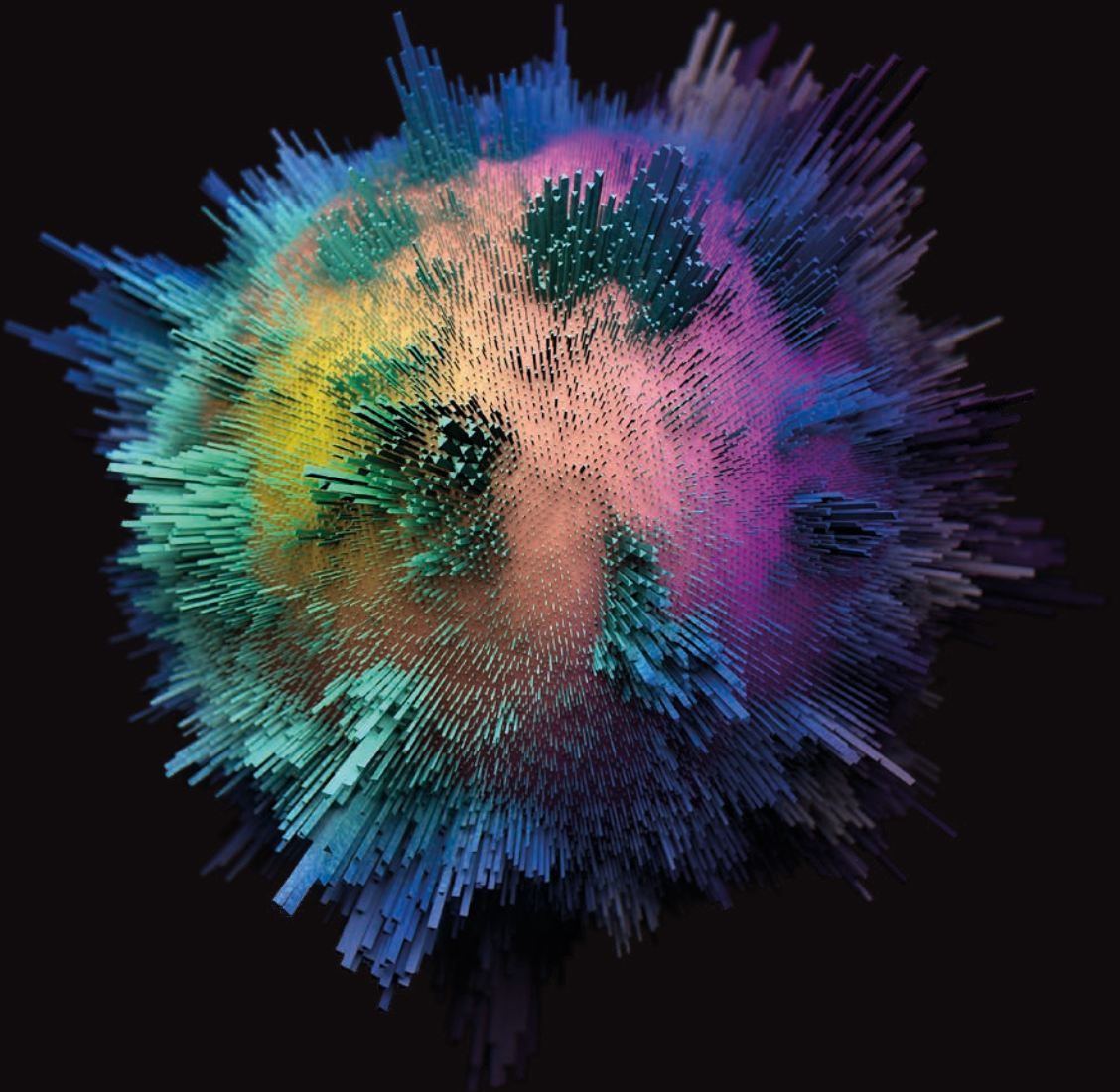


Deloitte.



**Aligning strategy,
workforce and technology**

Digital Disruption Index

January 2019

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To join our survey panel and help shape future editions of our research please contact ukdigitaltransformationatdeloitte@deloitte.co.uk

About the research

Deloitte invited leaders from the UK's most influential companies and public sector bodies to participate in an online survey. One hundred and fifty-eight executives responsible for digital technologies and ways of working from FTSE listed companies, large private companies and large UK public sector organisations participated in the survey. The total operating revenues of the 158 survey participants is £1.38 trillion. This information, which was collected between September and October 2018, has been analysed in aggregate and forms the basis of this publication. In some Figures, because of rounding, percentages may not add up to 100.

In this publication, references to Deloitte are references to Deloitte LLP, the UK affiliate of Deloitte NWE LLP, a member firm of Deloitte Touche Tohmatsu Limited.

Foreword

Welcome to the third edition of the *Digital Disruption Index*. Over the past 24 months we have examined how organisations respond to the disruption caused by digital technologies and ways of working. This edition explores the idea of 'digital maturity', building on Deloitte's recent research into innovation and the future of work.

Digital maturity is not just about technology and it is not just about what technology enables.

Digitally maturing organisations are able to adapt and align their strategy, workforce, culture and technology to meet ongoing digital advances in a way that other organisations struggle to achieve. Here we outline the characteristics that distinguish them.

Together with insights from our subject matter experts, the Digital Disruption Index is also intended to help senior executives understand their talent and leadership models in the context of digital disruption. Our analysis shows a number of factors that determine whether leaders are confident in their own digital skills and leadership abilities. Confident leaders tend to be content with the amount of resources they receive to develop their own skills, and they are also more likely to engage in self-learning and development than leaders who are not confident in their digital skills. We also find that digitally maturing organisations are more likely to have leaders who are confident in their digital skills.

As in previous editions, we examine investment in technologies and in particular Artificial Intelligence (AI). The likes of Cyber-security, Cloud and Data analytics are now well established, whereas AI, Robotic & cognitive automation (RCA) and the Internet of Things (IoT) show significant investment growth but a lack of scalable implementation.

The use of advanced data science, whether explicitly AI or a combination of AI, RCA and Data analytics, is at the centre of much current debate about ethics and the societal impact of digital technology. A significant number of senior leaders seem unaware of these ethical considerations. We believe that what is unethical in the real world is unethical in the digital world, and we explore how organisations are able to make AI decision-making as transparent as human decision-making.

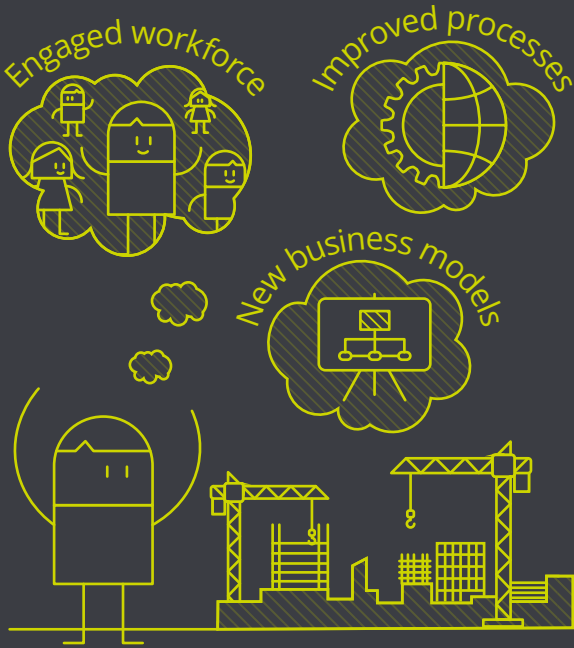
We hope you find the Digital Disruption Index useful and look forward to your feedback.



Oliver Vernon-Harcourt
Partner, Digital Transformation

Executive summary

The **ideal organisation** transformed by digital is still a work in progress for most executives...

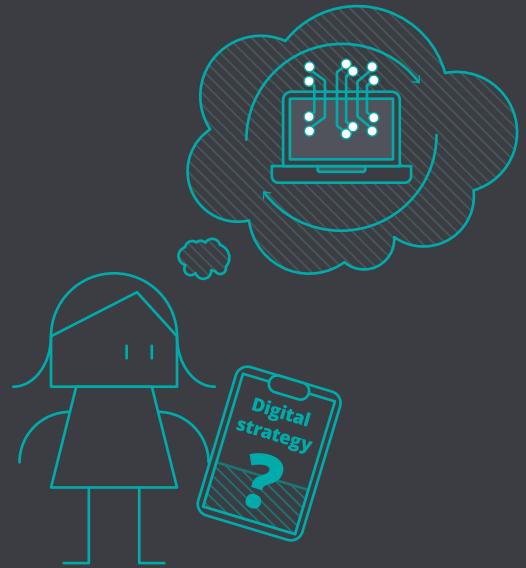


28%

...of senior leaders say their organisations are in the **early stages of digital development**

Three-quarters

of executives believe that **digital is fundamentally changing their organisation...**



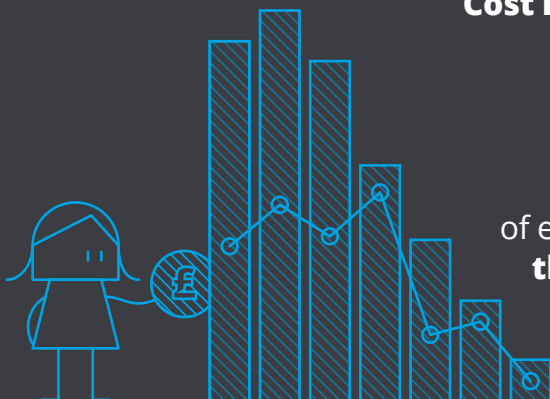
...and **58%** have a **coherent strategy** to exploit **digital technologies** and ways of working

Cost reduction is increasingly important with

52%

of executives saying it is now one of the **top three drivers of their digital strategy.**

This is up from **29%** in 2017.



