

PROJECTING THE FUTURE

A big conversation about the future of the project profession

CHALLENGE PAPER 1

**THE FOURTH INDUSTRIAL REVOLUTION:
DATA, AUTOMATION AND
ARTIFICIAL INTELLIGENCE**

AUGUST 2019

#projectingthefuture

ABOUT THIS PAPER

HOW DOES THE PROJECT PROFESSION THRIVE IN A CHANGING WORLD?

That's the question at the heart of Projecting the Future.

This is the first of a series of short papers on the Challenges shaping our profession's future. It follows on from the launch of our discussion paper in June 2019, which set out our plans for a 'big conversation' in 2019-20 about the future of the project profession.

That paper identified six key questions for the future of the profession, which will run throughout Projecting the Future. Every one of these Challenges papers will pose big questions for the project profession too – not least the impact of new technology.

But as Tim Banfield, chair of APM's Projecting the Future Group, wrote in our discussion paper: "The future could look daunting, but for the project profession, it shouldn't – because projects are the way that successful change happens."

We are a confident, optimistic profession. We will be at the centre of the immense changes that lie ahead, tasked with leading complex projects that deliver transformative change. We are proud of the profession's development to date – yet we believe we have the potential to be so much more. Projecting the Future aims to help build a picture of how we can, collectively, realise our potential as a true leadership delivery profession. We look forward to your input.

JOIN THE CONVERSATION

We hope you will share your views with us and other project professionals on LinkedIn, Facebook, or Twitter.

[in](#) [f](#) [t](#) **#projectingthefuture**

You can also email your thoughts and comments to: ptf@apm.org.uk.

We are particularly keen to hear about case studies of projects that are making innovative use of data, autonomous systems or AI today.

We recommend reading the Projecting the Future discussion paper alongside this Challenge paper. It can be found at:

www.apm.org.uk/projectingthefuture

THE BIG ISSUES

We are in the early stages of a fourth industrial revolution. New technologies are set to affect nearly every aspect of how we live and work, disrupting major organisations, whole sectors of the economy, and entire professions.

The fourth industrial revolution - 4IR, or sometimes 'industry 4.0' - will be driven by technology that closes the gap between the physical and cyber worlds. More than anything else, this technological revolution will drive the evolution of the project profession in the years ahead and the emergence of what we have dubbed project management 4.0, or PM 4.0.

Fields like artificial intelligence, the Internet of Things, blockchain, robotics, nanotechnology, quantum computing and biotechnology all carry huge potential. Combined, they will allow humans to do things that were simply unimaginable to previous generations. They will lead to enormous innovation both in commercial products and services and in public services, like healthcare.

New technology will also profoundly change how we work. In many cases, technology promises to replace human labour: as it advances, we will be able to automate increasingly sophisticated tasks. Andy Haldane, the Bank of England's chief economist, has said that as many as 15 million jobs could be lost to automation in the UK over the next decade.¹ Globally, it could be 800 million over the next decade.

But such forecasts are far from certain – and, eye-catching as they are, can risk overshadowing the enormous upsides and

opportunities created by 4IR technologies. The automation of standardisable tasks will generate huge productivity gains, which could add billions of pounds to the UK economy. New jobs and new companies will be created: and they could be better, more engaging jobs, oriented around creativity and human relationships, rather than the execution of repetitive tasks. Seizing such opportunities is a critical challenge for the coming years.

So it is no surprise that this area is high on the UK policy agenda. The government's Industrial Strategy identifies AI and the data economy as one of its four 'grand challenges', and sets a policy objective of putting the UK "at the forefront of the artificial intelligence and data revolution".² To pursue that goal, an Office for Artificial Intelligence was formed in 2018.³

It's no exaggeration to say that the fourth industrial revolution could change nearly every aspect of our lives. The implications for project management are equally far-reaching.

Is the project profession ready for PM 4.0?

"We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten."

