

Annual Report 2017

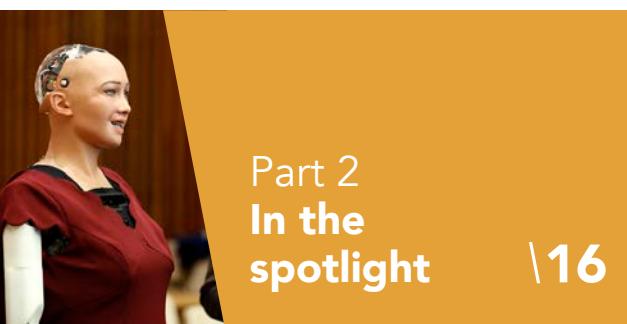


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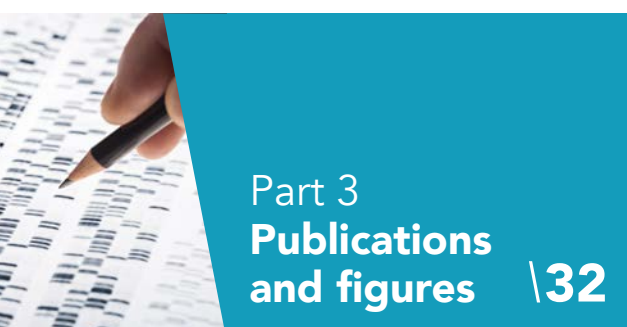
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Layout: Jacob & Jacobus

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Photo on previous page: As of 2017, only travellers with a public transport smart card can enter Utrecht Central Station.

Photo: Sabine Joosten/Hollandse Hoogte.

Foreword

My neighbourhood has a WhatsApp group that we use to warn each other about burglars. It's very effective –so effective that we also use it to ask someone to pick up groceries when one of us is sick.

Digitisation can make society friendlier and more social. Then again...when I take my dog for a walk, I see people out on lunch break barely talking to each other; they sit side-by-side on a park bench staring at their phones.



We need to be vigilant when we talk about science. To reach a sound assessment, we not only need to understand developments in science and technology, but in society as well. Just like an interpreter needs to have a large vocabulary.

The Rathenau Instituut provides analyses necessary for a good dialogue about the impact of science and technology on society. It also generates scenarios so people understand and have a basis for making up their own minds about those innovations, and so politicians can take informed decisions.

That is precisely what our institute's namesake, Gerhart Rathenau, did in the period that saw the rise of the computer. He made an expert analysis and showed us what lay ahead for society. His work formed the basis for the Netherlands' computer purchase scheme, which brought PCs into the homes of many Dutch employees. We are still reaping the benefits of that head start.

Today, everyone has an internet connection. The online and offline worlds have become inseparable, and we see the advantages and disadvantages all around us. In 2017, the Rathenau Instituut fuelled the relevant debate, not by taking up a position but – like a good interpreter – by giving society the right words to discuss technology and science.

We had that discussion in many different places last year, both in the Netherlands and abroad, and even during lunch breaks and in WhatsApp groups. The Rathenau Instituut can be proud of its role as an interpreter.

Gerdi A. Verbeet

Chair of the Board of the Rathenau Instituut

Part 1 Impact

From the Binnenhof to Brussels and from Terschelling to Tehran: our studies had a significant impact in 2017. Everywhere we went, we discussed the challenges of our time, as you'll read in this section.

Visitors at a virtual reality film theatre in Amsterdam.
Photo: Berlinda van Dam/Hollandse Hoogte

Searching together for answers to critical questions

Director Melanie Peters looks back on a year dominated by the debate about science and technology. 'In each case, the question is what sort of society we want to be.'

'For more than thirty years, it's been our task to make progress in science and technology comprehensible to the public and politicians. In 2017, we made an effort to do precisely that. It was a turbulent year, both in science and in technology. It was the year in which digital society lost its innocence for good. We found out that the Dutch place great trust in science, but that is not always the case in other countries. Our work advanced the dialogue on this topic.

We combine science and technology because they're closely intertwined. Without research, there would be no new apps; without innovation, there would be no new labs. But how do we ensure that everyone benefits? Do we all get a say? And is the Dutch knowledge ecosystem ready for the future?

These are the questions that underpin our work programme for 2017 and 2018. We drafted it late 2016 after talking to the public, MPs, policymakers and many others. We used this input to draw up a research and debate agenda into which we incorporated trends provided by other institutes, such as the OECD, UNESCO and our sister institutes in Europe and beyond.

Major challenges of our time

From the Internet of Things and 5G to research funding, our work programme addresses the major challenges of our time. In each case, the question is whether society can adapt quickly enough, and what sort of society we want to be.



Director Melanie Peters: 'We combine science and technology because they're intertwined.'

These are questions that many different people and groups should be allowed to answer. As in previous years, we engaged with the general public and received a terrific response on social media. We organized a dialogue with experts from government and business at the Social and Economic Council of the Netherlands. Our founder Gerhart Rathenau got the Netherlands used to the personal computer; now, we want to do the same for algorithms and artificial intelligence. But what we discovered in the past year is a significant lack of awareness. There is much work to do before the digital society becomes an invitation to everyone. For example, the elderly need to be trained and young people taught. We need new standards for devices that are connected to the internet and our human rights are due for an update in the digital age.

Peeling back arguments until we see the worries

Researchers play a significant role in the debate about our future. As a society, we expect science to answer many of our questions. But it's up to us to answer the most difficult questions of all. We expect advances in medicine, but are we willing to relinquish our personal data to achieve it? Should we be using laboratory animals in research? What are our personal opinions on progress? What are the uncertainties, and which legitimate interests play a role? Why do our opinions differ on issues? We have to keep peeling back the arguments until we see the underlying worries and then search for common ground. That is what we did in 2017, for example in our research on ammonia emissions from agriculture, which are harmful for human

health and the environment, and in our investigation into ultra-deep geothermal energy, a promising replacement for natural gas.

We're raising the bar

My next point is the Dutch knowledge ecosystem, which is in a period of tremendous change. The government wants it to play a leading role on the international stage. Our report *Balans van de wetenschap* [Science balance sheet] shows that this is already the case, but what does the Netherlands need to do to retain its edge? How do we ensure that the knowledge output of our top economic sectors or our 'Living Labs' work for the people who can benefit from them most, such as patients and local communities? Getting expert partners, universities, local authorities and civil society organisations to cooperate on tackling major challenges – for example the transition to sustainable energy, better health care and a safer society – isn't easy, but it is necessary.

We are pleased with our work in 2017. Our aim in 2018 is to make people and organisations even more aware of how they can take control and help to decide how much influence science and technology have on their lives and their work.

We will be producing reports on digital democracy, modern biotechnology, and public-private partnerships between universities and businesses. We will also continue to encourage dialogue about trends in research, for example by publishing reports on PhDs and the Dutch government's policy on promoting scientific excellence. We hope to see you again in 2018.'

Keep track

By reading our newsletter: rathenau.nl/nl/nieuwsbrief (in Dutch) and on  Twitter,  LinkedIn en  Facebook

In conversation



Photo: Shutterstock

In 2017, we brought urgent issues in science and technology to the attention of a large and diverse audience, for example, by inviting the Netherlands' police superintendent to write a blog about data and surveillance, or by giving a lecture on ethical innovation in Iran.

To spark public debate on technology and science, our staff wrote opinion pieces and gave interviews on topics ranging from robots in health care to new childbirth techniques or biotechnology in agriculture. One of their aims was to get new issues on the political agenda, and to help journalists and others engage in an informed dialogue about science and technology. Another aim was to make readers, voters and consumers aware of the choices that they must make. Agendizing, informing and making consequences visible: that is our mission.

We continued the dialogue about the results of our studies – and what they mean in practical terms – by encouraging debate online too. In our blog series

Decent Digitisation, we invite philosophers and practitioners to share their views on such topics as the influence of algorithms and defending our autonomy. So far we have heard from the National Ombudsman of the Netherlands, Amnesty International and the Netherlands Police Service, the UWV Employee Insurance Agency and the ICTU Foundation, which is working to build a better digital government. There were also blogs by various researchers.

We used our newsletter and social media to reach as many people as possible and talked to people live at conferences, festivals, workshops and presentations in the Netherlands and abroad – from Terschelling to Tehran.

Nine tips for dealing responsibly with innovation

The world is digitising at lightning speed. Once data is collected, combined and processed, algorithms do an astonishing job of calculating what is best for us, what we ought to read, what we should listen to, when we should exercise and other patterns of behaviour. How do we deal with this? It's a topic that we've been publishing about for years. In 2017, we published the Dutch version of our essay 'Rules for the digital human park' and began our *Decent Digitisation* blog series. We also invited Harvard professor Sheila Jasanoff to address this topic at our autumn conference. The event attracted a broad and attentive audience.

It went home with nine tips for dealing responsibly with new technology. Research coordinator Rinie van Est had five tips of his own to share in his introduction to Jasanoff's lecture. 'Don't hesitate to embrace new, revolutionary products.'

But how?

1. Use education and training to learn how to deal with innovations.
2. Update institutions: our laws, our regulatory bodies, and our political system.

On the other hand, society must try to hold on to its shared values. Three tips for that:

3. Put people, communities and society at the heart of innovation.
4. Do not exclude anyone from participating in digital innovation.
5. Protect and improve human rights, for example by adding the right to opt out of tracking and the right to personal communication.



On-stage discussion with Sheila Jasanoff (right) in The Hague.

Sheila Jasanoff, Professor of Science and Technology Studies at Harvard Kennedy School, then talked about how we can make those shared values central to discussions about innovation and digitisation. 'We'll have to change the way we think.' And for every new technology, we should try to answer four questions:

1. Is there another way to evaluate the need that this technology is addressing?
2. Who is most likely to be hurt by this technology?
3. Who will win and who will lose if we adopt this technology?
4. How can we learn and improve our understanding of this technology?

→ Sheila Jasanoff and other experts share their thoughts and ideas in the *Decent Digitisation* blog series on our website, which will continue in 2018. rathenau.nl/en/decentdigitisation

OEROL: THE IDEALISTS

14 June, Terschelling

Rinie van Est was invited to lecture at the Oerol Festival during the theatre programme The Idealists. He addressed the growing intimacy between humans and technology. Are robots really taking over the world and how is that playing out? Which of our ideals does that fulfil?