Sentiment is improving but still only

27%

of executives believe **UK companies** lead the way with digital

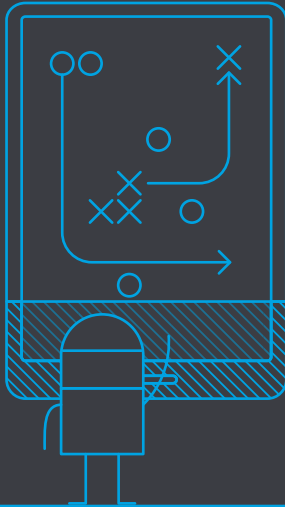


Only **18%**

of executives believe **UK school leavers** and **graduates** have the **right digital skills**

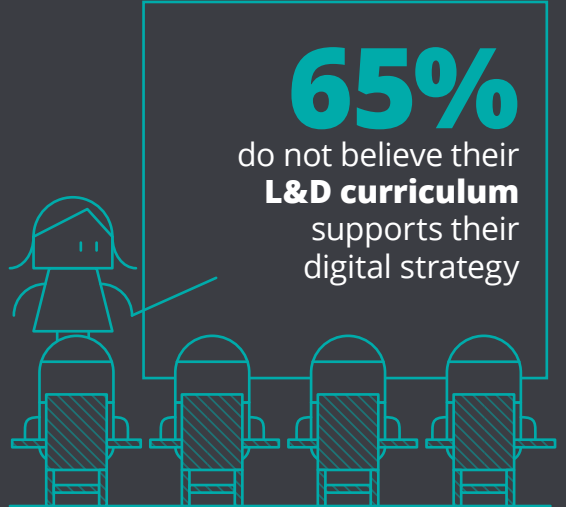
Only **25%**

of executives believe their **talent pool** has the **capabilities** to deliver their **digital strategy**



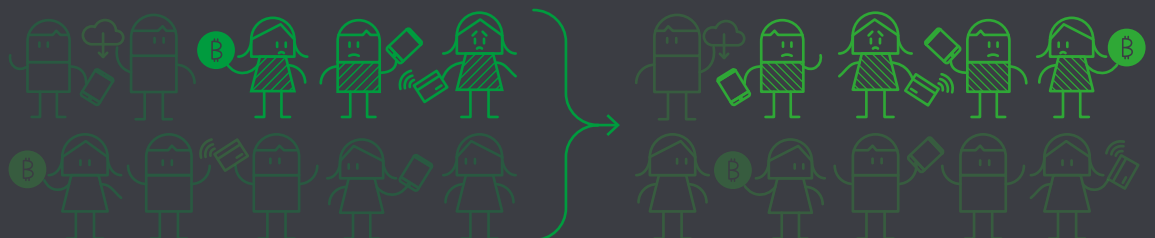
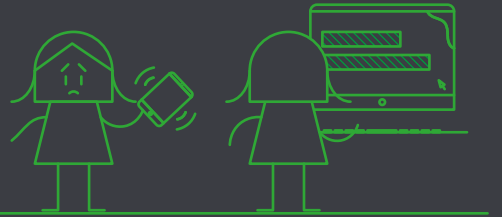
65%

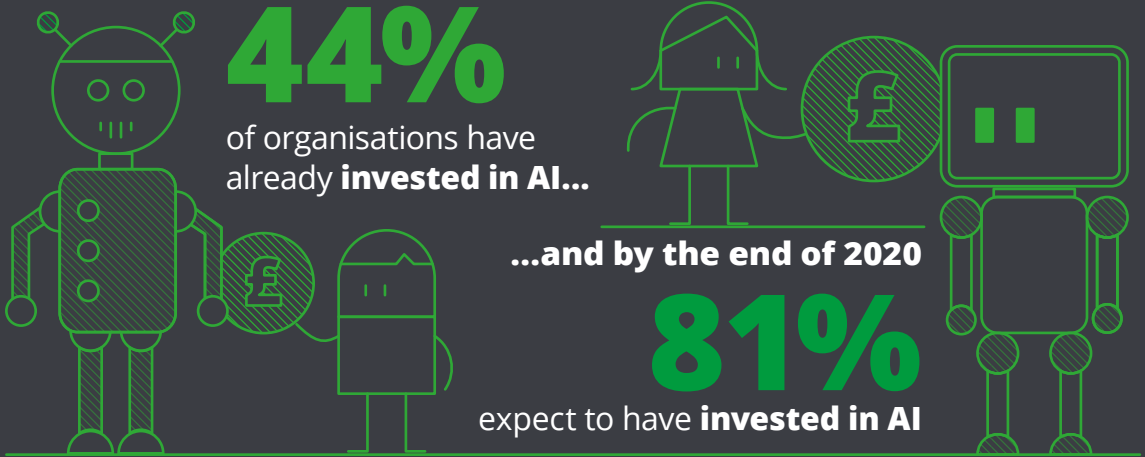
do not believe their **L&D curriculum** supports their digital strategy



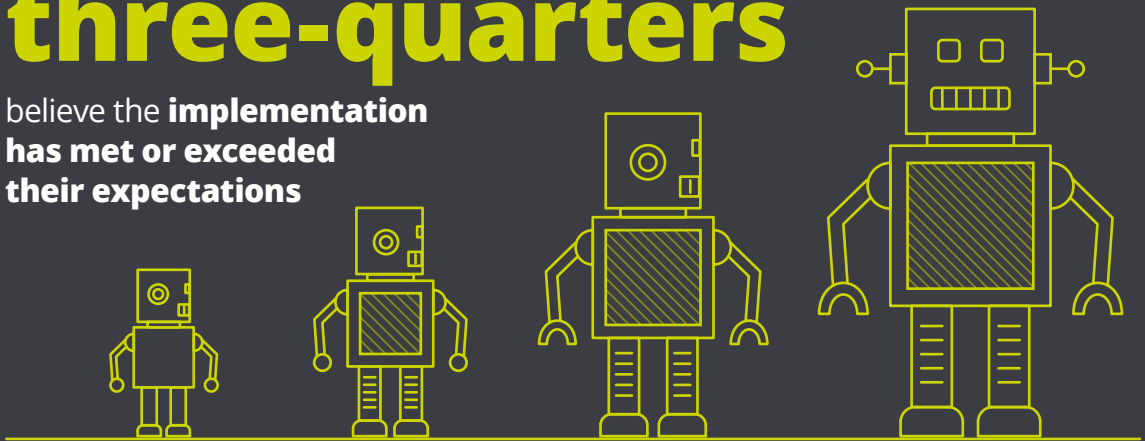
In less than a year the number of senior leaders who say they are **not confident** in their own **digital skills** has risen from

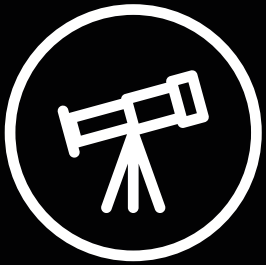
28% to **37%**





Only **10%** of organisations that have **invested in AI** have **scaled it** but **three-quarters** believe the **implementation has met or exceeded their expectations**





Digitally maturing organisations

Digitally maturing organisations

To identify digitally maturing organisations, we asked survey respondents to “imagine an ideal organisation where digital technologies and ways of working are used to improve processes, engage the workforce and drive new business models.”

We then asked respondents to rate their organisation against that ideal on a scale of 1 to 10, with 1 representing ‘not close at all’ and 10 representing ‘very close’.

We grouped organisations into three maturity bands according to their responses:

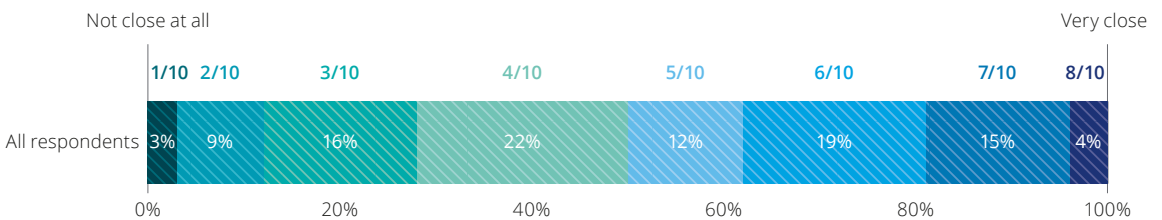
- At an early stage of digital development (rating of 1-3, 28 per cent of respondents)
- Digitally developing organisations (rating of 4-6, 53 per cent of respondents)
- Digitally maturing organisations (rating of 7-10, 19 per cent of respondents)

No respondents rated their organisation 9 or 10 on the scale.

We observed four main differences between digitally maturing organisations and others. These differences related to: the transformation that digital is enabling; the support provided by the finance function for digital transformation; their current stage of technology implementation; and the confidence executives have in their own digital skills.

Twenty-eight per cent of organisations are in the early stages of digital development.

Figure 1. Digital maturity groupings

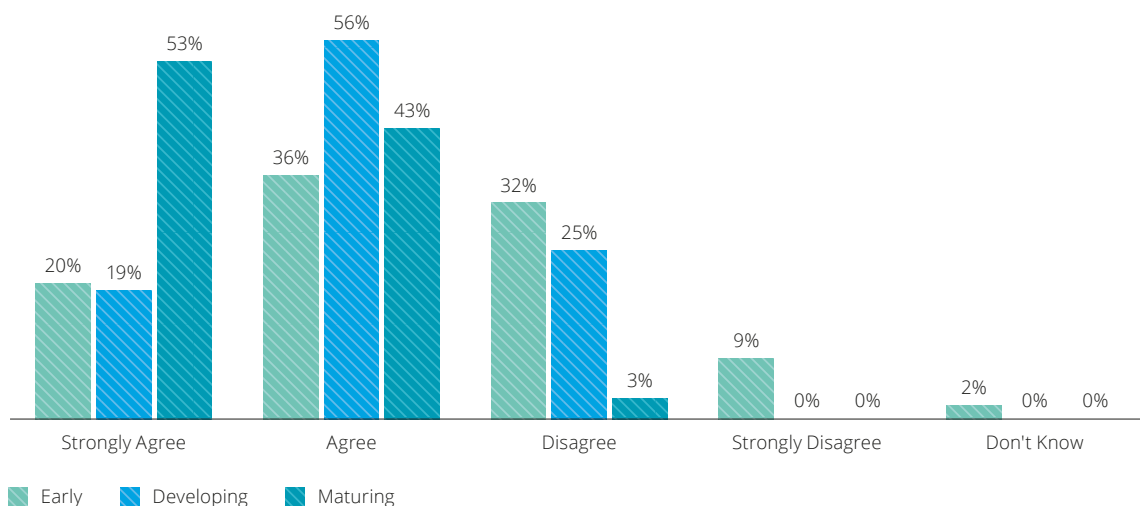


Source: Deloitte analysis n=158

Fundamental transformation

Across all levels of digital maturity, the majority of survey respondents thought that digital is changing their organisation in a fundamental way. However, respondents from digitally maturing organisations were far more likely to 'strongly agree' with this point of view.

