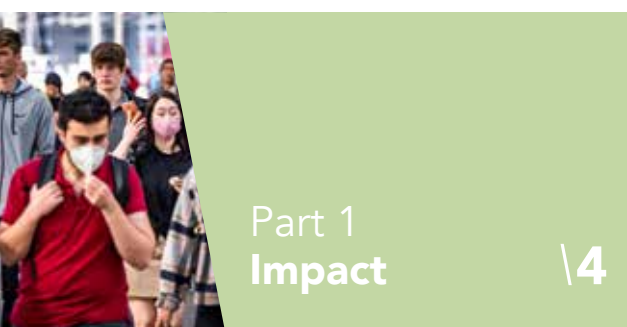


Annual Report 2020

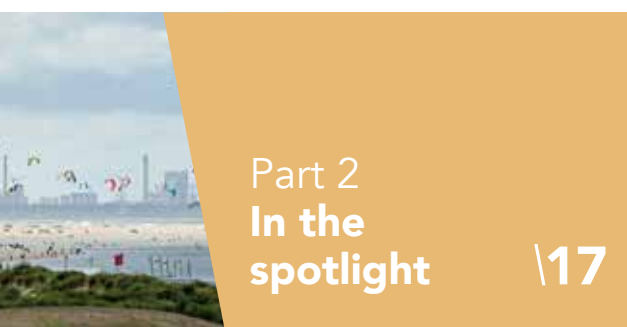


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Foreword

2020 will go down in history as the year our lives were turned upside down by the COVID-19 pandemic. Working from home became the norm and socialising with others something special. Digital tools were already having a strong impact on how we co-exist and interact as a society, but the crisis accelerated this trend. Over the past year, we have all become accustomed to ordering meals on an app or holding meetings online. The importance of sound scientific knowledge also became abundantly clear this year. At the same time, there was growing awareness that public support for political decisions requires not only knowledge but also dialogue about how we wish to co-exist.

The Rathenau Instituut is here to serve society and democracy. It examines how science and technology are changing our lives and what role the public, politicians, policymakers and stakeholders can play in that context.



‘The Rathenau Instituut is committed to ensuring that everyone can reap the benefits of scientific knowledge, and that people can have a say in shaping their shared future.’ Photograph: Rogier Veldman

The COVID-19 pandemic has highlighted urgent societal issues that the Rathenau Instituut had already been examining in recent years. For example, how do we ensure that everyone can participate in the digital society? Things move so quickly that mere digital skills are not enough. How do we retain control over the personal data and profiles collected by a contact-tracing app or embedded in a vaccination passport? And what do autonomy and the right to privacy mean when employers use software to monitor employees working from home, as we investigated last year? How much trust do we have in science and technology, and is there enough unbiased knowledge for policy?

Let’s hope that future historians do not describe 2020 solely as a pandemic year, but also as the year when that pandemic forced us to confront urgent issues and arrive at a better understanding, setting us on the path towards positive change. Let the pandemic be the gamechanger that we need as a society, and let us emerge from the crisis stronger than ever.

For although the economy is expected to recover once the mass vaccination has been completed, the question is whether this recovery will benefit Dutch society, and society worldwide. Experts envisage a K-shaped graph. The ascending line represents those groups that will quickly recover their economic standing. The descending line represents those groups that will feel the negative impact of the pandemic for a long time to come. Science, technology and innovation play an important role in the recovery. The Rathenau Instituut is committed to ensuring that everyone can reap the benefits of scientific knowledge, and that people can have a say in shaping their shared future.

By the time you read this annual report, I will have said farewell to the Rathenau Instituut after eight years as its chairperson. During that time I have seen, again and again, how humanity, and contact with others, lies at the heart of the institute’s work. I would like to encourage my successor and the entire staff to continue pursuing these important values.

Gerdi A. Verbeet

Chair of the Board of the Rathenau Instituut

Part 1

Impact

In 2020, we used our research to encourage public dialogue about science, technology and innovation in the media and during online debates and by putting issues on the political agenda. In Part 1, we tell you how and where we did so.



Crowd at Amsterdam Central Station.
Photograph: Ramon van Flymen / ANP

Making choices in a virus-haunted world

The COVID-19 crisis that shook our everyday existence in 2020 did not fully disrupt society, in part because we shifted much of our lives to the digital domain. While this shift had already been happening for some time, it gathered enormous momentum owing to the pandemic. The consequences will likely only become clear in a few years, says Rathenau Instituut director Melanie Peters.

On 4 March 2020, we sent our employees an email in the 'unlikely event' that the spread of the coronavirus would cause our office to close temporarily. The email offered them tips on working from home if necessary and advised them to wash their hands as often as possible. We had yet to recognise the importance of social distancing then and the email concluded with what is now a somewhat laughable suggestion: 'You might consider not shaking hands with anyone for a while.' Twelve days later, seven million Dutch people watched Prime Minister Mark Rutte address the nation on television. Shortly thereafter, offices and school buildings were practically deserted. For weeks on end, much of the Netherlands worked from home or studied at the kitchen table. Since March last year, some people have only seen their colleagues on screen.

The coronavirus crisis is once again highlighting the importance of science and innovation. The Dutch Government took all key decisions after consulting scientists in the Outbreak Management Team (OMT) and, in most cases, followed their advice. The end of the pandemic is in sight because scientists succeeded in developing vaccines faster than expected.

On two occasions, we sent insights to the Dutch House of Representatives on its approach to COVID-19. In both cases, we warned against focusing unilaterally on technology. Technology – whether that means a vaccine or an app that tells you when you have been in close proximity to an infected person – is never more than one element in a broader solution that must also address how society has organised healthcare. Ultimately, human behaviour is also critical.

Shortly after Pfizer became the first drug manufacturer to publish hopeful results about a possible vaccine, we reminded the House of Representatives of the importance of developing a social roadmap for exiting the crisis.

That roadmap must include adequate planning for communication and measures to ensure that the public trusts, and continues to trust, the vaccines.



Director Melanie Peters: 'It will always be important to avoid hasty decisions and to make our own choices.'

We emphasised that we can only overcome a global pandemic by making a sufficient number of vaccines available in poorer countries.

The COVID-19 pandemic suddenly made trends and developments that we had already been observing much more significant. A few weeks after the Dutch started working from home en masse, we published *Valued at work*, our report on the growing role of digital monitoring in the workplace. Digital monitoring tools often serve a noble purpose in the workplace, but they can also lead to breaches of privacy, discrimination in recruitment and selection, and more work pressure. We wrote our report at the request of the House of Representatives' Social Affairs and Employment Committee. During the report's presentation, we pointed out that government must consult unions and employers about limiting the use of digital monitoring tools in the employment relationship.

When schools closed in the spring, around 100 teachers and parents agreed to share their initial experiences with distance learning with us. We used their input for our blog series *Leren digitaliseren*, in which we examined how digitalisation in education affects values that we consider crucial to our society. Digital tools offer wonderful opportunities to better attune education to the needs of individual pupils, but such tools can only be effective if learning is teacher-centred (and of course, pupil-centred).

Digitalisation is also making rapid strides in other domains. We published studies on two increasingly popular immersive technologies. Speech technology allows us to talk to computers, and a growing number of smartphones, smart speakers and other smart devices are listening to what we say. Augmented reality adds digital layers to our experience of reality. Virtual reality, the subject of one of our reports in 2019, takes us to an entirely simulated world in which all the images we see and sounds we hear are computer-generated.

To help society maintain its grip on the digitalisation process, we drafted the *Rathenau Manifesto*, in which we identify ten design requirements to implement now for tomorrow's digital society. They include designs that allow us to remain in control of our digital body, to remain anonymous if we wish to be, and to take control of our virtual identity.

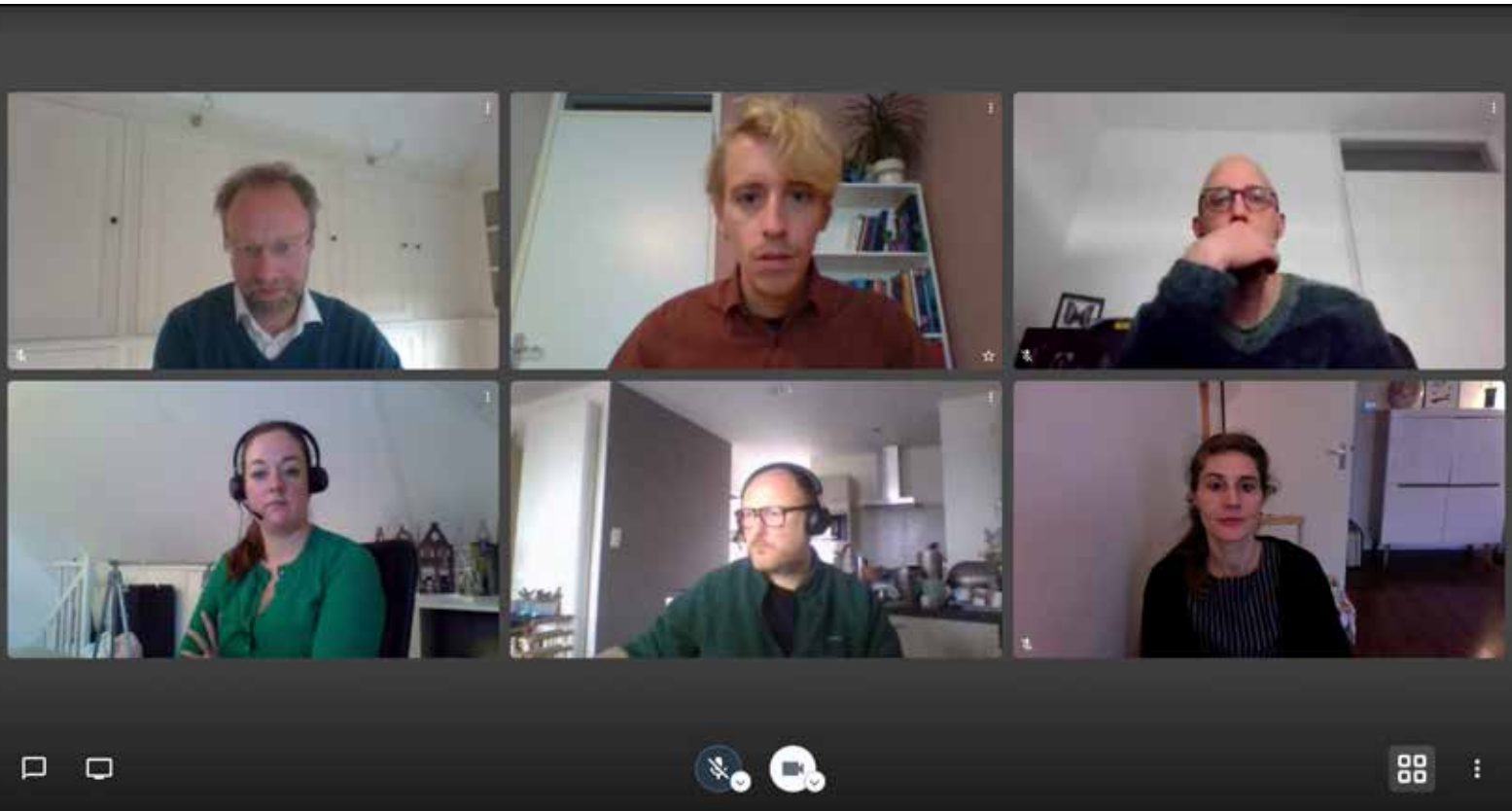
At the request of the House of Representatives' Temporary Committee on the Digital Future, set up to investigate how the House can better manage the desirable and undesirable consequences of digitalisation, we presented the report *More grip on digitisation*. We scanned the working methods that parliaments in ten different countries employ to address digitalisation and used the outcomes of our study as a basis for identifying various ways in which the Dutch parliament can tighten its grip on this process. One recommendation was to establish a standing committee for digital affairs, which the House has now adopted.

