

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/326191354>

# Mastering the Digital Transformation: An Inclusive Robotization Agenda

Chapter · June 2018

CITATIONS

0

READS

15

2 authors:



**Monique Kremer**

University of Amsterdam

74 PUBLICATIONS 853 CITATIONS

[SEE PROFILE](#)



**Robert Went**

Scientific Council for Government Policy

24 PUBLICATIONS 174 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



The Fall Of The Middle Class [View project](#)



Meer op eigen benen in de etnisch diverse stad. Jongvolwassenen met een licht verstandelijke beperking en zware problemen. [View project](#)

# **MASTERING THE DIGITAL TRANSFORMATION**

## ***An inclusive robotisation agenda***

Monique Kremer and Robert Went

Over recent years there has been a lively debate in the Netherlands about robots and the potential consequences of digitalisation for society. ‘Will robots ever take over our jobs?’ was the front-page headline in the newspaper *Algemeen Dagblad* on 15 September 2015. ‘Scared of the robots? There’s good reason to be’, wrote the daily *NRC Handelsblad* in March 2015 (Noort 2015). And the title of an item on *Telegraaf TV* was: ‘Look out – the robots are coming!’ In addition, the then minister for social affairs and employment, Lodewijk Asscher of the *Partij van de Arbeid (PvdA)*, made a speech in which he expressed his concerns that robots and digitalisation could lead to a loss of employment opportunities.

There is a connection between the shrill headlines and recent research. The contentious study by Frey and Osborne (2013), which predicts that in 20 years’ time 47% of all jobs in the US could be taken over by computers, was reproduced in the Netherlands by Deloitte (2014), with exactly the same alarming results.

But robots can be seen as fascinating and valuable in certain contexts. Google’s self-driving cars have garnered innumerable television, newspaper and internet reports. Searches on the subject

(on Google, naturally) turn up some 900 million hits. The use of robots in healthcare has also generated a lot of interest in the Netherlands. According to reports, the therapeutic robot seal *Paro* is brightening the lives of elderly people with dementia. These media reports consistently put a more positive spin on the future of work. ‘Robot vacuum cleaner reduces workload’ was a headline in the *Algemeen Dagblad* on 16 June 2015. A robot can also make a person’s working life easier, and Minister Asscher gave examples of this, too.

At the Netherlands Scientific Council for Government Policy (*Wetenschappelijke Raad voor het Regeringsbeleid*; *WRR*), one of the key policy advising bodies to the Dutch government, we are working on a project that looks at the future of work. We have principally been considering two major trends – automation to do with robots and artificial intelligence (AI) and the increasing flexibilisation of our labour market – which require analysis and policies to ensure that we will all benefit from the new technology, and that benefits do not merely accrue to those who own the robots (Freeman 2015). In this chapter we present key elements of an ‘inclusive robot agenda’.

## **TECHNOLOGY WILL NOT SIMPLY HAPPEN TO US**

Hardly a day goes by without news about professions that are in danger of being eliminated by ‘robots’ and algorithms, and by advancements in AI. There is a great deal of exaggeration and hype in such reports, because the development from a ‘proof of concept’ to the roll-out and diffusion of a new application on a scale that would have an impact on society would take a considerable amount of time and would involve a large degree of uncertainty. Furthermore, there is a lot of over-simplification, for example in the above-mentioned studies that predict the destruction of 20–30% of extant jobs or more (Frey and Osborne 2013). Jobs are bundles of tasks and it is very unlikely that everything done by a person will be

taken over by a robot or an algorithm (see Arnold et al. this volume). In the near future, most workers will probably encounter changes in their work, to a greater or lesser extent. However, studies by the Organisation for Economic Co-operation and Development (OECD) and McKinsey & Company in which jobs were examined at the task level estimate that around 9% of jobs (10% in The Netherlands) may completely disappear in the next 20 years according to the OECD (Arntz, Gregory and Zierahn 2016, 33), and according to McKinsey & Company (MGI 2017) the figure may be less than 5%.