Figure 2. "We are fundamentally changing our business or organisation as a result of digital technologies and ways of working", by digital maturity grouping

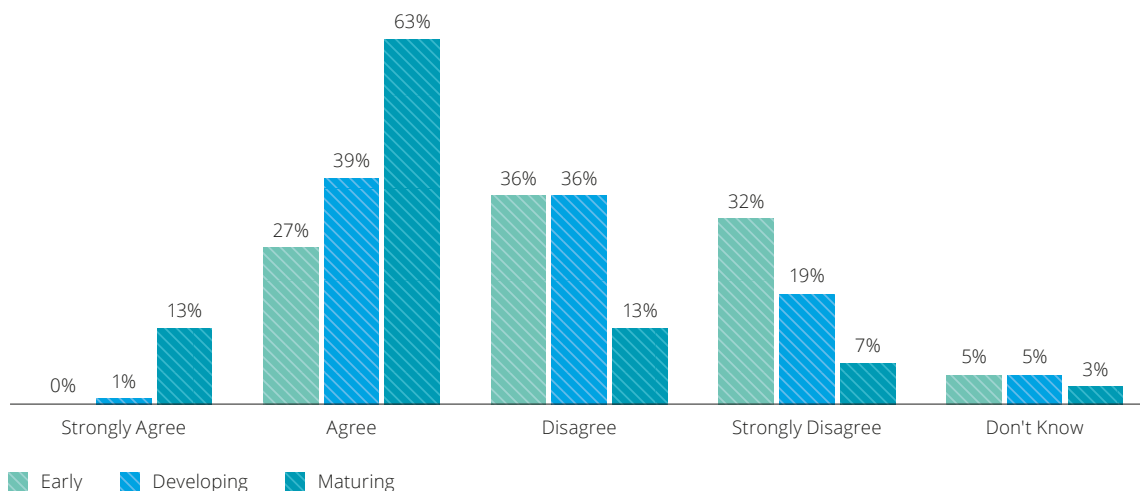


Source: Deloitte analysis n=158

Finance function support for digital transformation

The budgetary and financial processes of digitally maturing organisations are much more supportive of digital transformation.

Figure 3. "Our financial and budgetary processes adequately support our digital transformation", by digital maturity grouping



Source: Deloitte analysis n=158

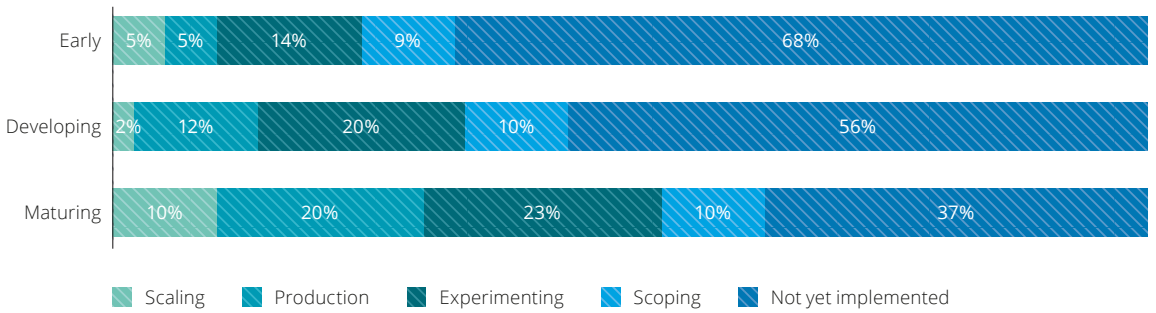
Stage of digital implementation

Maturing organisations have progressed further in implementing and scaling up their use of technologies. Thirty per cent of digitally maturing organisations are either in the scaling or production phase of AI implementation, compared to just ten per cent that are in their early stages of digital development. See Figure 4 for definitions of implementation stages.

Figure 4. Implementation definitions

Scaling	Deploying across multiple functions and business areas
Production	Deploying and using in certain functions or business areas
Experimenting	Running production pilots
Scoping	Identifying use cases

Figure 5. Artificial Intelligence stage of implementation, by digital maturity grouping



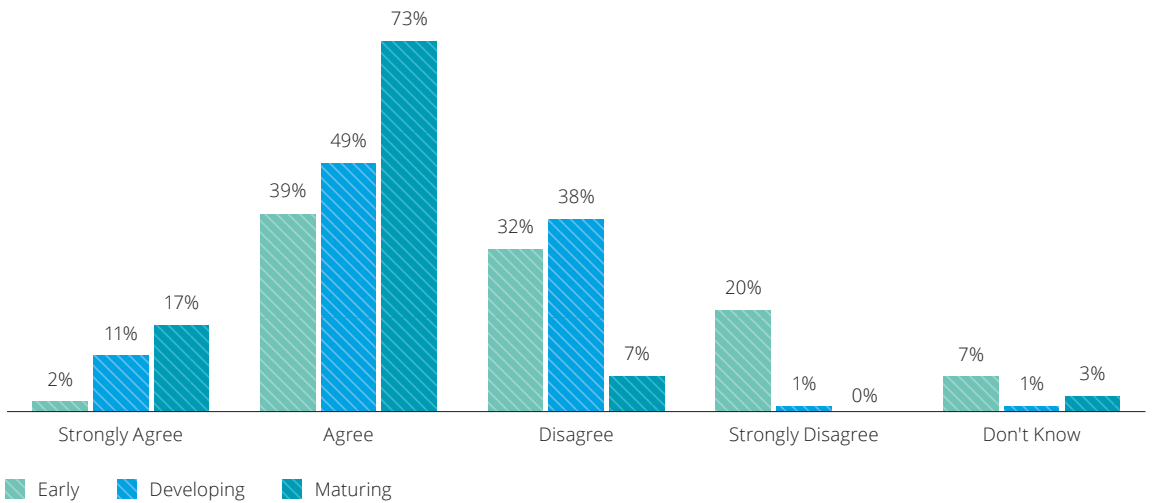
Source: Deloitte analysis n=158

Thirty per cent of digitally maturing organisations are either in the scaling or production phase of AI implementation, compared to just ten per cent that are in their early stages of digital development.

Self-confidence in digital skills

Executives in digitally maturing organisations are significantly more confident in their own digital skills. Ninety per cent of leaders from digitally maturing organisations are confident compared to just 41 per cent of leaders in organisations at the early stages of digital development. This suggests that digital maturity and digital confidence might go hand in hand.

Figure 6. "I am confident that I have the digital skills needed to successfully lead an organisation in the digital economy", by digital maturity grouping



Source: Deloitte analysis n=158

Ninety per cent of leaders from digitally maturing organisations are confident compared to just 41 per cent of leaders in organisations at the early stages of digital development.

Fall in love with the problem

Our motto in the Disruption Team at Deloitte is to fall in love with the problem, not with the solution. This is important across all aspects of digital transformation and not just for technical solutions. Plans, operating models, job descriptions are all things we can fall in love with and in doing so lose sight of the problem they were created to solve.

So how do you fall in love with the problem? You put the user at the centre. Whether the user is a customer or an employee, put them at the centre of everything that you do. If you are user-centred then you have no choice but to work iteratively to produce, test and then improve. It also means you have to work collaboratively through multidisciplinary teams to deliver something testable in the quickest most efficient way.

But this is not enough. We see organisations where small pockets of innovation occur but these green shoots tend to wither and die without a coherent overall narrative.

So we always stress the importance of coming up with a tangible hypothesis. To be tangible it must be a description at the user-level – from the view of the customer or employee. For example, it could describe the ideal retail customer experience and then the ideal employee experience to enable it. Rather than create a goal, create a hypothesis. That way you can validate it iteratively. This then creates a clear narrative that enables a multidisciplinary approach where teams from different functions, markets and business areas work together.

This was the idea behind Clerk and Green, an immersive experience that we built in our London studio. Take a look on page 11 for more details.

We are at an exciting time, because right now when we talk about the “ideal experience” we actually have the capabilities to deliver it. Right now, you can create whatever experience you want for your customers or colleagues, or you can put in place the building blocks to do it in the next five years. So far none of the work we have done with our clients has disproved this. Although to begin with, some of the ideas remain quite conservative, which shows that executives still find it hard to fall out of love with their existing solutions.