At the start of the coronavirus crisis, Prime Minister Mark Rutte regularly pointed out that his Government had to take 100% of its virus-related decisions based on 50% of the necessary knowledge. That has in fact long been the case for most of the subjects that the Rathenau Instituut studies. It is, by definition, difficult to say how innovative technologies will ultimately affect society. For that very reason, it is important to have a clear idea of where we wish to go as a society. What values do we cherish most?

To identify those values, we need to engage with the public. Surveys often fail to reveal what people really think about complex issues; what we need is to have real conversations. Despite the restrictions on physical encounters imposed by the Government's COVID-19 policy, we were able to talk to members of the public in 2020 about the modification of human embryo DNA, trust in science, and the role of the internet. The latter was the topic of the United Nations' Global Citizens' Dialogue on Internet, 'We the Internet'. As part of its 75th anniversary celebrations, the UN organised dialogues in more than one hundred countries about the future of the internet. We organised the dialogues in the Netherlands with our partner Radboud University Nijmegen.

The merger between our physical and digital worlds accelerated by the coronavirus crisis in 2020 will certainly not be reversed completely in 2021, not even if vaccines and treatments succeed in rendering COVID-19 harmless. But digitalisation is not something that simply befalls us, like an unknown virus. That is equally true of other innovations. What the future holds is largely up to us. The Rathenau Instituut helps the public, politicians, policymakers and civil society organisations come to terms with this idea, because it will always be important to avoid hasty decisions and to make our own choices.

In conversation



Screenshot from the annual Rathenau Live Event, organised entirely online on 26 and 27 November.

The Rathenau Instituut studies the impact of science and technology on society and discusses this with stakeholders, professionals, the public, fellow knowledge institutions, politicians and civil society organisations. In 2020, the COVID-19 pandemic meant that most, but not all, of those discussions took place online. We participated in debates and conferences in the Netherlands and abroad, attended meetings in the Dutch Senate and House of Representatives, and appeared regularly in the media.

In conversation with politics and society

The Rathenau Instituut in figures:



Rathenau Live 2020: augmented reality, virtual reality and speech technology

What does it mean to be immersed in a virtual world?

The focus of the Rathenau Instituut's annual autumn event on Thursday 26 and Friday 27 November 2020 was on augmented reality (AR), virtual reality (VR) and speech technology. The rise of these new, immersive technologies is blurring the line between humans and computers and between the physical and digital domains. What does this mean for our behaviour or our professional and private lives? Can we still tell the difference between fake and real? These were the questions discussed by participants in our online event.

We published our report **Fake for real**, about AR, and **Look who's talking**, about speech technology, in the autumn of 2020, following our earlier report **Responsible VR**, about virtual reality. The three technologies discussed in these publications are advancing rapidly. They help us to do our work and to learn new skills, and they also support operational processes. They do this by immersing us in a new, hybrid reality, something that affects our sensory perception and has implications for such matters as privacy and identity. There is a critical need to consider what rules are necessary to manage these technologies effectively. To kick off the debate, we published the **Rathenau Manifesto**, which lays down ten design requirements for our digital future.



Screenshot of the VR experience, part of the Rathenau Live Event 2020.

The COVID-19 restrictions meant that we organised our annual autumn event entirely online. There were several presentations highlighting the various aspects of AR, VR and speech technology, with researcher Dhoya Snijders and director Melanie Peters appearing as avatars, a VR game, and discussions in small groups. There was also ample opportunity for one-on-one discussions in the online environment.

Many different sectors, from education and healthcare to enterprise, academia and government, are grappling with issues related to AR, VR and speech technology. Participants shared their own accounts of these technologies in the dialogue sessions and discussed their questions and concerns. At the end of Rathenau Live 2020, we concluded that we must continue to discuss these technologies and work together to shape the future of our digital society.

Impact of digitalisation

7 - 9 July: DAO knowledge festival / online

To mark publication of the final report by the House of Representatives' Temporary Committee on the Digital Future (TCDT), the House Analysis and Research Department (DAO) organised an online knowledge festival. Dhoya Snijders was invited to attend and gave a presentation in which he discussed the impact of digitalisation on our society and how it affects every single House committee.



DNA Dialogue

January and throughout the year / online and at various locations

What do the Dutch think about modifying human embryo DNA? The DNA Dialogue project gave people the opportunity to discuss their views. In 2020, Petra Verhoef, Sophie van Baalen and Jeroen Gouman travelled up and down the country or moderated online discussions with various groups of people, from visitors at the Nine Months Fair parenting event to embryologists.

Valuable AI for public health

7 February: InEen, Utrecht

One of the organisations representing primary healthcare professionals, InEen, helps members with questions about new technology and encourages innovation and collaboration. InEen organised a meeting about artificial intelligence in healthcare. Petra Verhoef gave the introductory lecture 'Using artificial intelligence for the benefit of public health' and shared the Rathenau Instituut's most important findings on this subject.



Rathenau online talk show

24 October: Dutch Design Week, Eindhoven / online

How can AR, VR and speech technology touch people's lives, and under what conditions can they enrich society? Dhoya Snijders and Rinie van Est discussed this topic with inspiring guests during the online talk show *Enriching reality: Designing human-centred AR, VR and voice applications*.

Polarisation

30 January: Studium Generale, Wageningen University and Research

How is polarisation in debate affecting our political preferences? What does this mean for our tolerance of other political views? Geert Munnichs gave a lecture entitled 'Democracy and Public Debate' as part of the lecture series The Public Sphere & Polarization.

Recommendation on Science and Scientific Researchers

19 January: Netherlands National Commission for UNESCO, The Hague

Patricia Faasse and Alexandra Vennekens took part in an expert meeting about developing indicators for the UNESCO Recommendation on Science and Scientific Researchers, which promotes adequate financial and institutional support for scientific researchers and provides information on appropriate national research, technology and innovation policies and the measures necessary to implement these.

Higher education and AI

4 March: Eindhoven University of Technology's Centre for Humans and Technology, EAIIS, Studium Generale, Eindhoven

What are the implications of AI for higher education and how can we prepare ourselves by acquiring the new skills and knowledge needed to manage it? Bart Karstens gave a lecture during the symposium 'From blackboard to black box: education and learning in the age of AI'.



Connecting with citizens during the coronavirus crisis

11 May: 'Digital participation – Engagement during the coronavirus crisis' / online webinar

How can regional and local authorities use digital participation tools to engage or engage more deeply with citizens at a time of social distancing? In this webinar, Paul Diederik talked about digitalisation and engaging with society.

Evidence-based policy

15-18 December: conference, The Hague / online

The COVID-19 pandemic has governments worldwide basing their policies on scientific evidence (information, data). Can the crisis teach us how to improve communication between policymakers and scientists? What underlying conditions do we need to establish for that to happen? Melanie Peters gave a presentation with recommendations. Wopke Hoekstra, Pieter Duisenberg and Jonathan Breckon were among the speakers.



Coronavirus vaccine and ethics

10 November: ISPE Symposium / online

Pieter van Boheemen gave a presentation at the Young Professionals Virtual Event, part of a symposium organised by the International Society for Pharmaceutical Engineering (ISPE). His presentation concerned the ethics underpinning the order in which different groups of people are getting vaccinated against COVID-19.



21st-century challenges

4-5 February: Odyssey Hackathon Connect, The Hague

How can we devise open source solutions to the complex global challenges now facing society, such as the energy transition? The non-profit organisation Odyssey brings together governments, businesses, scientists and the non-profit sector to discuss issues of the future. The Rathenau Instituut helped to organise the event.



Open science

12 March: Leibniz Research Alliance Open Science / online

One of the main goals of open science is to promote equality. But can open-science applications also have adverse effects? Anne-Floor Scholvinck gave a presentation and participated in a panel discussion at the Open Science Conference 2020.

The geography of innovation

29-31 January: University of Stavanger, Norway

The *Geography of Innovation* conference addressed the scientific, policy and strategic issues related to the spatial dimension of innovation activities. The conference brought together leading scientists from a wide range of disciplines. Jos van den Broek spoke at the conference on behalf of the Rathenau Instituut.

