomous robots
Augmented reality / mixed reality / virtual reality
Chatbots / natural language processing
Pattern analysis and pattern recognition
Artificial intelligence / machine learning
Big data / (predictive) analytics
Internet of things
Cloud computing
Digital communication technology / collaboration software
Digital platforms
Cybersecurity

0%　80%

tries of Germany and France in particular only attach a below-average level of importance to digital technology for their profession. The same goes for the Netherlands (see image 3).

The way digital technology is perceived by European corporate decision makers differs with regard to administration (finance, human resources, etc.), production and logistics and customer communication (e.g. marketing, sales and customer support). The ranked order of companies in Europe strongly resembles that of employees, although they do tend to consider the technology more relevant to their sector (see image 4). This indicates that people on a management level are more conscious of the significance of digitisation and Industry 4.0 than people on the lower levels of the

corporate hierarchy. The process of change could therefore be expected to occur from the top down and potentially take some workers by surprise.

Most of the technology is considered exceptionally relevant to the field of administration. As expected, additive manufacturing techniques, autonomous robots and autonomous vehicles are relatively more important in production and logistics. On the other hand, chatbots and natural language processing as well as augmented, mixed or virtual reality play the most important role in customer communication.

From country to country, the situation is the same with companies as it is with workers: Italy, Poland and Spain are in the lead in terms of the relevance of future technology,

Image 3: Varying evaluation of future technology from country to country

Only employees who see a certain technology as important to their profession
Highlighted: Proportion above the international average of European countries

	ø	NL	IT	DK	PL	FR	SE	DE	UK	NO	ES
Cybersecurity	68%	67%	80%	69%	74%	56%	66%	53%	71%	68%	73%
Digital platforms	63%	56%	73%	64%	63%	48%	65%	56%	61%	72%	70%
Digital communication technology / collaboration software	60%	58%	71%	49%	69%	52%	60%	53%	65%	64%	61%
Cloud computing	47%	39%	53%	30%	51%	37%	53%	40%	54%	56%	61%
Internet of things	46%	43%	57%	33%	65%	37%	36%	38%	48%	46%	60%
Big data / (predictive) analytics	38%	36%	50%	29%	45%	29%	35%	29%	40%	35%	48%
Artificial intelligence / machine learning	36%	29%	50%	28%	46%	27%	35%	31%	31%	35%	47%
Pattern analysis and pattern recognition	32%	25%	44%	24%	46%	22%	29%	31%	28%	29%	44%
Chatbots / natural language processing	26%	23%	36%	23%	36%	19%	25%	21%	19%	23%	33%
Augmented reality / mixed reality / virtual reality	26%	23%	34%	18%	41%	16%	25%	21%	16%	25%	36%
Autonomous robots	25%	20%	36%	19%	40%	19%	21%	20%	18%	23%	33%
Additive manufacturing (3D printing)	24%	17%	37%	15%	44%	21%	19%	21%	14%	17%	32%
Autonomous vehicles	21%	15%	34%	13%	35%	19%	18%	18%	12%	14%	28%
Blockchain	18%	17%	31%	10%	32%	14%	14%	13%	11%	12%	28%

Image 4: Expected relevance of future technology to the respondent's own company
Proportion of answers in %

Administration

- Cybersecurity
- Digital platforms
- Digital communication technology / collaboration software
- Cloud computing
- Networked and communicating machines / devices (Internet of things)
- Big data / (predictive) analytics
- Artificial intelligence / machine learning
- Pattern analysis and pattern recognition (e.g. language, writing, faces)
- Augmented reality / mixed reality / virtual reality
- Chatbots / natural language processing
- Additive manufacturing techniques (3D printing)
- Autonomous robots
- Blockchain
- Autonomous vehicles

Production and logistics

- Cybersecurity
- Digital platforms
- Digital communication technology / collaboration software
- Cloud computing
- Networked and communicating machines / devices (Internet of things)
- Big data / (predictive) analytics
- Artificial intelligence / machine learning
- Pattern analysis and pattern recognition (e.g. language, writing, faces)
- Augmented reality / mixed reality / virtual reality
- Chatbots / natural language processing
- Additive manufacturing techniques (3D printing)
- Autonomous robots
- Autonomous vehicles
- Blockchain

Customer approach

- Cybersecurity
- Digital platforms
- Digital communication technology / collaboration software
- Cloud computing
- Big data / (predictive) analytics
- Networked and communicating machines / devices (Internet of things)
- Pattern analysis and pattern recognition (e.g. language, writing, faces)
- Artificial intelligence / machine learning
- Chatbots / natural language processing
- Augmented reality / mixed reality / virtual reality
- Blockchain
- Additive manufacturing techniques (3D printing)
- Autonomous robots
- Autonomous vehicles

0%   80%

■ Important   ■ Not important   ■ Not applicable in our sector

Remaining percentage: Don't know / NA

14   Technology of the future

whereas Germany and France are below the international average. Employees and employers in 'relatively large' and economically stable national economies are perhaps underestimating the influence of innovative technology in future.

Overall, the results suggest that people are yet to become fully aware of the implica-

tions of future technology. This goes for workers in particular. It is noteworthy – albeit not very surprising – that workers and corporate decision makers alike are particularly conscious of technologies which have already achieved widespread market penetration.

## 2.2 The implementation of future technology within a company

The current state of digitisation becomes evident when we examine the reality of companies: what progress has been made with planning or implementing future technology? According to corporate decision makers, European companies have on average made exceptional progress with the implementation of cybersecurity, digital platforms, digital communication technol-

ogy and collaboration software and cloud computing solutions (see image 5). On the other hand, many of them do not plan to use autonomous vehicles, autonomous robots or additive manufacturing techniques. One reason for this might be that these technologies are still relatively untested and have so far only been used by a handful of corporate pioneers.

Image 5: Progress in the use of future technology
Proportion of answers in %

Only companies that have not previously indicated that the technology in question is irrelevant to their sector

- ■ Already implemented or in the pipeline
- ■ Implementation planned in the next one to two years
- ■ Implementation intended but not planned
- ■ No implementation intended
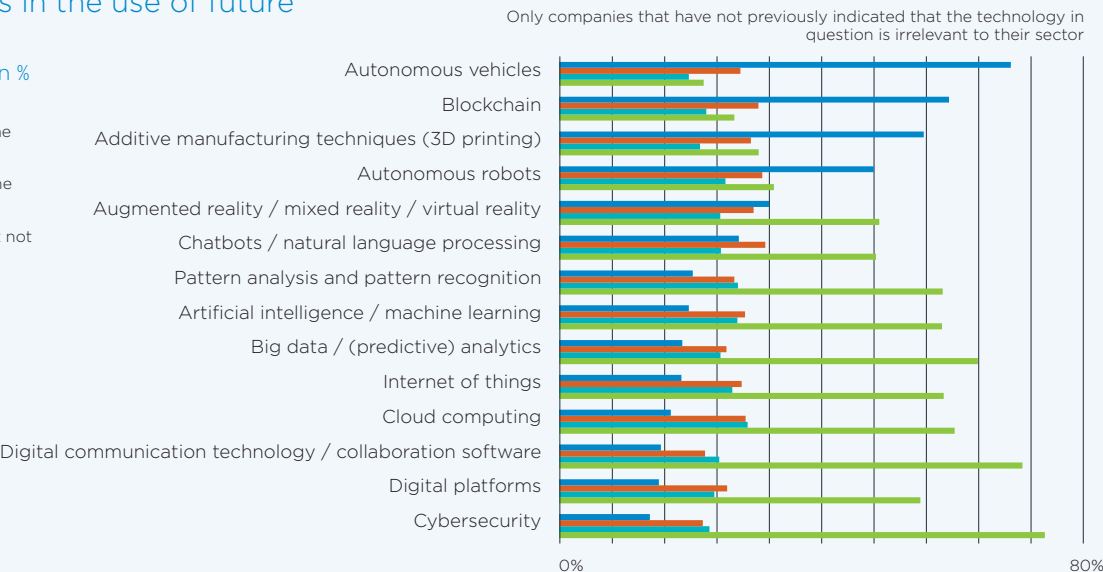
In a comparison of countries, Denmark, Germany, Norway and Sweden tend to be below average with regard to the use of future technology (see image 6). However, Sweden is significantly above average in the top four categories alongside the Netherlands and the United Kingdom.

Rolling out and using such future technology is always a question of financial resources too. These, in turn, normally depend on the size of the company. As such, it is less surprising that it is mainly larger companies that are already using each example of future technology (see image 7).

Image 6: Use of future technology from country to country

Proportion of companies that have already implemented the technology or are in the process of doing so
Only companies that have not previously indicated that the technology in question is irrelevant to their sector
Highlighted: Proportion above the international average of European countries

	ø	NL	IT	DK	PL	FR	SE	DE	UK	NO	ES
Cybersecurity	43%	58%	40%	42%	37%	37%	47%	34%	62%	40%	42%
Digital platforms	37%	40%	32%	34%	29%	31%	44%	32%	53%	43%	36%
Cloud computing	35%	41%	25%	23%	22%	34%	45%	31%	55%	41%	37%
Digital communication technology / collaboration software	30%	37%	26%	20%	27%	34%	33%	28%	43%	35%	23%
Internet of things	20%	22%	22%	12%	21%	22%	20%	16%	23%	19%	23%
Big data / (predictive) analytics	17%	20%	18%	10%	16%	21%	12%	17%	22%	15%	21%
Pattern analysis and pattern recognition	13%	9%	14%	6%	14%	14%	12%	15%	11%	10%	17%
Artificial intelligence / machine learning	12%	18%	15%	7%	13%	14%	12%	14%	10%	8%	14%
Additive manufacturing (3D printing)	12%	7%	15%	5%	15%	14%	11%	12%	8%	6%	16%
Chatbots / natural language processing	12%	12%	13%	7%	11%	18%	9%	11%	11%	8%	14%
Augmented reality / mixed reality / virtual reality	11%	15%	12%	5%	14%	12%	9%	11%	7%	8%	13%
Autonomous robots	10%	10%	11%	6%	12%	14%	8%	9%	6%	5%	12%
Blockchain	9%	14%	14%	3%	11%	13%	8%	11%	4%	4%	13%
Autonomous vehicles	9%	8%	13%	4%	13%	11%	7%	7%	3%	6%	10%

Whereas, for example, cloud computing is already being used by 49 per cent of larger companies with 500 or more employees, only 31 per cent of smaller companies with fewer than 50 employees are using it.

In contrast, smaller companies tend to strongly refrain from making use of the

various technologies any time soon (see image 8). For instance, 45 per cent of the small companies say that they do not want to use blockchain technology in future. Only 17 per cent of the companies with 500 or more employees gave the same answer.

Image 7: Use of future technology in companies – by company size
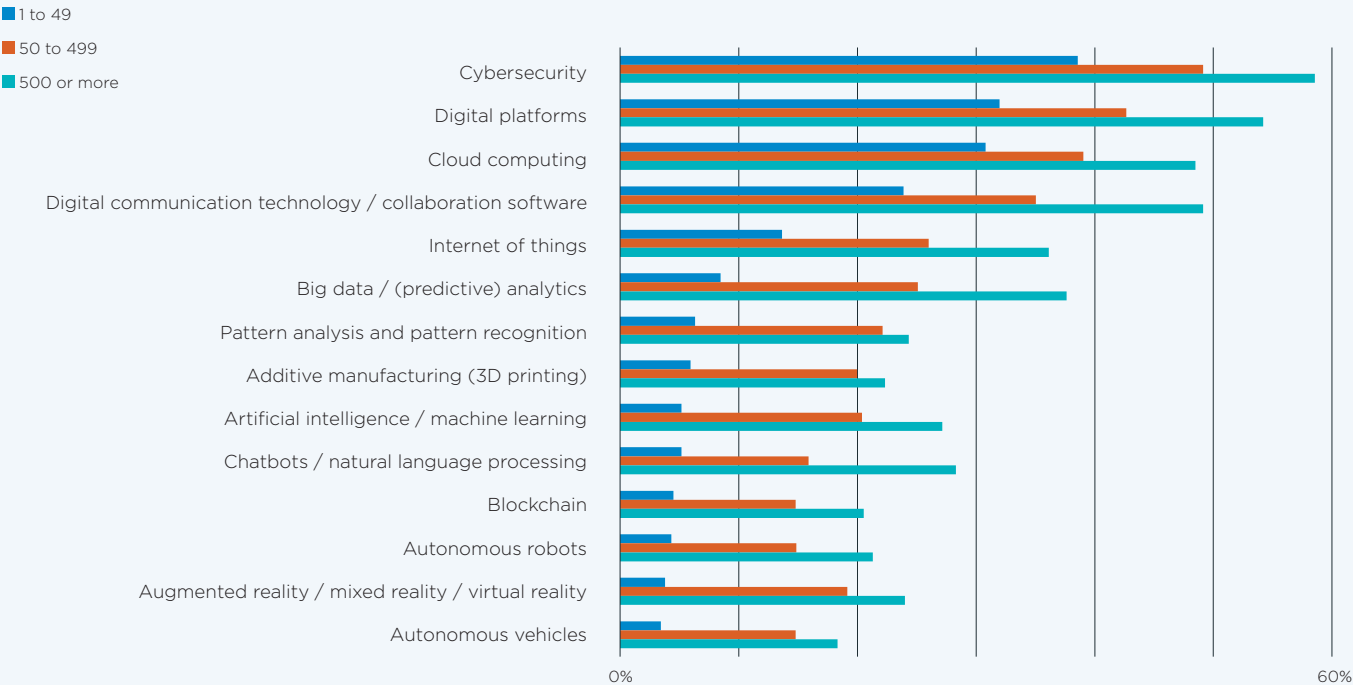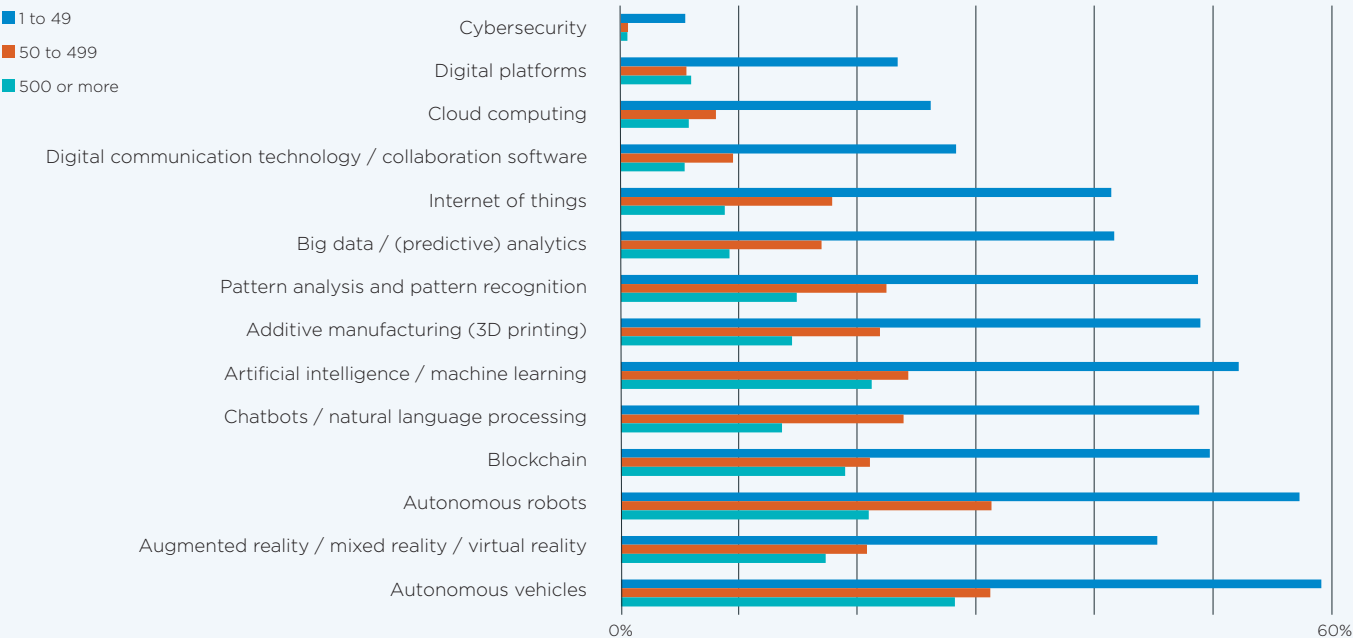Proportion of answers in %