Photo: Victor van Verkeven

POLICE ACADEMY: THE ELECTIONS AND THE POLICE: WHAT'S AT STAKE?

2 March, Apeldoorn

The eve of the Netherlands' general elections was the right time for a debate about the police and security under the new government. Director Melanie Peters offered her analysis of online security as part of a panel that included Netherlands Police Commissioner Erik Akerboom and Dimitri Tokmetzis, journalist for De Correspondent and co-author of the book *Je hebt wél iets te verbergen: Over het levensbelang van privacy*.

**EVENING DEBATE ON THE 'DIGITAL THREAT'**

28 June, Amsterdam

Geert Munnichs spoke about the impact of web technology on democracy and geopolitics at Pakhuis De Zwijger, along with Sico van der Meer of the Clingendael Institute. The event marked the publication of our report on cybersecurity, *A never-ending race*.

**DIGITAL RIGHTS AND SELF-DRIVING CARS AT THE BORDER SESSIONS**

28 to 30 June, The Hague

Using technology for positive, critical, societal change: that is the mission of the Border Sessions, an annual tech culture festival that invites active participation from all. The Rathenau Instituut has been an official festival partner for many years and organised two sessions at the 2017 event.

**INAUGURAL LECTURE: CABINET OF CURIOSITIES FOR SCIENCE POLICY**

27 March, Leiden

In his inaugural lecture, Prof. Barend van der Meulen, head of Research at the Rathenau Instituut and endowed professor in Evidence for Science Policy at Leiden University, advocated a new way of looking at science policy.

**WESTERDIJK YEAR: 100 YEARS SINCE APPOINTMENT OF FIRST DUTCH FEMALE PROFESSOR**

10 February, Utrecht

On 10 February, it was precisely one hundred years ago that Johanna Westerdijk, the first female professor in the Netherlands, gave her inaugural address at Utrecht University. In her honour, we published a factsheet on 'Women in Academia'. Westerdijk's biographer, researcher Patricia Faasse, gave a talk during the event marking the start of Westerdijk Year, co-organised by the Rathenau Instituut.

iGEM

9-13 November, Boston, USA

iGEM is the biggest technology competition in the world, with thousands of secondary school pupils and university students competing in more than 300 teams. Seven Dutch teams entered the fray in 2017, and researcher Pieter van Boheemen represented the Rathenau Instituut on the jury. To assist the teams, we also developed an interactive online tool for responsible biotech research, the iGEM Guide to the Future (see our website).

**EPIPREDICT SCIENCE CAFÉ**

14 December, London, United Kingdom

How do you tell your patients about your research and the impact that it could have on them? That was the question that researcher Pieter van Boheemen and communication advisor Arnold Vonk addressed with twelve PhD students in the EpiPredict research project. The students applied what they had learned that very evening at a meeting place for breast cancer patients.

**E-HEALTH IN CALIFORNIA**

5-10 November, Silicon Valley, USA

Lisa van Bodegom and Maartje Niezen talked to researchers and entrepreneurs in California about digitisation in health care. They saw service robots and 'smart' diapers, but also found that data use in the US medical world is lagging behind expectations.

**OECD FORUM 2017: HOW CAN WE BRIDGE DIVIDES TO BUILD MORE INCLUSIVE SOCIETIES?**

6-7 June, Paris, France

Melanie Peters led an interactive discussion on artificial intelligence in the Idea Factory. Invitees discussed what sort of policy can steer artificial intelligence in a human-friendly direction and help eliminate inequality.

**EPTA IN LUCERNE**

6-8 November, Lucerne, Switzerland

Melanie Peters and researcher Magda Smink travelled to Lucerne to represent the Rathenau Instituut at the annual meeting of institutes involved in Parliamentary Technology Assessment. This year's theme was the future of mobility. Magda gave a presentation about the public dialogue and policy on mobility in the Netherlands.

**1ST INTERNATIONAL CONGRESS ON ETHICS IN SCIENCE AND TECHNOLOGY**

4-8 December, Tehran, Iran

Rinie van Est gave a presentation on 'Human Rights in the Robot Age' at the First International Congress on Ethics in Science and Technology in Tehran. The conference was organised by the Iranian Association for Ethics in Science and Technology, in cooperation with other Iranian research and educational institutions, academic institutes and cultural and civil society organisations.

In the media

Women in academia

The Rathenau Instituut notes that women are playing an increasingly prominent role in academia. The number of female assistant, associate and full professors is growing, the institute says, but not at what one would call lightning speed.

Algemeen Dagblad, 9 February

Constant attacks

The national government and major tech firms are subject to constant cyberattacks. Current measures are not enough to protect them against cyberthreats. That is the conclusion of the Rathenau Instituut's report *A never-ending race*, published today.

LindaNieuws.nl, 2 March

Hackers

The Rathenau Instituut, which studies the impact of new technologies on society, claims in a report published this month that hackers earn between 70,000 and 1.5 million euros a year from ransomware.

De Limburger, 20 March

Research grants

It was a good idea to award young researchers individual grants because it gave them the chance to compete on their own terms. But there's too much competition now, universities refuse to pre-select promising ideas, and to make matters worse, they have made tenure conditional on the award of research funding.

Trouw, 4 April

Digitisation agreement

There is no single policy domain that is exempt from the inexorable rise of digital technology. That is in part why the Rathenau Instituut published its report *Urgent upgrade*, in which it asked for more power for regulatory bodies, a digitisation agreement, a national dialogue, a strategic agenda by the government, and regular parliamentary debates about digitisation issues.

RTLZ.nl, 24 April

Much too naive

Government and the public are still much too naive about the damaging consequences for society of such online platforms as Airbnb and Uber. That is the conclusion of the Rathenau Instituut in a report that it published today. 'Innovation is wonderful, but it shouldn't be at the expense of everything else.'

De Telegraaf, 31 May

Internationalisation

The Rathenau Instituut studied the dizzying increase in the number of foreign students. It found that internationalisation is a trend at all the Dutch universities. Rathenau claims the reason lies in the way in which funding is currently arranged.

Nieuwsuur, 4 September

Fragmented expertise

The devolution of the responsibility from national to local government has not always gone smoothly, including in the field of health care, the Rathenau Instituut has asserted. The research institute published a new report today in which it warns against the fragmentation of expertise in this field.

OmroepMax.nl, 7 September



740x

References in newspapers, magazines and online



15

Radio and television appearances



2,973

Newsletter subscribers

Online community: **10,976**

Of which:



6,473



3,428



915



Website visits
168,385

Unique website visitors
88,514



87 lectures for a specific audience

34 contributions to a public event

55 appearances as expert or panellist

49 guest lectures or workshops

Setting the agenda



Party leaders in debate on the eve of General Election.
Photo: Hollandse Hoogte

The impact of science and technology on society ends up on the political agenda in all sorts of ways. That was even more the case in 2017 than in previous years.

We not only encourage public debate through the media and events, we also support the debate about science and technology in the Dutch Senate and House of Representatives. As a result, politicians can make informed decisions about such issues as digitisation and the role of science and knowledge in society and allow for their impact on the public. The Rathenau Instituut informs politicians when asked, but we also do so on our own initiative if we see that questions have arisen. We also undertake extra research on request. For example, the Province of Noord-Brabant asked us to survey the opinions of various stakeholders about ultra-deep geothermal energy.

In 2017, our research gave rise to a number of specific political debates. We describe the various options available to political decision-makers in our reports, but we naturally leave the decisions to the politicians themselves. In 2017, the Dutch Senate and House of Representatives, the European Parliament, the Council

of Europe and municipal and provincial authorities were all profoundly interested in how science and technology impacts on society. We consider the year to have been a successful one in that respect as well.

Our studies review the current state of knowledge of a particular issue and analyse the various positions. All our reports are available online free of charge and comply with open access criteria. They are intended for a general readership, and not only for experts.

We receive frequent enquiries from Dutch Senate and House Committees and from members of the European Parliament and the Council of Europe's Parliamentary Assembly. We are regularly invited to participate in round-table discussions or expert meetings. To ensure that MPs and others can read up on a topic quickly, we produce concise summaries that we send to both houses of Parliament as 'Parliamentary Briefings'.



370

Number of references to the Rathenau Instituut in the Dutch Parliament

8

Number of briefings, round-table discussions, presentations and lunch meetings (at the invitation of the Senate and House)



24,395

report downloads

Most downloaded publications in 2017

Opwaarderen / Urgent upgrade (about our digitised society)	1,503x
Een nooit gelopen race / A never-ending race (about taking measures against cyberthreats)	1,033x
Human rights in the robot age (for the Council of Europe)	890x
Opwaarderen / Urgent upgrade – Parliamentary Briefing	878x
Work Programme 2017-2018	769x

Evaluation protocol for applied research institutes

The Rathenau Instituut has developed an evaluation protocol for the Netherlands' applied research institutes (Netherlands Organisation for Applied Scientific Research, DLO agricultural research institutes, Deltares, Energy Research Centre of the Netherlands, Maritime Research Institute Netherlands, and National Aerospace Laboratory). We did so in consultation with the institutes themselves and the relevant ministries, and at the request of the Evaluation committee TO2, under the chairmanship of ir. A.H. Schaaf. The results were announced in March. The 'Protocol for the Evaluation and Monitoring of Applied Research' (EMTO) gives assessment committees a structure for rating the quality and impact of applied research.

The results show that the institutes are performing well in that respect, and some are even ranked among the top institutes in the world. There is some concern about their robustness due to the many cuts in long-term funding.

The work of developing the protocol fits in with our 'Knowledge for policy' theme (see page 21), in which we take a critical look at the relationship between science and policy.