The future of the potato

30 November: Potarei (partnership between Rathenau Instituut, University of Groningen, Wageningen University and Research and Solynta) and the Netherlands Food Partnership / online

Rosanne Edelenbosch gave a lecture during the Potato Futures: Impact of Hybrid Varieties conference. The conference addressed the responsible cultivation of the hybrid potato and shared the findings of the Potarei project.

In conversation about the future of the internet

8-10 October: Rathenau Instituut, Radboud University and Missions Publiques / worldwide, online

What can our data be used for and how do we ensure that the internet is safe and beneficial for all? On behalf of the United Nations' Global Citizens' Dialogue on Internet, 'We the Internet', the Rathenau Instituut spoke to people all around the Netherlands about their internet experiences and ideas.

AI and ethics

Late April: UNESCO, Rathenau Instituut (observer status), global / online

How do we arrive at international agreements about AI that prioritise human rights? UNESCO is working on a *Recommendation on the ethics of artificial intelligence*. The Rathenau Instituut has been appointed as a national observer in this process. In July, regional virtual consultations were held with various UNESCO-designated stakeholders from Western Europe and North America, chaired by Linda Kool. The Rathenau Instituut organised the consultations.

In the media

Potato Revolution

The Rathenau Instituut is to publish the project results on Tuesday. Its main finding is that commercial parties and government must lead the potato revolution together and ensure that it not only aids in the battle against hunger but also promotes sustainable development.'

Trouw, 21 January 2020 \ about *Potatoes are the future*

Temporary contracts at universities

'Dutch universities employ few permanent staff compared with their counterparts elsewhere in Europe. Many lecturers in the Netherlands, and post-doctoral fellows in particular, work on temporary contracts. That is one of the findings of a new study by the Rathenau Instituut.'

AD.nl, 4 February 2020 \ about the fact sheet *'Tijdelijke contracten bij universiteiten in perspectief'*

Questions about a challenging topic

'The DNA Festival is part of the national #DNADialogue project in which various organisations – including the Rathenau Instituut and Erasmus Medical Centre – are talking to members of the public about genome editing and answering its questions about this complex topic.'

Linda.nl, 10 March 2020 \ about the *DNA Dialogue project*

Public support

'Less than a third of Dutch people support lifting the ban on creating embryos for medical research. In fact, public support has even declined slightly compared to a 2007 survey, according to the Rathenau Instituut.'

ANP, 11 March 2020 \ about *Gewicht in de schaal. Nederlanders over onderzoek met embryo's*

International mobility of AI scientists

'The Netherlands is losing researchers who specialise in artificial intelligence (AI) to foreign countries, scientists warned late last year. But the Rathenau Instituut claims that we are welcoming just as many in return.'

Technisch Weekblad.nl, 26 May 2020 \ about the fact sheet *'International mobility of AI scientists'*

Ratio of male and female staff

'The eight university medical centres in the Netherlands now have more female than male researchers on staff, says the Rathenau Instituut. More than 60 per cent of researchers at Dutch UMCs are women and 40 per cent are men. "At universities, the ratio is just the opposite," according to the institute.'

Reformatisch Dagblad, 18 June 2020 \ about the fact sheet *'Het personeel bij de universitair medische centra'*

International competition

'Dutch science is internationally competitive. The Netherlands has a large number of universities that place well in international rankings, it has institutes that cooperate closely with their counterparts abroad and with industry, Dutch research publications are widely cited, and Dutch researchers are successful at obtaining European funding for their projects. That is the conclusion of the Rathenau Instituut's report *Balans van de Wetenschap*, published on Tuesday.'

De Telegraaf, 25 August 2020 \ about *Balans van de wetenschap*

Investment and growth potential

'Investment in R&D is a good indicator of a country's growth potential. The more investment, the better. As the Rathenau Instituut showed earlier this year, government expenditure on R&D as measured in euros has risen sharply in recent years. Again, compared to the rest of Northwest Europe, the Netherlands's performance is decidedly lacklustre.'

Het Financieele Dagblad, 14 September 2020 \ about *TWIN 2018-2024*

Conceptual framework

"The fact that local councils have little to say about digitalisation means that decisions lack democratic legitimacy," says Melanie Peters, Director of the Rathenau Instituut. A new five-step conceptual framework should help local representatives to make more conscious choices about digitalisation.'

Media Digitaal, 21 September 2020 \ about *Raad weten met digitalisering*

Fake news, deepfake videos and disinformation

‘Digital technology is getting better and cheaper all the time. So it is likely that Dutch democracy will soon be threatened by fake news, deepfake videos and disinformation, according to the Rathenau Instituut, which studies and debates the impact of science, innovation and technology on society.’

Nederlands Dagblad, 14 October 2020 \ about Digital threats to democracy

Robotisation of employees

‘Digital monitoring tools allow employers to keep an ever closer eye on their staff. Workers are being turned into robots, warns the Rathenau Instituut in a report presented to the House of Representatives on Thursday.’

De Volkskrant, 5 November 2020 \ about Valued at work

‘There is even American software that takes a screenshot every so often to see which windows employees have open.’

Researcher Djurre Das in *Nederlands Dagblad*, 5 November 2020, about our report *Valued at work*

On the agenda



The municipal council of Rotterdam
Photograph: Jerry Lampen / ANP

The Rathenau Instituut's task is to use research and dialogue to support political debate and consensus-building in the Dutch House of Representatives and Senate and in the European Parliament. We do this in our Messages to Parliament, for example, and by making ourselves available for technical briefings, round table discussions and general consultations. We share our insights in this way and offer politicians courses of action for decision-making on the impact of science and technology on society. The following pages offer examples of how we support political debate.

532

Total number of references in all official documents of the Dutch Senate and the House of Representatives

143

Number of Letters or Reports to Parliament referencing the Rathenau Instituut.

26

Number of debates in Parliament in which the Rathenau Instituut's output was mentioned in the arguments.

Nurturing debate

The Rathenau Instituut's research and dialogue also nurtured the political debate in 2020. We submitted a total of 21 Messages to Parliament in which we briefly explained our findings, focusing on current issues in the House of Representatives. We spoke to several MPs about such matters as digitalisation, climate and energy, and science policy. Our publications were widely cited in Government letters and parliamentary debates, for example on germline genetic modification, the Dutch contact-tracing app, and scientific cooperation with such countries as China.

At the request of the House of Representatives' Committee on Social Affairs and Employment, the Rathenau Instituut investigated the role that digital monitoring technologies play in the workplace and their influence on the quality of work. The main message conveyed during the presentation of our report **Valued at work** was that the unions, employers and government must enter into a dialogue with a view to limiting the use of digital technology in employment relationships.

One highlight of the year was our involvement in the investigation by the House Temporary Committee on the Digital Future. The committee examined how the House can better organise itself to gain a better grip on the digital transition.



Members of the Temporary Committee on the Digital Future take receipt of the Rathenau Instituut's report *More grip on digitisation*.
Photograph: Niels Donker

We arranged a familiarisation programme to help the committee members get started, seconded one of our researchers to the committee staff, and conducted research at the request of the committee. This resulted in our report **More grip on digitisation**, in which we surveyed how other national parliaments deal with digitalisation. The committee incorporated our input into its final report and recommendations.

In the political arena

In 2020, elected officials made frequent reference to the Rathenau Instituut's research. Below is a selection.

'Consider the broader context'

'The Rathenau Instituut has concluded that the ammonia controversy goes beyond the scientific debate. Values and interests, including the revenue model of livestock farmers, also play an ongoing role. The only way to resolve this controversy is to consider the broader context in the discussion.'

*Minister of Agriculture Carola Schouten referred to our report **In gesprek over ammoniak** when responding to questions in the House of Representatives following a report by the Netherlands Court of Audit on manure pollution.*

'Very precise recommendations'

'It would be good for the Minister to submit a letter to Parliament. The Rathenau Instituut has made very precise recommendations as to how to contextualise the debate concerning interventions involving embryos so that people are properly informed and can participate on that basis. So my question is very simple, really. Will he address the Rathenau Instituut's recommendations in his letter?'

*MP Lianne Ploumen (PvdA) referred to our report **Gewicht in de schaal** during a general parliamentary discussion on medical ethics.*

'No logical explanation'

'In fact, a number of universities are consistently underperforming. I refer in that regard to a recent publication by the Rathenau Instituut, which concludes that there is actually no logical explanation for why some universities appear to have far more temporary contracts than others.'

*MP Frank Futselaar (SP) referred to our fact sheet **'Tijdelijke contracten bij universiteiten in perspectief'** during a discussion of the Strategic Agenda for Higher Education.*

'Examined ... other parliaments'

'With assistance from researchers at Utrecht University, Radboud University and the Rathenau Instituut, we reviewed our own performance in recent years and examined how other parliaments deal with the issue of digitalisation.'

*Chair of the Temporary Committee on the Digital Future Kathelijne Buitenweg (GroenLinks) referred to our report **More grip on digitisation** in the committee's own report.*

'Do more than merely reference'

'I therefore call on the Minister to do more than merely reference the institutions or conversations and actually do what the Rathenau Instituut says.'

*MP Harry van der Molen (CDA) warned of the risk that China may extract important military know-how from the Netherlands during a general discussion between the Standing Committees for Education, Culture and Science, Economic Affairs and Climate Policy, and European Affairs with Science Minister Ingrid van Engelshoven. He referred to our report **Kennis in het vizier**.*

'In line with the report'

'Given that in its report the Rathenau Instituut calls on the national government to flesh out and elaborate on a framework to prevent sensitive scientific knowledge from being leaked to high-risk countries, we ask the Government to follow up the report **Kennis in het vizier** by developing new assessment frameworks and clear-cut procedures and by making firm agreements that will ensure a socially responsible approach to knowledge-generation for defence and security purposes.'

*The House of Representatives adopted a motion by MPs Harry van der Molen (CDA) and Dennis Wiersma (VVD) that refers to our report **Kennis in het vizier** and asked the Government to investigate whether China should be added to the list of countries being examined by the Task Force on 'Supervision of students and researchers from high-risk countries'.*

'Necessity and proportionality'

'The amended DPIA will also describe in more detail what had been done to ensure that the CoronaMelder contact-tracing app complies with the principles of fairness/necessity and proportionality, thereby also addressing the considerations presented to the House of Representatives by the Rathenau Instituut.'