Bill Gates

IN NUMBERS

AI COULD ADD AS MUCH AS
£654BN
 TO THE UK ECONOMY BY 2035

90%
 OF THE WORLD'S DATA HAS BEEN
 CREATED IN THE LAST TWO YEARS

UP TO
800M
 JOBS GLOBALLY COULD BE
 REPLACED BY AUTOMATION BY 2030

AS MUCH AS
25%
 OF CEOs' JOBS TODAY COULD
 ALREADY BE AUTOMATED

HIGH RISK 35%

MEDIUM RISK 28%

LOW RISK 37%

35%
 OF CURRENT UK JOBS COULD
 BE AT HIGH RISK OF DISRUPTION
 FROM AUTOMATION

SOURCES FOR THE ABOVE GRAPHICS: £654BN^{iv}, 90%^v, 800M^{vi}, 25%^{vii}, 35%^{viii}

THE FOUR INDUSTRIAL REVOLUTIONS

FIRST INDUSTRIAL REVOLUTION

1700s

WATER AND STEAM POWER:
 MECHANISED PRODUCTION

THIRD INDUSTRIAL REVOLUTION

1900s

ELECTRONICS AND COMPUTING:
 AUTOMATED PRODUCTION

SECOND INDUSTRIAL REVOLUTION

1800s

ELECTRIC POWER AND ASSEMBLY LINES:
 MASS PRODUCTION

FOURTH INDUSTRIAL REVOLUTION

2000s

DIGITAL REVOLUTION – CYBER-PHYSICAL
 SYSTEMS, AI, INTERNET OF THINGS,
 GENOME EDITING,
 AUTONOMOUS VEHICLES

As defined by Klaus Schwab^{ix}

OPPORTUNITIES AND CHALLENGES

Big data

The Data Never Sleeps research by cloud technology firm Domo calculates that, every minute of every day, the internet carries 3.1 million gigabytes of traffic globally, including 159 million emails, 473,400 tweets, and 97,222 hours' worth of Netflix content. It is predicted that by 2020 some 1.7 MB of data will be created every second for every person on Earth.^x An estimated 90% of the world's data was generated in just the last two years, and the rise of smart-sensor equipped devices – connected by the Internet of Things – will generate further exponential growth.^{xi}

Big benefits

4IR technologies could deliver huge economic benefits. PwC predicts that the UK economy could be 10.3% bigger by 2030 thanks to AI, a gain worth £232bn a year – part of a \$15.7trn global return,^{xii} flowing from both productivity gains and the creation of new economic opportunities. (That compares to a predicted £90bn cost of a no-deal Brexit, should it occur.^{xiii}) Accenture forecasts a potential £654bn benefit to the UK by 2035, with 25% higher productivity gains compared to baseline trends.^{xiv}

A big challenge

The government's Industrial Strategy identifies four dimensions to the AI and data revolution 'grand challenge'. It aims to make the UK a global centre for AI and data-driven innovation; it promises government support to industry to boost productivity through AI and data analytics; it commits to leading the world in safe and ethical use of data and AI, something that is critical to business and consumer confidence; and it pledges help for people to develop the skills needed for the jobs of the future.^{xv}

The impact on work?

Any forecasts for the potential impact of technology – the pace of its development, its benefits, the disruption it could cause to jobs – are highly uncertain. A recent report from the RSA has explored four potential scenarios for the adoption of 4IR technology.^{xvi} Each has pros and cons. None are in the gift of government, or indeed of any other single entity, to determine.

Making sense of change

The RSA's report proposes a simple taxonomy to help think about the impact of technology. Automation might mean the substitution of human work – or it might augment what we do. It will create new work tasks and activities – generation – and it might involve transference, moving work from one group of people to another: self-service checkouts are a simple example. All four effects are likely in different places, with different technology, at different times.

The potential for automation

Uncertainty aside, the impact of AI and robots in augmenting or replacing human work could be enormous. It has been forecast that up to 30% of workers globally – between 400 and 800 million people – could have their jobs displaced over the coming decade. That could include 15 million in the UK.^{xvii}

What sort of work will be affected?

It is useful to think about the types of work that could be automated. Simple and repetitive tasks, which are standardised or standardisable, are ideal for automation; that means that low-skilled jobs are likely to be affected first. But technology is likely to become more sophisticated quickly and there is huge potential for automating elements of professional roles too. At JPMorgan, machine learning systems are already used to analyse complex financial deals that once took lawyers 360,000 hours a year.^{xviii} McKinsey estimates that 25% of what CEOs currently do could be automated.^{xix} Automation of routine tasks could free up more of people's time to focus on more creative, higher-value, and more rewarding work – including in the project profession. Which parts of project management tasks could, and should, be automated?