In the political arena

Investing in science

MP Pieter Duisenberg addressing the General Meeting of the House Standing Committee for Education, Culture and Science on 25 January: *'If we want to attain our target of investing 2.5% of GDP in R&D, then public research and the private sector will have to work together more than they now do. You'll really have to do your best. The Rathenau Instituut calculated the shortfall in its most recent report. The Netherlands scores higher than the OECD average in terms of public research. I advise everyone to take a look at the report.'*

Modified crops

Addressing the Dutch House of Representatives on 27 February, the State Secretary for Economic Affairs, Martijn van Dam, said the following about genetically modified crops, based on the review mechanism for that the Rathenau Instituut had developed at his request: *'Whether or not we permit genetically modified crops in the Netherlands hinges on a discussion of vast ethical and political significance. [...] That's something that we have to consider as we face that decision. And I'm not alone in thinking this – the Rathenau Instituut has advised basing the decision on just such factors. Mr Bosma is correct in saying that it then becomes a more subjective decision.'*

R&D and innovation

The Dutch Minister of Finance, Jeroen Dijsselbloem, said the following in his written response to Senator Frank de Grave's remarks about public spending on research and

innovation, 28 February: *'The Rathenau Instituut recently published new figures on trends in government spending on R&D and innovation. Their data show that expenditure will rise from 6,276,400,000 euros in 2015 to 6,372,300,000 euros in 2021.'*

Take time to think things through

Joint memo by the Minister of Social Affairs and Employment, the Minister of Economic Affairs, and the Minister of Education, Culture and Science to the House of Representatives, 1 March: *'The reports by the Rathenau Instituut [Working on the Robot Society, 2015], the WRR and the SER address a huge number of socially relevant themes. Not all of them lend themselves to or can be resolved by means of short-term policy responses. They require politicians and policymakers to take more time to think things through.'*

Talent in balance

Government memorandum in reply to the Senate regarding the motion to amend the Dutch Higher Education and Research Act, 26 April: *'Analyses by the Rathenau Instituut show that talent inflow and outflow are evenly balanced.'*

Personal data

The Dutch State Secretary for Security and Justice, Klaas Dijkhoff, in a letter to the House of Representatives about the Dutch Data Protection Authority, 6 June: *'It is both socially and economically important to protect personal data. The Rathenau Instituut's recent report 'Urgent upgrade. Protecting public values in our digitized society' describes how the sweeping digitisation of society is giving rise to fundamental ethical and societal issues. The report says that government, regulatory bodies, businesses and society are ill-equipped to handle these new issues. That poses a threat to important public values and human rights such as privacy, equal treatment, autonomy and human dignity, says the Rathenau Instituut.'*

Ban on Airbnb

MP Sandra Beckerman during a General Meeting on housing, 7 June: *'In New York, more and more people are calling for a ban on Airbnb. Last week, the Rathenau Instituut warned against being too naive and advised us to start drafting rules. My esteemed colleague Hijink has requested a debate on the matter.'*



We wrote the report Human Rights in the Robot Age for the Parliamentary Assembly of the Council of Europe.

Photo: Council of Europe

Hack test

Question by MP Kathelijne Buitenweg for State Secretary of Security and Justice Klaas Dijkhoff after a worldwide ransomware attack, and the State Secretary's response on 22 June: *'What does the State Secretary think about asking firms that manage critical infrastructure to undergo a hack test every year? The idea was suggested by the Rathenau Instituut.'* Response: *'Ms Buitenweg asked about the annual stress test recommended by the Rathenau Instituut. I think that could be very useful, but I hesitate to make it mandatory straight away on behalf of government.'*

Quality of life

MP Hanke Bruins Slot in a plenary debate on the digitisation of infrastructure, 4 October: *'In fact, the Netherlands Environmental Assessment Agency comes to the same conclusion as the Rathenau Instituut in its report entitled Urgent upgrade. The point is that we must apply the public values of security, privacy, accessibility, availability and quality of life in our services and facilities in the digital domain too.'*

Round table on horizontal privacy

Horizontal privacy is about how we ourselves deal with other people's privacy, for example placing photographs or film clips of others online. The House Standing Committee for Justice and Security organised a round table meeting on this topic (which is also addressed in the government coalition agreement) based on a summary produced by the Rathenau Instituut. During the round table on 12 October, director Melanie Peters pointed out that the government should clarify the private sector's duty of care, and that technology can also help reduce risks to privacy, for example mobile phones that emit an alert before they take a photograph.



Researcher Linda Kool explaining the motion in the Senate that led to the conference organised by the Social and Economic Council of the Netherlands (SER).



Iris Korthagen and Ira van Keulen presenting the report on digital democracy to the European Parliament in Brussels.

Inhibitions

Senator Annelien Bredenoord in a debate about recording and storing automobile registration numbers, 23 November: *'The more people are subjected to systematic observation, the more their behaviour changes. They become more inhibited, says the Rathenau Instituut.'*

Questions in Parliament about germline engineering

Dutch Minister of Health, Welfare and Sport, Hugo de Jonge, responding to the House of Representatives on 7 December: *'The Rathenau Instituut's call for a quality public dialogue that encompasses both individual and collective perspectives is in line with this government's views.'* De Jonge was responding to questions by MP Kees van der Staaij, who had read about new methods for editing genetic material – i.e. germline engineering – on our website. The Rathenau Instituut has concluded that in the Dutch germline gene editing debate, *'the ethical questions are being relegated to the background, even though these are precisely the questions we should be addressing'*.

The Minister: *'The government wants to encourage a broad ethical and public debate and focus on the alternatives. In my Medical Ethics policy document, I will provide further details about this intention, which we put forward in the coalition agreement. The Rathenau Instituut's essay on the Dutch germline gene editing debate is helping me in that regard. [...]It gives us tools for a broader, deeper dialogue.'*

Part 2

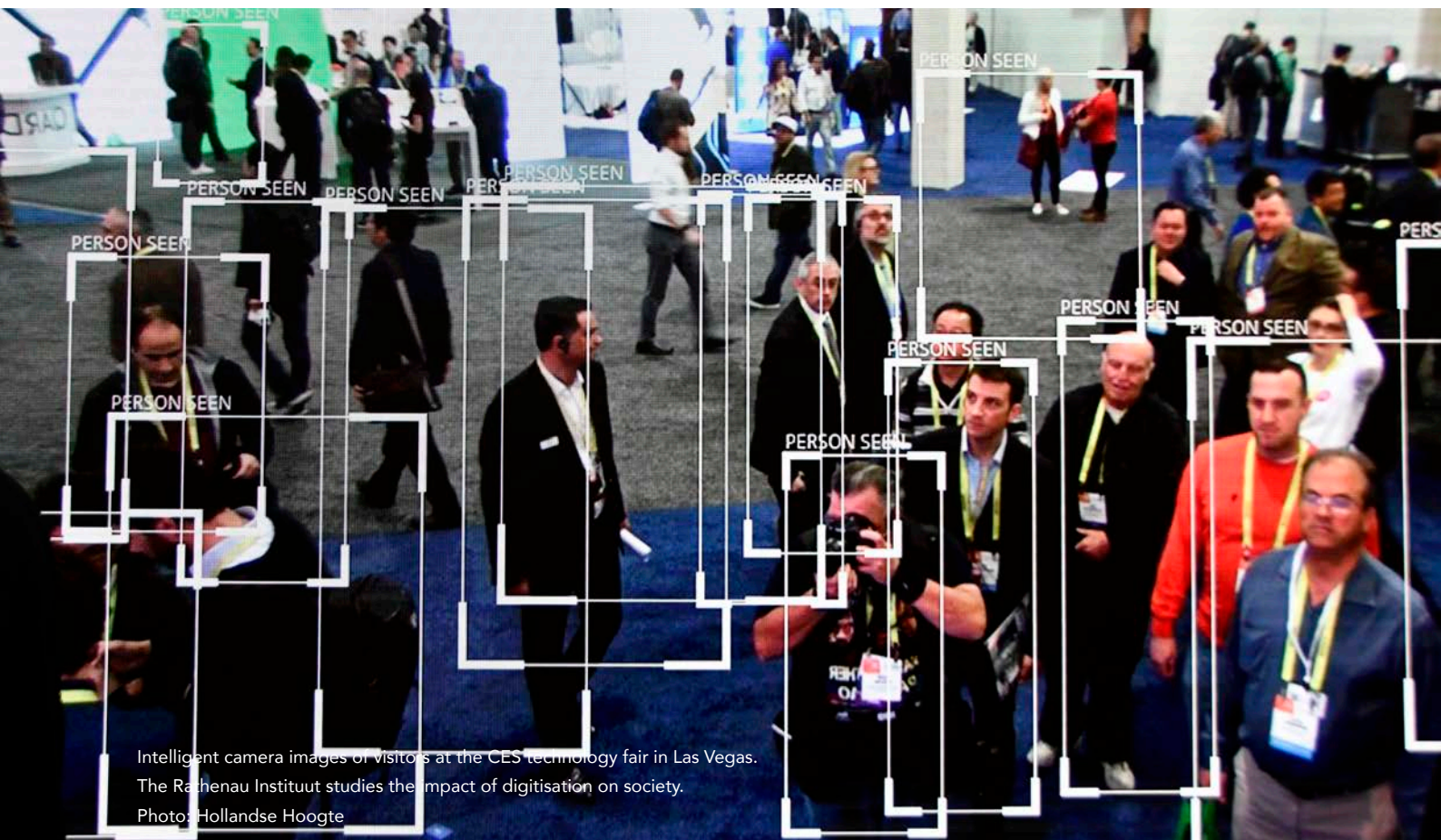
In the spotlight

From robots to artificial intelligence and from district nurses to top researchers, this section reviews all the topics that we investigated in 2017 by theme.

Sophia the Robot was granted Saudi citizenship in 2017

Photo: Li Muzi Xinhua / eyevine

How do we manage our 'onlife' future?



Intelligent camera images of visitors at the CES technology fair in Las Vegas.
The Rathenau Instituut studies the impact of digitisation on society.
Photo: Hollandse Hoogte

Innovations in digital technology are changing our lives. Online and offline are becoming more closely intertwined, a state referred to as 'onlife'. While that has many advantages, there are also risks, for example with respect to privacy and security, but also online discrimination and exclusion. That is why we study how the Netherlands can shape its digital future.

For more than thirty years, the Rathenau Instituut has studied the impact of computers and digitisation on society. We see that devices are becoming ever faster, smaller and cheaper. A sensor that cost 20,000 euros in 2009 now retails for less than 80 euros. That is why in 2017, digitisation became a priority issue on the social and political agenda.

The virtual and physical worlds have become intimately connected; online is now 'onlife'. Digital applications are so ubiquitous and our personal data serve so many surreptitious purposes that they are altering our lives in ways that are often beyond our comprehension. Does everyone follow the rules, and are those rules still up to date?