In his update for the House of Representatives regarding the contact-tracing app, Health Minister Hugo de Jonge wrote that the new 'data protection impact assessment' will apply principles highlighted in our Message to Parliament 'Considerations arising from the letter to Parliament on the introduction of the "CoronaMelder"'.

'Protection of privacy'

'Finally, I'd like to say a word about sharing medical information during the pandemic. The Rathenau Instituut correctly points out that the concept of "data solidarity" undermines patients' rights and the protection of privacy. ...It would be helpful for the Minister to speak out against this threat.'

MP Chris Jansen (PVV) referred to our Message to Parliament 'Gegevensuitwisseling in de zorg' during a general discussion between the Standing Committee on Health, Welfare and Sport and Medical Care Minister Tamara van Ark.

'A very important report'

'We have received a very important report from the Rathenau Instituut. I would ask the state secretary to comment on it in detail, so that we can include it in further debates about the future of the job market.'

*MP Bart van Kent (SP) refers to our report **Valued at work** during a general discussion in the House Standing Committee on Social Affairs and Employment.*

'Rules offering guidance'

'Following a request by the police force, the Rathenau Instituut studied what the public thinks of sensors in 2019. Based on what it learned, it has drawn up eight rules that offer guidance when assessing the use of sensors in policing.'

*In his response to questions by Dutch MPs Marijke van Beukering (D66) and Kees Verhoeven (D66) about the use of discriminatory algorithms and mass surveillance in policing, Justice Minister Ferdinand Grapperhaus referred to our report **Citizens and Sensors**.*

'Clear and comprehensible'

'The Rathenau Instituut has delivered a clear and comprehensible report that provides a good idea of trends in the third funding stream and what we know about the influence of this funding stream on scientific research.'

*In December, Education Minister Ingrid van Engelshoven sent our report **Ontwikkeling derde geldstroom en beïnvloeding van wetenschappelijk onderzoek** to the House of Representatives.*

Deel 2

In the spotlight

The Rathenau Instituut's work covers a broad spectrum of subjects, from digitalisation in education to gene-editing in embryos, and from European innovation policy to Dutch science and scholarship. In this part, we describe our research in 2020 by theme.



The Maasvlakte port complex seen from the beach at The Hague.
Photograph: Frans Blok / Shutterstock

How do we create an inclusive digital society?



A grandson teaches his grandfather to play an online game.
Photograph: Sabine Joosten - Hollandse Hoogte

Digital systems are changing many sectors of our society. The greatest challenge is to build a digital society in which everyone can participate. In 2020, the Rathenau Instituut studied the impact of digitalisation on work, education and other domains. Our findings resulted in tools and design requirements that officials, professionals and members of the public can use to shape the digital society of the future.

We must design tomorrow's digital society today

Technological citizenship, digital education, and requirements for digitalisation

Technological citizenship

Digital inclusion is when everyone can participate in digital society. It is one of the Dutch government's key policy objectives and means that everyone in the Netherlands should be able to use a computer and find their way around the internet. The Rathenau Instituut provided the relevant figures in its fact sheet **'Digitale vaardigheden voor technologisch burgerschap'**.

Compared with other citizens of the European Union, the Dutch have decent basic digital skills. They can look up information on the web, send e-mails or do their banking online. But to develop true technological citizenship, the level of skill needs to improve across all groups in society.

Technological citizenship implies that people understand the opportunities of digitalisation and can handle its risks. As technological citizens, they are aware that personal data may be vulnerable online and protect their log-in data. They are able to participate in digital public debate and make up their own minds. Statistics show that not only elderly and less educated people need to improve their digital skills, but also young people and the higher educated. To ensure the secure use of the internet and to employ digital tools to improve public and political discussions, the Dutch must acquire a broader type of technological citizenship.

We all have a lot to learn when it comes to privacy, cybersecurity and spotting fake news. We need greater awareness and enough knowledge to participate in discussions and decision-making on crucial legislation. That is not easy for any of us, including politicians.

Education

In 2020, the Rathenau Instituut examined digitalisation in education. Part of the study, concluded in 2021, was the blog series **Leren digitaliseren**.

The series analyses practical examples of distance learning and the use of data and digital tools in face-to-face learning, for example tools that personalise the curriculum for individual pupils or that analyse data on learning behaviour. How is digitalisation affecting the quality of education? And how is it impacting such core values as autonomy, fairness and humanity?

Do schools, pupils and their parents have anything to say about how the education sector is proceeding with digitalisation?

The COVID-19 pandemic has accelerated the digitalisation process in education, with mass adoption of IT tools by education professionals, students and pupils. In June 2020, the Rathenau Instituut published a Message to Parliament to use as input for a general parliamentary discussion about 'education and the coronavirus' entitled **'Handvatten voor doordachte digitalisering in het onderwijs'**. In it, we list various points of concern regarding the ongoing digitalisation of primary and secondary education, for example the risk of high-tech companies leveraging control over data and growing social inequality. We also called on government to encourage research into educational innovation, to coordinate such efforts at the national level, and to ensure that education professionals, parents, pupils, software developers and publishers are actively involved in the research.

Design requirements

The Rathenau Instituut has been looking closely at immersive technologies in recent years. Building on our 2019 study of virtual reality, we published two reports in 2020: **Look who's talking**, about speech technology, and **Fake for real**, about augmented reality.

These technologies are knitting the physical and digital worlds together more than ever before. Virtual reality transports us to a completely artificial world in which all sounds and images are computer-generated. Augmented reality adds digital layers to our experience of reality; a car mechanic wearing a pair of smartglasses, for example, will see a layer of useful information while working on an engine.

And speech technology allows us to talk to computers, while a growing number of smartphones, smart speakers and other devices are listening to what we say.

Our digital society is entering a new phase, then, one that is raising urgent societal and political questions. Can we still tell the difference between fake and real? How will we interact with one another in the new digital world? And do we control that world, or are we being controlled by it?

Based on our research into virtual reality, speech technology and augmented reality, we presented our **Rathenau Manifesto**, which sets out ten requirements for tomorrow's digital society as a prelude to a broad public and political debate.

Ten requirements for tomorrow's digital society

1. We want to remain in control of our digital body.
2. We want to be able to remain anonymous.
3. We want control over our virtual identity.
4. We want clarity on new digital property issues.
5. We want to live in an inclusive digital world.
6. We want to be able to tell that something is fake.
7. We want protection against manipulation and persuasion.
8. We do not want our health to be harmed.
9. We want a digital market with a fair balance of power.
10. We want public spaces to remain public.

'Digitalisation makes teachers even more important. They must ensure that the system's set-up is appropriate for the pupil and monitor the group process, because otherwise it's all going to go wrong.'

Researcher Bart Karstens in *NRC Handelsblad*, 27 November 2020

Valued at work with digital monitoring tools

More dialogue about digital monitoring of workers

Online job applications, productivity tracking and metrics on workload and employee engagement: in 2020, the House of Representatives' Social Affairs and Employment Committee asked the Rathenau Instituut to investigate the influence of digital monitoring technologies on the quality of work. Digital monitoring tools became an even more important element of employment in 2020 owing to the COVID-19 pandemic, which forced large sections of the population to work from home.

Digital tools can support decision-making and improve the quality of work. But as our report **Valued at work** shows, such tools are changing employment relationships and can lead to a narrow view of what constitutes valuable work. By definition, they ignore the non-quantifiable, for example the value of social contact between co-workers.

The study also shows that digital tools can impinge on worker privacy, lead to discriminatory recruitment practices, and increase workloads. Employers in the Netherlands are already using screenshots to monitor employees working from home, analysing facial expressions in video job interviews, and automating workload instructions.

It is important, then, for organisations to guard against abuse and to understand the effect of digital tools. During a Technical Briefing for the House of Representatives in November 2020, Rathenau Instituut researchers stressed that employers, workers and government must engage in dialogue about setting limits on the use of digital technology in the employment relationship. Digital tools should support people at work but not reduce them to robots.



Researchers Djurre Das and Roos de Jong presented the report *Valued at work* to the House of Representatives' Social Affairs and Employment Committee.

Photograph: Dirk Hol

How do we generate knowledge and innovations for a society in transition?



Biking past wind turbines on the Eemmeerdiijk cycle path.
Photograph: Egbert Hartman / ANP

Our society is transitioning in several respects. There is the digital transformation, the transition to a sustainable energy supply, and the move to become a circular economy. All these changes require new knowledge and innovations, generated in new ways. Research universities, universities of applied sciences, knowledge institutions and companies are working together, with each one having its own role to play. As they interact with one another, they create knowledge ecosystems. The Rathenau Instituut charts the dynamics of knowledge ecosystems and studies how they can be mobilised to generate knowledge and solutions to major societal challenges.

Cooperating on a mission

A new policy genre for science and innovation

Government expenditure on R&D and innovation

One of the Rathenau Instituut's tasks is to improve our understanding of how the Dutch science system functions. That is why we publish annual data on trends in government expenditure on R&D and innovation.

Totale Investerings in Wetenschap en Innovatie 2018-2024 (TWIN 2018-2024) shows that the Dutch government budgeted 9.5% more for R&D and innovation in 2020 than in 2018, with 7.7 billion euros in direct and tax-related support in 2020 compared to 7.1 billion euros in 2018.

Public spending on R&D in the Netherlands is slightly higher than the EU average and slightly lower than the OECD average. The TWIN figures for 2018-2024 show, among other things, that EU funding is paying for a growing proportion of Dutch R&D. The Netherlands takes about one and a half times more out of the EU's research grant budget than it pays in. It has received an average of around 700 million euros in recent years, financing some 12% of all publicly funded research in the Netherlands. Until 2014, that was only 9%.

Governance philosophy

Ministries, public knowledge organisations and other institutions and companies must work together to tackle major societal challenges. In 2019, the Dutch Government introduced a mission-driven innovation policy which envisages the science community, the political world, businesses and civil society organisations joining forces to tackle missions or challenges, for example climate change mitigation and adaptation, the energy transition, and the move to sustainable food production.