It is more important to note that the direction in which applications of new technology will develop is not set in stone, and is not necessarily predictable. Smarter machines can change our lives, but governments, companies, engineers, citizens and interest groups can influence such changes and help to determine how things may change. The impact of a technological innovation depends not only on a specific technology, but also more broadly on the way in which the introduction of any new technology is handled. Technology is a means to an end and not the end itself. In addition, new jobs will emerge and no one can predict with any accuracy what and where these new opportunities will be. McKinsey & Company (2017) has already presented a study positing that the Netherlands will be short of 100,000 people to do the new jobs created by the introduction of new technologies. For this reason, it is unnecessary and counter-productive, and also not in keeping with the available evidence, to frighten people about the prospect of robots coming to take our jobs.

‘Too often technology is discussed as if it has come from another planet and has just arrived on Earth’, wrote the late LSE professor Anthony Atkinson (Atkinson 2015; see also Mazzucato 2013 and Rotman 2015). Markoff (2015) describes wonderfully how two different schools of thought arose in the engineering community of the 1960s about the relationship between humans and computers and robots. In the AI school, the point is to replace people by machines, whereas in the intelligence augmentation school, the aim is to use computers to improve human learning and to drive human innovation (see Petropoulos this volume). These two schools of thought

still exist alongside as well as opposite each other. Therefore, there is no predetermined path for the further development of robotics and AI.

Digital technology will not in itself transform the world. According to the World Bank (2016), for any major transformation to occur, it must be complemented by analogue factors such as legislation and regulation, institutions, skills and education. Technological revolutions reach deep into the social, political and cultural fabric of society, and put these under stress. They lead to conflict between different interests, visions and possibilities of how society might look and function. It is therefore necessary as well as possible to think about the opportunities that companies, engineers, trade unions, other interest groups, and citizens have to act, and about the role that governments should play in any putative technological revolution.

## **DIGITALISATION AS A DISTRIBUTION PROBLEM OF WORK AND MONEY**

In this context, it is important also to see digitalisation and robotisation as a distribution problem. There is evidence that digitalisation and its applications have had a different impact on the various segments of the labour market in the past few years. Graetz and Michaels (2015) studied the impact of industrial robots in 17 countries between 1993 and 2007, and concluded that in that period the introduction of robots (in the narrow sense of the word) was not reflected in a decline in employment. They state that there are distribution effects, with fewer opportunities for lower-skilled and intermediate-skilled workers.

The same observation can be found in research on the consequences of digitalisation and offshoring. In an international comparative study, Goos, Manning and Salomons (2014) show that in the period 1993–2006 there was ‘job polarisation’ – a gradually contracting middle segment in the labour market between x jobs and y jobs (see also Goos, Manning and Salomons 2009). This contraction

appears to have been relatively limited for the Netherlands. Research by the Netherlands Bureau for Economic Policy Analysis (van den Berge and ter Weel 2015a; 2015b) also shows that in the last 15 years digitalisation has led to changes in the Dutch labour market, although these changes are limited when compared with many other countries. Jobs at the lower end of the middle segment are disappearing in the Netherlands, and the people who become unemployed as a result often end up taking new jobs on an even lower rung of the ladder. Jobs are also disappearing at the upper end of the middle segment, and many employees end up in jobs on a higher rung. The researchers conclude that a new dividing line has opened up between mid-level workers and those at the bottom and top of the income ladder.