These are questions that we can only answer by engaging in a broad public debate in which all the actors are made aware of their responsibilities. After all, technology doesn't just 'happen' to us; we design it ourselves. We believe it is our task to show Dutch political representatives that there are options in policymaking and to make people aware of how much latitude they have to make their own choices. We will continue working with international partners to address the impact of digitisation on human rights and on the UN's Sustainable Development Goals.

In 2017, we provided a considerable amount of fuel for this debate. We issued a number of widely read reports, gave interviews and wrote opinion pieces on this theme. A full list of our publications can be found on pages 33 to 39. Two of our reports stood out in 2017: *A fair share* (see box) and *Urgent upgrade*. We discuss the latter report in more detail below.

A fair share

The sharing and gig economy is the economy of online sharing platforms like Airbnb, second-hand platforms like Marktplaats and gig platforms like Helpling. It is the subject of our report *A fair share*. The sharing economy generates employment and promotes innovation in existing sectors. The SnappCar platform is a good example; it allows people to share cars and keeps the automotive industry on its toes. The gig economy encourages entrepreneurship. The meal delivery platform Thuisafgehaald, for example, is wonderful for amateur chefs with commercial ambitions. But online platforms can also grow into monopolies, and some even pose a risk to public order and privacy. One of our conclusions is that such values must be afforded better protection.

→ Download the full report (in Dutch) at rathenau.nl/en/afairshare



A bicycle courier on the job in Amsterdam.
Photo: Michiel Wijnbergh/Hollandse Hoogte

Urgent upgrade

From parliamentary motion to well-attended working conference

Government, regulatory bodies, businesses and the public are having trouble dealing with the consequences of digitisation. Our conclusion, which inspired the title of our report, is that society requires an urgent upgrade.

On 23 September 2014, a significant majority of the Dutch Senate voted in favour of the motion put forward by Senator Arda Gerkens. She had asked herself what digitisation means for Dutch legislation and whether new legislation is needed. The Dutch Minister of the Interior and Kingdom Relations, Ronald Plasterk, asked the Rathenau Instituut to look into the matter.

Human rights in peril

Our answer was brief and to the point. 'We update our apps, our software and our technology regularly, but we've neglected to upgrade society itself.' The public debate tends to focus on privacy and security. People are much less interested in equal treatment, human dignity and the balance of power, public values that digitisation has also put under pressure. We need more discussion of that issue, inside Parliament and out.

The government can learn lessons from the biotech sector. It can also seek to join initiatives such as the one undertaken by the Council of Europe, which is exploring whether a separate convention is needed to protect human rights in relation to robotics, artificial intelligence and other new technologies.

Existing legislation often offers guidelines. Nevertheless, because digitisation cuts across different sectors, closer coordination is required between regulatory bodies. Government can also develop guidelines governing the purchase, design and organisation of digital systems, for example explaining how software developers can account for algorithms.

Government can also draft guidelines in cooperation with businesses and interest groups, similar to the approach taken by the stakeholders in the Dutch Energy Agreement for Sustainable Growth.

Updating society in five steps

We recommend that politicians, policymakers, businesses and civil society organisations follow these five steps to upgrade digital society:

- 1. Strategic agenda:** Draft an inter-ministerial strategic agenda underscoring the societal and ethical significance of digitisation and the need to safeguard fundamental freedoms and human rights.
- 2. Supervision:** Boost the role and position of regulatory bodies.
- 3. Agreement:** Draw up a 'Digitisation Agreement' in which businesses, government and civil society organisations commit to and accept responsibility for protecting public values.
- 4. Dialogue:** Organise a national dialogue on digitisation and public values.
- 5. Check-up:** Schedule regular discussions/'check-ups' in the Dutch Senate and House of Representatives on governance aspects of digitisation issues.

Impact

Our report clearly hit a nerve. There were numerous references to it in the media. The Senate and House of Representatives asked the Government for a response, which will be forthcoming in the spring of 2018 with contributions by several different ministries.

The report *A fair share* was about the sharing and gig economy and online platforms such as Airbnb, Helping and Deliveroo (see box on page 18). That too led to hundreds of media publications, with the House of Representatives once again asking the Government to respond.

Both reports and the reactions that they evoked show that it is time for businesses to display a greater sense of accountability, for example by signing a Digitisation Agreement.

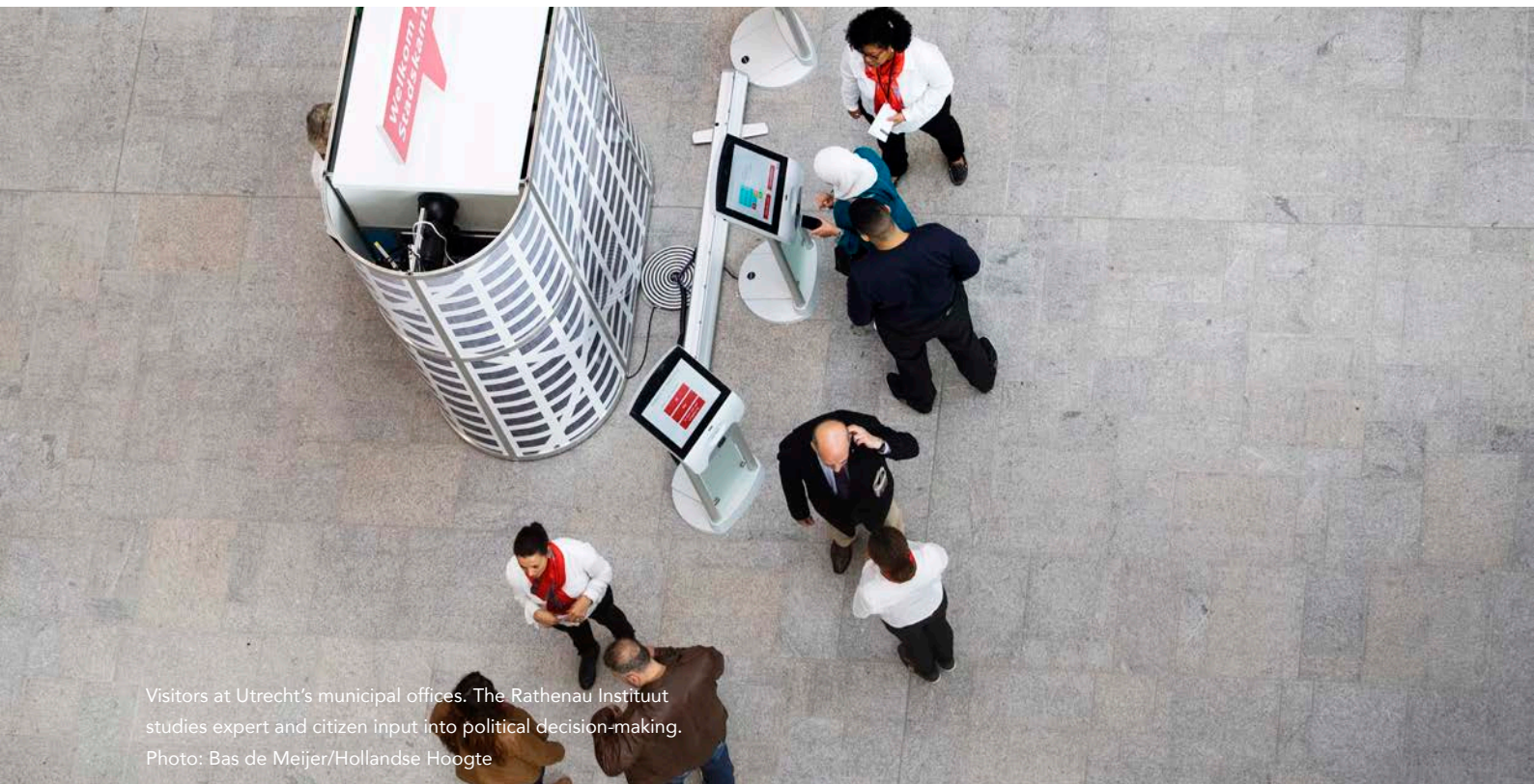
Director Melanie Peters twice called for just such an agreement in the Opinion sector of Dutch financial daily *Financieel Dagblad*. In December, we joined forces with the Social and Economic Council of the Netherlands to organise a working conference. The aim was 'to work towards constructing a framework for a responsible digitized society'. Businesses, civil society organisations and interest groups sent around 150 delegates to the conference. There was a follow-up meeting in January 2018.

→ Download the full report at
rathenau.nl/en/urgentupgrade



In China, the job of inspecting these high-voltage cables in the bright sun has been entrusted to a robot.
Photo: Hollandse Hoogte

How do society and politics use knowledge?



Visitors at Utrecht's municipal offices. The Rathenau Instituut studies expert and citizen input into political decision-making. Photo: Bas de Meijer/Hollandse Hoogte

We expect politicians to take decisions based on evidence, the same principle that we apply in our everyday lives. But the way they use this evidence often gives rise to controversy. That is why we study the interaction between knowledge and policymaking and the decisions that impact us daily.

Society expects policymakers to use scientific evidence to help them take difficult decisions. But are they actually basing themselves on the right evidence? We are keen to answer that question because it is our task to influence the dialogue between science and society in a way that produces the right responses to knowledge demand and to normative questions.

That is why we take different approaches to studying expert and citizen input into policymaking and political decision-making. Depending on the research question, we interview stakeholders, perform desk or data research, or organise expert workshops and debates to explore different perspectives.

We also examine research organisations that have a public task, such as the Royal Netherlands Meteorological Institute (KNMI) and the Netherlands Institute for Public Health and the Environment (RIVM),

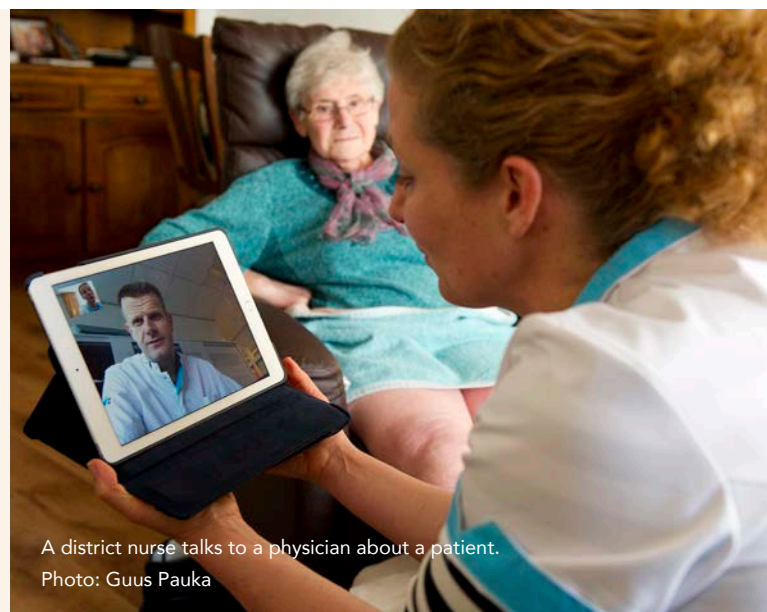
which lend support to policymakers and policy implementation bodies. They ensure public safety by alerting people to the threat of a storm or epidemic. One pertinent question in relation to the devolution of government tasks is whether their information reaches public administrators at all levels, for example in municipalities. How can they too make use of the output of academics engaged in basic research and the results of applied research? That is one of the questions that the Rathenau Instituut studies.