The Rathenau Instituut studied the new mission-driven innovation policy in 2020 and shared its insights with the House of Representatives. In our Message to Parliament **'Missiegedreven innovatiebeleid vraagt samenwerking tussen lokaal en nationaal niveau'**, we described what is needed to mobilise knowledge institutions, companies, civil society parties and the public to tackle complex missions. Until now, innovation policy involved supporting technological advances and innovativeness in the private sector. Major societal challenges were conceived of and interpreted mainly as economic opportunities for companies.

That governance philosophy is too limited for an innovation policy designed to address societal missions or challenges. A new approach is needed in which local initiatives, such as living labs (see page 25), should be incorporated into the national innovation strategy. What is also required is a government that actively ensures consistency. In our Message to Parliament **'Maak werk van opgavegericht innovatiebeleid'**, we explain what a proactive government can mean for the design, governance and management of mission-driven knowledge and innovation programmes.

The EU's growing ambitions

The European Commission is also growing more ambitious about deploying R&D to attain societal goals. It intends to use the new research and innovation programme Horizon Europe, which runs from 2021 to 2027, to target six strategic priorities; these include making Europe climate-neutral (by means of the European Green Deal), preparing Europe for the digital transition, and creating a more resilient Europe in the world. In our report **European research and innovation in a new geopolitical arena**, we performed desk research and interviewed experts to take stock of the changes being made to the EU's Science, Technology and Innovation policy.

The European Union is more than an important source of funding for Dutch researchers. In recent years it has come to have an important impact on the Dutch research agenda and on how research in the Netherlands is organised, carried out and valorised. The EU is likely to influence Dutch research and innovation even more in the future than it does now, with multi-level cooperation between the EU, the Member States, regions and cities playing an essential role in tackling major societal challenges.

Engaging citizens

Our report **De belofte van opgavegericht innovatiebeleid** was a follow-up to our study of the EU's research and innovation policy. Lessons learned in the EU offer inspiration for Dutch innovation policy. We analysed two instances of European innovation policy, one related to the Green Deal and the other to the development of artificial intelligence in the EU.

Our conclusion was that if the EU wants its new policies to succeed in addressing major societal challenges, it must seek to engage with other authorities, with its citizens, and with stakeholders.

Innovation policy meant to tackle societal challenges can only succeed if the general public is engaged at an early stage of policymaking and if policymakers take public interests into account.

In the context of R&D governance and programming, this is already more common when the policy addresses climate change than artificial intelligence, an area that requires public trust in technology. Indeed, technology that works for people and respects such values as non-discrimination, professional autonomy and privacy must be designed from the outset with these aims in mind.

‘Trust in science is strong in the Netherlands, but it’s important to keep it that way. You do see people becoming suspicious when it turns out that a university is cooperating with a company or government.’

Researcher Lionne Koens in *De Telegraaf*, 25 August 2020, about our report *Balans van de wetenschap*

Lessons for scaling up living labs

Looking beyond technical solutions

Living labs are true-to-life experimental environments in which multiple parties (knowledge institutions, companies, authorities, civil society organisations, professionals and citizens) work together to generate knowledge and develop solutions to complex societal problems. One good example is The Green Village in Delft, an environment in which researchers and companies can test out urban sustainability projects in a real-life setting.

How can living labs go beyond the local and experimental and gain a broader social impact? Our report ***Voorbij lokaal enthousiasme. Lessen voor de opschaling van living labs*** answered that question. The Rathenau Instituut interviewed people participating in trend-setting Dutch living labs, carried out a literature review, and studied inspiring practices in agriculture, water management and development cooperation.

Local living labs can transcend the experimental if those involved look beyond what are often technical solutions and consider revenue models, legislation and the preferences and interests of the public at large right from the start. In other words, living labs should be used not only to study the innovation itself but also its social context. It is also advisable to connect with other initiatives, parties and locations, so that local initiatives can share what they know and learn from one another. Intermediary organisations can help them make those connections.

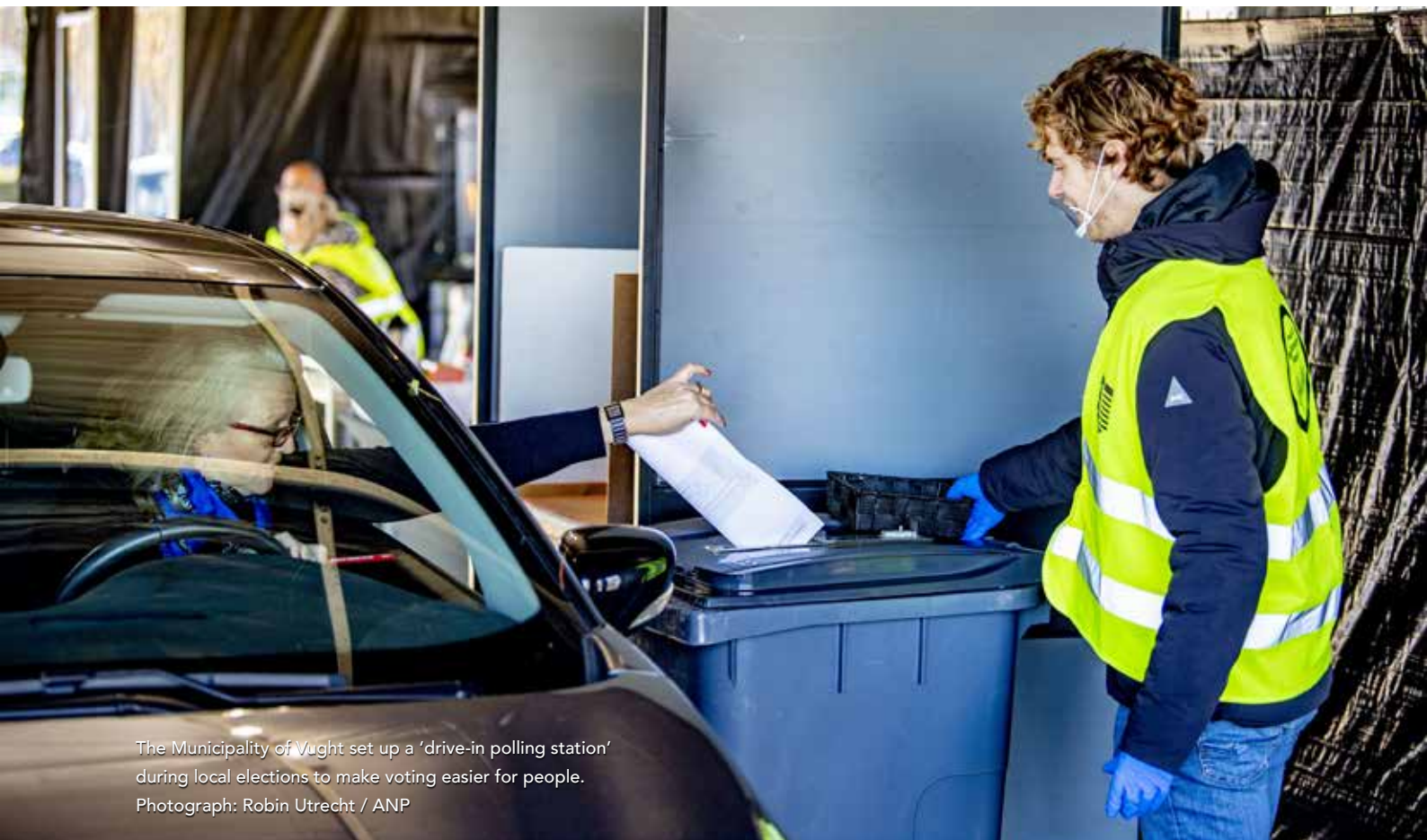
Initiators, participants and funding bodies can use these lessons to scale up their living labs and ensure that their results have a broader and more enduring impact.



Urban Farmers – growing vegetables and farming fish in an office building in The Hague.

Photograph: Joost Bataille / Hollandse Hoogte

How can knowledge serve democracy?



The Municipality of Vught set up a 'drive-in polling station' during local elections to make voting easier for people.
Photograph: Robin Utrecht / ANP

Knowledge helps democracy to function properly. Politicians and policymakers must have access to enough knowledge to analyse societal issues according to the values that the public considers important. Digital innovations can help citizens leverage their influence in this process. All this can set the Netherlands on the path to becoming a knowledge-driven democracy, with all the associated opportunities and risks.

Making informed choices based on what we consider important

Helping politicians, civil servants and the public access knowledge and make choices

Digitalisation choices

For a long time, politicians and public administrators viewed digitalisation mainly in terms of implementation. But there is a growing awareness at national and local level that digitalisation decisions are often also policy choices.

Digitalisation brings about major changes in municipal government but municipal councils rarely discuss its social and societal impact. That was the conclusion of our report ***Raad weten met digitalisering***, based on interviews with some thirty municipal and executive councillors, registrars and experts from various municipalities. We developed a five-step conceptual framework that can help local representatives to make more conscious choices about digitalisation.

The Dutch House of Representatives can better manage the desirable and undesirable consequences of digitalisation by following the example of other national parliaments. That was the conclusion of our report ***More grip on digitisation***, an international comparative study carried out at the request of the House's Temporary Committee on the Digital Future. We examined methods used by national representative bodies in nine other European countries and the United States and pointed out that Germany's Bundestag and the UK's Upper and Lower Houses of Parliament both have standing committees on digitalisation. The Dutch House of Representatives has responded to the Temporary Committee's proposal by deciding to install a Standing Committee for Digital Affairs.

Organising knowledge

In our report ***Kennis, kunde, beleidskeuzes***, we argue that ministries should invest more in acquiring the skills needed to organise their knowledge. Ministerial staff have less subject-specific expertise than they used to. They are more likely than in the past to face complex issues involving multiple ambiguities. What should the purpose of the policy be? What measures are advisable and feasible? How can progress be monitored? Who should be involved in the implementation?

The knowledge required to answer these questions cannot be purchased as a product but must be organised and produced in cooperation with researchers, practitioners, other government tiers and stakeholders. Political decision-makers must then ultimately make the decisions.