Proportion of surveyed companies that have already implemented or are in the process of implementing the technology in question; only companies that have not previously indicated that the technology in question is irrelevant to their sector; company size in number of employees

■ 1 to 49
■ 50 to 499
■ 500 or more

Cybersecurity
Digital platforms
Cloud computing
Digital communication technology / collaboration software
Internet of things
Big data / (predictive) analytics
Pattern analysis and pattern recognition
Additive manufacturing (3D printing)
Artificial intelligence / machine learning
Chatbots / natural language processing
Blockchain
Autonomous robots
Augmented reality / mixed reality / virtual reality
Autonomous vehicles

0%   60%

Image 8: Future technology not intended to be used in companies – by company size
Proportion of answers in %

Proportion of companies that do not intend to implement the technology; only companies that have not previously indicated that the technology in question is irrelevant to their sector; company size in number of employees

■ 1 to 49
■ 50 to 499
■ 500 or more

Cybersecurity
Digital platforms
Cloud computing
Digital communication technology / collaboration software
Internet of things
Big data / (predictive) analytics
Pattern analysis and pattern recognition
Additive manufacturing (3D printing)
Artificial intelligence / machine learning
Chatbots / natural language processing
Blockchain
Autonomous robots
Augmented reality / mixed reality / virtual reality
Autonomous vehicles

0%   60%

2.3 The attitude of employees towards future technology

Whether or not certain innovations can be put to effective use by a company also depends on the willingness of the workforce to get to grips with new technology. The workers cannot be excluded when the workplace requirements change as part of the digitisation process. That is why employees' attitudes to future technology are a decisive factor.

Employees in Europe have proven to be consistently more open to the technology that might be of relevance to their occupations (see image 9). This goes for office workers and non-office workers alike. However, the acceptance rate is significantly

higher among office workers than non-office workers. The reason is that non-office workers more often see all technology as irrelevant to their jobs. The technologies that have already largely been rolled out by companies are the most accepted overall: cybersecurity (80 per cent), digital platforms (77 per cent), digital communication technology and collaboration software (73 per cent) and cloud computing (66 per cent). Only with regard to blockchain technology do the majority of employees not have a clear stance, opting instead not to provide information, possibly because the topic is still too abstract for them to be able to form an opinion.

Image 9: Attitude to the use of future technologies in the respondent's own profession
Proportion of answers in %

Proportion of employees who have not previously indicated that the technology in question is irrelevant to their job

■ Generally positive ■ Generally negative
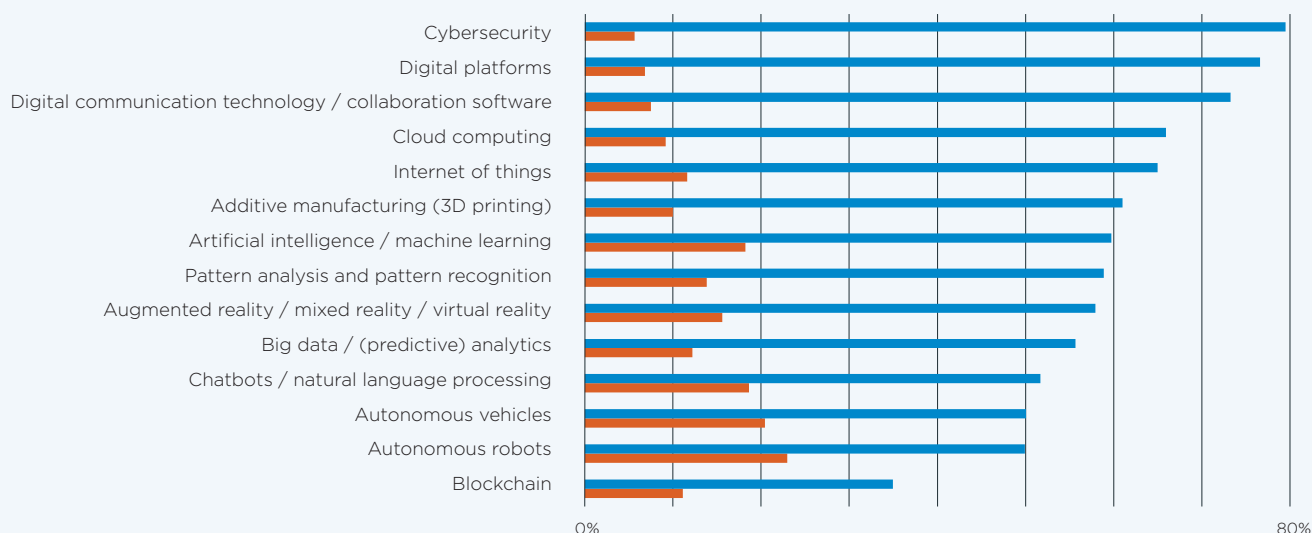
Compared to the other European countries, workers in Italy, Poland and Spain are the most open to the introduction of innovative technology in their occupations (see image 10). It is striking that the acceptance rates from Germany and Denmark are consistently below the European average.

Summary: It is a surprising outcome that Germany, the largest national economy in Europe, is below average in terms of both the use of innovative technology by companies and the openness of employees to this technology in their own jobs. The situation is similar in Denmark, Sweden and Norway. In contrast, attitudes are extremely positive in Italy, Poland and Spain and there is great receptiveness to future technology, at least according to the results. And whereas the implementation of this technology has made above-average progress in the Netherlands, workers there are significantly less amenable to it than in other countries.

Image 10: Receptiveness to future technology by country
Proportion of workers with a positive opinion of the technology
Only workers that have not previously indicated that the technology in question is irrelevant to their occupation
Highlighted: Proportion above the international average of European countries

	ø	NL	IT	DK	PL	FR	SE	DE	UK	NO	ES
Digital communication technology / collaboration software	73%	72%	83%	60%	80%	74%	67%	68%	75%	71%	82%
Cloud computing	66%	56%	72%	46%	74%	66%	66%	56%	69%	69%	83%
Cybersecurity	79%	78%	86%	74%	85%	80%	75%	69%	83%	75%	89%
Blockchain	35%	31%	49%	23%	52%	39%	26%	26%	18%	29%	55%
Additive manufacturing (3D printing)	61%	54%	72%	45%	78%	66%	51%	59%	58%	47%	73%
Digital platforms	77%	71%	84%	73%	80%	73%	73%	72%	73%	79%	87%
Internet of things	65%	61%	76%	57%	78%	68%	51%	56%	63%	58%	80%
Artificial intelligence / machine learning	60%	51%	71%	52%	70%	62%	55%	51%	53%	53%	76%
Pattern analysis and pattern recognition	59%	53%	69%	51%	71%	57%	49%	54%	51%	52%	77%
Chatbots / natural language processing	52%	52%	57%	50%	65%	53%	45%	39%	36%	48%	68%
Big data / (predictive) analytics	56%	56%	70%	44%	65%	58%	46%	41%	53%	49%	75%
Autonomous robots	50%	44%	63%	45%	64%	52%	37%	44%	42%	42%	62%
Autonomous vehicles	50%	40%	62%	39%	65%	55%	40%	41%	45%	40%	66%
Augmented reality / mixed reality / virtual reality	58%	55%	62%	49%	70%	61%	48%	51%	54%	52%	75%

3 Humans and technology working together

In the past, the introduction of innovative technology has always resulted in more or less major changes to companies' internal organisational structures and job requirements. It goes hand in hand with investments, the need to adapt and ultimately uncertainty for companies and employees alike. This section examines what employees and corporate decision makers expect regarding the impact of digitisation on employment. The opportunities that corporate decision makers associate with the launch of innovative technology are contrasted against the challenges that the parties in question expect to face in the process. This also raises the question of how employees and companies perceive the general willingness to innovate in the working environment, as this is one of the factors that determine the scale and speed of technological advancement.

3.1 The impact of new technology on occupational profiles and jobs: complement or replacement?

The use of digital technology is likely to have highly heterogeneous effects on occupational profiles: whereas the productivity of certain workers will rise, other jobs will be performed entirely by machines. All jobs are likely to be affected by changing profiles of requirements.

Consequently, there is currently a wide range of views on how digitisation might affect the future of work. In a pessimistic scenario, human workers will increasingly be replaced by networked machines fitted with artificial intelligence; many jobs that currently exist could disappear. On the other hand, an optimistic scenario posits that digitisation will create more jobs than it destroys. Not only does it have the potential to create completely new jobs, but it may also help existing employees complete their current tasks more efficiently. However, digitisation cannot play a complementary role at work unless workers have been adequately prepared for the future requirements.

According to the results of our survey, the majority of European employees (50 per cent) expect a third scenario: new technology will not have a noticeable effect on their jobs as their key tasks cannot be automated (see image 11). Workers in the United Kingdom (59 per cent) and Germany (56 per cent) are particularly certain of this.

The strongest disagreement with this prediction comes from Poland (33 per cent). Inversely, at almost 20 per cent, a relatively large number of workers in Poland – compared to the 13 per cent average for the European countries – assume that new technology could make their jobs redundant.
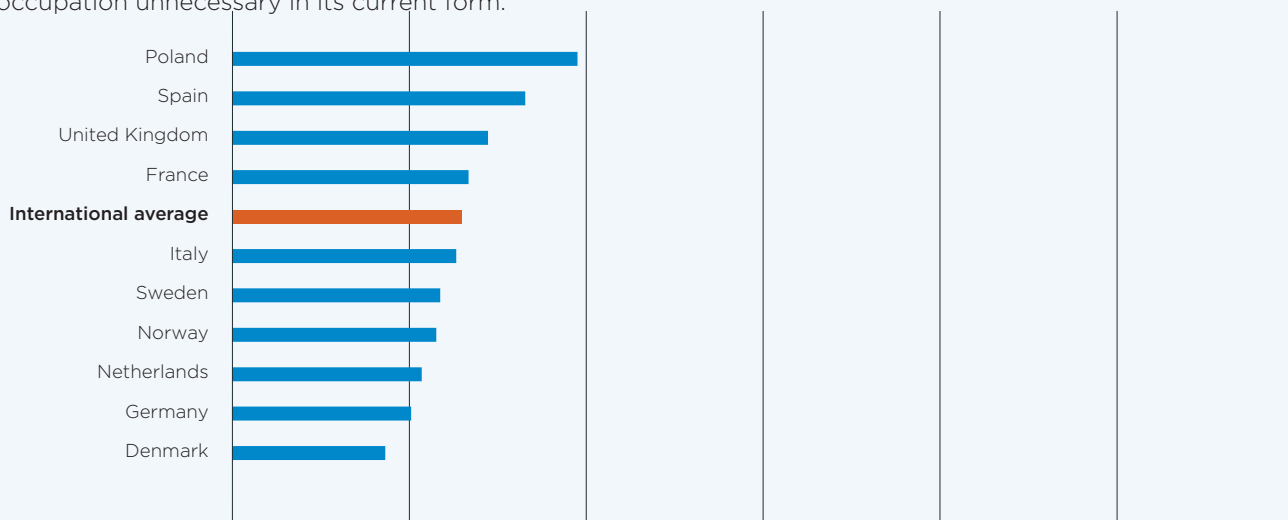
At the same time, however, the hope that technological advancements will make work safer and simpler is strongest in Poland at over 38 per cent. In fact, Poland is the only country where the expectation that innovative technology will play a helpful role at work dominates the two other scenarios. In contrast, employees from the United Kingdom (16 per cent) and Sweden (22 per cent) are exceptionally reserved with regard to the optimistic scenario.

The differences between office workers and non-office workers are evident not in the ranked order of the scenarios, but rather in the relative weighting. For instance, a significantly larger proportion of non-office workers (56 per cent compared to 48 per cent) assume that their key tasks cannot be automated. On the other hand, the pessimistic and optimistic views are shared by office workers relatively more frequently (15 and 30 per cent compared to 11 and 20 per cent).
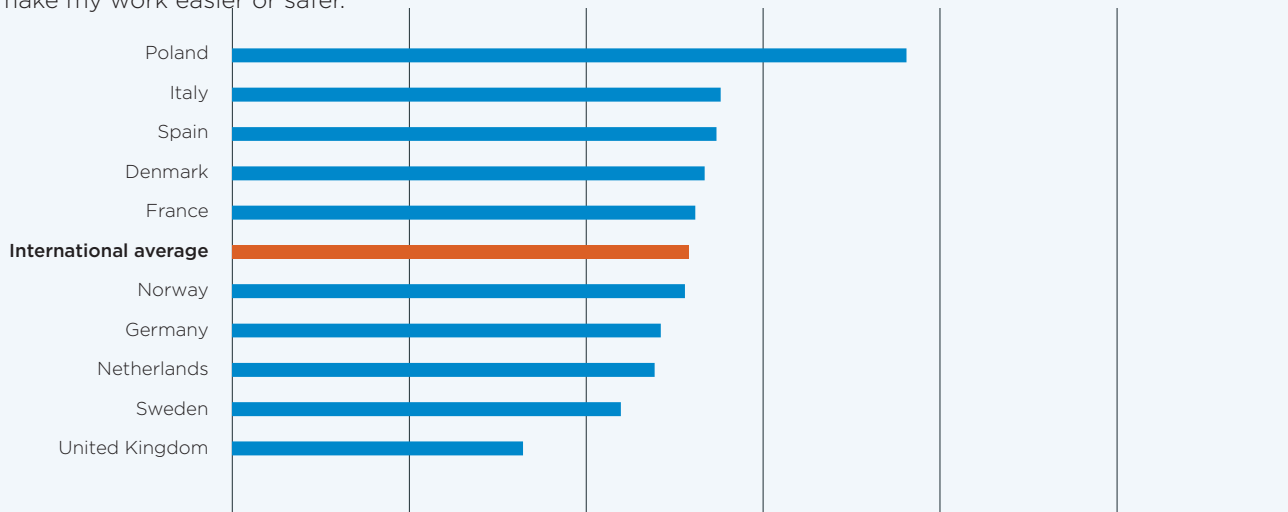
Image 11: Effects of digitisation on the respondent's own employment situation
Rate of agreement from workers in %

Pessimistic scenario: In future, new technology could take over the majority of my tasks and render my job or occupation unnecessary in its current form.