In 2017, we issued various reports and other publications on this theme, covering topics as diverse as the dilemmas of digital democracy, the ammonia debate, smart urban alliances ('Living Labs'), and the performance of public knowledge organisations in the field of public health. A full list of our publications can be found on pages 33 to 39. We look at three publications in greater detail below.

Gezond Verstand [Healthy Knowledge]

Public knowledge organisations traditionally deliver evidence to help policymakers improve the way society functions at the national level. Since 2015, local authorities have been responsible for much of the health care system and they require the support of researchers. As our report *Gezond Verstand* reveals, this transition has altered the role that four of the Netherlands' national public knowledge organisations play in health care and their position in that system. This in turn undermines their ability to support local professionals and coordinate health expertise at the national level.

→ Download the full report (in Dutch only) at rathenau.nl/nl/gezondverstand



A district nurse talks to a physician about a patient.
Photo: Guus Pauka

From Ape to Better

An investigation and dialogue on non-human primate research

The Dutch House of Representatives wants to ban non-human primate research as quickly as possible, the only exemption being research aimed at testing for acute risks to public health. The Dutch Ministry of Education, Culture and Science asked the Rathenau Instituut to examine the steps that could lead to a future without primates as test animals.

In the Netherlands, non-human primates (NHPs) may only be used in research when alternatives do not exist. For the most part, that means they are used in basic research and applied medical research. Of all the laboratory animals that researchers use, NHPs are the most controversial because of their close relationship to homo sapiens. The Dutch House of Representatives wants to end research using NHPs, the sole exception being 'research that is strictly necessary to combat life-threatening illnesses and outbreaks of infectious disease that pose a risk to public health'. In 2016, the House asked the State Secretary of Education, Culture and Science to investigate how to end the use of NHPs in research. The study the Rathenau Instituut carried out at the State Secretary's request showed that if the Netherlands wishes to ban non-human primate research entirely, it must start now to develop innovations that do not involve laboratory animals at all, rather than look for alternatives.

What precisely did the Rathenau Instituut study?

We looked at current use of NHPs in research and the alternatives available, both now and in the near future. Almost all of the 1500 Dutch NHPs used in research live at the Biomedical Primate Research Centre (BPRC) in Rijswijk. Every year, some 200 to 250 of these NHPs are used in experiments. We studied how the Netherlands can draw up a plan to end the use of NHPs at the BPRC and other Dutch research centres without this affecting public health.

What are NHPs used for?

Of the NHPs used in research in 2015, 59% were used in translational research, which involves using the results of

basic research to develop practical applications such as medicinal drugs. These studies involve the development of vaccines and medicines meant to combat infectious diseases, multiple sclerosis, tuberculosis, rheumatoid arthritis and other disorders, and to improve transplantation medicine. 41% of the NHPs were used in basic research, i.e. in the fields of neuroscience and immunology and to study infections. Very few product safety experiments are conducted in the Netherlands using NHPs. The Netherlands banned the use of NHPs for cosmetic testing and defence. There is a further prohibition on using great apes in biomedical research; macaques (rhesus monkeys and cynomolgus monkeys) and marmosets are used instead.

Is there an alternative for laboratory NHPs?

Our study showed that it would be impossible to replace every NHPs with an alternative in every experiment. To end experiments using NHPs entirely will require a new way of thinking and working. There are several alternative research methods and technological advances that make it possible to scale back, refine and replace research using NHPs, but so far they have not led to a reduction in such research. The broad consensus that emerged from interviews and the stakeholder dialogue organised by the Rathenau Instituut is that research using NHPs will continue, despite the current focus on alternatives. Instead of searching for one-to-one alternatives, we should be exploring entirely different methods to research health and safety. Rather than conducting a series of animal tests that we then extrapolate to human beings, for example, we could analyse data of people in their everyday environments. Such methods are referred to as 'innovation without laboratory animals'.

Can we stop using NHPs in research entirely?

Based on its study, the Rathenau Instituut sees two ways to minimise research using NHPs:

1. **Permit the use of NHPs only in research on infectious diseases that pose an acute threat to health.** This would likely reduce Dutch research involving NHPs by a third to a half. The BPRC's current breeding colony would probably be scaled back. A further reduction is possible if the Netherlands were to enter into international agreements governing which type of research is permitted where.
2. **Ensure that research using NHPs is relevant and responsible.** Some stakeholders stress the importance of basic research using NHPs even when there is no acute threat to health. This calls for further discussion and for a definition of socially relevant and ethically responsible research.

Impact

The Dutch House of Representatives organised a technical briefing about our report in September. Our conclusions also align with the new government's aim of positioning the Netherlands in the vanguard of innovation without laboratory animals by 2025. In the meantime, various parties are working to develop such innovations. Their aim is to scale back not only NHP primate research but also the use of other laboratory animals in the Netherlands, and to transition to entirely new methods of researching health and safety.

→ Download the full report (in Dutch only) at rathenau.nl/nl/vanaapnaarbeter



Photo: Shutterstock

Is Dutch research ready for the future?



Students sitting exams in Tilburg. The Rathenau Instituut studies whether researchers in the Dutch knowledge ecosystem are capable of answering tomorrow's questions.
Photo: Dolph Cantrijn/Hollandse Hoogte

Dutch research is at the top of the international rankings. How do we ensure that it stays there? We study this question so that we can contribute to the development of research policy.

Knowledge is necessary to solve complex problems, like flooding along the Netherlands' major rivers due to climate change, or the rising cost of health care resulting from the ageing population. And more issues are arising all the time.

That is why there are numerous institutions in the Netherlands that carry out research and are involved in knowledge acquisition and development. They include universities and businesses, but also public knowledge organisations such as the Netherlands Organisation for Applied Research (TNO) and the Netherlands Forensic Institute (NFI).

We want to know whether researchers in the Dutch knowledge ecosystem are capable of answering tomorrow's questions and whether we, as a society, are asking the right questions.

The ministries responsible for specific policy domains, municipal authorities, politicians and even businesses raise questions, and it is important for the public and civil society organisations to do the same. In the past year we looked closely at the Dutch National Research Agenda, top technology institutes and trends such as 'open science' and 'responsible research & innovation'.

Our results help local, national and international authorities take informed decisions and think carefully about how to organise research more effectively as we go forward into a future in which China, the USA, India and other countries will play an increasingly prominent role.

In 2017, we issued various publications within this theme on a variety of subjects, including excellent research, innovation in and with cities, and strategic partnerships in research. A full list of our publications can be found on pages 33 to 39. We look at three publications in greater detail below.

Living Labs

Living Labs are initiatives in which local authorities, local residents, knowledge institutions, local businesses and others work together to tackle such modern-day challenges as climate change and social inequality. For example, there is a Living Lab in the Amsterdam-Noord district that is experimenting with a zero-waste economy. The Rathenau Instituut studied more than 90 initiatives that style themselves as Living Labs. Our analysis showed that many of these alliances do not involve co-creation with the public or with end-users. It also became clear that their expertise and experience are difficult to transfer to others or to apply in a broader context. The knowledge that they develop may be at risk of being lost.

→ Download the full report (in Dutch) at rathenau.nl/nl/livinglabs



An 'intelligent paving stone' in Amsterdam that lights up when a cyclist approaches.

Photo: Herman Wouters

Pioneers

From anecdote to facts and figures for policymaking

In 2015, Maaïke Kroon won the annual Science Talent Award. Less than a week later, she announced her departure for Abu Dhabi. Hers was one of many anecdotes about Dutch researchers packing their bags. High time to investigate.

Does the Netherlands have trouble attracting and holding on to talented researchers? We studied this question in 2017 and presented our findings in two publications: 'International mobility of researchers', part of our Facts & Figures series, and the Dutch-language *Grensverleggers* [Pioneers].

Why do researchers undertake research?

Within our 'Futureproof Knowledge' theme, we studied how Dutch research functions. It might seem as if researching academic research is the ultimate form of navel-gazing, but before we can change something, it's important to know precisely what needs to be changed. Our figures and reports can help politicians and policymakers assess, take decisions going forward, and make research more relevant to society.

The departure of Maaïke Kroon put the international mobility of researchers firmly on the agenda. In 2015, she won the annual Science Talent Award. Less than a week later, she announced her departure for Abu Dhabi. Universities chancellors and deans, national federations and the government were worried. The battle for 'brain gain' and the fear of 'brain drain' suddenly became a fiercely debated topic in the newspapers and politicians felt that the government's anxieties had been confirmed. In its 2014 strategic policy document *Vision for Science in 2025*, it had already referred several times to a potential brain drain: '[T]here are some indications that it is now becoming more difficult to attract the most established scientists.'

Concerns about brain drain groundless

In our *Facts & Figures* publication 'International Mobility of Researchers', we investigated precisely how many researchers leave the Netherlands and how many come

to take their place. What we found is that concerns about brain drain are groundless. Below are some of our conclusions:

- Dutch researchers are among the most mobile researchers in the world.
- Researchers do leave for other countries, but the Netherlands also attracts foreign researchers. The quality of incoming and outgoing researchers (based on their citation impact scores) is similar.
- Academic staff at Dutch universities is growing increasingly international; foreigners accounted for 20% of all staff in 2005, but that figure had risen to 33% by 2015.

What's the best way to attract top international researchers?