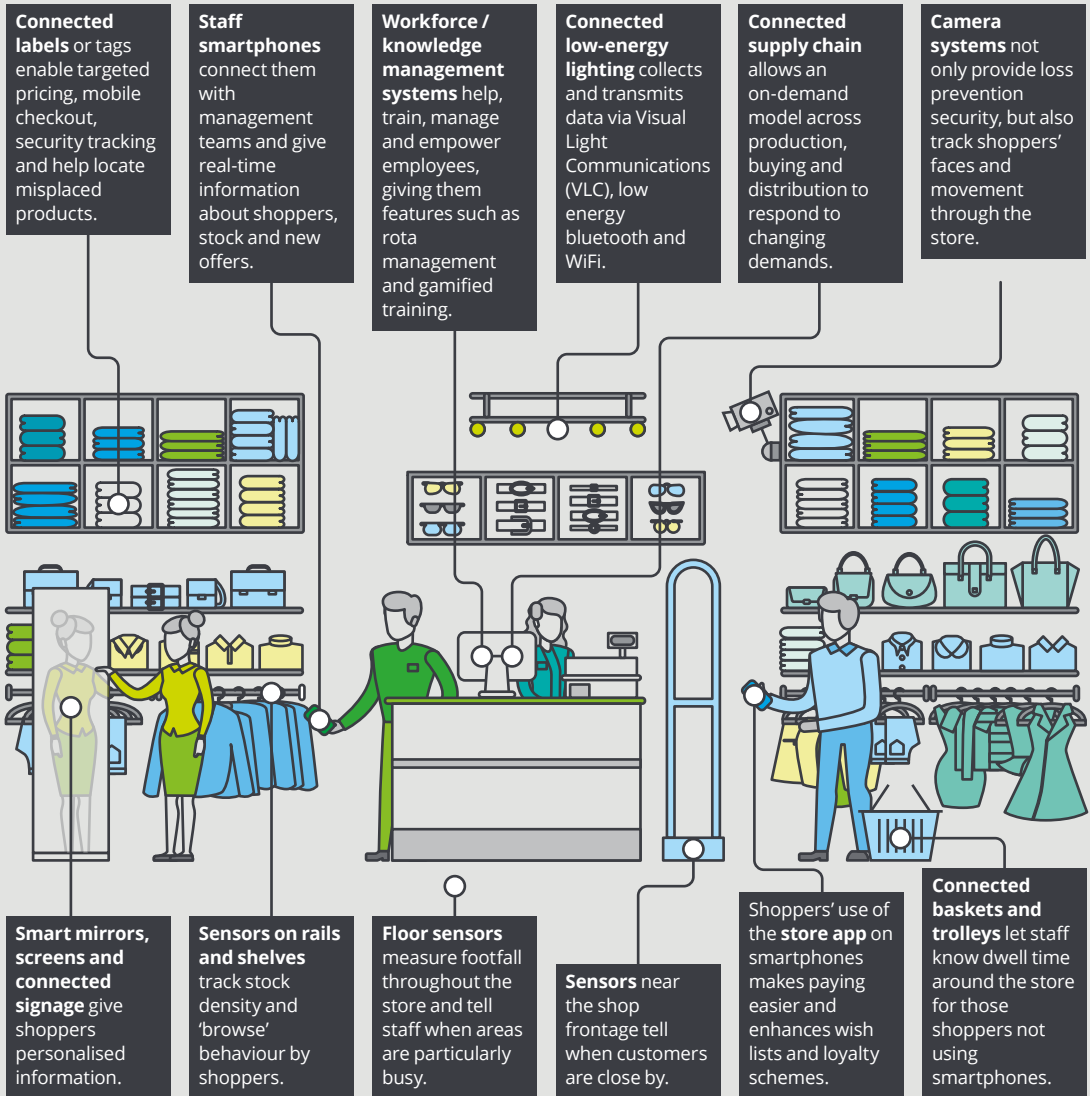
So what do you need to do? Take a step back and create an end-to-end description of your customer experience, a tangible hypothesis, to give your organisation coherence. Everyone should know the role they play in making that happen. And make it compelling, by really pushing yourself to imagine the ideal experience, you will be surprised how close you can get to it right now. If you can imagine something that is not possible then I salute you and I will personally bestow you with a Chief Disruptor hat!



Ed Greig
Chief Disruptor, Deloitte

Introducing the connected store

Deloitte has created *Clerk and Green*, an immersive experience that follows customers and employees as they navigate a digitally connected fashion and grocery retail environment.

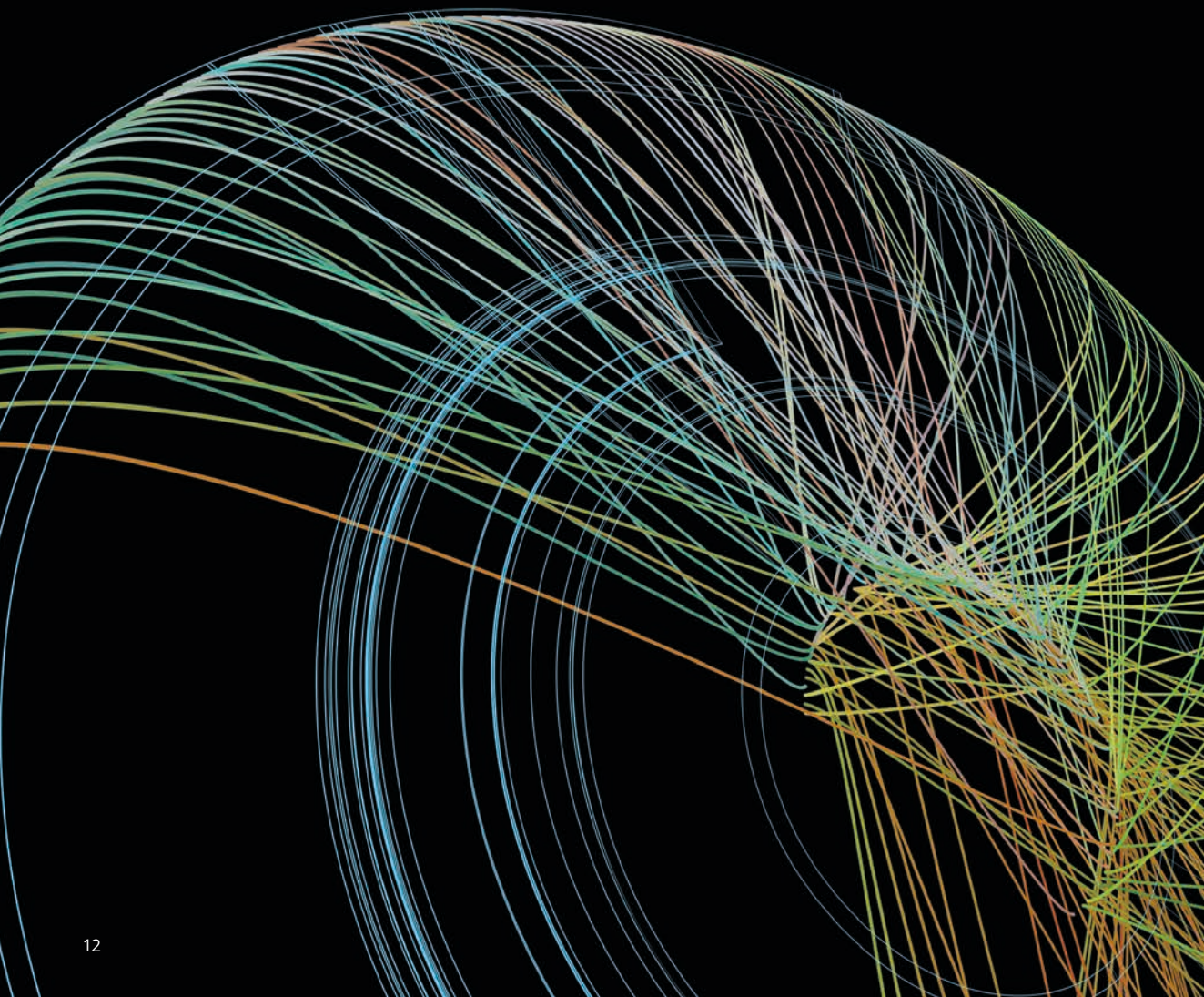


The story of user personas helps executives visualise the 'art of the possible' and the value of digital transformation. *Clerk and Green* facilitates strategic discussions on the kind of experiences and value executives wish to create, as well as showcases a range of enabling technologies. It explores themes including:

- personalised content
- digital signage
- loyalty
- inventory management
- mobile self-checkout
- store management
- analytics



Confident digital leadership



Confident digital leadership

Defining digital confidence

Here we define 'confident leaders' as respondents to our survey who 'agreed' or 'strongly agreed' that they are confident they have the digital skills needed to give successful leadership to an organisation in the digital economy. We describe those respondents who 'disagreed' or 'strongly disagreed' with the statement as 'not confident' or 'unconfident'.

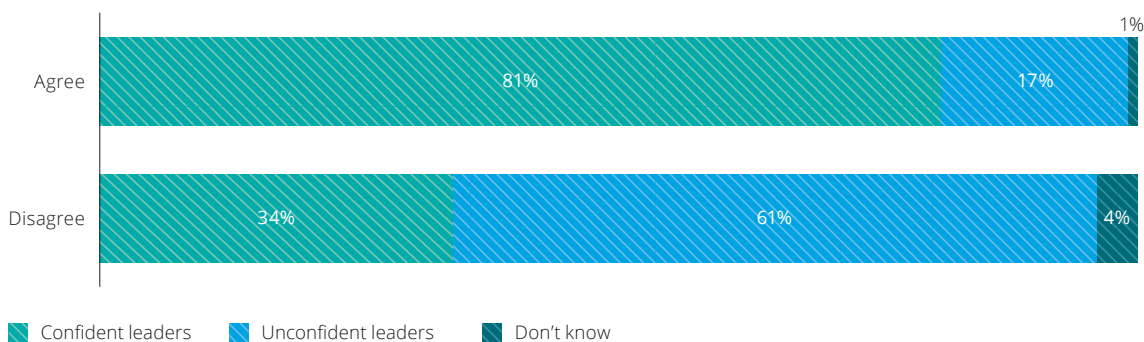
Unsurprisingly, those respondents who are closest to their organisation's digital strategy (such as Chief Digital Officers or executive sponsors of digital transformation initiatives) are the most confident in their digital skills; and those who are furthest away, such as key functional stakeholders (for example Finance, Human Resources or Information Technology Directors), are more likely to lack confidence.

Confident leaders were considerably more positive about their organisation's digital strategy. Seventy-three per cent of confident leaders stated that they have a coherent digital strategy in place, compared to just 33 per cent of leaders who are not confident.

Our analysis indicates a number of factors that determine whether leaders are confident in their personal digital skills and leadership abilities. In particular, confident leaders tend to be content with the amount of resources they receive to develop their skills: 74 per cent agreed they are receiving the resources they need to upskill, compared to only 26 per cent of unconfident leaders.

Forty-seven per cent of confident leaders reported that their organisation's learning and development (L&D) curriculum supports its digital strategy, compared to just ten per cent of unconfident leaders. However, given that over half of confident leaders disagreed with this statement, this might suggest that broad L&D programmes have less of an impact on executive confidence than training resources provided to the leaders themselves.