Poland
Spain
United Kingdom
France
International average
Italy
Sweden
Norway
Netherlands
Germany
Denmark

Optimistic scenario: New technology could perform individual difficult or dangerous tasks at my work to make my work easier or safer.

Poland
Italy
Spain
Denmark
France
International average
Norway
Germany
Netherlands
Sweden
United Kingdom

Neutral scenario: New technology is not likely to have a significant impact on my everyday work as my core tasks cannot be automated.

United Kingdom
Germany
Denmark
France
Netherlands
Spain
Italy
International average
Norway
Sweden
Poland

0%   60%

Remaining percentage: Don't know / NA

At first glance, it seems surprising that the majority of non-office workers expect digitisation to bypass their jobs without affecting them. After all, industrial job requirements are expected to change dramatically and networked machines and collaborative robots are expected to greatly reduce the need for physical and manual skills, driving up the relevance of information technology and data.

We can resolve this stark contrast by looking at the results of the survey in more detail. Just 7 per cent of the surveyed non-office workers are industrial workers. Of these workers, 42 per cent assume that digitisation will not affect their jobs, and while this does represent the majority of these respondents, it is far below the 50 per cent average when compared to the full population of workers. In contrast, an above-average number of non-office workers in the manufacturing sector expect new technology to complement (34 per cent) or replace (15 per cent) their jobs. As such, industry does seem to have a general awareness of the problem, even if – as with all workers – this awareness is potentially not acute enough yet. Corporate decision makers are setting completely different priorities than workers. They are the most accepting of the complementary role played by new technology at work. The majority expect workers to be less bur-

dened by time-consuming routine tasks (68 per cent) or dangerous work (65 per cent) and to work more hand in hand with machines in future (61 per cent, see image 12). Additionally, a narrow majority of 52 per cent agree with the statement that algorithms will make autonomous decisions in future.
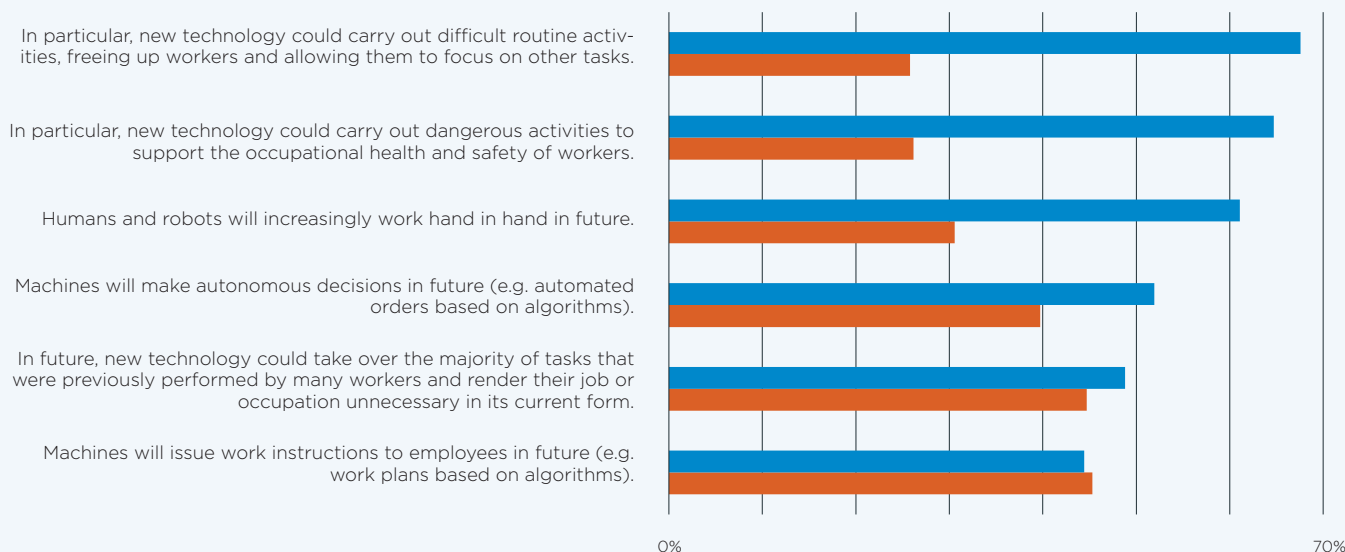
However, it is obvious that managers are far more conscious of the possibility of job losses due to digitisation than workers. Almost half of them expect new technology to take over the majority of tasks that are currently being performed by a lot of workers and render their jobs superfluous in their current forms. This is especially pertinent to companies in Poland, Spain and Italy which show above-average rates of acceptance for this scenario – as for all other potential answers too, however.

There seem to be divergent expectations at the moment: employers believe that new technology will have a significant effect on existing occupational profiles and on employment, whereas the majority of surveyed workers in Europe do not expect new technology to change their daily working lives. Consequently, it may be important for companies to include their workers in the process and prepare them for the potential changes of digitisation more effectively.

Image 12: The future of humans and technology working together in the respondent's own company

Proportion of surveyed corporate decision makers in %

Remaining percentage: Don't know / NA
■ Agree ■ Reject

In particular, new technology could carry out difficult routine activities, freeing up workers and allowing them to focus on other tasks.

In particular, new technology could carry out dangerous activities to support the occupational health and safety of workers.

Humans and robots will increasingly work hand in hand in future.

Machines will make autonomous decisions in future (e.g. automated orders based on algorithms).

In future, new technology could take over the majority of tasks that were previously performed by many workers and render their job or occupation unnecessary in its current form.

Machines will issue work instructions to employees in future (e.g. work plans based on algorithms).

0%   70%

3.2 The business potential of new technology

Investments are only made in new technology if it can be expected to yield a business advantage. This makes the concrete business potential corporate decision makers expect from digitisation a decisive factor; otherwise they might instead sceptically oppose the introduction of digital technology for economic reasons.

The majority of companies in Europe believe that it will be advantageous to digitise their fields of business. First and foremost, they plan to use it to improve the quality of their products or services (68 per cent, see image 13). The second-most important reason given is to cut costs (67 per cent). However, the primary concern is obviously not to cut down on workers, as the majority of corporate decision makers in Europe reject it as a reason for using new technology, even if responses to this might differ in individual countries. In this matter, the majorities in Polish, Spanish and Norwegian companies are contrary to the international average.
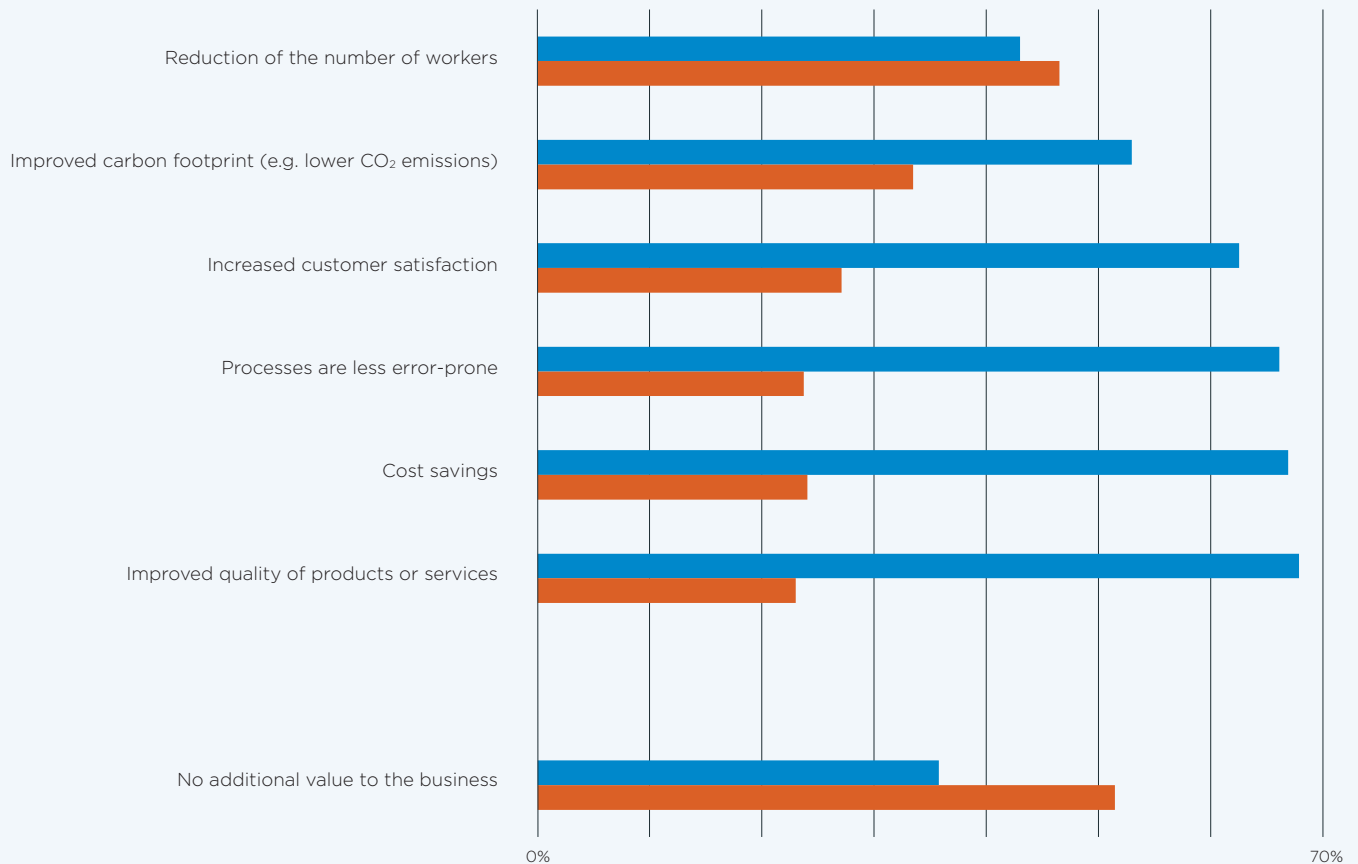
Image 13: Potential business advantages of using digital technology

Proportion of surveyed corporate decision makers in %

Reduction of the number of workers

Improved carbon footprint (e.g. lower CO_2 emissions)

Increased customer satisfaction

Processes are less error-prone

Cost savings

Improved quality of products or services

No additional value to the business

0%   70%

3.3 The challenges of digitisation

Obstacles may potentially have to be overcome for digitisation to succeed in a company's fields of business. Managers in Europe consider using digital technology in further training programmes in order to improve the technological expertise of workers to be the most important challenge (75 per cent). The new challenges facing the company in terms of data protection are rated as almost equally significant (71 per cent, see image 14).
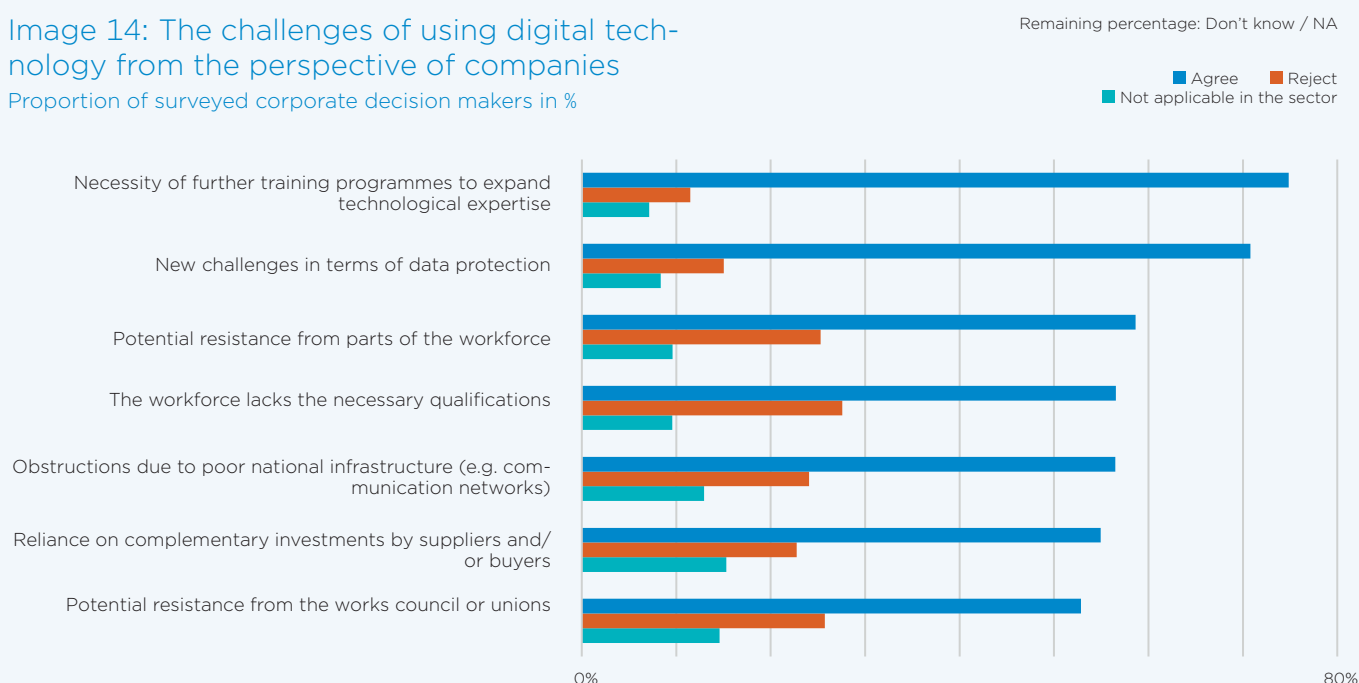
In a comparison between countries, companies in Poland (73 per cent), Italy (70 per cent) and Spain (64 per cent) in particular see qualification deficits in their workforces as obstacles impeding the use of digital technology. Managers in Italy (82 per cent), Poland (80 per cent) and Germany (79 per

cent) most strongly agree with the need for further training programmes.

From the perspective of workers, the greatest challenges of digitisation are that data protection is becoming more and more important (78 per cent) and that further training is necessary in order to roll out new technology effectively (76 per cent, see image 15). Additionally, workers consider it more likely that there might be resistance from parts of the workforce than corporate decision makers do (62 per cent compared to 59 per cent).