Van den Berge and ter Weel also point out that job content and occupational activities are changing. Secretaries, who used to spend most of their working hours typing, answering the phone and distributing faxes, now have other duties, for example in relation to scheduling and project management. They conclude that the greatest changes are taking place within jobs (see also Chui, Manyika and Miremadi 2015). Studies involving data analysis are, of course, retrospective by nature. They help us to understand what has already happened, and we can learn a great deal from history. But no one knows whether the trends and developments of the past will continue into the future. There is no way of predicting whether technological advances will continue to have an impact on the middle segment (see Arnold et al. this volume). Algorithms and smart machines could just as easily pose a growing threat to jobs at the higher end of the labour market. Autor (2015), an authority on computerisation and the division of labour, does not expect the job polarisation trend of recent years to continue endlessly. Many jobs in the middle segment involve a combination of specific professional skills and basic skills such as literacy, numeracy, adaptability, an ability to solve problems, and applied common sense. Autor conjectures that such jobs cannot easily be divided into mid-level activities for machines and lower-level activities for people without a loss of coherence and quality.

It is not inconceivable that in the future a mismatch will arise between jobs and the skills and knowledge that many people possess. Therefore on the one hand workers must be allowed – and must want – to continue learning, including during work, in order to acquire new skills and knowledge so as to be able to remain in employment now and in the future. This requires space for, and the organisation of, ‘learning by doing’ and ‘learning while you earn’ (see Benhamou this volume). On the other hand, digitalisation should be adapted in favour of working people, and used to improve and simplify work. For example, care workers would have more time to talk to those they look after thanks to the role of robots and technological innovations in the home, and the hard physical work of road builders would be eased with the help of robots.

Throughout all these developments, digitalisation can increase economic inequality. ‘A widespread application of the technologies of the second machine age creates a real chance of inequality increasing in the future’, write van Est and Kool (2015) for the Rathenau Instituut, an influential Dutch thinktank in the field of science and technology, in a report for the Dutch House of Representatives. The impact will be felt both in equality of opportunities and equality of income and capital. In its aforementioned policy brief on job polarisation, the Netherlands Bureau for Economic Policy Analysis stated that “the rise of ICT since the 1980s has led to growing wage inequality between high-skill and low-skill workers and, recently, to a decline in employment and pressure on wages in the middle segment” (van den Berge and ter Weel 2015b; see also Kremer et al. 2014). What will happen to incomes in the future remains to be seen. What is certain, however, is that some people will benefit more from technological progress than others. In contrast, there will be people who will be worse off when new technologies are put into use.

Economists have been talking for some time about skill-biased technological change, which relates to technological innovations that benefit people with higher skills and education (see Aubrey this volume). A fairly recent discussion concerns capital-biased technological change, or technological innovation that is mainly

advantageous to those who own robots (Cohen-Setton 2012; Krugman 2012). Richard Freeman (2015) states that robots and related technologies are growing more and more capable of taking over all sorts of workers' tasks, and that the economic position of labour versus that of capital is deteriorating as a result:

Unless workers earn income from capital as well as from labour, the trend toward a more unequal income distribution is likely to continue, and the world will increasingly turn into a new form of economic feudalism. We have to widen the ownership of business capital if we hope to prevent such a polarization of our economies.

## **MASTERING THE ROBOT: AN INCLUSIVE ROBOT AGENDA**

In order to respond to the development of robots and AI, and to ensure that the associated benefits accrue to everyone in society, we need an 'inclusive robot agenda'. In this regard, the key word for us is 'complementarity'. This means that the aim should be not to try and replace as many people as possible with robots, but rather to make people more productive with the help of robotics. It is not a case of 'man *versus* machine', but 'man *with* machine'. In this regard, it is important to strive for inclusiveness. Although robots and other machines are getting smarter, technological advances and applications often turn out differently than expected and can proceed more slowly than is often predicted, and the costs and benefits of new technology are not automatically shared equally. For this reason, it is desirable for the government to encourage different parties to come together to seek out opportunities for co-creation. New applications should no longer be thought up by technicians and investors for people who then have to work with them, but instead all parties should develop such applications together. This is the first item in our proposal for an 'inclusive robot agenda'.