Automation and the project profession

Analysis by the Office for National Statistics has found that roles with the lowest risk of automation include those associated with "management, planning and advisory skills". That could mean that project professionals are among the occupational groups least likely to see their jobs put at risk by automation^{xx} – although some commentators believe that much of project management could in fact be automated.

Business preparedness

APM's *Salary and Market Trends Survey 2019* found that technological innovation was the number one trend expected to impact the profession, identified by 87% of those surveyed.^{xxi} At a strategic level, the readiness of business for 4IR is open to debate. Recent research by the Economist Intelligence Unit^{xxii} found that for 84% of firms, automation is a C-suite issue: yet an RSA/YouGov poll suggests just 14% of business leaders are making significant investments in technology now, or plan to in the near future. One in five want to invest but say it will take time, while 39% believe the technology is as yet too costly or unproven.^{xxiii} PwC analysis, however, points to steadily increasing investments in 4IR technology over recent years, totalling US \$646bn over 2012-2018.^{xxiv} McKinsey forecast that 70% of businesses will have at least one form of AI in place by 2030, though fewer than half will have full-scale adoption.^{xxv}

AI preparedness

There is much debate over how quickly AI might develop. Its champions point to eye-catching progress like AlphaZero, the AI built by DeepMind, which was revealed in late 2018 to have taught itself to play chess, Go and Shogi by playing millions of games against itself – enabling it to beat the previous generation of AI after just a few hours.^{xxvi} Sceptics point to unrealised hype about AI in previous decades, to the scarcity of profitable examples of AI's use to date,^{xxvii} and the risks of reliance on AI in critical areas like autonomous vehicles or healthcare diagnoses.^{xxviii}

Cyber security

Building secure systems that maintain public trust and safety will be a major challenge. Accenture's 2019 Cost of Cybercrime study suggests a global risk of \$5.2 trillion over the next five years alone. Information theft is the fastest-rising and most expensive impact of cybercrime, but it can also be destroyed, or manipulated.^{xxix} And as cyber-physical systems become more prevalent, the potential for cyber-attacks to create harm in the real world will grow exponentially.

**McKinsey
forecast
that 70% of
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will have at
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of AI in place
by 2030.**

A PROJECT PROFESSIONION VIEW

We look at some of the potential implications of the fourth industrial revolution for the project profession. Agree? Disagree? Whatever your perspective, we hope you will add to the debate.

The scale of change heralded by the fourth industrial revolution can be hard to grasp. Some aspects still look like the stuff of sci-fi, but in many parts of our lives and our work, change will arrive quickly. For some of us, it is already here.

Forecasting technological change with real accuracy is difficult, but it is surely the case that when the 4IR storm gets here, project professionals will be at its heart. We will be responsible for delivering the future and for making the most of the opportunities that lie ahead.

The impact of technology was considered both by APM's 2017 collaboration with Arup and UCL, *Future of Project Management*,^{xxx} and a 2017 APM Chartered paper, *The Robot Professional?*, which argued that professional judgement and adaptability will be critical to managing digital transformation. We will need to show leadership, to identify and seize opportunities, and chart a path through uncertain territory.^{xxxi} As the Projecting the Future discussion paper suggests, following Dave Snowden's Cynefin framework: we will have to experiment and learn as we go in order to use new technology to its full potential.

Whatever the excitement generated by new technology, leaders must also remember that digital does not exist in a vacuum: successful implementation means interaction with people. All the factors that can undermine traditional projects and change programmes will continue to apply, including fast-changing business priorities, shifting requirements, and fear and resistance from those affected.

The speed at which change happens will also be shaped by myriad powerful external factors: the health of the economy, the pace of climate change, investment in skills, and changes in migration and labour markets. Today's predictions also hinge on how quickly technological advances actually happen: there are no guarantees that AI or robots will be able to do everything that enthusiasts today might claim.