Workers tend to be critical of the prediction that machines will perform tasks autonomously (54 per cent). However, the majority of employers (52 per cent) believe that

Image 14: The challenges of using digital technology from the perspective of companies
Proportion of surveyed corporate decision makers in %

Remaining percentage: Don't know / NA

Agree Reject
Not applicable in the sector

- Necessity of further training programmes to expand technological expertise
- New challenges in terms of data protection
- Potential resistance from parts of the workforce
- The workforce lacks the necessary qualifications
- Obstructions due to poor national infrastructure (e.g. communication networks)
- Reliance on complementary investments by suppliers and/or buyers
- Potential resistance from the works council or unions

0%   80%

this situation will become a reality (see image 12). Machines issuing work instructions has been viewed with more criticism; around 54 per cent of workers said that this scenario would be going too far (see image 15). However, the relative majority of employers (45 per cent) are also not convinced that it will come to this (see image 12).

The main differences between office workers and non-office workers are that the latter consider the challenges of using new technology to be less relevant to their jobs.

Furthermore, it is evident that in countries which are exceptionally open to new technology (Poland, Spain and Italy), the level of awareness of the related challenges is also exceptionally high.

In summary, employers and employees in Europe all recognise how important further training is to the success of digitisation. Effectively implementing new technology in a company and being able to make skilful use of it as a worker require the right qualifications. However, employers might be underestimating the importance of involving the workforce in the launch of new technology so as to avoid any resistance to it.

Image 15: The challenges of using digital technology from the perspective of employees
Proportion of people surveyed in %

Remaining percentage: Don't know / NA

■ Agree   ■ Reject
■ Not applicable in my occupation
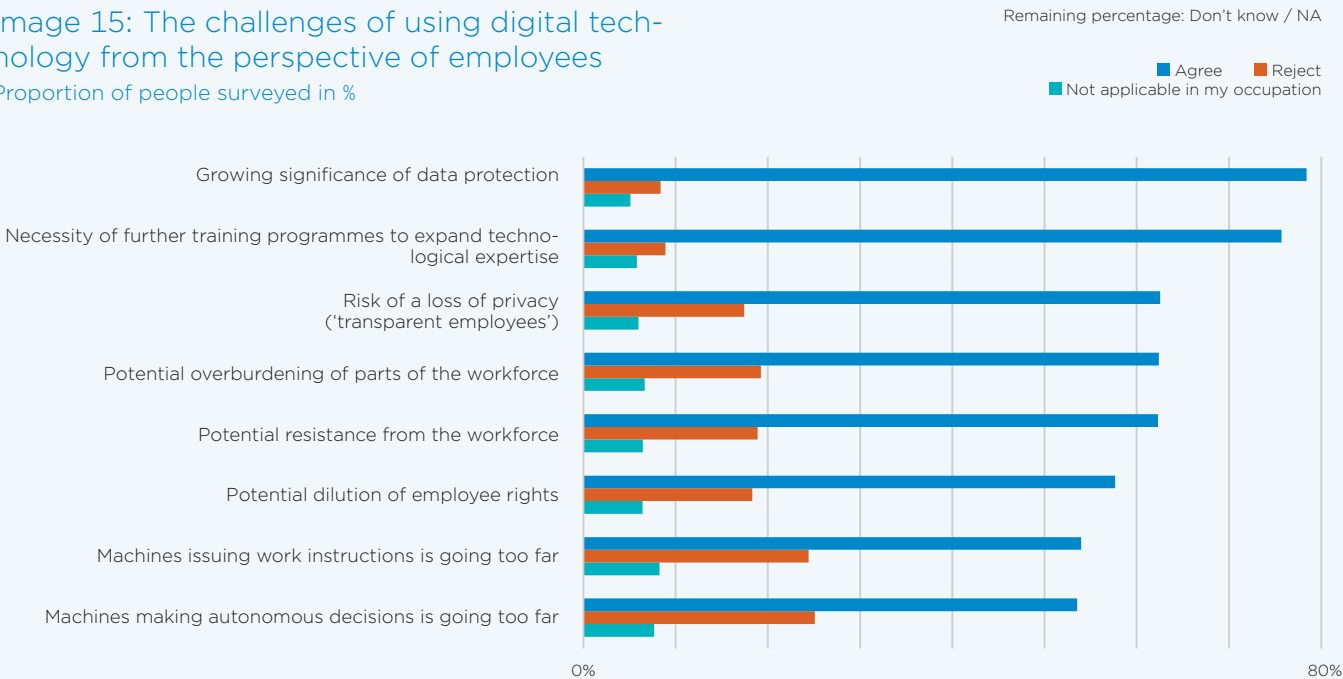
3.4 Willingness to innovate in the working environment

Besides corporate incentives and potential internal and external obstacles, the willingness to innovate in the working environment plays an important role in the successful implementation of new technology and the speed of technological advancement. If the workforce does not cooperate, attempts by the management to innovate 'from the top down' can come to nothing. On the other hand, innovations can also originate from the workforce (from the bottom up) if employees are able to convince their superiors of the advantages of certain technologies.
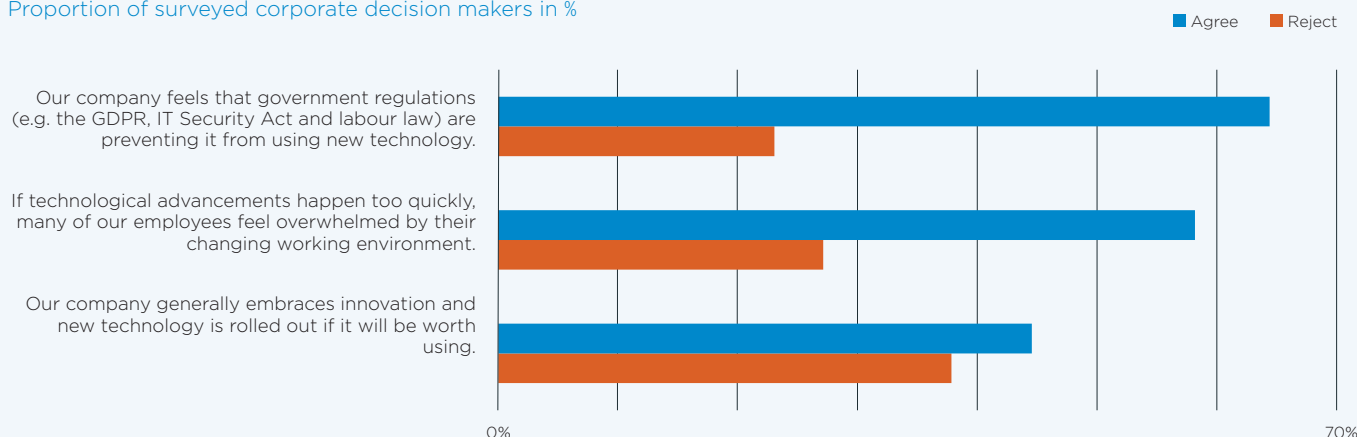
According to their own assessment, corporate decision makers believe that the majority of European companies embrace innovation and will use new technology if it will be worth it from a business perspective (64 per cent). However, over half of employers (58 per cent) also fear that many of their employees might feel overburdened by the changing working environment if the technological change happens too quickly (see image 16). The companies in Poland are ranked highest in terms of willingness to innovate and the companies in France are the most worried about overwhelming their workforces.

Image 16: Innovation behaviour of companies
Proportion of surveyed corporate decision makers in %

Remaining percentage: Don't know / NA

■ Agree ■ Reject

Our company feels that government regulations (e.g. the GDPR, IT Security Act and labour law) are preventing it from using new technology.

If technological advancements happen too quickly, many of our employees feel overwhelmed by their changing working environment.

Our company generally embraces innovation and new technology is rolled out if it will be worth using.

0%   70%

Employees in Europe are predominantly happy with the willingness to innovate in their working environments (see image 17). This goes for Italy and Poland in particular. Relatively few workers feel overwhelmed by the rate of innovation or, conversely, that their willingness to innovate is being stifled by their working environment. From country to country, however, a disproportionately large number of workers in Spain would prefer a higher level of innovation. In contrast, workers in the Netherlands, France
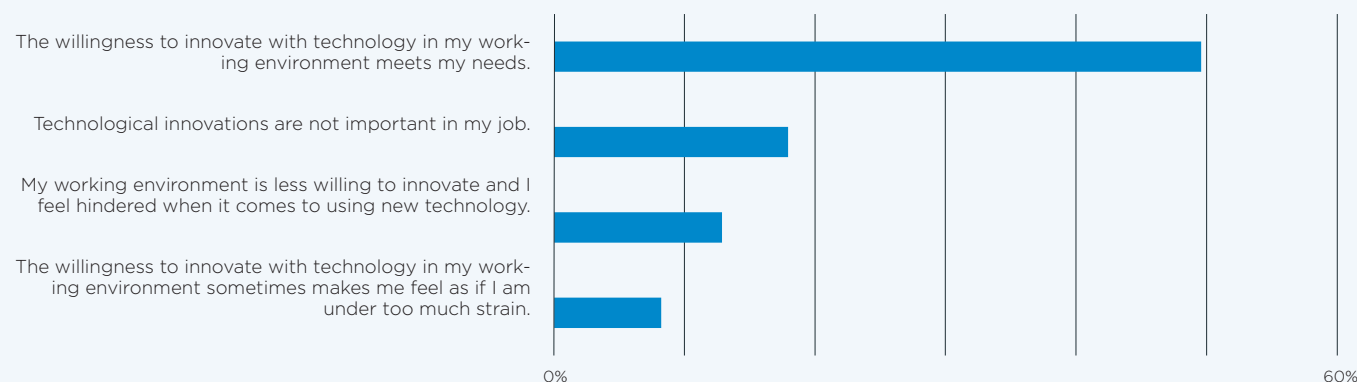
and Germany attribute an exceptionally low level of significance to innovation in their jobs.

Overall, workers in Europe essentially seem to be going along with the rate of innovation set by companies so far, although little pressure to innovate 'from the bottom up' is to be expected from workforces.

Image 17: Willingness to innovate in the working environment
Proportion of surveyed employees in %

Remaining percentage: Don't know / NA

The willingness to innovate with technology in my working environment meets my needs.

Technological innovations are not important in my job.

My working environment is less willing to innovate and I feel hindered when it comes to using new technology.

The willingness to innovate with technology in my working environment sometimes makes me feel as if I am under too much strain.

0%   60%

4 Future way of working: working remotely versus in person

The coronavirus pandemic has had far-reaching effects on business and society in Europe since early 2020. The world of work was also heavily affected. In particular, places of work had to be relocated. Business operations permitting, many companies moved their employees out of the office and into home offices – in keeping with government orders in some countries. This measure aimed to limit the spread of the virus while keeping business operations running.

Even now, the employees of many companies have still not returned to the office, working from home instead. In any case, the coronavirus pandemic gave a significant boost to the concept of remote working. Many companies and employees who previously had little to do with the concept have now – out of necessity – gained experience with remote working and home offices.

This raises the question of how work will be structured in future and whether the earlier status quo will be re-established after the crisis.

4.1 Evolution of ways of working after the coronavirus pandemic

The expectations of both employees and employers clearly point in one direction: a hybrid way of working. The coronavirus pandemic will lead to long-term changes in work organisation with regard to the place of work. As remote working will be more relevant in future, working in companies will be a flexible mixture of remote working and working in person in the office. More than one quarter (27 per cent) of all employers in the ten surveyed European countries expect this (see image 18). This expectation is particularly strong in companies in the Netherlands, the United Kingdom and France. The proportions of surveyed corporate decision makers who answered yes are 35, 32 and 31 per cent in these countries.

Around one-fifth (21 per cent) of surveyed employers even assume that remote work-

ing will be the norm in future, business processes permitting. This expectation is exceptionally strong in companies in Poland and Italy, where 27 and 26 per cent of the surveyed corporate decision makers respectively answered to that effect. In both countries, these values also match the proportion of respondents who expect a flexible mixture of remote working and working in the office.
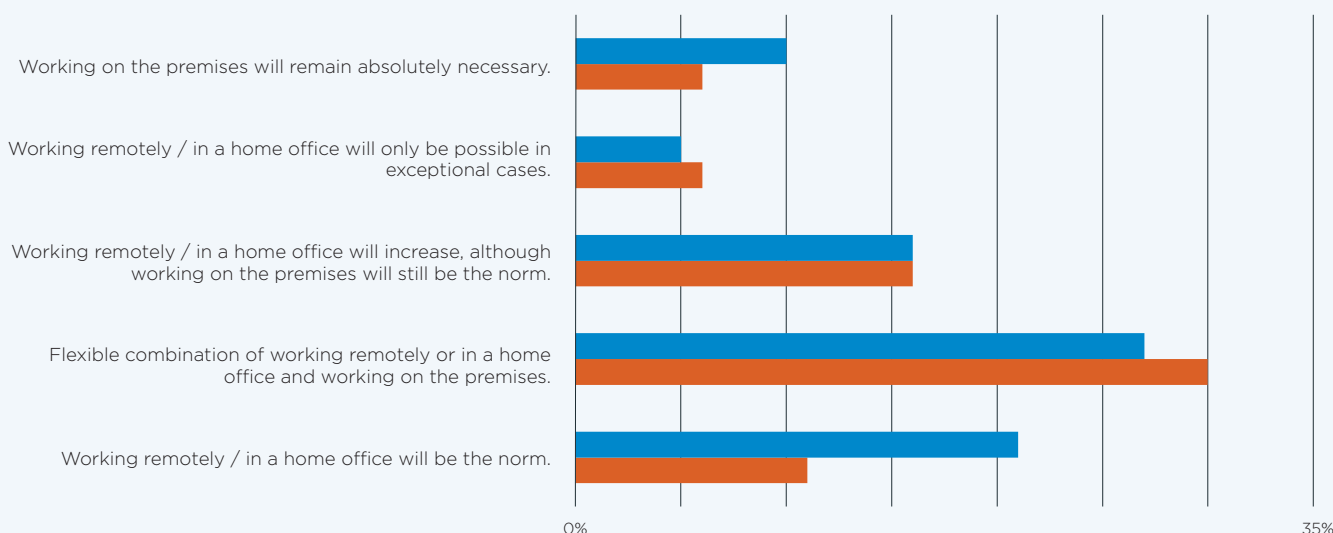
Incompatibility with business processes is one key reason why remote working will certainly not be possible in all companies and for all employees. For example, a product cannot be manufactured just anywhere. Consequently, 12 per cent of corporate decision makers state that remote working simply cannot be implemented in their businesses.

Image 18: Expectations regarding work in companies in future
Proportion of people surveyed in %

Remaining percentage: Don't know / NA

■ Corporate decision makers   ■ Employees

Working on the premises will remain absolutely necessary.

Working remotely / in a home office will only be possible in exceptional cases.

Working remotely / in a home office will increase, although working on the premises will still be the norm.

Flexible combination of working remotely or in a home office and working on the premises.

Working remotely / in a home office will be the norm.

0%   35%

A look at the job situation paints a more detailed picture: over half of non-office workers say that remote working is not possible in their jobs, compared to just 10 per cent of office workers (see image 19). In contrast, over three-quarters of workers who work in an office at least partially expect an increase in remote working, a mixture of remote working and working on company premises or even permanent home offices.