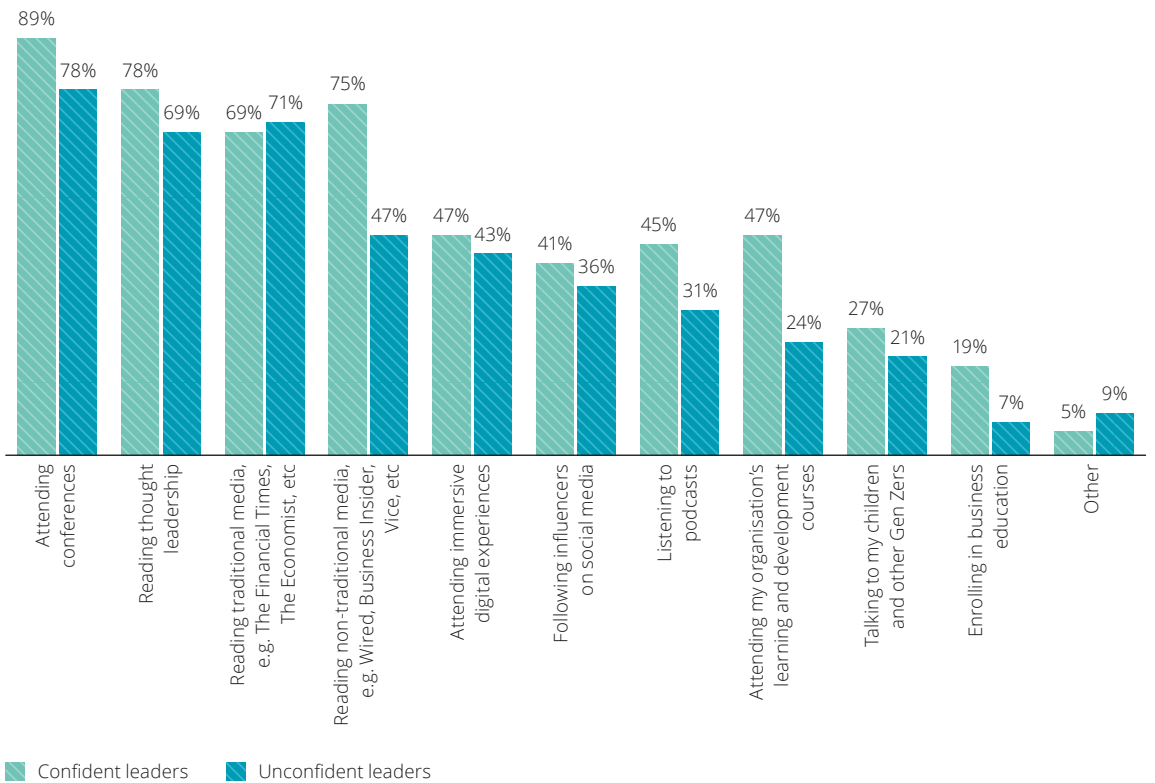
Figure 7. "My organisation provides me and other leaders with the resources to develop our own digital skills", percentage of respondents



Source: Deloitte analysis n=156

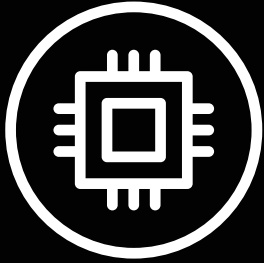
Confident leaders are also more likely to engage in self-learning and development than leaders who are not confident in their digital skills. Confident executives tend to do more of everything in an effort to improve their personal understanding of digital. They are more likely than their unconfident counterparts to read non-traditional media, listen to podcasts and attend digital learning programmes in their organisation.

Figure 8. “How are you currently improving your own understanding of digital technologies and ways of working?”, percentage of respondents

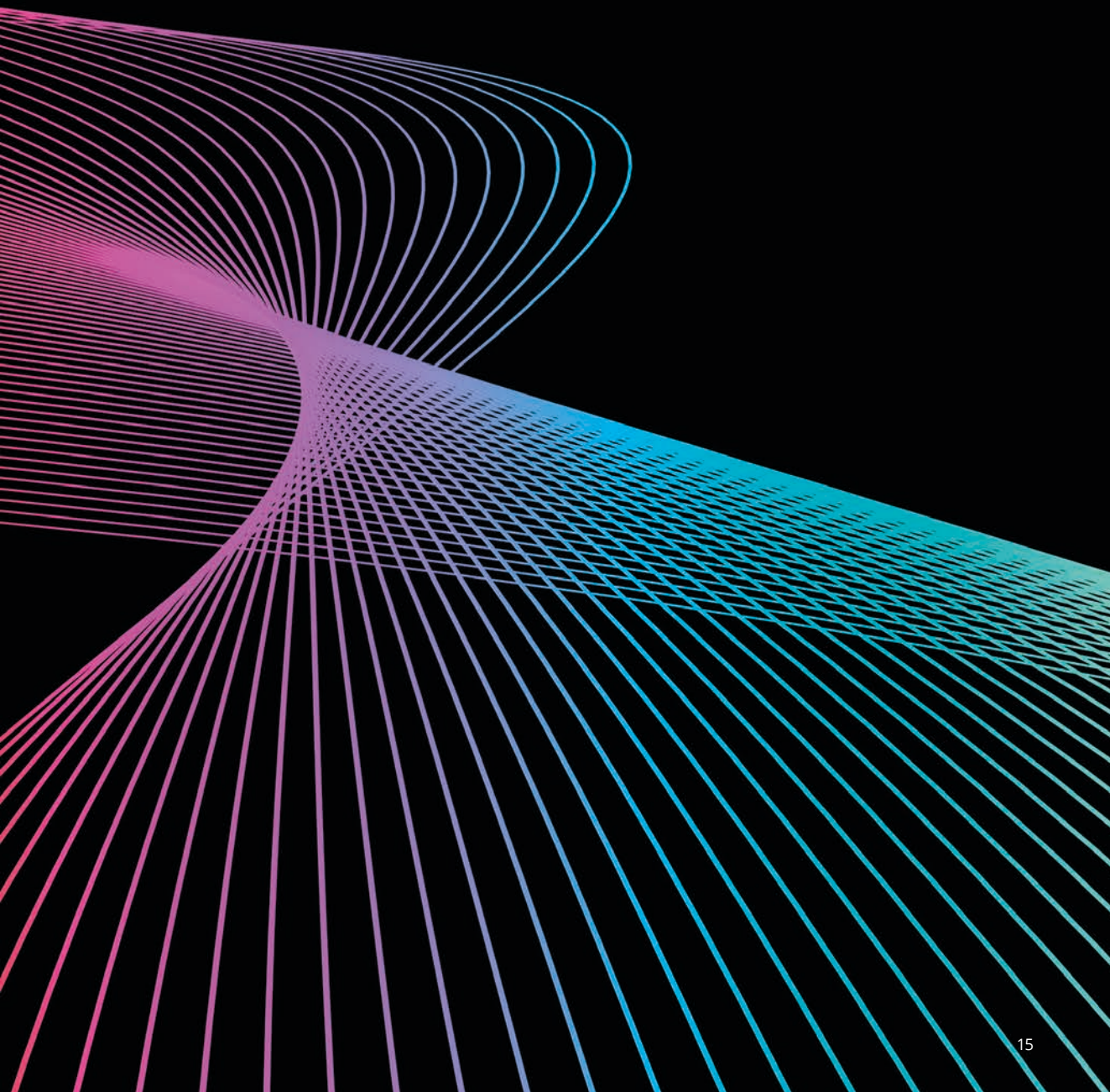


Source: Deloitte analysis n=153

81 per cent of leaders whose organisation provides them with the resources they need to develop their digital skills are confident in their leadership ability, compared to just 34 per cent of executives who do not feel supported by their organisations.



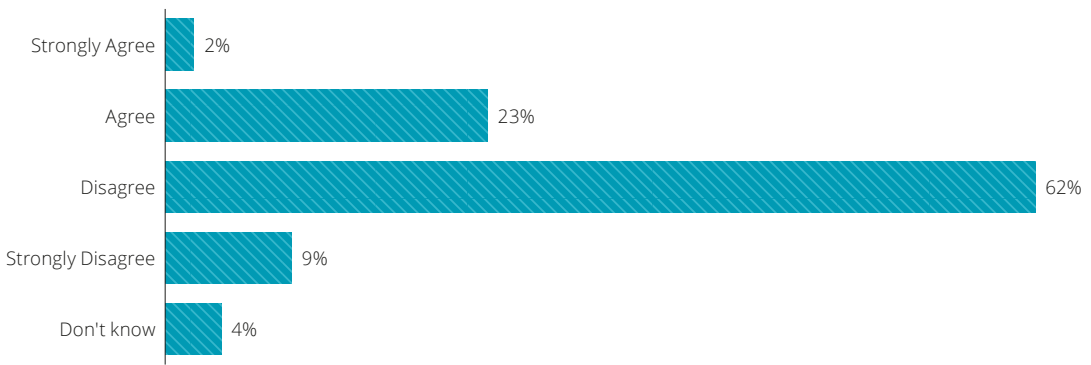
Digital skills and learning



Digital skills and learning

Digital skills shortages are a persistent problem for organisations in all industries. Seventy-two per cent of survey respondents do not believe that their workforce has sufficient knowledge and expertise to execute the digital strategy of their organisation.

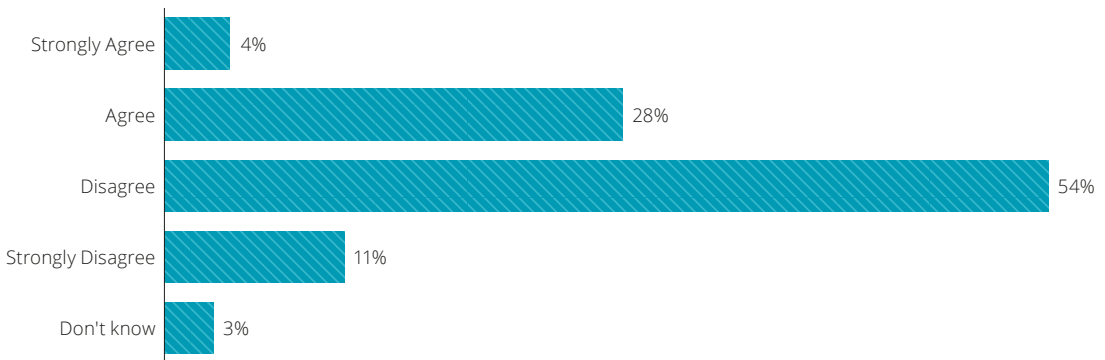
Figure 9. “Our talent pool has sufficient knowledge and expertise to execute our digital strategy”, percentage of respondents



Source: Deloitte analysis n=158

Just 18 per cent of respondents believe that school leavers and graduates enter the UK labour market with the right digital skills and experience. The skills shortage persists within the workplace, and 65 per cent of respondents consider that their learning and development (L&D) programmes do not support their digital strategy.