The second item in our robot agenda is that we must develop complementary expertise and skills at all levels of education. A good

education is not in itself enough to anticipate the rise of increasingly intelligent machines. Accountants, physicians, lawyers and other highly educated professionals may see certain aspects of their work being taken over by robots some day in the future. Neither is technical training alone likely to be enough. The question that also concerns education should be: what aspects of work are typically human? Which tasks, relationships and responsibilities will continue to require the human touch, or will we specifically want to entrust (or continue to entrust) to people? That is why it is important to consider and identify complementary expertise and skills.

The third item relates to the ownership of work (see Crouch this volume). A common finding in studies about stress in the workplace, burnout and – on the positive side – work enjoyment and productivity is that autonomy or ‘ownership’ is good for productivity. The question we must ask is how we can get people and technology working together, and how people can become or continue to be masters of their own work (and of the robot). The emergence of ‘digital Taylorism’ and ‘algorithmic management’ increases the possibilities for tightly controlling and regulating work, thereby turning people into ‘meat robots’. In a literature study for our WRR report, *Mastering the Robot*, economist Anna Salomons (2015) concluded:

In summary, therefore, the digital revolution does not mean that our existing labour organisations and institutions, such as collective labour agreements, will become surplus to requirements. On the contrary, if employees are treated like robots, this will stand in the way of the productivity gains from the introduction of real robots.

The final item on the agenda that we are advocating concerns (new) distribution problems that can come into play if more robots and AI are used at work. Differences in income can increase if, as a result of further automation, large numbers of workers lose their jobs and either remain unemployed or find a new job at a lower level with lower income. Wealth gaps can widen if all the profits made from robots end up in the hands of the robots’ owners. It will then become

important to consider whether it is possible (and desirable) to make workers co-owners of robots and other machines, for example by means of a ‘robot dividend’ for all through a social wealth fund. And, finally, there will be people who cannot keep up in the robot society and who cannot be helped with an extra course or additional studies. It is impossible to predict who they will be. We do not know who will find themselves without work or who will need to be assisted from one job to the next. For this reason, we are in favour of a portfolio of several policy instruments for these groups (eg early retirement schemes, a form of basic income, government jobs), in order to help and support these people where necessary.

With these four agenda items, we can welcome robotisation and digitalisation with open arms, without a widening of the gaps between social groups. In this way, the workers can continue to master the robots.

## REFERENCES

- Arntz, M., T. Gregory, and U. Zierahn (2016), *The Risk of Automation for Jobs in OECD Countries: a Comparative Analysis*, OECD Social, Employment and Migration Working Paper 189, Paris: OECD Publishing.
- Atkinson, A. (2015), *Inequality: What Can Be Done?*, Cambridge MA and London: Harvard University Press.
- Autor, D. (2015), ‘Why Are There Still So Many Jobs? The History and Future of Workplace Automation’, *Journal of Economic Perspectives*, 29(3): 3–30.
- Chui, M., J. Manyika and M. Miremadi (2015), ‘Four Fundamentals of Workplace Automation’, *McKinsey Quarterly*, 29(3): 1–9.
- Cohen-Setton, J. (2012), ‘Blogs Review: Robots, Capital-Biased Technological Change and Inequality’, blog, Bruegel, 10 December, <http://bruegel.org/2012/12/blogs-review-robots-capital-biased-technological-change-and-inequality/>.
- Deloitte (2014), *Mogelijk 2 tot 3 Miljoen Banen op de Tocht: De Impact van Automatisering op de Nederlandse Arbeidsmarkt*, Deloitte, 1 October, <https://www2.deloitte.com/nl/nl/pages/data-analytics/articles/mogelijk-2-3-miljoen-banen-tocht.html>.