Digital tools

In ***Initiatives supporting digital democracy*** at national level, we showed which digital citizen engagement tools the national governments in other countries use. We produced this report at the request of the House of Representatives and the Ministry of the Interior and Kingdom Relations. We were not able to identify one type of tool that lends itself to every form of citizen engagement at every stage of the policy cycle. The Netherlands would, however, do well to develop certain applications and platforms, for example to make government websites more easily searchable and to make the voting behaviour of individual elected representatives more transparent. But the report also carries a warning: productive, unfettered and safe interaction between policymakers and citizens requires more than technology alone.

Safe progress

New technologies such as AI, gene editing and nanotechnology make it possible to solve all sorts of problems, but they may also pose risks that we cannot yet foresee. That is why the precautionary principle is important. How can we reconcile this principle with opportunities for innovation? That is the main question being addressed by RECIPES (reconciling science, innovation and precaution through the engagement of stakeholders), a project in which we are cooperating with ten other organisations in seven European countries. The diverse group of forty individuals with whom we spoke felt that precaution was important but should not be at the expense of innovation; decisions about innovation should, however, involve making reliable information available to the general public, transparency, international agreements and public participation.

Digital threats to democracy

Disinformation and the international cyberconflict

The days when the Netherlands could claim that its democracy was largely unaffected by disinformation may soon be over. That is the warning that we issued in our report **Digital threats to democracy**, produced at the request of the Ministry of the Interior and Kingdom Relations. The report provided a general survey of technologies that could play a role in producing and disseminating disinformation in the foreseeable future. Artificial intelligence, for example, makes it much easier to manipulate voice messages (voice cloning) and videos (deepfakes).

In our Message to Parliament '**Desinformatie bestrijden, censuur vermijden**', we advised the House of Representatives to monitor the influence of disinformation in the Netherlands more closely and to provide stricter regulation of social media companies while avoiding censorship at the same time.

We also pointed out that more robust technological citizenship will ensure that people can identify fake news more easily.

In our blog series **Bits for peace**, we looked for ways to de-escalate the international cyberconflict. Although largely ignored by the media, states (including the Netherlands) have long been engaged in a digital arms race. Cyberweapons are an important component of their geopolitical toolkits, allowing them to cripple or disrupt other countries' systems. These weapons can also fall into the hands of cybercriminals. De-escalating this process requires greater diplomatic effort.



Max Kisman designed the illustrations for the blog series Bits for peace.

How do we ensure that smart healthcare actually works?



Twelve children between the ages of 8 and 12 discussed gene editing in human embryos at Sophia Children's Hospital. Photograph: Leven Willemse

Biotechnological and medical innovations are raising urgent questions. What do such innovations mean for our ability to make perfect lives and for the limits of life itself? And how are they changing our behaviour? The Rathenau Instituut surveyed trends and developments in healthcare technology and investigated relevant options, consequences and issues.

Healthcare of the future: working together and deciding together

In conversation about socially responsible healthcare innovation

Gene therapy

Medical science is producing a host of innovations that are set to significantly change our healthcare system and in fact are already doing so. Gene therapy, for example, holds tremendous promise but requires a broad policy approach to live up to that promise. In our Message to Parliament '**Gentherapie. Integraal beleid nodig voor faciliteren gentherapie**', we advise ministries to coordinate closely and to develop a clear set of rules on safety and effectiveness. A pricing and innovation policy should ensure that patients with rare illnesses also have access to gene therapy.

AI in healthcare

In our **Healthy Bytes** blog series, we investigated how artificial intelligence (AI) is being used responsibly to promote good health. We invited a variety of different stakeholders, from policymakers to investors, to share their views on socially responsible innovation with AI in healthcare. Time and again, they made clear that to develop responsible AI in the healthcare domain, parties must work together and decide together.

DNA Dialogue

In the DNA Dialogue project, we worked with several partners to engage with various groups in society. The main question was: should we add the modification of heritable DNA in embryos to our existing set of techniques for human reproduction? Our discussions revealed that people are capable of drawing ethical boundaries and taking a nuanced approach. To assist in these discussions, we developed a number of scenarios that helped to clarify this complex subject and made it easier to describe the possible implications of decisions taken today and going forward. The results of our dialogues and our analysis of the DNA Dialogue project as a whole can be found in our report **Zo denken Nederlanders over het aanpassen van embryo-DNA**.

Hybrid potato

We also developed a set of scenarios in the past year concerning our future food supply and hybrid potato breeding, a Dutch innovation that can speed up the development of new potato varieties.

These new varieties are grown from true potato seed rather than from seed potatoes (tubers). Our report **Potatoes are the future** explores the opportunities and challenges of this innovation by examining three scenarios. Based on our analysis, we concluded that hybrid potato breeding offers opportunities for a sustainable food supply not only to Western countries but also to the African continent, for example. It is important, however, to take the daily practices of local users into account when developing and adopting the hybrid potato.

Data solidarity and data transfer

Research that serves public health can benefit from having access to large amounts of patient data. That is why government wants to encourage people to make their medical records available to researchers conducting big data research projects aimed at improving public health. Referred to as 'data solidarity', it involves using personal data normally subject to doctor-patient confidentiality for research purposes. On the one hand, patient rights must be protected; on the other, such research serves an important purpose. In the study **Datasolidariteit. Verbeterpunten met oog voor ieders belang**, the Rathenau Instituut asked researchers, patients, physicians and other healthcare professionals to identify problems in the way medical data is now being handled and offered a number of possible solutions.

The topic of data solidarity was also covered in our Message to Parliament '**Gegevensuitwisseling in de zorg**'. Good healthcare depends on the simple and efficient transfer of medical data. But data must be shared responsibly, with patient privacy being protected and with commercial parties being prevented from using medical data indiscriminately. The relevant parties therefore favour setting standards and creating a uniform and unique register for patient medical data.

A way out of the crisis

Technological innovation combined with a broad societal strategy

2020 was the year in which the COVID-19 pandemic brought every one of us face to face with questions about health, illness and the performance of our healthcare system. Innovations such as the contact-tracing app and the rapid development of coronavirus vaccines have made it clear that smart healthcare cannot be based on data and technological ingenuity alone. Medical innovations can only be effective and have an impact if they are accompanied by proper communication with the public and a broader societal strategy. The Rathenau Instituut emphasised this in the past year in three Messages to Parliament: **'The coronavirus crisis calls for careful action and democratic debate'**, **'Considerations arising from the**

letter to parliament on the introduction of the "CoronaMelder"' and 'Maatschappelijke routekaart nodig voor het COVID-vaccin'.

For example, while the COVID-19 vaccines were in development and prior to their approval, we called for information and data about the vaccine to be widely shared. We also proposed giving the public a say in the order in which groups would be vaccinated. We further argued that transparent communication would enable the Government to retain the public's trust. More than anything else, an exit strategy, including a comprehensive package of social measures, can help in finding a way out of the crisis.



Outgoing Health Minister Hugo de Jonge visits care facility 's Heeren-Loo, where residents are being vaccinated. Photograph: Robin Utrecht / ANP

'For years, research at the Rathenau Instituut has shown that the relationship between science and politics is a fragile one. Our aim is to safeguard the independence of the public knowledge infrastructure and to ensure that unasked and unwelcome questions can also be examined.'

Director Melanie Peters in *De Volkskrant*, 23 July 2020

Providing insight into Dutch science



Staff at Leiden University Medical Centre (LUMC).
Photograph: Robin Utrecht / ANP

Dutch research is world-class, an achievement that takes staff, vision, a network of knowledge institutions and money. To inform the debate on Dutch research policy, the Rathenau Instituut develops indicators, updates facts and figures on R&D, and performs quantitative research. We have about a hundred fact sheets and data publications on our website.

Science for and by society

Engaging the public in research, being aware of dependencies and security threats

Open science

Pupils, students, parents, trade unions and professional associations scarcely have any input into research on education. That was made clear in our report *In open science toont zich de meester*. It is the second in a series of three studies in which we examine how researchers engage people in various sectors in setting the research agenda, conducting research and applying the results. Because public engagement in research on education is limited to individuals or individual schools, the gap between different institutions may grow wider.

Tens of thousands of people are involved in studying water quality, but their involvement in fact consists solely of collecting data and they have little input into the research agenda itself. Agenda-setting is almost exclusively a matter for public authorities, implementing organisations, companies and research institutes. Volunteers also derive few benefits from the outcomes of research. That was our conclusion in *Open science op de oever*, the third part in our Open Science series. The first part appeared in 2019 and concerned psychiatric research. A general conclusion will be published in 2021.

Third funding stream

Over the past decade, Dutch universities have begun to receive a larger share of their income from the third funding stream, i.e. funding from public and private sources, contract research for public and private clients, and sources outside the Netherlands. Whereas research commissioned by government, companies and non-profits accounted for a seventh of their revenue in 2008, in 2018 it accounted for almost a sixth. That was made clear in our report *Ontwikkeling derde geldstroom en beïnvloeding van wetenschappelijk onderzoek*, commissioned by the House of Representatives. Universities vary significantly in how heavily they depend on the third funding stream. That dependency can have both desirable and undesirable effects on research, something that universities would do well to consider.

Secure knowledge

The Netherlands lacks a centralised source of adequate information on scientific cooperation with 'unfree' countries. As a result, there is no clear picture of the aggregate risks and possible undesirable dependencies arising from such cooperation. The Government has clarified the division of responsibility for knowledge security between the state, institutions and individual researchers. For a hearing to be

held by the House Committee on Education, Culture and Science on scientific cooperation with unfree countries, we explained five ways in which the Netherlands can solidify and elaborate on its policy in our Message to Parliament *'Kennisveiligheid in hoger onderwijs en wetenschap'*. For example, universities can wean themselves from the third funding stream when conducting dual-use (military and civilian) research and improvements can be made to screening procedures for researcher visa applications.

Temporary contracts

Compared with their counterparts in other European countries, universities in the Netherlands have a relatively high proportion of temporary staff, as our fact sheet *'Tijdelijke contracten bij universiteiten in perspectief'* made clear. That difference is particularly significant when the contracts concern post-doctoral fellows. Dutch universities themselves vary widely in the percentage of temporary contracts, from 26% to 52%. They differ most in the contracts for lecturers and assistant professors. Twenty-seven per cent of all employees in the Netherlands work on temporary contracts. The average for universities is 41%, which is well above the national average. When PhD candidates are not included in the tally, the figure drops to 29%.