If we assume that it is ultimately the companies that set the way of working – in coordination with employee representatives – the relevance of remote working will increase as part of a flexible combination with working on company premises.

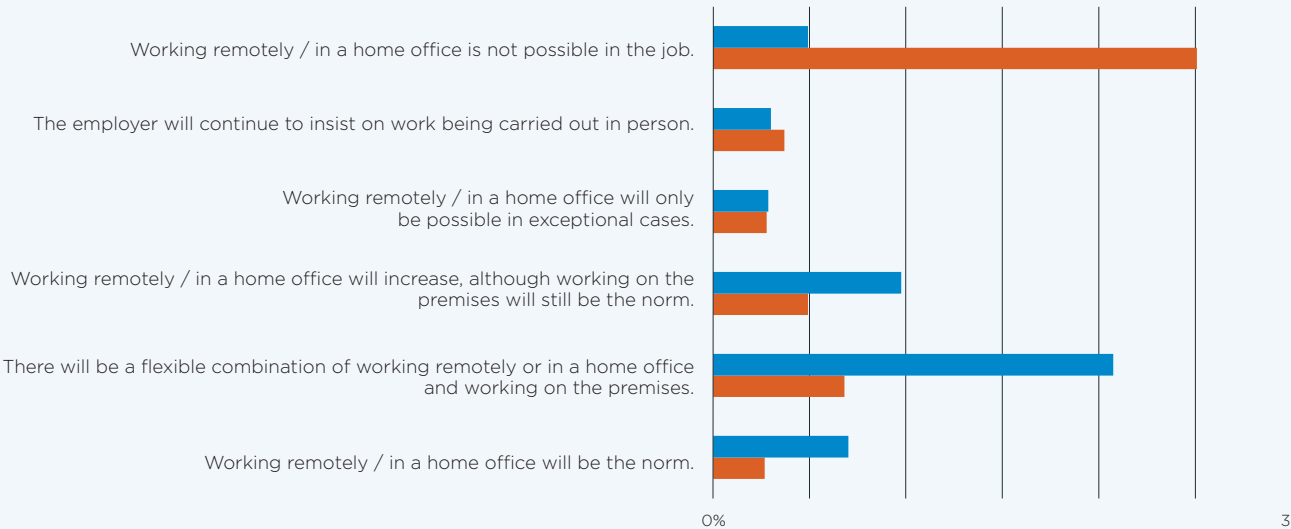Interestingly, the data also show that the topic of remote working also requires employers to be open to new concepts to a certain extent. The companies that expect remote working or a flexible combination to become the new norm tend to be the ones who say they embrace innovation (see section 3.4). For example, 33 per cent of the companies that embrace innovation expect remote working to be the norm in future, compared to just 13 per cent of the companies that do not see themselves as willing to innovate.

That being said, the expectation that working remotely and working in the office will coexist in future is a common thread across all the companies. Most workers in Europe are of a similar opinion (see image 18). Almost one-third (30 per cent) of the surveyed workers in the ten countries assume that companies will have a flexible combination of remote work and office work in

Image 19: Expectations regarding the future way of working depending on the place of work
Proportion of people surveyed in %

Office workers   Non-office workers

Working remotely / in a home office is not possible in the job.

The employer will continue to insist on work being carried out in person.

Working remotely / in a home office will only be possible in exceptional cases.

Working remotely / in a home office will increase, although working on the premises will still be the norm.

There will be a flexible combination of working remotely or in a home office and working on the premises.

Working remotely / in a home office will be the norm.

0%   35%

future – not as many employers share this opinion. The expectation is particularly strong among workers in the United Kingdom at 41 per cent. However, a smaller proportion of workers compared to employers (11 per cent) expect remote working to be the norm in future. The proportion of workers in the ten surveyed European countries who expect remote working to only be possible in exceptional cases or that their employer will insist on coming into the office to work is even lower (6 per cent in each case). Another 25 per cent of workers also say that remote working is fundamentally not viable in their companies.

Overall, therefore, the expectations of employers and workers that there will be a hybrid way of working involving remote work and office work in future largely overlap. Although companies are working to-

wards this, it would also meet the needs of workers perfectly. At 37 per cent, the majority of surveyed workers for whom working remotely is a possibility would prefer to work remotely two or three days a week (see image 20).

This preference is particularly distinct among workers in Spain and the United Kingdom. The proportion of respondents who prefer this option is 41 per cent in each of these countries. The second-strongest preference (22 per cent) is for occasionally working off the company premises. And only 17 per cent of workers would prefer to no longer work in the office at all in future, moving completely to remote working. Again, this preference is particularly distinct among workers in the United Kingdom (29 per cent) and Spain (25 per cent). As such, workers in these two countries are the

Image 20: Employees' preferred future way of working
Proportion of surveyed employees in %

Proportion of surveyed employees for whom working remotely is a possibility
Remaining percentage: Don't know / NA
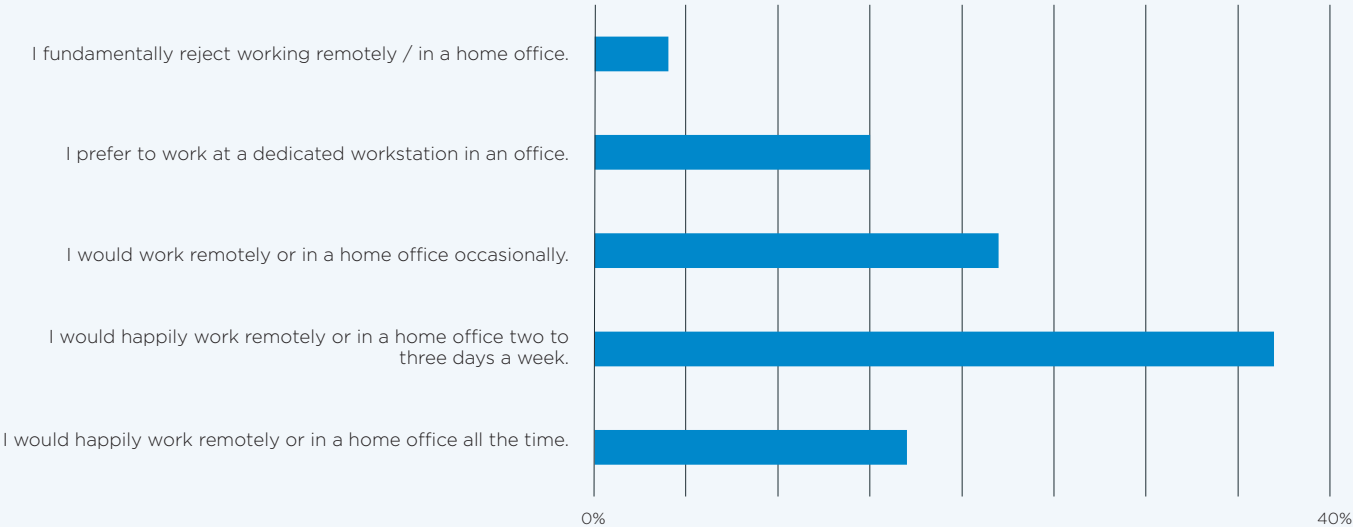
most receptive to remote working out of all ten countries.

Only 15 per cent of European employees would welcome a complete return to the office after the coronavirus pandemic. Workers in Denmark (19 per cent) and Germany and Italy (18 per cent each) would most readily do so. Only a small minority (4 per cent) of the surveyed workers fully reject remote working. This issues a certain call for companies to make this expectation – a flexible mixture of remote work and office work – a reality in future as, in doing so, they would also satisfy the needs of their workers.

A shift away from working in person in the office will always make it necessary for companies to implement certain measures. Employees require a mobile workstation, the IT infrastructure has to be adjusted, the organisational structure and management will change and a different approach might have to be taken to motivate employees.

When companies were asked about what measures relating to remote working they had already implemented or are currently planning to implement, it became evident that support for employees with technical equipment and/or furniture is the most
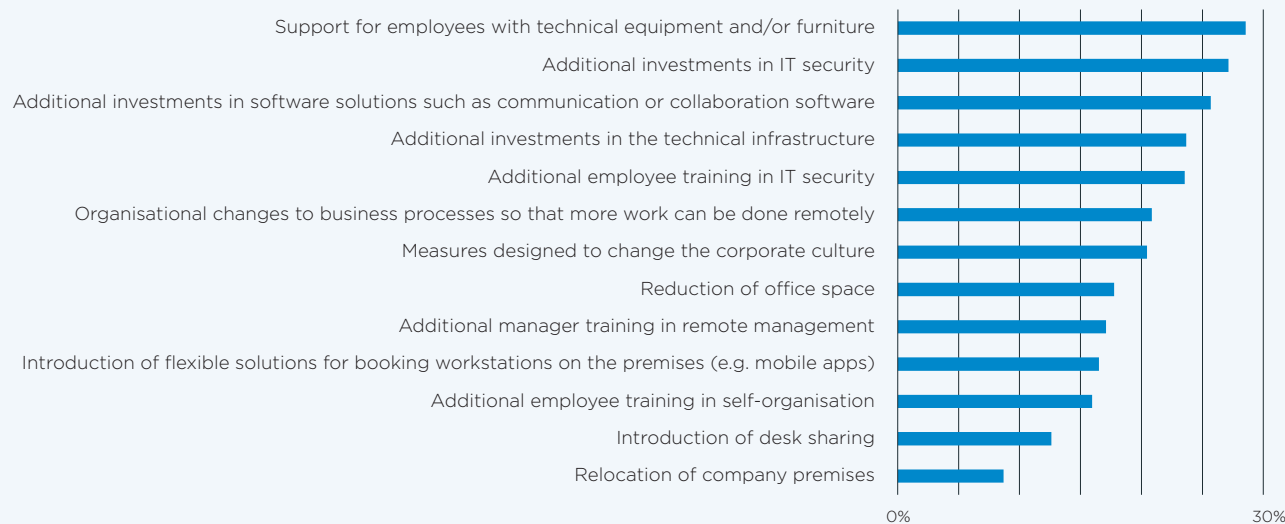
widespread (29 per cent), followed by additional investments in IT security (27 per cent) and other investments in software solutions such as communication or collaboration software (26 per cent, see image 21).

Image 21 makes it clear that companies are working most actively on IT infrastructure and IT security in order to support remote working. Measures in the office itself, such as the introduction of flexible workstation booking solutions or desk sharing, are less widespread. Interestingly, only 18 per cent of the companies where remote working is an option said that they are reducing the amount of office space they have. The reason might be that this topic will become relevant to more companies as soon as the new organisational structure of work materialises and it becomes clear what parts of the office will no longer be needed/used in future.

Image 21: Measures planned or implemented by companies with regard to remote work

Proportion of surveyed corporate decision makers in %

Measure	
Support for employees with technical equipment and/or furniture	
Additional investments in IT security	
Additional investments in software solutions such as communication or collaboration software	
Additional investments in the technical infrastructure	
Additional employee training in IT security	
Organisational changes to business processes so that more work can be done remotely	
Measures designed to change the corporate culture	
Reduction of office space	
Additional manager training in remote management	
Introduction of flexible solutions for booking workstations on the premises (e.g. mobile apps)	
Additional employee training in self-organisation	
Introduction of desk sharing	
Relocation of company premises	

0%   30%

4.2 Advantages and disadvantages of remote working

Working remotely differs from working in person in an office in many different ways. There are therefore certain advantages and disadvantages, especially compared to working in an office.

Firstly, only an exceptionally small minority (4 per cent) of the surveyed companies in Europe where remote working is an option do not see any disadvantages in this way of working (see image 22). The advantage most frequently cited by the other respondents is the reduction in operating costs (51 per cent) such as lower rent due to reduced office space, lower energy and material consumption and reduced travel expenses. This is followed by a smaller environmental impact due to the reduction in commuting (51 per cent) and a more family-friendly

corporate image by virtue of the improved work-life balance (44 per cent). These advantages are more or less consistent from country to country. Regardless of where the surveyed corporate decision makers are, the aforementioned advantages are almost always among the most frequently cited.

It is interesting that cost-related aspects, environmental friendliness and work-life balance are also the benefits of remote working most readily cited by workers (see image 23). The most popular advantage from the perspective of workers is the time saved from not having to commute (68 per cent). In the eyes of many employees, other advantages include avoided travel expenses (58 per cent), more flexible working hours (56 per cent), avoided pollution (51 per

Image 22: Advantages of working remotely from the perspective of employers
Proportion of surveyed corporate decision makers in %

Proportion of respondents for whom working remotely is a possibility
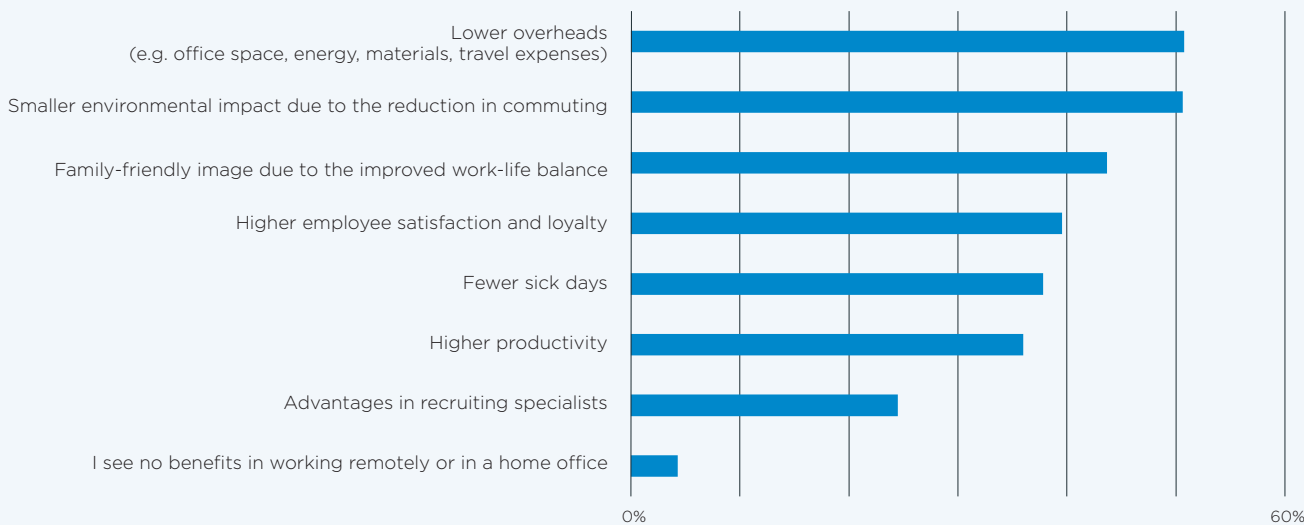Multiple answers can be given

Image 23: Advantages of working remotely from the perspective of employees
Proportion of surveyed employees in %

Time saved from not having to commute	
No travel costs	
More flexibility with time	
Smaller environmental impact due to the reduction in commuting	
Better work-life balance	
Better balance between family and work	
More personal responsibility	
Higher productivity	
Smaller workload / less stress	
I see no benefits in working remotely or in a home office	

0%   70%

cent) and an improved work-life balance (44 per cent). Even with employees, these advantages are among the most frequently cited in almost all ten surveyed countries, even if they are ranked differently.