We then interviewed policymakers and top researchers about mobility. What can research institutions do to hold on to top researchers? Our report 'Grensverleggers' [Pioneers] includes five proposals for improving mobility policy:

1. **Create more latitude for negotiating with top researchers.** Institutions and researchers feel constricted when it comes to salaries and opportunities for promotion.
2. **Focus on Dutch researchers returning to the Netherlands.** On average, their quality surpasses that of incoming or non-mobile researchers. At the moment, neither the government nor research institutions have specific tools to appeal to this group.
3. **Make a point of selecting the biggest talents and offer them an inviting future.** There is a particular absence of policy targeting the retention of top researchers. The low award percentages for NWO grants are not inviting enough going forward.

4. **Allow researchers to go on frequent sabbaticals lasting from three months to a year.** Short-term mobility facilitates more knowledge-sharing than having more tenured foreign researchers on staff.
5. **Help researchers integrate into Dutch society.** That will encourage them to contribute to innovation, knowledge-sharing or policymaking.

Impact

Both publications on international researcher mobility provide a framework for a broader debate about mobility policy. That debate has already been addressed in various newspapers. The Rathenau Instituut also

explained the results of its study in the House of Representatives during a technical briefing on the government's research policy on 24 May 2017. The study has also generated interest abroad, for example in the report *Attracting top international talent and anchoring it in Flanders* by the Flanders Advisory Council for Innovation and Enterprise.

→ Download the reports at
rathenau.nl/en/internationalmobility
rathenau.nl/nl/grensverleggers (Dutch only)



Sander van Lanen was appointed assistant professor at the University of Groningen in 2017. Shortly before, he had received his PhD at University College Cork.

Photo: Piet den Blanken/Hollandse Hoogte

What's the state of knowledge in the Netherlands?



Lab research. The Rathenau Instituut studies the careers of women in academia.
Photo: Shutterstock

Dutch research is world-class. This takes vision, money, staff and a network of knowledge institutions. To facilitate the discussion on Dutch research policy, the Rathenau Instituut gathers facts and figures on what the Netherlands spends on science and technology, for example. We also identify long-term trends.

There are numerous parties that want data on the state of knowledge, ranging from politicians and policymakers to academics, journalists and the general public. What's working, and what isn't? For example, how many female professors work in Dutch academia, how much does the government spend on research, how many students are awarded PhDs and where do they end up working? We answer all these questions on our website 'Science in figures'. We also compare figures for different years, chart fluctuations and trends, and benchmark the Netherlands against other countries.

We did this in 2017 in more than 100 data publications, divided across six different themes. For example, we

studied the way in which 'the science system' operates. This is important information for administrators, universities and other knowledge institutions because it supports them in their decision-making.

Which figures are needed is determined in part by a liaison group consisting of representatives from various ministries and from the Advisory Council for Science, Technology and Innovation (AWTI), the Royal Netherlands Academy of Arts and Sciences, the Netherlands Organisation for Scientific Research (NWO), employers' federation VNO-NCW, the Association of Universities in the Netherlands (VSNU) and the Association of Universities of Applied Sciences.

Six themes in figures

THEME 1: POLICY AND STRUCTURE

University hospitals play an important role

In this theme, we describe which organisations are involved in research and innovation policy and what role they play. Who comes up with policy, and who implements it? It turns out that university hospitals – the Dutch university medical centres or UMCs – play an important role in the Dutch knowledge ecosystem. **The eight university hospitals recorded a total revenue of:**

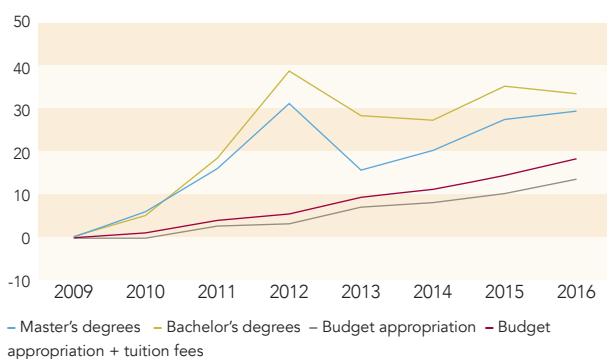
8.4 billion euros

source: consolidated annual accounts from the university hospitals' 2016 annual reports.

THEME 2: INVESTMENTS

Research funding and expenditure

In this theme, we look at various aspects of research funding and expenditure on research. We calculate R&D investment in the Netherlands and compare the Dutch figures with those of other countries. **Government funding for universities is increasing, but it is not keeping pace with the universities' own output.** Between 2009 and 2016, universities awarded



Annual Report 2017

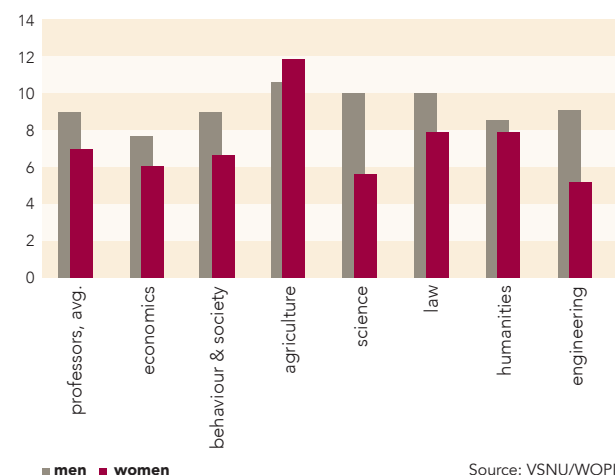
33% more bachelor's degrees 29% more master's degrees. The budget appropriation received by the universities rose only 13% in that same period.

THEME 3: PERSONNEL

Women have shorter careers as professors than men do

In this theme, we study how many researchers work in the Netherlands and in which fields. How do their careers unfold? We also look the number of foreign researchers working at Dutch universities, for example. In 2017, we discovered that women tend to have shorter careers as professors than their male counterparts. Between 2003 and 2015, male professors were an average of 49 years of age at the time of their appointment and spent an average of 8.9 years in their position. **Women were appointed as professors at the average age of 47 and left after 7.1 years.** That is a difference of almost two years.

Comparing job tenures per field of science: professors



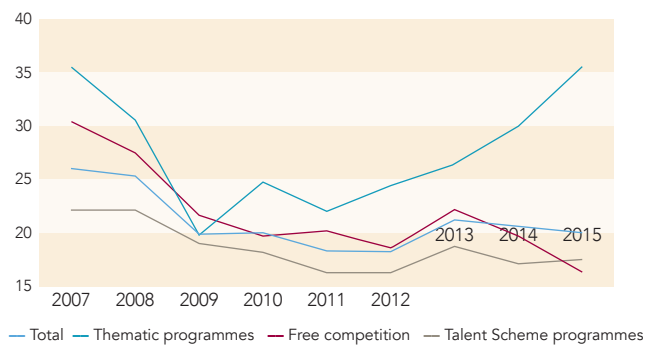
Source: VSNU/WOPI

THEME 4: PROCESS

More competition for research funding

In this theme, we discuss how research actually comes about. We look at research excellence, examine how the best researchers are selected and investigate collaboration in research, for example between research institutes and businesses. What we noticed in 2017 is that there is growing competition for research funding. Between 2007 and 2015, the number of funding applications received by NWO, which distributes the Dutch government's budget for research, rose by 15%. In the same period, however, NWO granted 14% fewer grants. In other words, the award percentage declined. **This trend – more competition for funding and fewer awards – has been around for several years, and not only in the Netherlands.** When there is only a small likelihood of an award, the amount of effort that obtaining research funding requires from applicants – and the reviewers and fellow researchers who assess the applications – is relatively high. The figure shows how the success rate is increasing again only for NWO's thematic grants.

NWO programme awards



Only investment in the thematic programmes is increasing again.

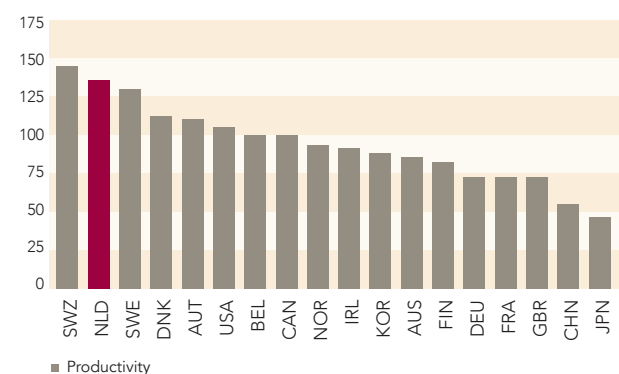
THEME 5: OUTPUT

Netherlands performing well in international rankings

The output of science and research is varied and includes articles in academic journals, publications in other media or book chapters. Other output includes the number and, for example, the quality of university graduates and PhDs as well as technological output, such as patents. In 2017, we kept track of data on all these various outputs.

One of our conclusions of the past year: the Netherlands rates as average when it comes to the absolute number of research publications. However, when we break the figures down per researcher, we see that **Dutch researchers produce a large number of publications per person per year.** The Netherlands is in second place in this set of reference countries, with only Switzerland having slightly more publications per 100 researchers.

Research publications per 100 full-time researchers (public sector)



THEME 6: VALIDATION AND IMPACT

Netherlands is making progress on innovation

Top five

In this theme, we explore the impact of research on society. What effect does it have on Dutch innovation capacity, for example? And how much trust do people place in science? **We discovered that the Netherlands is making good progress, but just how good depends on the ranking.** It takes fourth place on the European Commission's European Innovation Scoreboard, and is moving up the innovation rankings in the World Economic Forum's Global Competitiveness Index.

The aim is to break through to the top five.

The Netherlands ranked sixth in the 2017-18 Global Competitiveness Index. In 2010-2011, it was still in 13th place.

Part 3

Publications and figures

From reports to board members, this section covers our publications and the people and resources that we worked with in 2017.

Reports



Balans van de wetenschap 2016 \ 20 January 2017

Full title: Horlings, E., C. Chiong Meza, A. Vennekens & B. van der Meulen. *Balans van de wetenschap 2016*. Den Haag: Rathenau Instituut, 2017, 75 p. (in cooperation with AWTI and KNAW)

→ Download the report (in Dutch only) at rathenau.nl/nl/wetenschap2016



Urgent upgrade \ 6 February 2017

Full title: Kool, L., J. Timmer, L. Royakkers & R. van Est. *Opwaarderen: borgen van publieke waarden in de digitale samenleving*. Den Haag: Rathenau Instituut, 2017, 213 p.
Translation: Kool, L., J. Timmer, L. Royakkers & R. van Est. *Urgent upgrade: Protecting public values in our digitized society*. The Hague: Rathenau Instituut, 194 p.