Figure 10. “My organisation’s learning and development curriculum supports our digital strategy”, percentage of respondents



Source: Deloitte analysis n=158

Skills are no longer the currency of work

On the face of it, finding that only 18 per cent of executives believe that UK school leavers and graduates have the right digital skills looks damning, and it would seem obvious to blame our education system. However, that is far too narrow an assessment. Everything we know about the Future of Work suggests that this finding from our survey is, in many ways, to be expected.

Digital skills are not a static set of skills. We live in a world where the half-life of a learned business competency is approximately five years and the half-life of a technical skill is two-and-a-half years or less. As such, human-centred design skills have some longevity but some programming skills are redundant after a couple of years. On that basis it should not be a surprise that people are coming out of education with skills that are already not relevant to the way we work.

In the Future of Work the entire paradigm of learning into your 20s, working in your 30s, 40s and 50s, and retiring in your 60s needs to change. The notion that skills are the currency of work no longer applies. We are in a world where lifelong learning and reinvention is a reality.

Deloitte's Human Capital Trends highlighted the lag in time between public policy and educational curriculums catching up with evolving technology. However businesses and individuals, as well as government, must play a part in delivering the skills required in the Future of Work.

As individuals:

- We need to understand that lifelong learning is a reality and our responsibility – even beyond formal education.

As businesses:

- We need to change the way we think about learning. We need to take responsibility for reskilling our workforce rapidly and creating a culture and environment that promotes lifelong learning.
- We need to think differently about how we acquire skills and build our workforces – an eco-system of gig workers, crowd, third parties or joint ventures to give us the flexibility we need to respond to a rapidly changing world.
- We need to work more closely with the education establishment to ensure that future workers have the skills we specifically require. It is encouraging that some businesses have already started to work closely with technical colleges to shape their curriculums.
- We need to work closely with government and educational establishments to shape the future, and not blame them.

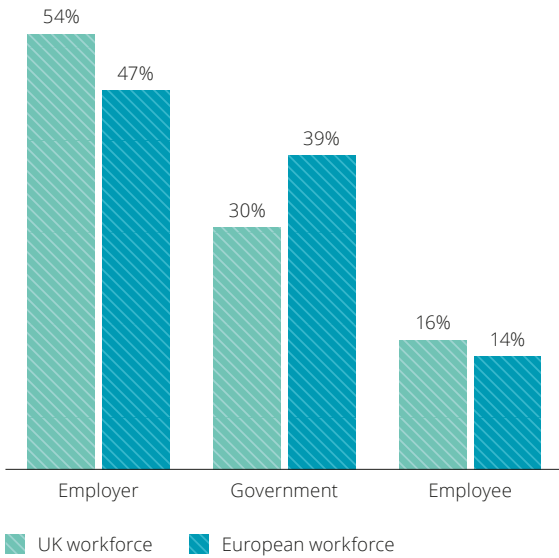


Richard Coombes
Partner, Future of Work

Work is changing. Deloitte's *European Workforce Survey*, based on responses from workers in ten European countries, including 2,043 from the UK, found that for 44 per cent of British workers some of the tasks they performed five years ago have now been automated. Thirty-four per cent said that entire business processes relevant to their roles had been fully automated since 2013.¹

The future of work is 'now' and our roles are being augmented to an ever-increasing extent by technology. It is imperative that L&D should reflect this change. Moreover, a majority of British workers expect their employer to pay for and provide them with the opportunities to develop these skills.²

Figure 11. Who should have the primary responsibility for the maintenance and development of workplace skills? Percentage of respondents




Source: The Deloitte European Workforce Survey

Similarly, Deloitte's *Human Capital Trends 2017* noted that the 'ability to learn and progress' is now the principal driver of an organisation's employment brand.³ And yet L&D currently fails to meet the digital learning needs of individual workers and the need of businesses for a workforce with the capabilities to develop and maintain new digital products and services.

Workers consider that the most effective methods for learning are on-the-job training and the ability to work on a new task or problem in a small group. Yet there continues to be an over-reliance on formal teaching. Workshops, seminars and conferences remain the most popular forms of training available, whereas the contribution of practice and experience to skills acquisition is undervalued by many organisations.⁴

Until recently the L&D function had a monopoly on learning within the organisation. It was a function characterised by architectures, systems and technology supporting an analogue approach. Now workers are able to access learning via search engines, video sharing platforms, social networks and other communication tools. The monopoly of L&D has been broken, and the training provided by many L&D functions does not represent the 'always on and always available' approach to learning that many workers want. As a result the structure and purpose of L&D faces far-reaching change.⁵

To meet the needs of today's digital organisations, L&D must provide a learning environment that reflects increased workforce mobility. The function must be business-led and provide worker-driven learning via curated content, video and mobile solutions and micro-learning. It must also be able to harness the huge amount of external content available via the internet.⁶



To do list

- Evaluate internal mobility
- Review your organisation’s role architecture
- Build a culture of hiring from within
- Track learning metrics
- Refocus the L&D function
- Rethink the L&D technology infrastructure
- Rethink your corporate university
- Manage your employment brand

Source: Deloitte’s Human Capital Trends

Leaders’ digital skills

Even at a senior leadership level, our survey found that 44 per cent of executives say they are not receiving the resources they need to develop their personal digital skills, but where support is provided it delivers a substantial boost to executive confidence.

Eighty-one per cent of leaders who receive the resources they need to improve their digital skills are confident in their ability to lead their organisation in the digital economy. Digitally maturing organisations do more to help their leaders and employees develop their skills. They also distinguish themselves in how they help. Being a digitally maturing organisation is as much about developing the right skills and leaders as it is about having the right skills and leaders.⁷

Finding the right leadership is a perennial challenge for organisations that never seems to go away. The disruption caused by digital creates even greater leadership gaps.⁸

To successfully lead an organisation in the digital economy, leaders need to think, act and react differently, see Table 12.

Figure 12. Leadership capabilities needed to succeed in a digital world

		
Imagine <i>Think differently</i>	Deliver <i>Act differently</i>	Run <i>React differently</i>
<ul style="list-style-type: none"> • Conceptualise possibilities in a virtual world • Handle ever-increasing cognitive complexity • Think divergently about new ways of doing things • Make decisions quickly without all of the information 	<ul style="list-style-type: none"> • Adapt to constantly shifting power and influence • Collaborate with ease across many different teams • Value the contribution of new work partners and different interest groups • Invest huge amounts of energy into getting things right: try, fail, try again 	<ul style="list-style-type: none"> • Tolerate an environment of risk and ambiguity • Show resilience in the face of constant change • Be brave in challenging how things are being done • Have the confidence to take the lead in driving change

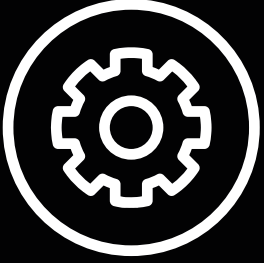
Source: Deloitte’s Human Capital Trends

In September 2018 Deloitte hosted a group of leaders in human resources and technology from the UK's largest and most influential companies, to explore how we can enable the whole of the UK population to engage in, and contribute to, a more technology-driven society – 'powering up' the UK and its businesses.

There are some great programmes already established, which are trying to drive up this awareness and close the skills gap. But barriers around motivation across different demographics were seen as key.

Out of these discussions came a range of ideas. For example, a 'Tech Culture Club' to equip executives and Board Members from the UK's largest companies with insights around the potential business value new technologies bring. If you would like to join the 'Tech Culture Club' please contact the authors.

There are some great programmes already established, which are trying to drive up this awareness and close the skills gap. But barriers around motivation across different demographics were seen as key.

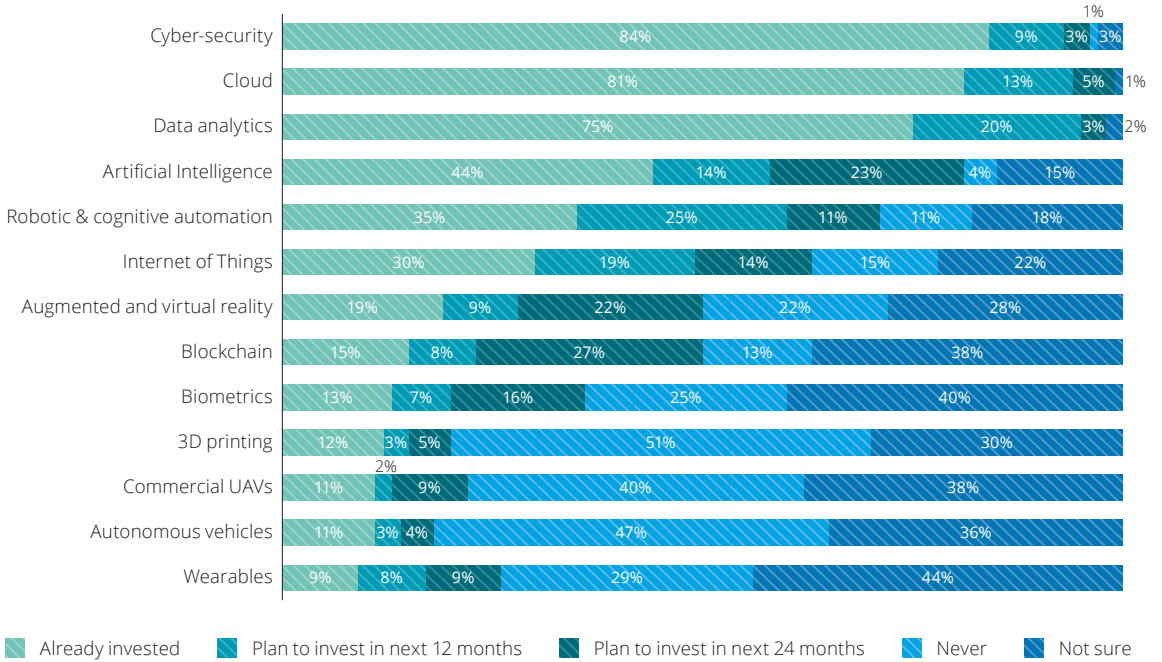


Technology investment and implementation

Technology investment and implementation

Further to our earlier surveys, Cyber-security, Cloud and Data analytics continue to see widespread implementation. By the end of 2020, executives expect significant growth in AI, RCA and IoT in particular.