In this respect, both employers and employees largely emphasise the same positive aspects of remote working, regardless of nationality. There are certain disadvantages to remote working according to both groups, however, and the responses given by employers and employees are relatively consistent (see image 24 and image 25). For both groups, the most commonly cited disadvantage of remote working is the lack of social contact on a daily basis (e.g. small talk with colleagues). The loss of personal contacts (e.g. customers and suppliers) who are important to the success of a

company are also mentioned frequently. As such, workers and employers do not believe that digital communication channels are a suitable alternative to meetings in person.

Whereas the difficulty of keeping their professional and private lives separate is one of the three disadvantages most commonly cited by workers – 44 per cent – around one-third of companies (32 per cent) see a different risk in remote working: too many distractions for employees (such as housework, partners, children and flatmates). Interestingly, 31 per cent of the surveyed workers agree with this, although they consider other disadvantages more striking.

Individual employers still admit the prejudice that employees do less work – 'are lazy'

– as soon as they can no longer be 'supervised' directly in their home offices. Some employers who were of this opinion surely cannot maintain this belief after over one year of the coronavirus pandemic and many months of work in home offices where the work was still performed well. In any case, the majority of surveyed companies do not share this opinion. Only 15 per cent say that reduced productivity is a disadvantage of remote working.

Image 24: Disadvantages of working remotely from the perspective of employers

Proportion of surveyed corporate decision makers in %

Lack of social contact on a daily basis (e.g. small talk with colleagues)
Loss of personal contacts (e.g. customers and suppliers) who are important to the success of a company
Too many distractions for employees (such as housework, partners, children and flatmates)
Difficulty of developing a real corporate culture and the sense of being part of a team
Difficulty of onboarding new employees
Loss of identification with the company
Considerable amount of organisation (e.g. more virtual meetings and phone calls)
Difficulty of evaluating performance accurately
Difficulty of supervising employees
Lack of employee motivation
Larger workloads and/or more stress for employees
Arrangements become more difficult
Stricter requirements and in turn higher technical infrastructure, software and IT security costs
Lower productivity
I see no disadvantages in working remotely or in a home office

0%   50%

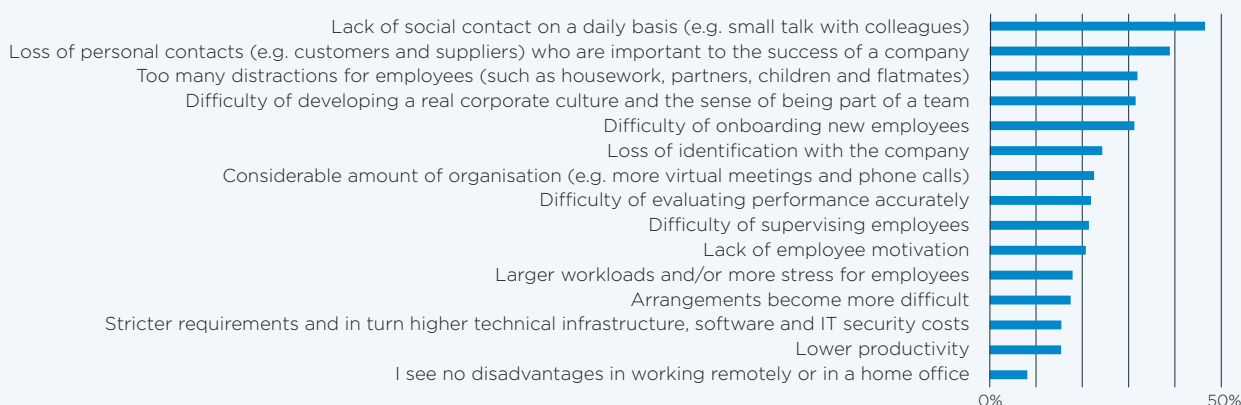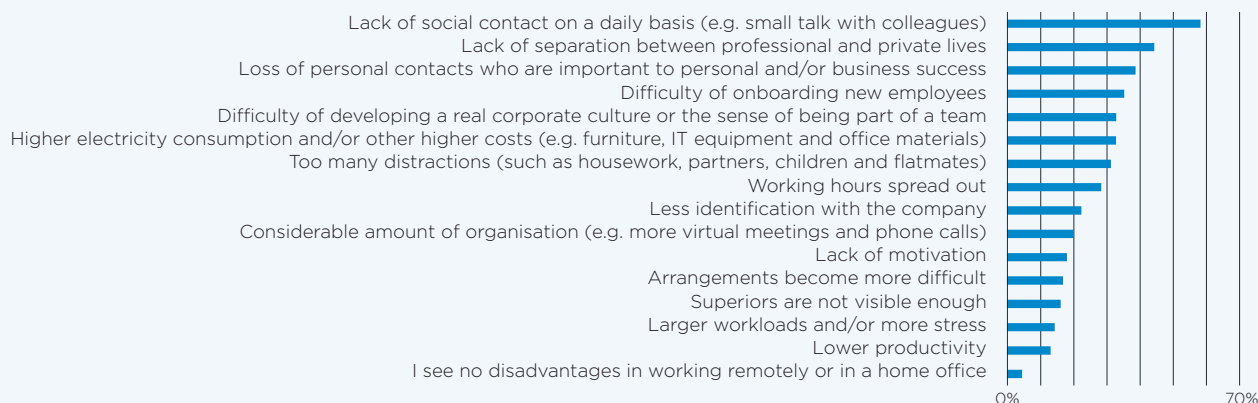## Image 25: Disadvantages of working remotely from the perspective of employees

Proportion of surveyed employees in %

Lack of social contact on a daily basis (e.g. small talk with colleagues)
Lack of separation between professional and private lives
Loss of personal contacts who are important to personal and/or business success
Difficulty of onboarding new employees
Difficulty of developing a real corporate culture or the sense of being part of a team
Higher electricity consumption and/or other higher costs (e.g. furniture, IT equipment and office materials)
Too many distractions (such as housework, partners, children and flatmates)
Working hours spread out
Less identification with the company
Considerable amount of organisation (e.g. more virtual meetings and phone calls)
Lack of motivation
Arrangements become more difficult
Superiors are not visible enough
Larger workloads and/or more stress
Lower productivity
I see no disadvantages in working remotely or in a home office

0%   70%

5 Required qualifications and further training

5.1 The impact of digitisation on required qualifications

Section 3.1 has already examined the relationship between new technology and occupational profiles. In the world of work of the future, machines will certainly not be able to perform every single task that was once carried out by a human being. Neither a majority of workers nor one of employers expects this to happen. Nevertheless, a certain proportion of tasks will be made obsolete by automation. However, this will not necessarily result in the complete replacement of human workers. Rather, the technology will play a complementary role. In any case, however, occupational profiles will change and involve different tasks that cannot be performed by technology.

If occupational profiles do change along these lines, some workers will end up facing new qualification requirements in future. Workers and employers in the ten surveyed European countries have vastly different expectations in this regard.

Image 26: Changes to required qualifications due to digitisation
Proportion of people surveyed in %

Remaining percentage: Don't know / NA
■ Corporate decision makers ■ Employees

As the world of work is increasingly digitised …

… no new qualifications will become necessary.	
… a few new qualifications will become necessary.	
… many new qualifications will become necessary.	

0%   60%
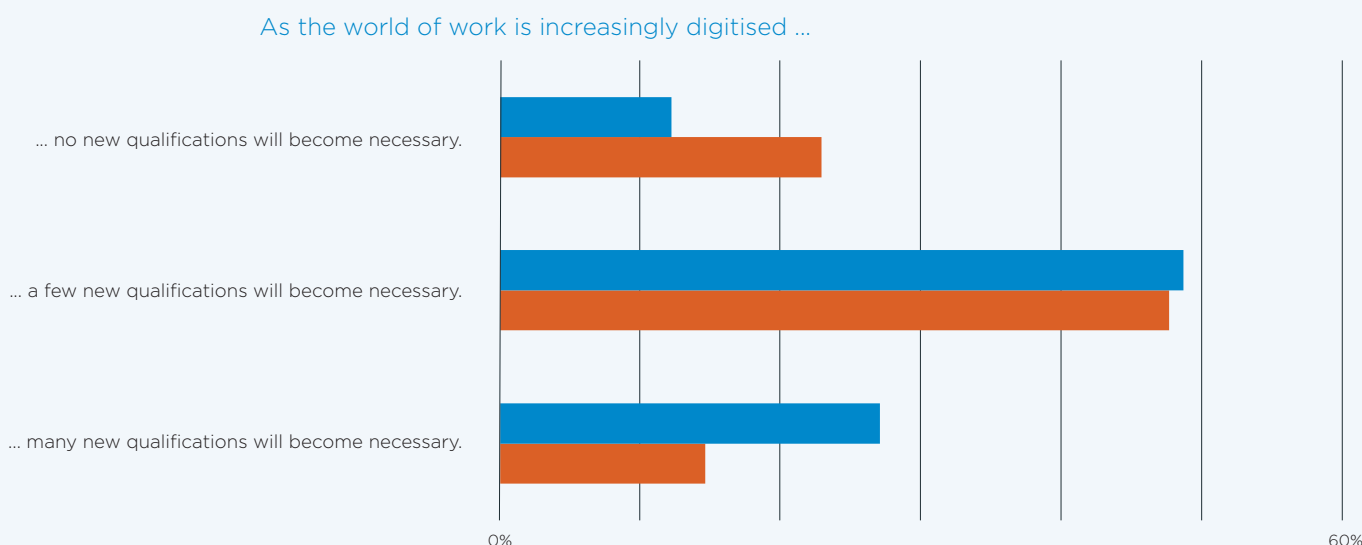
Most of the surveyed employers (49 per cent) and workers (48 per cent) assume that digitisation will make it necessary to obtain at least a few new qualifications (see image 26). Companies in the Netherlands in particular share this opinion (61 per cent). With regard to employees, workers in Germany (60 per cent) and Spain (54 per cent) in particular agree with this assessment. Significantly fewer people among the surveyed workers in the United Kingdom (37 per cent) and France (39 per cent) are able to picture this. In both countries, there are even similar numbers of workers who say that no new qualifications at all will be necessary. This proportion of workers is just 23 per cent across all ten countries, however, although this is still significantly higher than the 12 per cent of employers.

Companies cannot be in possession of better or more extensive information about the future qualification requirements. Nevertheless, workers might be underestimating the change somewhat and might therefore be failing to prepare for it properly. In agreement with this, the proportion of workers who expect lots of new qualifications to become necessary (15 per cent) is significantly lower than that of employers (27 per cent).

Overall, however, most employers and workers do expect there to be new qualification requirements to a certain extent. Images 27 and 28 offer a first impression of what these new qualification requirements might be in future, based on information available to us at present.

Image 27: Future skills from the perspective of employers – fields of competence that will gain importance in future

Proportion of surveyed corporate decision makers in % who are of the opinion that the field of competence in question will become more relevant to workers in future
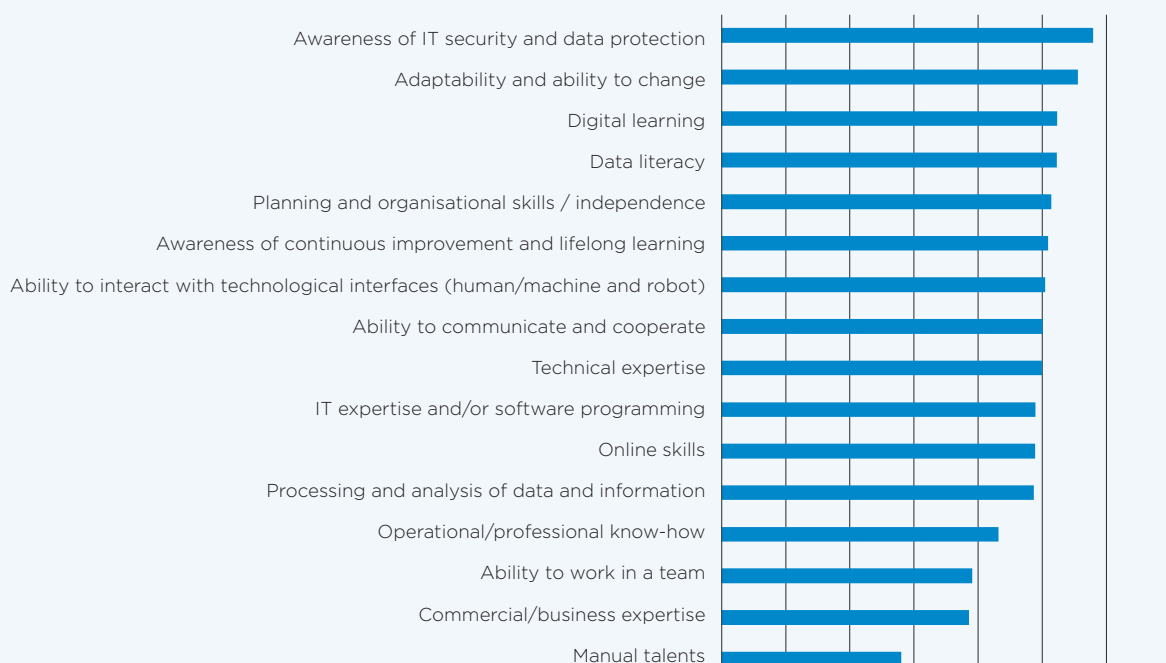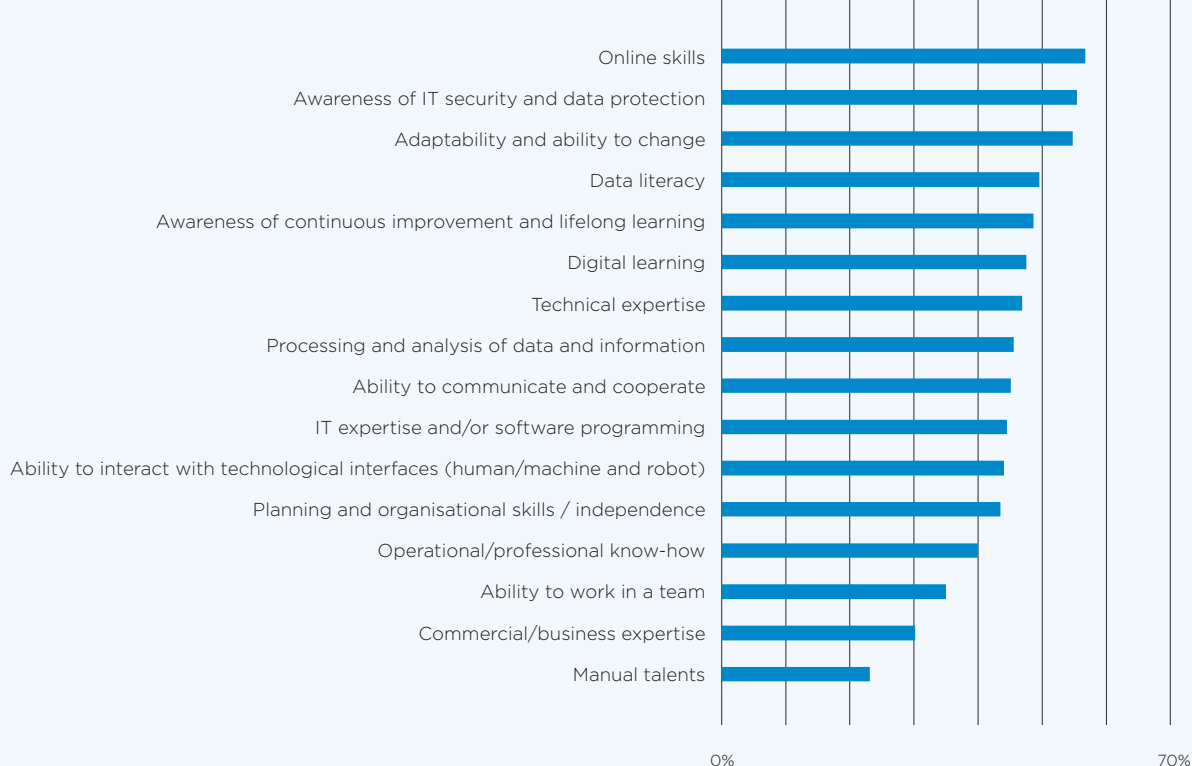
Field of competence	
Awareness of IT security and data protection	
Adaptability and ability to change	
Digital learning	
Data literacy	
Planning and organisational skills / independence	
Awareness of continuous improvement and lifelong learning	
Ability to interact with technological interfaces (human/machine and robot)	
Ability to communicate and cooperate	
Technical expertise	
IT expertise and/or software programming	
Online skills	
Processing and analysis of data and information	
Operational/professional know-how	
Ability to work in a team	
Commercial/business expertise	
Manual talents	