→ Download the report at rathenau.nl/en/urgentupgrade



Van aap naar beter \ 16 February 2017

Full title: Geesink, I., L. van Bodegom & M. Peters. *Van aap naar beter: een verkenning en dialoog over proeven met apen*. Den Haag: Rathenau Instituut, 2017, 51 p.

→ Download the report (in Dutch only) at rathenau.nl/nl/vanaapnaarbeter



Regels voor het digitale mensenpark \ 23 February 2017

Full title: Est, R. van, J. Timmer, L. Kool, N. Nijsingh, V. Rerimassie & D. Stermerding. *Regels voor het digitale mensenpark: 'telen' en 'temmen' van de mens via kiembaanmodificatie en persuasieve technologie*. Den Haag: Rathenau Instituut, 2017, 48 p.

→ Download the report (in Dutch only) at rathenau.nl/nl/digitalemensenpark



A never-ending race \ 2 March 2017

Full title: Munnichs, G., M. Kouw & L. Kool. *Een nooit gelopen race: over cyberdreigingen en versterking van weerbaarheid*. Den Haag: Rathenau Instituut, 2017, 86 p.
Translation: Munnichs, G., M. Kouw & L. Kool. *A never-ending race: on cyberthreats and strengthening resilience*. The Hague: Rathenau Instituut, 2017, 59 p.

→ Download the report at rathenau.nl/en/cyberthreats



International mobility of researchers | 30 March 2017

Full title: Koier, E., E. Horlings, W. Scholten & J. de Jonge. *Internationale mobiliteit van wetenschappers*. Den Haag: Rathenau Instituut, 2017, 17 p.

Translation: Koier, E., E. Horlings, W. Scholten & J. de Jonge. *International mobility of researchers. Facts and Figures 20*. The Hague: Rathenau Instituut, 2017, 17 p.

→ Download the report at rathenau.nl/en/internationalmobility



Grensverleggers | 30 March 2017

Full title: Scholten, W., E. Koier & E. Horlings. *Grensverleggers: internationale mobiliteit van onderzoekers en de Nederlandse positie in de mondiale strijd om talent*. Den Haag: Rathenau Instituut, 2017, 70 p.

→ Download the report (in Dutch only) at rathenau.nl/nl/grensverleggers



Feiten & Cijfers: Totale investeringen in wetenschap en innovatie 2015-2021 | 25 April 2017

Full title: Steen, J. van & A. Vennekens. *Totale Investerings in Wetenschap en Innovatie 2015-2021*. Den Haag: Rathenau Instituut, 2017, 32 p.

Translation (summary): Steen, J. van & A. Vennekens. *Summary of Total Investment in Research and Innovation (TWIN) 2015-2021*. The Hague: Rathenau Instituut, 2017, 8 p.

→ Download the report (in Dutch) or the English summary at rathenau.nl/en/twin2015-21



Human rights in the robot age | 11 May 2017

Full title: Est, R. van & L. Kool. *Human rights in the robot age: challenges arising from the use of robotics, artificial intelligence, and virtual and augmented reality*. The Hague: Rathenau Instituut, 2017, 58 p.

Translation: Est, R. van & L. Kool. *Nederlandse samenvatting van 'Human rights in the robot age'*. Den Haag: Rathenau Instituut, 2017, 2 p.

→ Download the report at rathenau.nl/en/humanrightsrobotage



A fair share | 30 May 2017

Full title: Frenken, K., A. van Waes, M. Smink & R. van Est. *Eerlijk delen: waarborgen van publieke belangen in de deeleconomie en de kluseconomie*. Den Haag: Rathenau Instituut, 2017, 134 p.

Translation: Frenken, K., A. van Waes, M. Smink & R. van Est. *A fair share: safeguarding public interests in the sharing and gig economy*. The Hague: Rathenau Instituut, 2017, 136 p.

→ Download the report at rathenau.nl/en/afairshare



Gezond verstand | 6 September 2017

Full title: Faasse, P. & L. Koens. *Gezond verstand: publieke kennisorganisaties in de gezondheidszorg*. Den Haag: Rathenau Instituut, 2017, 75 p.

→ Download the report (in Dutch only) at rathenau.nl/nl/gezondverstand



Living labs in Nederland | 17 October 2017

Full title: Maas, T., J. van den Broek & J. Deuten. *Living labs in Nederland: van open testfaciliteit tot levend lab*. Den Haag: Rathenau Instituut, 2017, 47 p.

→ Download the report (in Dutch only) at rathenau.nl/nl/livinglabs



Het ammoniakdossier | 9 November 2017

Full title: Vriend, H. de & G. Munnichs, *Het ammoniakdossier: op weg naar herstel van een geschonden relatie*. Den Haag, Rathenau Instituut 2017, 37 p.

→ Download the report (in Dutch only) at rathenau.nl/nl/ammoniak



Samen kennis aanboren | 13 December 2017

Full title: Smink M., J. van den Broek, T. Metze, E. Cuppen & R. van Est m.m.v. E. van de Grift & A. van Waes, *Samen kennis aanboren: Verkenning van kennis en opvattingen over ultradiepe geothermie*. Den Haag: Rathenau Instituut 2017, 93 p.

→ Download the report (in Dutch only) at rathenau.nl/nl/ultradiep

Other publications

Vrouwen in de wetenschap

1 February (updated 13 June 2017), factsheet by Jos de Jonge

Acties voor een verantwoorde digitale samenleving

6 February 2017, Parliamentary Briefing

Publieke kennisorganisaties door de jaren heen

20 February 2017, long read by Bram Harkema

Noblesse oblige

23 February 2017, blog post by Melanie Peters

Regel het digitale mensenpark beter

23 February 2017, long read by Joost van Kasteren and Rinie van Est (Eds.).

Buitenlandse overnames en de gevolgen voor het Nederlandse R&D-landschap

2 March 2017, blog post by Jasper Deuten and Jos van den Broek

Aanvraagdruk bij NWO

8 March 2017 (updated on 26 September 2017), factsheet by Jos de Jonge

Beoordelingsinstrument wetenschapscommunicatie: startpunt voor een gesprek

16 March 2017, blog post by Alex Verkade

Rariteitenkabinet voor wetenschapsbeleid

22 March 2017, inaugural address by Barend van der Meulen

Nadenken over het doel van wetenschapscommunicatie

30 March 2017, blog post by Alex Verkade

Het juiste communicatiemiddel

10 April 2017, blog post by Alex Verkade

Vuurproef voor een beoordelingsinstrument

13 April 2017, blog post door Alex Verkade

Publieke betrokkenheid bij de routes van de Nationale Wetenschapsagenda

1 May 2017, blog post door Alex Verkade

Living labs in Nederland: onderzoek en innovatie mét steden

8 May 2017, blog post by Jasper Deuten and Jos van den Broek

Bescherm mensenrechten in het digitale tijdperk

11 May 2017, Parliamentary Briefing

Lichaamsmateriaal opgespoord

16 May 2017, blog post by Ingrid Geesink

iGEM Guide to the Future

17 May 2017, web page with tools

Onderzoek en innovatie in Nederland

17 May 2017, article by Jos van den Broek and Jasper Deuten

Gelijke kansen, sterkere wetenschap

29 May 2017, blog post by Alex Verkade

Deeleconomie zet publieke waarden onder druk

6 June 2017, Parliamentary Briefing

Extra maatregelen nodig tegen cyberdreigingen

6 June 2017, Parliamentary Briefing

Goedbedoelende amateurs zonder structurele ondersteuning

12 June 2017, blog post by Leonie van Drooge

Inkomsten en prestaties Nederlandse universiteiten; onderwijs

14 June 2017, factsheet by Jos de Jonge

Hand-out privacywetgeving

20 June 2017, memo for expert meeting in the Senate

Nederlandse wetenschap houdt stand in strijd om talent

29 June 2017, Parliamentary Briefing

Plant is koning, het boerenbedrijf gaat digitaal

6 July 2017, article by Melanie Peters

Inkomsten en prestaties Nederlandse universiteiten

4 September 2017, factsheet by Jos de Jonge

Evaluatie van onderzoek

11 September 2017, article by Leonie van Drooge

Ontwikkeling van proefdiervrije onderzoeksmethoden

14 September 2017, memo for technical briefing in the House of Representatives

Glurende reclamezuilen

13 September 2017, blog post by Linda Kool

Kinderen van de toekomst: kanttekeningen bij het Nederlandse kiembaandebat

19 September 2017, long read by Lisa van Bodegom and Isabella Vos

Wanted: digital innovation that respects humankind

21 September 2017, blog post in the *Decent Digitisation* series by Melanie Peters

National Ombudsman of the Netherlands: Digitisation should not mean exclusion

25 September 2017, blog post in the *Decent Digitisation* series by Reinier van Zutphen and Jeanine Verhoef

ICTU: People with digital skills or services with people skills?

29 September 2017, blog post in the *Decent Digitisation* series by André Regtop and Victor Zuydweg

Amnesty International: Algorithms must respect human rights

4 October 2017, blog post in the *Decent Digitisation* series by Eduard Nazarski

Little big brothers are watching you

10 October 2017, long read

Horizontale privacy

12 October 2017, memo for round-table discussion in House of Representatives

Netherlands Police: Technology necessary to adapt to a rapidly changing society

26 October 2017, blog post in the *Decent Digitisation* series by Erik Akerboom

California Blues: Making Money with Health

3 November 2017, blog post by Maartje Niezen and Lisa van Bodegom.

Het 'sleepnetreferendum': voor privacy en veiligheid

7 November 2017, long read

UWV: Make online services appealing, not compulsory

14 November 2017, blog post in the *Decent Digitisation* series by Marije Wolsink

Gezondheid: grenzen aan de eigen regie

15 November 2017, long read by Jacqueline Pot

Werk in de platformeconomie

16 November 2017, memo for round-table discussion in House of Representatives

Data-driven cities

17 November 2017, long read by Iris Korthagen, Damion Bunders and Rinie van Est

California blues: gebarsten bubbel en toekomstmuziek

23 November 2017, blog post by Maartje Niezen and Lisa van Bodegom

Are smart-city practices putting pressure on public values?