Artificial intelligence

The Netherlands is not experiencing a 'brain drain' of scientists who specialise in artificial intelligence (AI). The number of researchers at Dutch universities and research institutes who left the Netherlands for positions abroad in the past twenty years is equal to the number who arrived in the Netherlands. That became clear in our fact sheet *'International mobility of AI scientists'*, in which we compared the mobility of AI scientists in the Netherlands with that of their counterparts in the top ten countries with the highest number of publications in the field of AI. The Netherlands can best be described as a 'brain exchange' country. Incoming and departing AI scientists are also very similar in terms of quality and output.

UMC researchers

The number of female researchers working at university medical centres is now almost equal to the number of male researchers. Our fact sheet *'Het personeel bij de universitair medische centra'* shows that women are in the majority in virtually every job category. The sole exception is the job category 'medical specialist', but here again, the number of women is likely to soon exceed the number of men.

Taking stock of science

The necessity of reinforcing a sound starting position

If we assess the performance of Dutch science on the relevant government targets, we see that it is in good shape. That was the conclusion of our report ***Balans van de wetenschap 2020***, which we presented before the opening of the 2020-2021 academic year. The Ministry of Education, Culture and Science wants Dutch science to have a global impact, to be engaged with society, and to nurture talent.

Our balance sheet reveals that Dutch research is of good scientific quality. Dutch researchers are involved in many international projects and also cooperate frequently with companies and public authorities, something that has a positive impact on the Dutch economy and on the Netherlands' ability to tackle societal problems. Such cooperation can, however,

undermine the autonomy of research institutions. Dutch universities derive a larger share of their revenue from companies and other private parties than their counterparts in many other countries.

Other concerns in Dutch science are workload and job security. Young researchers in the Netherlands tend to be given temporary contracts more often than in other countries. On average, researchers also work overtime by more than a quarter of the hours for which they are contracted to work. The level of sickness absenteeism at Dutch universities is growing. And although progress has been made in recent years, the Netherlands still lags behind other countries in percentage of female researchers.



Students working side-by-side in a university library.

Photograph: Shutterstock

Part 3

Publications and figures

In this part, we list our publications and review our staffing and finances in 2020.



Residents of a residential care facility get to know the iPad.
Photograph: Evert van Moort / Hollandse Hoogte

Reports



Potatoes are the future \ 21 January 2020 \ 59 pages

Rathenau Instituut (2020). *Potatoes are the future - Three scenarios for hybrid potatoes and the global food supply*. The Hague (authors: R. Edelenbosch & G. Munnichs)

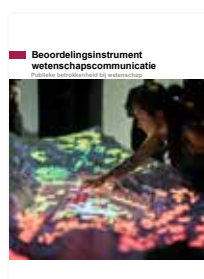
→ Read the report rathenau.nl/en/making-perfect-lives/potatoes-are-future



Voorbij lokaal enthousiasme \ 5 February 2020 \ 66 pages

Rathenau Instituut (2020). *Voorbij lokaal enthousiasme: lessen voor de opschaling van living labs*. The Hague (authors: J. van den Broek, I. van Elzakker & J. Deuten)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/voorbij-lokaal-enthousiasme



Beoordelingsinstrument wetenschapscommunicatie \ 28 February 2020 \ 81 pages

Rathenau Instituut (2020). *Beoordelingsinstrument wetenschapscommunicatie: publieke betrokkenheid bij wetenschapscommunicatie*. The Hague (auteur: A. Verkade)

→ Read the report rathenau.nl/nl/kennisgedreven-democratie/beoordelingsinstrument-wetenschapscommunicatie



Valued at work \ 8 March 2020 \ 125 pages

Rathenau Instituut (2020). *Valued at work. Limits to digital monitoring at the workplace using data, algorithms and AI*. The Hague (authors: D. Das, R. de Jong & L. Kool)

→ Read the report rathenau.nl/en/digitale-samenleving/valued-work



Gewicht in de schaal \ 11 March 2020 \ 115 pages

Rathenau Instituut (2020). *Gewicht in de schaal: Nederlanders over onderzoek met embryo's*. The Hague (authors J. Gouman, S. Vogelesang & P. Verhoef)

→ Read the report rathenau.nl/nl/maakbare-levens/meningen-embryo-onderzoek-2019



Kennis, kunde, beleidskeuzes | 25 March 2020 | 25 pages

Rathenau Instituut (2020). *Kennis, kunde, beleidskeuzes*. The Hague (authors: P. Faasse, I. van Elzakker & P. Diederer)

→ Read the report rathenau.nl/nl/kennis-kunde-beleidskeuzes



Onderzoeksinfrastructuur voor materialen in Nederland | 26 March 2020 | 24 pages

Rathenau Instituut (2020). *Onderzoeksinfrastructuur voor materialen in Nederland: knelpunten en oplossingen in beeld naar aanleiding van ADEM-rondetafelbijeenkomst*. The Hague (authors: J. van den Broek & J. Deuten)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/onderzoeksinfrastructuur-voor-materialen-nederland



European research and innovation in a new geopolitical arena | 14 April 2020 | 33 pages

Rathenau Instituut (2020). *European science and innovation in a new geopolitical arena*. The Hague (authors: L. Hessels, S. Tjong Tjin Tai, J. Jansen & J. Deuten)

→ Read the report rathenau.nl/en/vitale-kennisecosystemen/european-research-and-innovation-new-geopolitical-arena



Feiten & Cijfers: TWIN 2018-2024 | 15 April 2020 | 32 pages

Rathenau Instituut (2020). *Totale Investerings in Wetenschap en Innovatie 2018-2024*. The Hague (authors: A. Vennekens, N. van den Broek-Honingh & L. Koens)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/totale-investerings-wetenschap-en-innovatie-2018-2024



In open science toont zich de meester | 19 mei 2020 | 60 pages

Rathenau Instituut (2020). *In open science toont zich de meester: publieke betrokkenheid bij onderwijsonderzoek*. The Hague (authors: A. Scholvinck, W. Scholten & P. Diederer)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/open-science-toont-zich-de-meester



More grip on digitisation | 28 May 2020 | 232 pages

Rathenau Instituut (2020). *More grip on digitisation - An international comparison of parliamentary working methods*. The Hague (authors: R. de Jong, I. van Keulen, L. van Hove & G. Munnichs)

→ Read the report rathenau.nl/en/knowledge-democracy/more-grip-digitisation



Cyber resilience with new technology | 1 July 2020 | 97 pages

Rathenau Instituut (2020). *Cyber resilience with new technology – An opportunity and a necessity*. The Hague (authors: P. van Boheemen, G. Munnichs, L. Kool, G. Diercks, J. Hamer & A. Vos)

→ Read the report rathenau.nl/en/digital-society/cyber-resilience-new-technology



Open science op de oever | 28 July 2020 | 76 pages

Rathenau Instituut (2020). *Open science op de oever: publieke betrokkenheid bij onderzoek naar waterkwaliteit*. The Hague (authors: A. Scholvinck & P. Diederens)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/open-science-op-de-oever



Balans van de wetenschap 2020 | 25 August 2020 | 153 pages

Rathenau Instituut (2020). *Balans van de wetenschap 2020*. The Hague (authors: L. Koens, M. Schel, S. Vogelesang, N. van den Broek-Honingh & A. Vennekens)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/balans-van-de-wetenschap-2020



Raad weten met digitalisering | 17 September 2020 | 63 pages

Rathenau Instituut (2020). *Raad weten met digitalisering: hoe de gemeenteraad kan sturen op de maatschappelijke impact van digitale technologie*. The Hague (authors: D. Das, P. Faasse, B. Karstens & P. Diederens)

→ Read the report rathenau.nl/nl/kennisgedreven-democratie/raad-weten-met-digitalisering



Voeten in de aarde | 29 September 2020 | 118 pages

Rathenau Instituut (2020). *Voeten in de aarde: datagestuurde innovatie in de stad*. The Hague (authors: B. Karstens, L. Kool & R. van Est)

→ Read the report rathenau.nl/nl/digitale-samenleving/voeten-in-de-aarde



Digital threats to democracy | 13 October 2020 | 111 pages

Rathenau Instituut (2020). *Digital threats to democracy – On new technology and disinformation*. The Hague (authors: P. van Boheemen, G. Munnichs & E. Dujso)

→ Read the report rathenau.nl/en/digital-society/digital-threats-democracy



Initiatives supporting digital democracy at national level | 15 October 2020 | 115 pages

Rathenau Instituut (2020). *Initiatives supporting digital democracy at national level – An international comparison*. The Hague (authors: R. de Jong, J. Jansen, P. Faasse & P. Diederer)

→ Read the report rathenau.nl/en/knowledge-democracy/initiatives-supporting-digital-democracy-national-level



Look who's talking | 20 October 2020 | 93 pages

Rathenau Instituut (2020). *Look who's talking – Tools for the responsible use of speech technology*. The Hague (authors: J. Hamer, S. Doesborgh & L. Kool)

→ Read the report rathenau.nl/en/digital-society/look-whos-talking



Fake for real | 21 October 2020 | 113 pages

Rathenau Instituut (2020). *Fake for real. Ethical and societal implications of augmented reality*. The Hague (authors: D. Snijders, E. Masson, S. Doesborgh, R. Groothuizen, R. van Est, with contributions by L. van Hove and M. Nagel)

→ Read the report rathenau.nl/en/digital-society/fake-real



Rathenau Manifesto \ 22 October 2020 \ 6 pages

Rathenau Instituut (2020). *Rathenau Manifesto: Set 10 design requirements for tomorrow's digital society now*. The Hague.