Changing the profession

Come what may, project professionals will need to be adaptable and creative in how they manage change. That is doubly true of how the profession delivers its own work.^{xxxii} It is easy enough to imagine automating many of the building blocks of project management, like generating reports, planning work and allocating resources. The first wave of change would see the automation of simpler tasks and the use of technologies like chatbot project assistants. Machine learning-based project management and, eventually, autonomous project management systems could follow. Projects in some areas could be transformed by sensor-equipped devices, which could for example automatically report progress on construction projects.

Such automation has the potential to free people from dull, repetitive work, allowing them to focus on more sophisticated, more human, priorities: working with business leaders to deliver on strategic goals, engaging stakeholders, and building relationships. New ways of working will challenge the profession at all levels.

We welcome views and evidence on these trends, and we will return to them with our **Future Workplace, Future Skills** challenge paper later in the course of Projecting the Future – identifying the implications for professional skills is a priority for this initiative as a whole.

The fourth industrial revolution will transform how all of us live and work. As it does, it will challenge the project profession in profound ways. Some of those effects can be forecast today. Others will be unexpected and disorienting, emerging from other dynamics of change in our complex, complicated and chaotic world. Delivering transformational digital change and building project management 4.0 will demand real leadership from the project profession.

DISCUSSION QUESTIONS FOR THE PROJECT PROFESSION

Throughout Projecting the Future, we want to explore the questions that matter about the future of the project profession.

We want to hear your views, ideas and case studies relating to these questions – and if we have missed a critical question that you think needs to be discussed, we want to hear that too.

How do you expect the fourth industrial revolution to affect the project profession over the next 5-10 years?

What sort of digital transformations should we expect to see in the next 5-10 years?

If 25% of work that a CEO does today could be replaced by AI, could this also apply to project professionals? What tools and techniques could be adapted with automation and AI?

How could the project profession accelerate its adoption of new technology?

Which parts of the project profession's work should remain human-led?

Does the project profession have the knowledge and skills needed to deliver value to organisations as they transform and adopt 4IR technologies? Can the project profession work effectively with technologists and business decision-makers to provide the leadership needed?

Do the challenges posed by 4IR over the coming 5-10 years mean we need to rethink the core skillset for project professionals in PM 4.0? If so, how?

How is your work changing as a result of big data, robotics and AI? Can you provide examples of where organisations today are adapting and implementing new technology effectively to deliver projects successfully?

See page 2 for details of how you can join the big conversation.

FIND OUT MORE: SIX TOP SOURCES

- APM's own previous work in this field includes the 2017 Chartered paper, *The Robot Professional?* and our collaboration with Arup and UCL, *Future of Project Management*. See <https://www.apm.org.uk/resources/find-a-resource/thought-leadership/road-to-chartered-series/road-to-chartered-series-the-robot-professional/> and www.arup.com/fopm
- The World Economic Forum Founder and Executive Chairman, Klaus Schwab, is a leading thinker on 4IR. His most recent book is *Shaping the Future of the Fourth Industrial Revolution* (Penguin Random House, 2018) – and 4IR is a regular theme of the analysis and articles on www.weforum.org
- The Office for National Statistics produces briefings on the likelihood of job automation. Interactive tools include a map showing the likelihood of job automation by geographical area across England, and a chart on the likelihood of jobs being automated in different professions and occupations. <https://www.ons.gov.uk/releases/occupationsandtheriskofautomation>
- The RSA's Future Work Centre is exploring the impact of technology on jobs and the workplace. Its March 2019 report, *The Four Futures of Work*, explores potential scenarios for technology's adoption and summarises much of the latest thinking in the field, while calling for policies that focus on 'good work', including funding for people to retrain and improve their skills throughout life. <https://www.thersa.org/action-and-research/rsa-projects/economy-enterprise-manufacturing-folder/the-future-of-work>
- PwC's work on AI examines its potential economic benefits and how organisations might make the most of the opportunities ahead www.pwc.co.uk/ai. Of specific interest for project professionals is the 2018 paper, *AI will transform project management. Are you ready?*, available via www.pwc.ch/ta
- McKinsey Global Institute's report, *Harnessing automation for a future that works*, provides extensive analysis of the potential impact of automation on work and jobs. <https://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works>

If you have recommendations for more great content on the impact of new technology on the project profession – books, reports, videos or podcasts – **let us know**. We will share our favourites back with other contributors to Projecting the Future.

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