- Freeman, R. B. (2015), 'Who Owns the Robots Rules the World', IZA World of Labor, <https://wol.iza.org/uploads/articles/5/pdfs/who-owns-the-robots-rules-the-world.pdf>.
- Frey, C. and M. Osborne (2013), *The Future of Employment: How Susceptible Are Jobs To Computerisation?*, Oxford: Oxford Martin School, [https://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf).
- Goos, M., A. Manning and A. Salomons (2009), 'Job Polarization in Europe', *American Economic Review*, 99(2): 58–63.
- Goos, M., A. Manning and A. Salomons (2014), 'Explaining Job Polarization: Routine-biased Technological Change and Offshoring', *American Economic Review*, 104(8): 2509–26.
- Graetz, G. and G. Michaels (2015), 'Robots at Work', CEPS Discussion Paper 1335, London: London School of Economics, <http://cep.lse.ac.uk/pubs/download/dp1335.pdf>.
- Kremer, M., M. Bovens, E. Schrijvers and R. Went (eds) (2014), *Hoe Ongelijk is Nederland?*, WRR verkenning 28, Amsterdam: Amsterdam University Press.
- Krugman, P. (2012), 'Capital-biased Technological Progress: an Example (Wonkish)', *The New York Times*, 26 December, [http://krugman.blogs.nytimes.com/2012/12/26/capital-biasedtechnological-progress-an-example-wonkish/?\\_r=0](http://krugman.blogs.nytimes.com/2012/12/26/capital-biasedtechnological-progress-an-example-wonkish/?_r=0).
- Markoff, J. (2015), *Machines of Loving Grace: Between Humans and Robots*, New York: HarperCollins.
- Mazzucato, M. (2013), *The Entrepreneurial State: Debunking Public vs Private Sector Myths*, London: Anthem Press.
- McKinsey Global Institute (MGI) (2017), *A Future that Works: Automation, Employment, and Productivity*, McKinsey & Company, [https://www.mckinsey.com/~media/McKinsey/Global%20Themes/Digital%20Disruption/Harnessing%20automation%20for%20a%20future%20that%20works/MGI-A-future-that-works\\_Full-report.ashx](https://www.mckinsey.com/~media/McKinsey/Global%20Themes/Digital%20Disruption/Harnessing%20automation%20for%20a%20future%20that%20works/MGI-A-future-that-works_Full-report.ashx).
- Noort, W. v. (2015), 'Bang voor de robots? Daar is ook wel reden toe', *NRC Handelsblad*, 30 March, <https://www.nrc.nl/nieuws/2015/03/30/bang-voor-de-robots-daar-is-ook-wel-reden-toe-1482084-a704094>.
- Rotman, D. (2015), 'Who Will Own the Robots?', *MIT Technology Review*, 16 June, <https://www.technologyreview.com/featuredstory/538401/who-will-own-the-robots>.
- Salomons, A. (2015), 'Hoe Robots Beter Kunnen Werken – en Wij Ook', in R. Went, M. Kremer and A. Knottnerus (eds), *De Robot de Baas: De*

- Toekomst van Werk in het Tweede Machinetijdperk*, WRR Verkenning 31, Amsterdam: Amsterdam University Press.
- van den Berge, W. and B. ter Weel (2015a), ‘De Impact van Technologische Verandering op de Nederlandse Arbeidsmarkt, 1999–2014’, in R. Went, M. Kremer and A. Knottnerus (eds), *De Robot de Baas: De Toekomst van Werk in het Tweede Machinetijdperk*, WRR Verkenning 31, Amsterdam: Amsterdam University Press.
- van den Berge, W. and B. ter Weel (2015b), *Baanpolarisatie in Nederland*, CPB Policy Brief, The Hague: Netherlands Bureau for Economic Policy Analysis.
- van Est, R. and L. Kool (eds) (2015), *Werken aan de Robotsamenleving: Visies en Inzichten uit de Wetenschap over de Relatie Technologie en Werkgelegenheid*, The Hague: Rathenau Instituut.
- World Bank (2016), *World Development Report 2016: Digital Dividends*, Washington DC: World Bank, <http://www.worldbank.org/en/publication/wdr2016>.