Image 28: Future skills from the perspective of employees – fields of competence that will gain importance in future

Proportion of surveyed employees in % who are of the opinion that the field of competence in question will become more relevant to their jobs in future

Field of competence	
Online skills	
Awareness of IT security and data protection	
Adaptability and ability to change	
Data literacy	
Awareness of continuous improvement and lifelong learning	
Digital learning	
Technical expertise	
Processing and analysis of data and information	
Ability to communicate and cooperate	
IT expertise and/or software programming	
Ability to interact with technological interfaces (human/machine and robot)	
Planning and organisational skills / independence	
Operational/professional know-how	
Ability to work in a team	
Commercial/business expertise	
Manual talents	

0%   70%

The surveyed companies in Europe expect an awareness of IT security and data protection in particular, as well as adaptability and willingness to change, to become more relevant skills for workers in future. In the first six months of 2021 alone, numerous cases of cybercrime had a massive impact on the entire sector. The 'weakest link in the chain' – human beings – is the starting point for many attacks. Employees who open email attachments and click on links still often make it too easy for attackers. In this context, an awareness of IT security and data protection is extremely important. The same applies to adaptability, although change itself is nothing new. Business and society have changed in decades past, causing required qualifications to change with them. Now, however, the adaptability of workers will really be put to the test as these changes are expected to occur at shorter intervals.

According to 52 per cent of companies, data literacy and digital learning will also become more relevant. These days, the challenge is not to gain access to information. Knowledge and information are available in abundance on the internet. Instead, workers must filter out the right and necessary information and data so they can potentially learn more.

Significantly fewer corporate decision makers are of the opinion that manual talents, commercial or business expertise and the ability to work as part of a team will gain even more significance in future. At the same time, however, this does not mean

that the respondents believe these skills will become less important. Their relevance will tend to remain the same. Teamwork has certainly been extremely important in recent years. And as machines and robots become increasingly capable, they will continue to erode the human advantage in terms of manual talents, causing the significance of this skill not to increase at the very least. The same applies to technical knowledge: if all information is available online, one no longer has to memorise it. Rather, workers must use the information that is available online wisely in order to identify what is important to them.

The surveyed workers are of a similar opinion. They too believe that manual talents, commercial or business expertise and the ability to work in a team are the areas of competence that are least expected to grow in relevance to occupations in future.

With regard to the ability to work as part of a team, the results are somewhat surprising at first glance: the proportion of respondents – both workers and employers – who predict an increase in relevance rises along with the expected extent of remote work in the future. Yet, teamwork is not as easy to do remotely compared to when all the team members are in the office. As remote teamwork is a more difficult challenge, the ability to do it becomes more relevant.

Moreover, most workers (57 per cent) believe that the relevance of online skills will increase in future – in stark contrast to employers. The use of digital applications

and online services will have more of an effect on jobs than at present. They also believe – as do companies – that an awareness of IT security and data protection, adaptability, the ability to change and data literacy will be key skills in future.

Both groups – workers and employers – have similar assessments of what fields of competence will be classed as future skills as they will become more important as time goes on. It is only among the corporate decision makers in Europe that a slightly

larger proportion of respondents compared to employees expect the skills in question to increase in relevance to employees.

This opinion is also highly similar in all of the ten surveyed countries. In particular, workers and corporate decision makers in Poland, Italy and Spain are often the most in agreement when it comes to the relevance of certain fields of competence in future.

5.2 The strategies of companies to cover the future need for qualifications

Companies will therefore be faced with a need for different qualifications in future. Their workers will need a different combination of skills and expertise compared to the current situation in order to be equipped to handle every task at work in future.

In this regard, companies can generally cover the new need for qualifications through two channels. The necessary skills and expertise can be recruited into the company as part of an external strategy. Recruiting suitable specialists – including

from abroad – will equip the company with the qualifications it will need to overcome future challenges. However, only a minority of surveyed companies are pursuing this strategy (see image 29). Around one-fifth (19 per cent) say that they will largely meet the need for qualifications by recruiting from the external job market. This approach is most popular among employers in Spain (29 per cent) and Italy (27 per cent). In the United Kingdom, on the other hand, only 9 per cent of the surveyed companies will take this as their main approach to meeting their need for qualifications.

Image 29: Companies' approaches to the future need for qualifications

Proportion of surveyed corporate decision makers in %

The need for qualifications should largely be met by recruiting from the external job market.

First and foremost, the need for new/additional qualifications in future will be met by providing current employees with further training.

0%　　　　　　　　　　　　　　　　　　　　　　　　60%
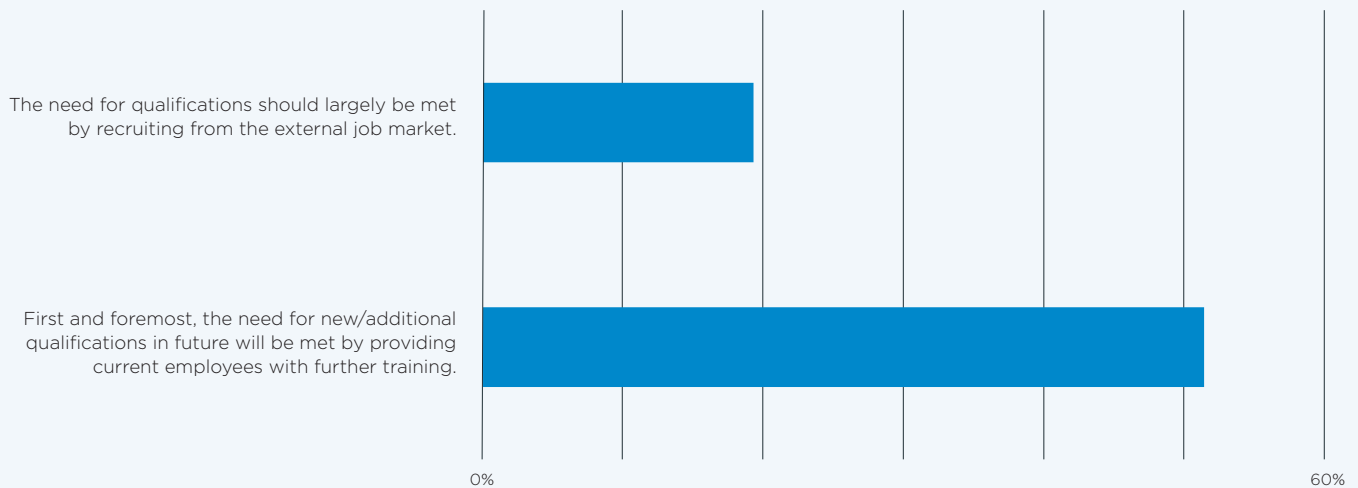
The majority of employers in Europe will deal with the future need for qualifications differently. In order to meet the need for qualifications, they will use an internal strategy and rely on further training to build new skills and expertise in their current workforces. Around half (51 per cent) of the companies plan to do this in future. This goes for companies in the Netherlands and Poland in particular (58 per cent in each case). However, the surveyed companies in Germany will also focus more heavily on this strategy (56 per cent).

Once again, this shows that further training will gain relevance in the future world of work. On the one hand, it creates the conditions for expanding the necessary technological expertise which employers and workers see as a key challenge in connection with the introduction of digital technology (see section 3.3). On the other, further training also paves the way to develop all other skills and expertise within a company that might become necessary in future.

5.3 Attitudes and expectations regarding qualifications and further training

As such, Work 4.0 will be greatly influenced by further training. The extent to which further training can successfully meet the future need for qualifications essentially depends on the behaviour of companies and workers. On the one hand, the companies organise and finance the majority of the further training measures. On the other hand, every single worker is responsible for recognising the importance of further training and making use of the available courses.

At any rate, the surveyed workers in Europe are generally willing to participate in further training and are aware of its significance. More than two-fifths (44 per cent) of the workers are of the opinion that it is fundamentally important to obtain new qualifications and that doing so will improve their working lives (see image 30). This means

that the majority is intrinsically motivated in terms of further training. With almost three-fifths in each country, this motivation is exceptionally strong among workers in Germany and Spain (58 per cent in Germany and 57 per cent in Spain).

External factors such as specific career opportunities (22 per cent) or job preservation (18 per cent) only motivate a significantly smaller proportion of respondents to seek further training.

The change in qualification requirements (see section 5.1) is not a one-off process. Rather, the qualification requirements will change permanently as digitisation progresses. Obtaining a school, professional or academic education and completing a further training programme will never con-

Image 30: Employee attitudes to qualifications and further training
Proportion of surveyed employees in %

Remaining percentage: Don't know / NA

Obtaining new qualifications is generally important to me and will improve my working life.

I will only obtain new qualifications if they tie in with specific career opportunities – potentially even in a new job.

I am only prepared to obtain new qualifications if it is necessary to keep my current job.

I expect my original education and training to suffice as qualifications for my job and do not want to obtain new qualifications over my working life.

Studying is an unacceptable burden for me.

0%   50%

stitute a final qualification; it will always be merely temporary. Continuous further training in the form of lifelong learning will be necessary throughout a person's life. This is necessary so workers can keep pace with the major changes brought about by technological advancements as well as the related transformation of fields of activity. In light of this, it is fortunate that only 5 per cent of surveyed workers expect their original education and training to be sufficient qualifications for their jobs. Only 6 per cent attribute no value to further training (see image 31). And studying is an unacceptable burden for just 2 per cent (see image 30).

The following aspect is less surprising in this context: workers who foresee a greater need for further training are more willing to participate in further training as many new qualifications will become important as a re-

sult of digitisation. In contrast, workers who do not think that any new qualifications will be necessary tend to find their original education and training sufficient.

As such, the majority of workers in Europe say that they are planning to make use of the further training offered to them. However, they have certain expectations as to how they will do this. The majority of employees (37 per cent) expect employers to provide individualised human resource development which recommends relevant further training opportunities to them on a regular basis (see image 31). The measures and content should match their specific needs so as to strengthen the skills and competence that will be needed in their line of work in future. And the recommendations should be made by the employer. This expectation is particularly pronounced among workers who expect lots of new

Image 31: How workers expect companies to approach further training
Proportion of surveyed employees in %

Remaining percentage: Don't know / NA

- In the interests of individualised human resource development, employers should regularly propose relevant further training opportunities.
- Employers should inform the workforce of general further training opportunities.
- It is okay if you have to worry about your own further training as long as it can be done in the work environment.
- Further training is not important to me.

0%   40%
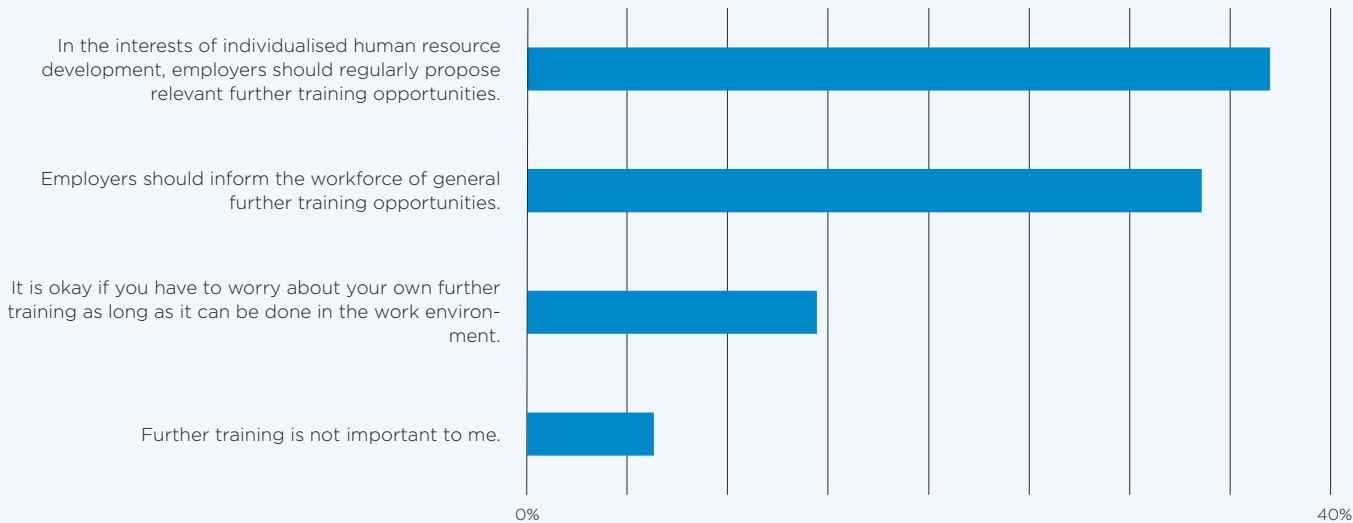
qualifications to become necessary in light of digitisation. At 51 per cent, this is significantly above the average of all workers (37 per cent). It seems that those who foresee a great need for further training are relying on employers to show leadership.

Moreover, this expectation is particularly widespread among employees in France and Spain with 44 per cent and 41 per cent respectively.

Another 34 per cent of respondents believe that employers are under an obligation to provide information and that general notices about relevant further training measures at regular intervals will be sufficient. Overall, over three-fifths of the surveyed workers believe that the first incentives to take part in further training should come from companies. Only 14 per cent say that they would be happy to have to deal with their own further training, provided that it can be conducted within the working environment. Denmark is an outlier here, with 23 per cent of respondents accepting this.