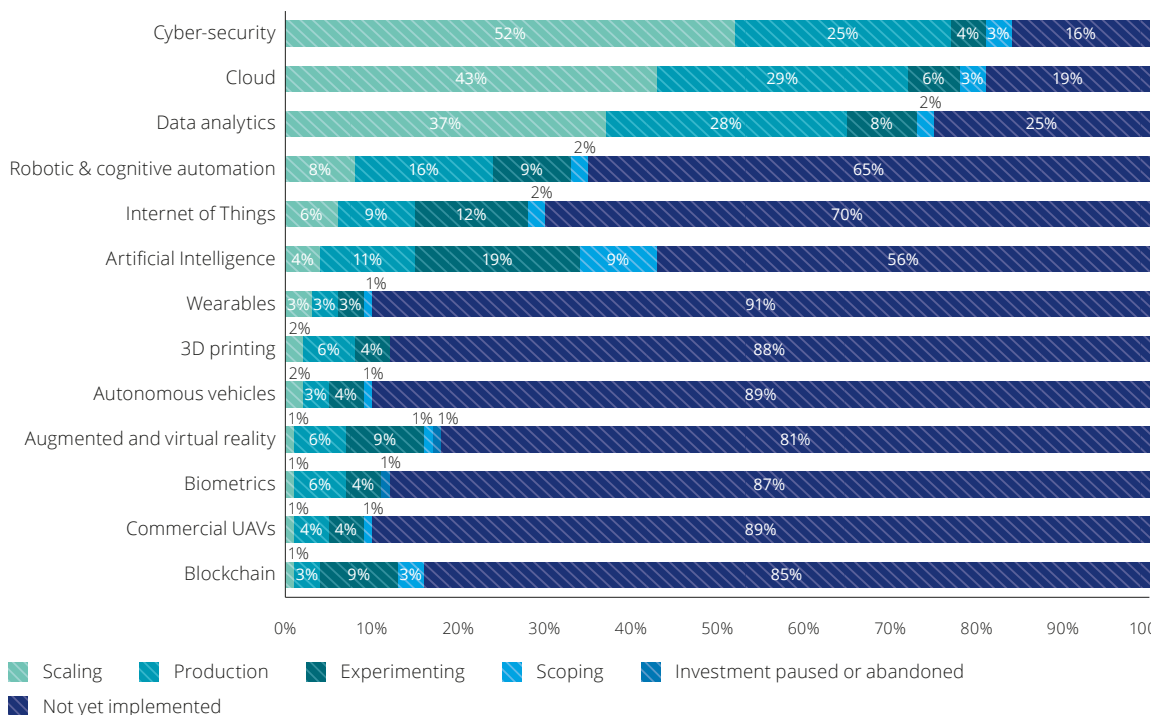
Figure 13. Actual and expected investment in technologies, percentage of respondents



Source: Deloitte analysis n=158

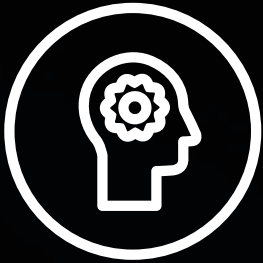
For the moment, current investment in AI, RCA and IoT is largely experimental and few organisations are implementing them at scale. However, initial feedback regarding their implementation is positive, with over three-quarters of executives indicating that AI, RCA and IoT have met or exceeded their expectations to-date.

Figure 14. Stage of technology implementation*, percentage of respondents

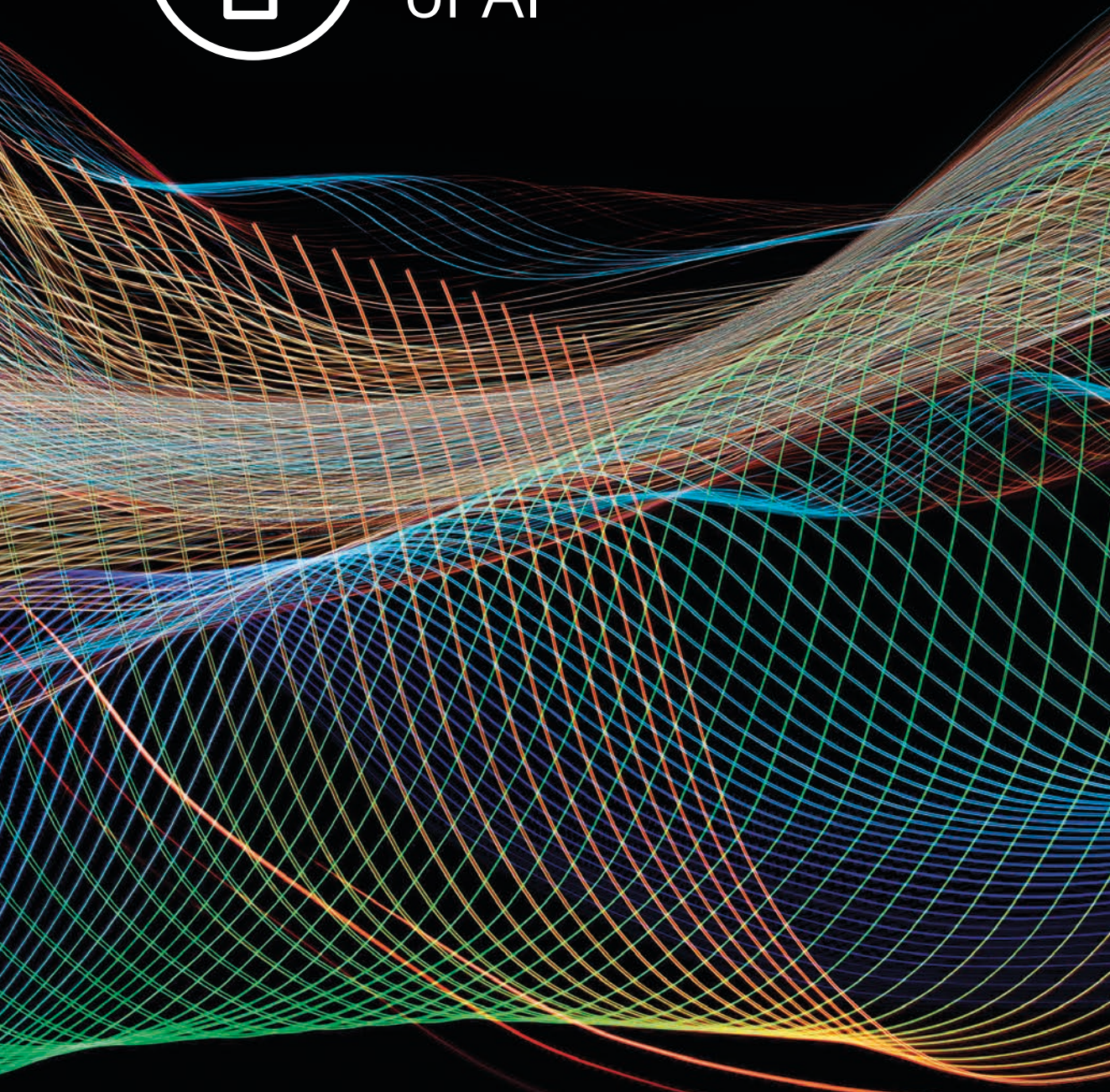


Source: Deloitte analysis n=158
 *See Figure 4 on page 8 for definitions of implementation stages.

Executives expect AI, RCA and IoT to receive significant investment over the next two years. Scalable implementation, however, remains a challenge, with few organisations currently progressing beyond production pilots.



AI and the ethics of AI



AI and the ethics of AI

Artificial intelligence (AI) is increasingly a strategic priority. After Cloud, Cyber-security and Data analytics – three foundational digital pillars – respondents to our survey rated AI as the most important technology to their digital strategy.

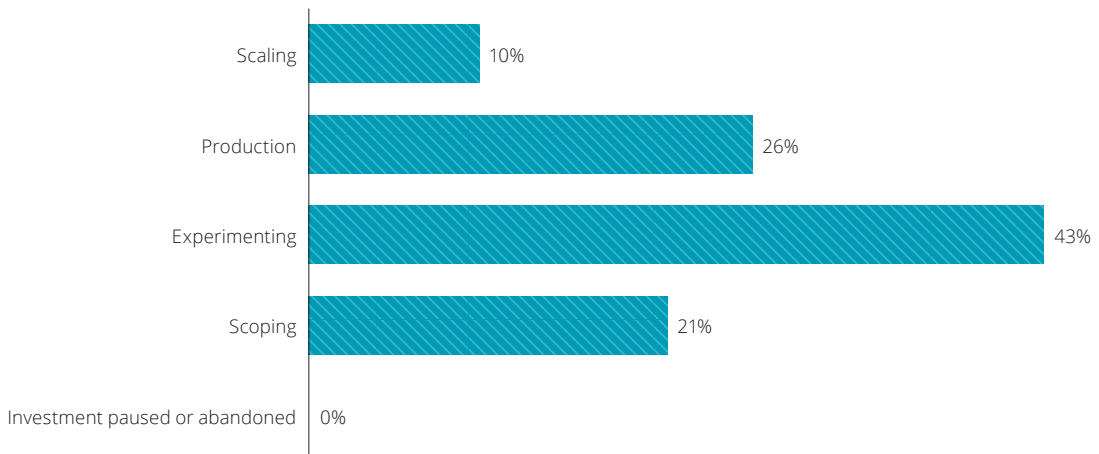
Our survey found 44 per cent of executives have already invested in AI, while a further 37 per cent expect to invest over the next two years. Customer care and operations are the two main functional areas organisations prioritised for investment, which reflects drives for operational efficiency and more tailored customer engagement at scale – an approach known as *mass personalisation*.

For the moment, actual implementation of AI is mostly experimental, with 21 per cent of organisations identifying use cases and 43 per cent running production pilots. Given the diverse nature of AI technologies and its propensity towards highly specific use cases, it is perhaps unsurprising that few organisations are scaling AI across multiple functions and business areas.

Deloitte's *State of AI in the enterprise* found that organisations use a range of methods to develop their AI capabilities. The most common approach is to acquire enterprise software, such as Customer Relationship Management (CRM) or Enterprise Resource Planning (ERP) systems, with AI 'baked into it'. Accessing ready-made AI allows organisations to try it out with low initial cost and minimal risk. The large number of Cloud-based options available partly explains the range of experimentation currently being undertaken.⁹

Forty-four per cent of executives have already invested in AI, while a further 37 per cent expect to invest over the next two years.