23 November 2017, long read by Rinie van Est and Iris Korthagen

Ethicist Frans Stafleu: Programmers, embrace the responsibility befitting to your position

29 November 2017, blog post in the *Decent Digitisation* series by Frans Stafleu and Linda Kool

How are municipal governments protecting public values in the smart city?

30 November 2017, long read by Rinie van Est and Iris Korthagen

Privacy expert Jaap-Henk Hoepman: Use open standards to break up monopolies

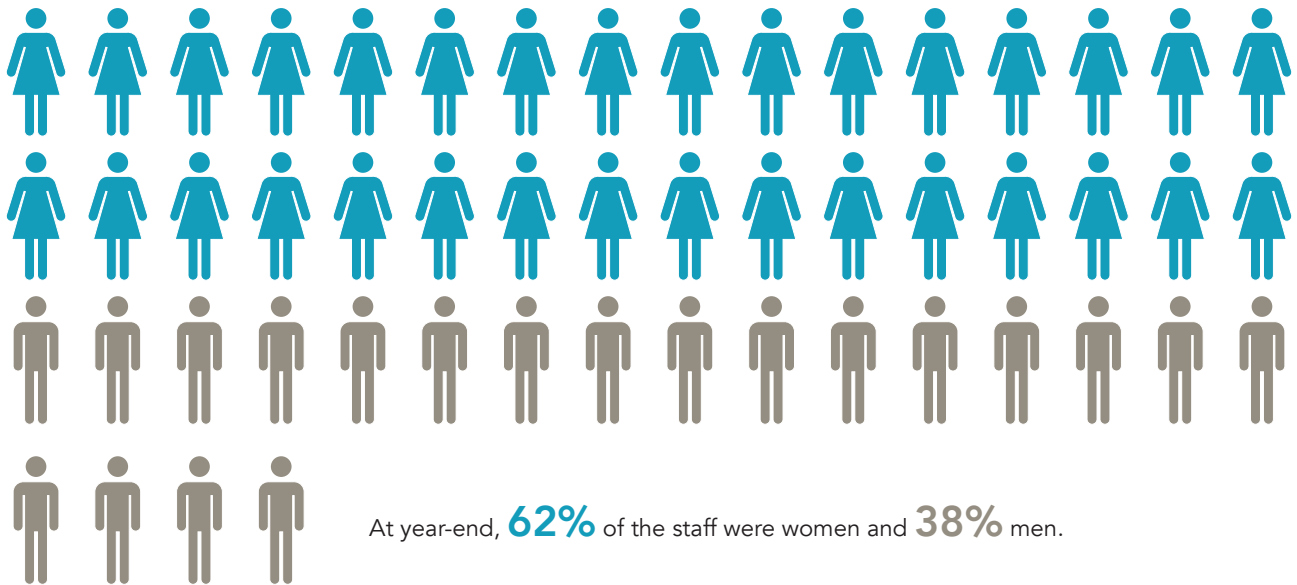
8 December 2017, blog post in the *Decent Digitisation* series by Jaap-Henk Hoepman

Technologisch burgerschap: dé democratische uitdaging van de eenentwintigste eeuw

21 December 2017, long read by Rinie van Est

Annual social report

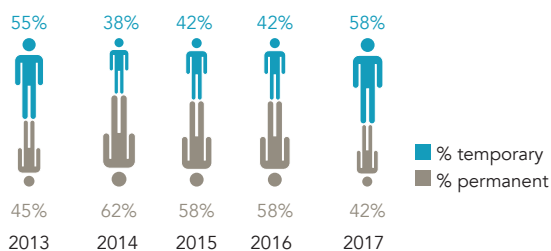
On 31 December 2017, the Rathenau Instituut employed **52** people (45.28 FTEs). In 2016, there were **43** employees (37.1 FTEs). It should be noted that a number of positions were vacant on 31 December 2016. All job openings were filled in 2017.



12 employees left the institute's employ. They worked in Research & Dialogue (**10**), Communication (**1**) and Operations & Support (**1**).



In 2017, **23** new employees joined the institute's staff. They work in Research & Dialogue (**17**), Communication (**4**) and Operations & Support (**2**).



The percentage of the workforce on permanent contract was **42%**.

In 2017 we had **4** interns.



Absenteeism stood at **3.22%**. In 2016 that was **4.47%**.

Annual financial report

Income 2017

In 2017, the Rathenau Instituut earned € 4,807,000 in income, € 231,000 less than budgeted. The institute received € 4,241,000 as a block grant from the Dutch Ministry of Education, Culture and Science. That is 88% of its total income. In addition, in the final quarter of 2017 it received € 103,000 in structural wage compensation. Other extra revenue came from copyrights and staff-related payments, such as attendance fees, social security reimbursements and recharged expenses. The institute

submitted several substantial project proposals to funding bodies this year. The projects were given high marks but not all of them were awarded funding. The institute earned contract-related income in 24 externally financed projects, including under such EU programmes as Horizon 2020 and STOA and from projects carried out for the Dutch Ministries of Economic Affairs, Education, Culture & Science, and Infrastructure & the Environment. The share of earned income from external contract projects came to 11% of the total.

Income	Income earned 2017 x € 1000	Budgeted 2017 x € 1000	Difference x € 1000
Budget appropriation from Ministry	4,241	4,138	103
Project revenues	525	853	-328
Other revenue	41	47	-6
Total income	4,807	5,038	-231

Year	2013	2014	2015	2016	2017
Total income x €1000	5,264	5,166	4,911	4,864	4,807
Contract project income x € 1000	497	776	687	660	525
% contract income compared to total	9%	15%	14%	14%	11%

Expenditure in 2017

Total expenditure came to € 4,825,000. This is € 623,000 less than budgeted. Expenditure on staffing was € 365,000 less than budgeted because some job openings remained vacant in the first six months of

2017. Material costs were reduced by € 91,000. Cost planning for certain internal projects was altered. These costs will be posted to 2018 (€ 114,000).

Expenditure	Expenditure in 2017 x € 1000	Budgeted 2017 x € 1000	Difference x € 1000
Staffing costs	3,498	3,863	-365
Project costs	650	817	-167
Material costs	676	767	-91
Totale lasten	4,825	5,448	-623

Annual financial statements

The institute's annual financial statements are consolidated into the annual financial statements of the Royal Netherlands Academy of Arts and Sciences. As such, they are included in the Academy's annual report.

Programme Panel

The members of the Rathenau Instituut's Programme Panel represent different sectors of society. The panel meets several times a year, discusses new trends and developments, and advises the Rathenau Instituut on its work programme. Gerdi A. Verbeet, chair of the Rathenau Instituut Board, also chairs the Programme Panel. Directeur Melanie Peters is its secretary. The members are listed below in alphabetical order.

Annet Aris teaches digital strategy at INSEAD Business School in France.

Marien Baerveldt builds innovative learning communities at Utrecht University and is a team and process supervisor at Hosted Beings.

Rob Bijl is the deputy director of the Netherlands Institute for Social Research (SCP).

Marc Chavannes is a journalist and emeritus professor of journalism (University of Groningen).

Felix Cohen is the director of the Dutch Traffic Safety Association (until 1 January 2018).

Willem Deetman is chairman of the supervisory board of ProDemos.

Linda Duits is a researcher, publicist and teacher.

Bas Eickhout is a member of the European Parliament.

Bert Fokkema is part of an international team at Shell that develops policy and internal standards for corporate social responsibility.

Yuri van Geest is the founder of ExOxo (corporate transformation) and co-author of the bestseller *Exponential Organisations*.

Peter Giesen is an editor and Paris correspondent for national newspaper *de Volkskrant*.

Joana Gomes Neto (starting in December 2017) is a student member and a master's degree student in Molecular Biology & Biotechnology at the University of Groningen.

Rob Hamer is the director of the Unilever Vlaardingen R&D Laboratory.

Rob van Hattum is Science editor-in-chief for Dutch public broadcaster VPRO.

Janneke Hoekstra is the head of the Faculty of Engineering at HAN University of Applied Sciences.

Yori Kamphuis is the co-founder of Coblue and Storro.

Annette Klinkert is the founder of the firm city2science.

Laurien Koster is the independent chairperson of the Kinderrechtencollectief and a supervisory director at Oxfam Novib.

Chris Kuijpers is the director-general for Governance and Housing at the Ministry of the Interior and Kingdom Relations.

Willem Lageweg holds a number of board and supervisory positions, for example with Triodos Bank, Close the Gap, and the Institute Positive Health.

Jolien Morren (until December 2017) worked on her master's degree in Biology and Science Communication & Society at Leiden University.

Dirk Pilat is the deputy director of the Science, Technology and Innovation Directorate of the Organisation for Economic Co-operation and Development (OECD) in Paris.

Stientje van Veldhoven (until October 2017) was a member of the Democrats '66 political group in the Dutch House of Representatives.

Jeanine van de Wiel is Global Regulatory Affairs Manager at DSM for food ingredients and health.

Lynn Zebeda is the co-founder of the Dr. Monk innovation studio.

Board

Gerdi Alida Verbeet / Supervisory director of charity organisation Novamedia and the Dutch Patient Federation and chair of the National 4 and 5 May Committee, which organises the national ceremonies commemorating the war dead and celebrating Liberation Day.

Emile Aarts / Rector of Tilburg University.

Wiebe Bijker / Professor of Technology and Society, Maastricht University and the Norwegian University for Science and Technology in Trondheim.

Roshan Cools / Professor of Cognitive Neuropsychiatry at Radboud University Medical Centre.

Hans Dröge / Supervisory director of the Brabant Development Agency.

Edwin van Huis / Director of Naturalis Biodiversity Center, Leiden.

Rianne Letschert (until September 2017) / Rector of Maastricht University.

Peter-Paul Verbeek / Professor of Philosophy of Technology, University of Twente.

Marijk van der Wende / Dean of Graduate Studies, Professor of Higher Education, Utrecht University and from 1 November Faculty Professor of Law, Economics, Governance and Organisation.

Melanie Peters (secretary) / Director of the Rathenau Instituut, The Hague.

The **Rathenau Instituut** stimulates public and political opinion forming on social aspects of science and technology. We perform research and organise debate relating to science, innovation and new technologies.

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Rathenau Instituut