Comparing the responses of workers with those of employers reveals a certain divergence in terms of responsibility for further training. 26 per cent of companies believe that workers are responsible for their own further training (see image 32). One-fifth would at least allow it to take place during working hours. However, 6 per cent of companies also expect workers to deal with their own further training outside of working hours. In particular, companies in the two Scandinavian countries of Norway and Sweden (35 per cent in each case) tend to say that the responsibility lies with the employees.

However, more than half of the companies will offer the first incentives – in line with employee preferences. One-quarter of surveyed employers will recommend relevant further training opportunities to their employees on a regular basis, in the interest of individualised human resource development: 27 per cent will at least provide general information about further training opportunities. Once again, there are certain differences between the ten surveyed countries with regard to this aspect. An exceptionally large number of companies in Poland and Spain said that they will make the first move and make individual recommendations to their employees (29 per cent in Poland and 28 per cent in Spain) or offer general information (39 per cent in Poland and 37 per cent in Spain).

Employees are notified of general further training opportunities.	
In the interests of individualised human resource development, relevant further training opportunities are recommended to employees on a regular basis.	
Employees should be responsible for keeping their qualifications up to date, although they can do it during working hours.	
Employees should be responsible for keeping their qualifications up to date, but not during working hours.	

0%   30%
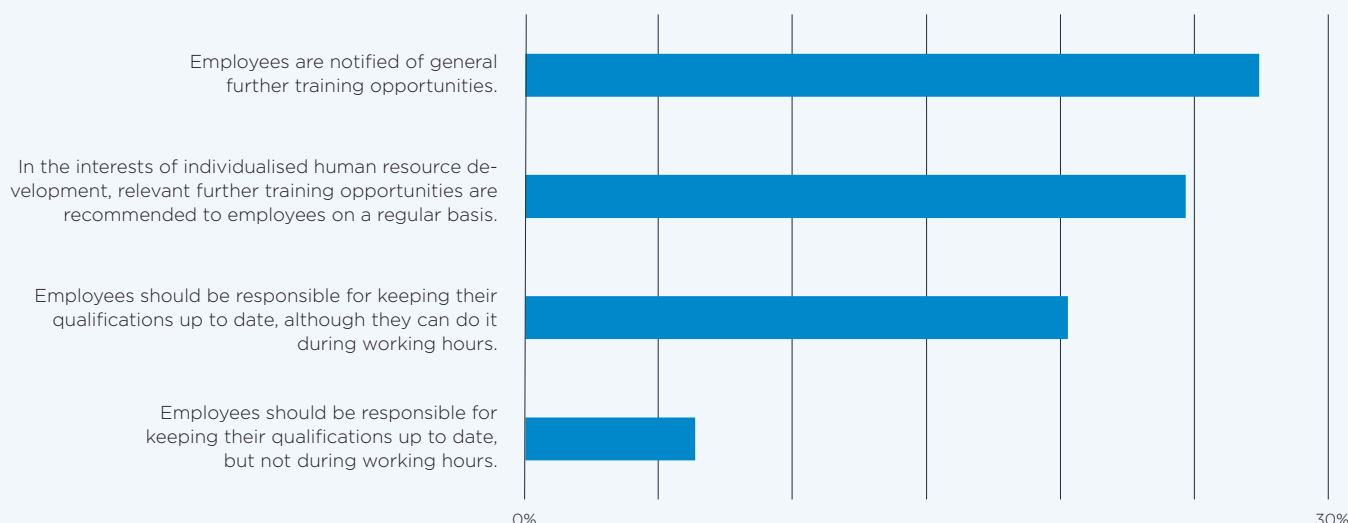
5.4 Evolution of investments in further training within companies

Further training is invaluable if workers are to meet the changing qualification requirements. Companies will be unable to tap the full potential of digitisation without employees who possess all the necessary skills and expertise.

This process of change will likely make it necessary for companies to intensify their efforts in terms of further training. This includes financial commitments. In line with these considerations, 38 per cent of companies are considering increasing their

investments in further training over the next five years (see image 33). The proportion of companies that will likely increase their investments in further training is particularly large in Poland (48 per cent) and the Netherlands (46 per cent).

Once again, companies with 500 or more employees have more financial leeway: 48 per cent of these companies say that they plan to increase how much they invest in further training. In contrast, only 34 per cent of companies with fewer than 50 employees gave the same answer.

Image 33: Investments in further training over the next five years

Proportion of surveyed corporate decision makers in %

They will increase.	
They will stay the same.	
They will decrease.	

0%   50%
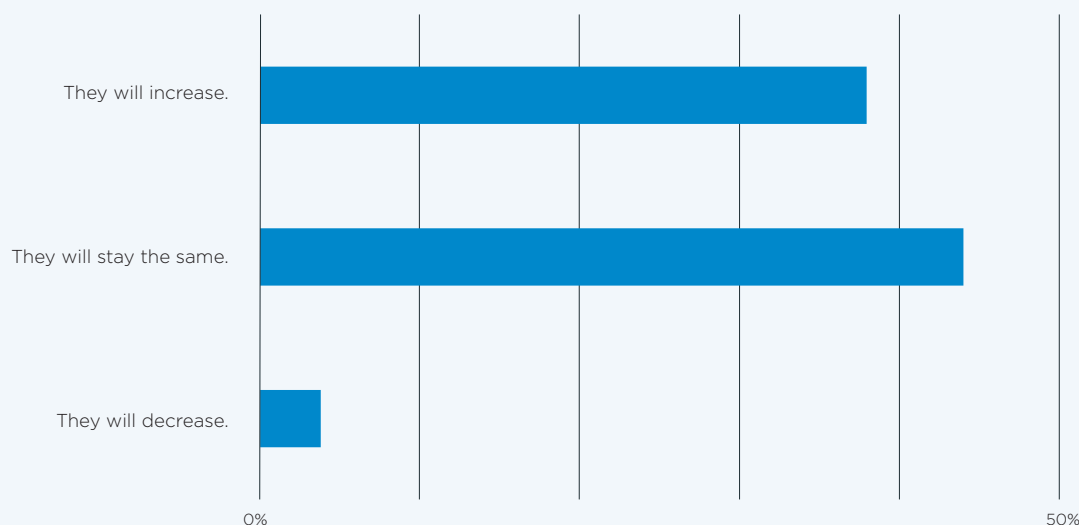
However, the majority of companies (44 per cent) assume that the amount they invest in further training will not change in the next five years. In particular, this is the case in Germany (49 per cent) and the United Kingdom (47 per cent). Maintaining the current level of investment can be sufficient as long as enough is already being invested to provide employees with further training. As, however, the majority of employers want to meet their future need for qualifications by providing existing employees with further training (see image 29), retaining the current level of investment might prove insufficient under certain circumstances. From

this group of employers at least, a relative majority of 47 per cent say that they want to increase their investments in further training in the next five years. However, 45 per cent are also planning to maintain the current level of investment.

At any rate, the plan of 4 per cent of the surveyed companies to reduce their investments in further training in the next five years will certainly not be beneficial, regardless of how the companies wish to meet the future need for qualifications.

5.5 The future forms of further training

Not only is digital technology changing the necessary qualification profiles, it is also paving the way for new forms of further training. In a similar way to how partially remote working is possible, workers have access to digital further training online. This might take the form of a self-learning service such as a learning platform. Another option is group courses where the instructors and workers meet in a digital 'room' such as a digital collaboration and communication platform. There are also 'blended learning' courses which combine digital formats with in-person events.

According to employers in Europe, the significance of digital self-learning courses in particular is set to increase in future; 58 per cent of the respondents expect this to happen (see image 34). Likewise, however, 53 per cent of companies expect that further training in companies will also be characterised by digital group learning to a greater extent than at present. And exactly half expect an increase in blended learning. Only in-person events are expected to remain at the same level of significance in the opinion of a majority of respondents (33 per cent). However, only 22 per cent expect the importance of in-person events

Image 34: Future importance of various channels to further training in companies
Proportion of surveyed corporate decision makers in %

Proportion of surveyed corporate decision makers who believe that the further training channel will become significantly/somewhat more relevant in future
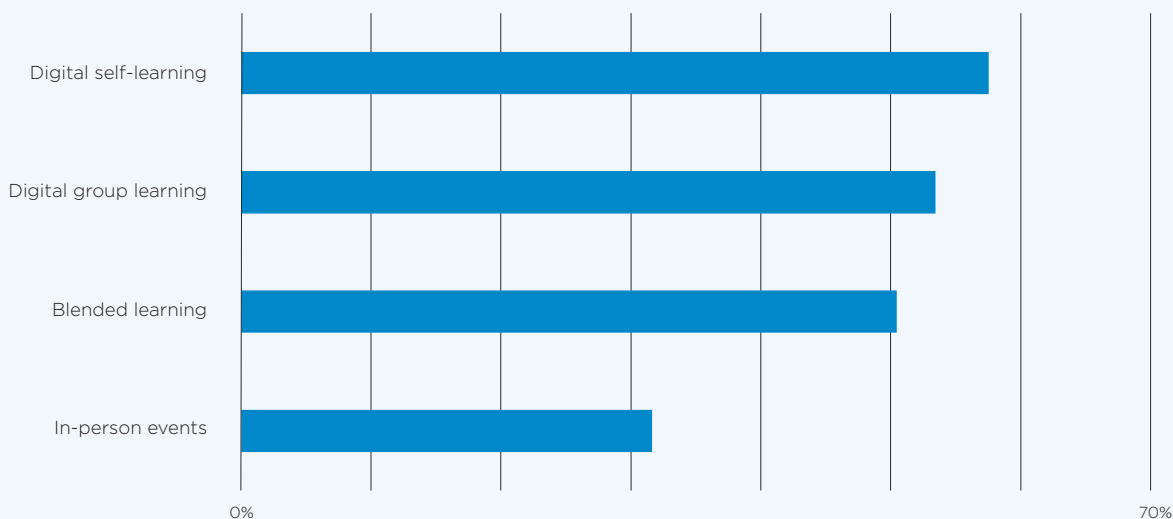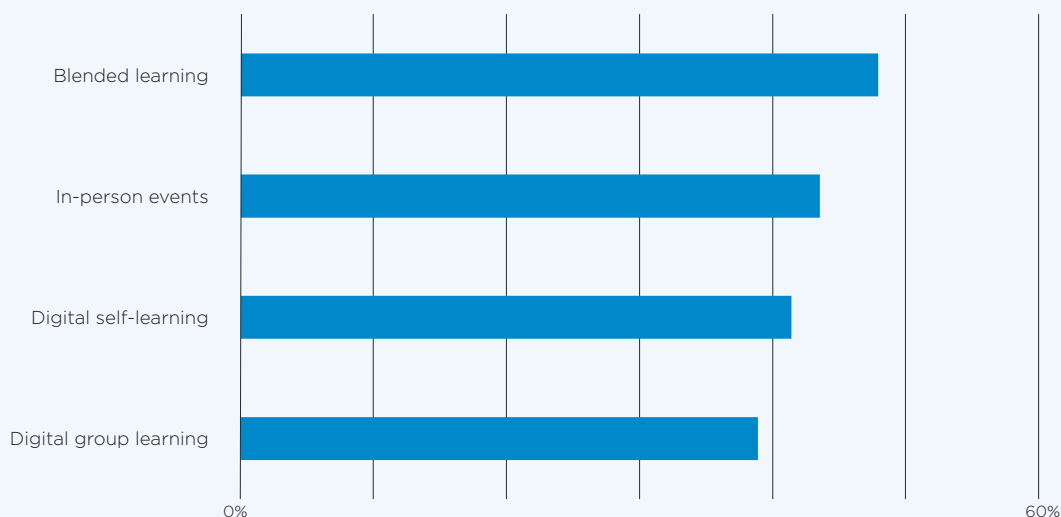
Image 35: Preferences of employees for further training channels in companies
Proportion of surveyed employees in %

Proportion of employees who want
their company to (continue to) offer the
further training channel in future
Multiple answers can be given

Blended learning

In-person events

Digital self-learning

Digital group learning

0%   60%

to decline in the further training landscape of tomorrow. As such, digital services will not fully supplant in-person events. The further training landscape will simply become more varied. And this is exactly what employees prefer.

The majority of employees (48 per cent) want companies to offer blended learning in particular, i.e. a combination of in-person events with digital learning formats, as a further training format (see image 35). In-person meetings will also remain popular (44 per cent). Consequently, making further training fully digital would not be in the interests of employees at all.

However, there are significant differences from country to country: most workers in Sweden (54 per cent), Norway (54 per cent) and the Netherlands (49 per cent) prefer digital self-learning formats. On the other hand, 53 per cent and 51 per cent in Germany and Poland respectively favour in-person meetings, which means that they remain the preferred form of further training by the majority of workers.

6 Summary and outlook

Work 4.0 is characterised by the use of new technology, extraordinary interaction between humans and technology, new ways of working such as remote work and new qualification requirements as well as the growing significance of further training. However, the survey has shown that employers and workers have different expectations as to what exactly this new reality will look like. There are also numerous differences between the ten surveyed countries in Europe. Poland, Italy and Spain have proven to be 'pioneers' in many ways as workers and corporate decision makers from these countries tend to be more receptive to innovative technology.

Certain findings can be derived from the results and especially the differences identified in responses given by companies and workers. The results suggest that people are yet to become fully aware of the implications of future technology. This goes for workers in particular. It is noteworthy – albeit not very surprising – that workers and corporate decision makers alike are particularly conscious of technologies which have already achieved widespread market penetration.

As more importance is already being attached to digitisation on a management level than on the lower levels of the corpor-

ate hierarchy, the change process could be expected to occur from the top down. If digitisation is to succeed, workers must be 'picked up' and 'brought on board' quickly to prevent them from being taken by surprise and to make sure that they draw the right conclusions, such as with regard to qualification requirements.

Smaller companies have not made as much progress with digitisation as larger companies. At the moment, they are making less use of future technology. However, the smaller companies cannot allow future trends to pass them by as they could suffer persistent competitive disadvantages as second movers. Naturally, it is right for small companies to wait until a certain innovative technology has been partially perfected before they make larger investments and initiate reorganisation processes. However, they should keep an eye on the market when dealing with such technology to avoid falling by the wayside due to the effects of learning curves. There is no reason to hold back when technology is already well established such as IoT, collaboration software and cloud computing.

In any case, it is positive that a majority of employers and workers recognise the great relevance of further training. It is now necessary for companies to structure the courses and measures in such a way that workers are actually able to act on their strong willingness to take part in further training. Under certain circumstances, it might not be enough if companies merely maintain their level of investment in further training. Ultimately, they are aiming to meet

the future need for qualifications by providing their current employees with further training.

The greatest management challenge in the medium term might be to bring the expectations of employees and employers into alignment. Whereas corporate decision makers believe that new technology will have a significant effect on existing occupational profiles and on employment, the majority of surveyed workers in Europe still do not expect new technology to change their daily working lives.

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