Figure 15. Stage of AI implementation*, percentage of respondents investing in AI



Source: Deloitte analysis n=70

*See Figure 4 on page 8 for definitions of implementation stages.

Encouragingly, three-quarters of executives implementing AI are satisfied that it has met or exceeded their expectations. Of those who indicated that implementation has not yet met their expectations, the majority are still experimenting, whereas those deploying AI in multiple functions and business areas were notably more positive.

Despite the importance of AI for the digital strategies of organisations, almost half of respondents do not believe that their leadership team has a clear understanding of AI or its impact on the end-to-end enterprise.

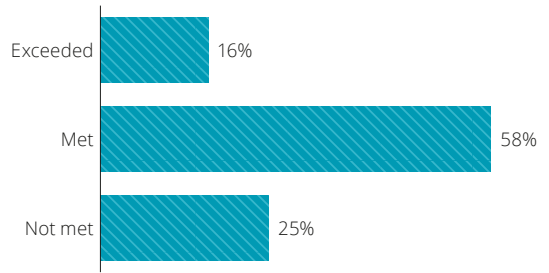
This could act as a barrier to the developing use of AI. We consider it imperative that executives take an active role in understanding the different types of AI technologies, how they can be utilised in different and how these could benefit their organisation.

AI and ethics

A substantial number of senior leaders seem underprepared for the ethical considerations that surround the use of AI. Less than half of survey respondents state that they have a policy in place for the safe and ethical development of AI and data-driven technologies.

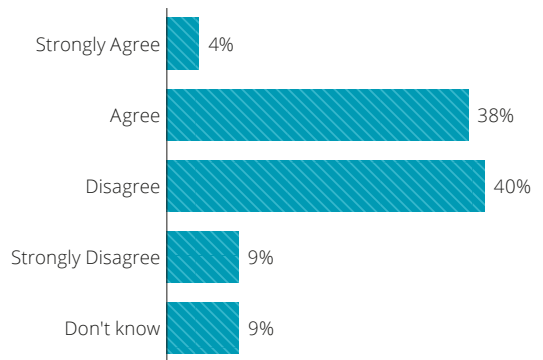
While humans continue to write code there is an inevitable risk that their biases will shape algorithms and the decisions made by AI. Digitisation codifies decision-making and AI codifies the way we make decisions. This has huge potential to increase the accuracy and timeliness of information and so the quality of decision-making. However when organisations identify use cases for AI, the benefits cannot be seen just in terms of efficiency and effectiveness. Consideration must also be given, as with human decision-making, to the values of the organisation and society at large.

Figure 16. Executive expectations of AI implementation, percentage of respondents implementing AI



Source: Deloitte analysis n=55

Figure 17. “We have a policy in place to ensure the safe and ethical deployment of AI and data-driven technologies”, percentage of respondents already investing or planning to invest in AI in the next 12 months



Source: Deloitte analysis n=92

Deloitte's view is that AI decision-making should be assessed with the same rigour as human decision-making. In most cases an organisation's existing ethics policy and procedures should be sufficient. In all cases an organisation's values should inform how and why AI algorithms make their decisions, just as those values are used to inform any other business decision. Particular emphasis should be placed on the data being used to train the AI and both an ethical and an operational assessment that it is fit for the intended purpose.

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Assess and manage the unique risks of every use case

If something is unethical in the analogue world, it will be unethical in the AI world. Ensuring that ethical standards are adhered to is essential. Rather than inhibiting AI adoption, ethical and regulatory frameworks should guide us on how to develop and manage solutions that are actually sustainable and scalable in a way that meets stakeholder expectations. While for many 'low-risk' machine learning applications, such as online consumer music or film recommendations, an unsupervised continuous learning model may be the best commercial approach. For 'high-risk' applications, for example clinical triage, judicial decisions or autonomous vehicles, robust control mechanisms and regulatory frameworks are vital. Through our work in healthcare, we have demonstrated that AI can be developed safely and responsibly, but it is key that business leaders and technologists work closely together from the outset. Consent for how data is used and the decisions made must always be obtained where appropriate.



Dr Matthew Howard
Director of Artificial Intelligence, Deloitte

Common misconceptions about AI

Misconception One: Once made, AI decisions cannot be explained

Increased computing power has enabled programmers to expose computers to terabytes of structured and unstructured data, allowing them to 'self-learn' based on experience. This has improved predictive and decision-making accuracy. However, it has also led to the misperception that decision-making is increasingly performed by an algorithmic 'black box'. Yet it is possible to test and validate the decision-making processes of AI models. Usually this is managed through an explanation technique and a model interpreter (see Figure 16).

Misconception Two: There is no 'stop button'

There is also a misperception that once an AI model is issued, it is difficult to modify erroneous outputs and disable the model if necessary. However, control measures are typically built upfront and embedded into the design of the AI application, with fixed parameters and 'backstops'. Bolt-on applications can also be applied. Key to this is bias detection. Many of the historical data sets that models are trained on will be inherently biased in relation to race, age and gender. In such instances, programmers must remove this bias and retrain models where necessary. Organisations can monitor AI outputs in order to fine-tune their systems. And they can hit the 'stop button' if needed.

Misconception Three: AI models are always learning

Continuous learning is a key feature of machine learning and deep learning models. They can adapt and change to different tasks and data distributions, whilst retaining useful knowledge and experience over time. This is a significant advantage in the training and optimisation of AI models. However, once these systems are trained and validated for accuracy, ethics and safety, there may be instances where continuous unsupervised learning is no longer desirable. For example, in Deloitte's work in healthcare, control and supervision are paramount and for this reason, we 'switch off' the continuous learning element of our model during live production in order to mitigate the risk.

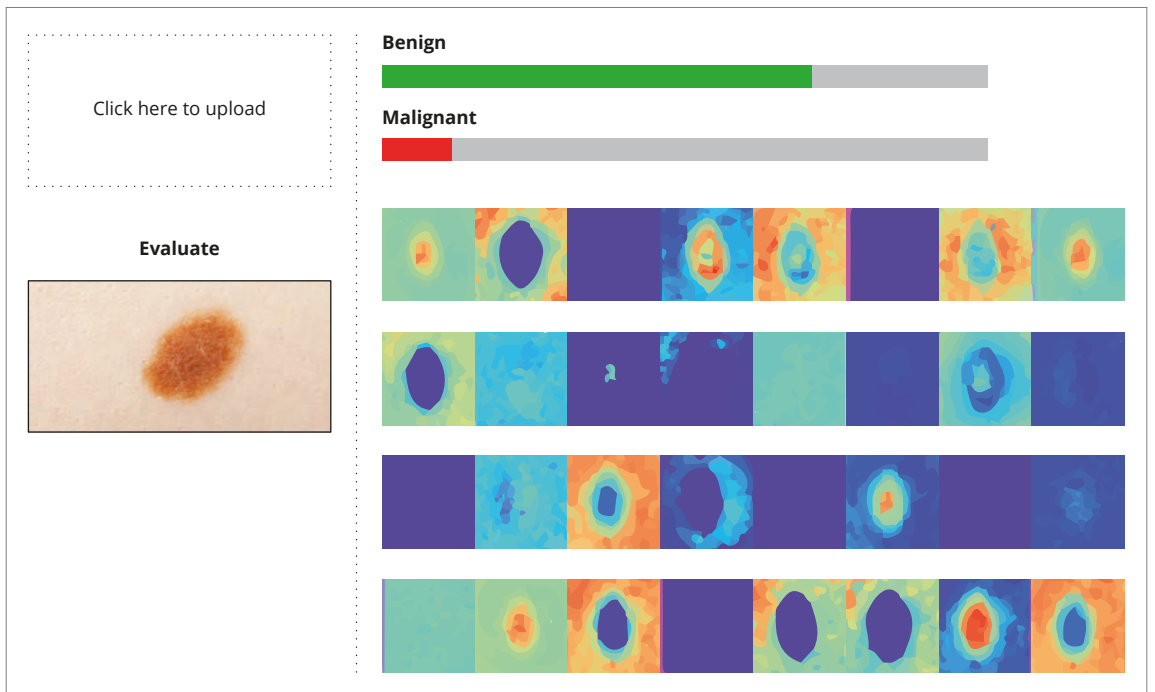
Misconception Four: AI developers alone are responsible for ensuring that AI is acting ethically

Risk assessment processes should be designed and agreed on by the organisation's management before the AI use case is even developed. If executives are required to take responsibility for AI, they must gain a comprehensive understanding into the system's rationale and be confident it is operating within its defined parameters. Similarly AI developers and specialists must also increase their understanding of the risk profile and regulatory requirements involved.

Figure 18 below displays an AI demonstration tool developed by Deloitte for identifying potential skin cancer. The graphical representation displays the key features of the skin lesion that have activated each layer of the AI model's 'neural network' to help us understand why the model has made its prediction. Powered by open source technologies and trained on a public dataset provided by the International Skin Imaging Collaboration (ISIC), Deloitte's model used a deep 'neural network' to achieve 92 per cent accuracy in predicting benign or malignant lesions against the test dataset. In future such approaches may help develop diagnostic tools to aid physicians.

After Cloud, Cyber-security and Data analytics – three foundational digital pillars – respondents to our survey rated AI as the most important technology to their digital strategy.

Figure 18. Understanding how an AI model makes decisions, illustration



Source: Deloitte analysis

Endnotes

1. *'Voice of the workforce in Europe'*, Deloitte Insights, November 2018.
2. *'Voice of the workforce in Europe'*, Deloitte Insights, November 2018.
3. *'Careers and learning'*, Human Capital Trends 2017, Deloitte University Press, February 2017.
4. *'Voice of the workforce in Europe'*, Deloitte Insights, November 2018.
5. *'Careers and learning'*, Human Capital Trends 2017, Deloitte University Press, February 2017.
6. *'Careers and learning'*, Human Capital Trends 2017, Deloitte University Press, February 2017.
7. *'Coming of age digitally'*, MIT Sloan Management Review and Deloitte Insights, June 2018.
8. *'Leadership disrupted'*, Human Capital Trends 2017, Deloitte University Press, February 2017.
9. *'State of AI in the enterprise'*, Deloitte Insights, October 2018.

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Notes



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