→ Read the report rathenau.nl/en/manifest



Stad zoekt toga \ 17 November 2020 \ 70 pages

Rathenau Instituut (2020). *Stad zoekt toga: universiteiten en hogescholen als structurele kennispartner voor gemeenten*. The Hague (authors: J. Jansen, S. Tjong Tjin Tai, J. van den Broek & J. Deuten)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/stad-zoekt-toga



Datasolidariteit voor gezondheid \ 3 December 2020 \ 145 pages

Rathenau Instituut (2020). *Datasolidariteit voor gezondheid: verbeterpunten met oog voor ieders belang*. The Hague (authors: J. Gerritsen & P. Verhoef)

→ Read the report rathenau.nl/nl/maakbare-levens/datasolidariteit-voor-gezondheid



De belofte van opgavegericht innovatiebeleid \ 16 December 2020 \ 85 pages

Rathenau Instituut (2020). *De belofte van opgavegericht innovatiebeleid: een analyse van Europees innovatiebeleid voor de Green Deal en kunstmatige intelligentie*. The Hague (authors: L. Hessels, S. Tjong Tjin Tai, J. Deuten)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/de-belofte-van-opgavegericht-innovatiebeleid



Ontwikkeling derde geldstroom en beïnvloeding van wetenschappelijk onderzoek \ 17 December 2020 \ 46 pages

Rathenau Instituut (2020). *Ontwikkeling derde geldstroom en beïnvloeding van wetenschappelijk onderzoek: een data- en literatuuronderzoek ter beantwoording van de motie-Westerveld*. The Hague (authors: N. van den Broek-Honingh, M. Schel & A. Vennekens)

→ Read the report rathenau.nl/nl/vitale-kennisecosystemen/ontwikkeling-derde-geldstroom-en-beïnvloeding-van-wetenschappelijk-onderzoek

Other publications

Garandeer privacy van burgers bij opvolger DigiD

7 January, article (previously published in *Trouw*)

Kunstmatige intelligentie in de zorg: wie beslist?

8 January, article

Investeer in de publieke kennisinfrastructuur voordat deze alleen nog in commerciële handen ligt

15 January, article (previously published in *De Volkskrant*)

Innovaties laten aansluiten bij de maatschappelijke praktijk: zo doe je dat

21 January, article

Nederlandse aardappelinnovatie biedt wereldwijd kansen

21 January, article

Mensen of robots op de werkvloer?

21 January, article

Beleid voor AI in de zorg: een waardenafweging

23 January, article

Hoe zou de samenleving eruit zien als risicovermijding in gezondheidszorg voorop staat?

28 January, case

Het oplopende cyberconflict: wat moeten we weten?

31 January, article

Aandeel tijdelijke contracten bij universiteiten varieert sterk

3 February, article

Tijdelijke contracten bij universiteiten in perspectief

4 February, fact sheet

Sturen op innovatiekracht in de landbouw

4 February, Message to Parliament

Missiegedreven innovatiebeleid vraagt samenwerking tussen lokaal en nationaal niveau

5 February, Message to Parliament

Living lab moet breder kijken dan lokale technische oplossing

5 February, article

Hoe AI iemand met dementie helpt om zijn boterham op tijd te eten

6 February, article

Hoe duurzame energie en digitalisering samenhangen

7 February, article

Investeer in onze publieke kennisinfrastructuur met beleid

9 February, Message to Parliament

Diplomatatie speelt belangrijke rol bij cyberveiligheid

13 February, article

Een duurzaam energiesysteem: complex om te beheren

14 February, article

Verantwoorde AI in de zorg: de waarde van voorbeelden

19 February, article

Dutch citizens set conditions for the use of sensors by the police

20 February, article

Verantwoord beheer van energiedata

21 February, article

Juist in vredetijd is praten over aanvalsregels in cyberspace belangrijk

23 February, article

Protect consumers in virtual reality

27 February, article

Publieke betrokkenheid bij wetenschap

28 February, article

AI in de zorg: implicaties voor het onderwijs

5 March, article

Digitale vaardigheden voor technologisch burgerschap

5 March, fact sheet

Nederlanders kunnen digitale vaardigheden verbeteren

5 March, article

Zeven acties voor verantwoord innoveren met AI

5 March, Message to Parliament

Het aanpassen van DNA in embryo's: hoe denken embryologen hierover?

6 March, review

Nog steeds weinig draagvlak voor het maken van embryo's voor onderzoek

11 March, article

Denk mee: nieuw werkprogramma 2021-2022

18 March, news

Ondernemen met AI in de zorg: behoefte aan samenwerking en strategie

18 March, article

Missiegedreven innovatiebeleid: wat, hoe, waarom?

20 March, article

Het aanpassen van DNA in embryo's: bezoekers van de Negenmaandenbeurs

24 March, review

Staten hebben de plicht om zich in cyberspace verantwoord te gedragen

27 March, article

Hoe een investeringsfonds kan bijdragen aan verantwoorde AI in de zorg

1 April, article

What could happen if society puts disease prevention first?

6 April, article

Vang niet alle mensenwerk in data

8 April, article

De kracht van deepfakes

9 April, article (previously published in iBestuur)

Denkt u mee over de openscience-richtlijn van Unesco?

10 April, news

Groeiende ambities bij de EU voor wetenschap en innovatie

14 April, news

Innoveren met AI in de zorg: 'Zodat mensen kunnen meedoen in de samenleving'

15 April, article

Overheid vergroot investeringen in R&D

16 April, news

De coronacrisis vraagt om zorgvuldig handelen en democratisch debat

17 April, Message to Parliament

Het aanpassen van DNA in embryo's: het perspectief van mensen met een beperking

17 April, review

Naar gezond datagebruik voor medisch onderzoek

23 April, article

The corona crisis calls for careful action and democratic debate

23 April, Message to Parliament

Het internet als de vrije zee van Hugo de Groot

24 April, article

Naar goed beheer van datatechnologie in de zorg

30 April, article

Praktijkgericht onderzoek hogescholen

30 April, fact sheet

Hogescholen doen steeds meer aan onderzoek

30 April, news

What if we choose to avoid risk and ban the modification of hereditary human DNA?

1 May, case

What's it like to be pregnant in a society that puts disease prevention first?

1 May, case

Can modification of hereditary DNA improve equality?

1 May, case

What if modification of hereditary human DNA was widely available?

1 May, case

Innoveren met AI in de zorg: 'Eerst de data op orde brengen'

7 May, article

Deel uw ervaringen met lesgeven op afstand

13 May, news

Doordachte digitalisering in het onderwijs

13 May, article (previously published in iBestuur)

Kunstmatige intelligentie in de zorg: samen beslissen blijkt de crux

14 May, article

Betrek burgers en wetenschappers van allerlei pluimage bij de coronacrisis

14 May, article

Digitale participatie in tijden van corona

19 May, news

Leerlingen en ouders nauwelijks betrokken bij onderwijsonderzoek

19 May, news

RECIPES: een onderzoek naar voorzorg en innovatie

19 May, article

RECIPES: a study of precaution and innovation

19 May, article

Growing EU ambitions for science and innovation

19 May, article

Het is hoog tijd om het debat over AI mondiaal te voeren

20 May, article

UNESCO van start met internationale aanbeveling over ethiek en AI

20 May, article

Het aanpassen van erfelijk DNA van embryo's en de DNA-dialoog

20 May, review

'Zonder gemeenschappelijke afspraken is uiteindelijk iedereen slechter af'

22 May, article

Internationale mobiliteit van AI-wetenschappers

26 May, fact sheet

Wetenschappers kunstmatige intelligentie gaan en komen

26 May, article

Tweede Kamer kan grip op digitalisering versterken

28 May, article

Prestatieverhogende pillen bij jongeren: zorg voor een breder perspectief

28 May, Message to Parliament

EU, zorg dat AI ons duurzamer, gezonder, vrijer en veiliger maakt

28 May, news

EU, ensure AI makes us more sustainable, healthier, freer and safer

28 May, news

Jaarverslag 2019

29 May, news

Annual report 2019

29 May, news

Gene editing en het belang van de onafhankelijke wetenschapper

3 June, article

Nieuwe economie: investeer in burger, niet alleen in techniek

9 June, article

Zo de-escaleren we het internationale cyberconflict

10 June, article

Handvatten voor doordachte digitalisering van het onderwijs

10 June, Message to Parliament

Maak afspraken over het gebruik van data, algoritmen en AI op de werkvloer

15 June, article

Connect European research programmes with local problems

17 June, news

Verbind Europese onderzoeksprogramma's met lokale problemen

17 June, news

Het personeel bij de universitair medische centra

18 June, fact sheet

Aandeel vrouwen in umc's neemt verder toe

18 June, article

Stuur op samenwerking in kennisecosystemen

18 June, Message to Parliament

Investeer in digitalisering die werkt voor mensen

24 June, Message to Parliament

Democratisch debat vergt meer dan bestrijding van desinformatie

25 June, article

Betrek burgers actiever bij energietransitie

25 June, Message to Parliament

Het aanpassen van dna in embryo's: hoe denken kinderen hierover

26 June, review

Mission-driven policy innovation policy: what, how, why?

29 June, article

Versterk digitale weerbaarheid met nieuwe technologie

1 July, article

Het aanpassen van dna in embryo's: gevoeligheden rond maakbaar ouderschap en leven

3 July, review

Feedback gevraagd op de internationale aanbeveling over AI en ethiek van UNESCO

17 June, news

Met digitale middelen besluitvorming verbeteren

16 July, Message to Parliament

Wetgever moet persoonlijke gegevens van burgers beter beschermen

20 July, article

Enhance cyber resilience with new technology

20 July, article

Het aanpassen van dna in embryo's: hoe denkt een BètaPlus-klas hierover?

23 July, review

Digitaal weerbaar in tijden van quantumcomputers

23 July, article

Betrek burgers bij de ethiek van AI

24 July, article

Voorbij de steun aan aardappelen, vlees en bieten

24 July, article

Enrichtingsonderzoek in wateronderzoek

28 July, article

Politici, wijs niet te snel naar de wetenschap

29 July, article (previously published in *De Volkskrant*)

International mobility of AI scientists

30 July, fact sheet

Plannen voor CoronaMelder vragen om verduidelijking

5 August, Message to Parliament

Stakeholders West-Europa en Noord-Amerika leveren input op UNESCO-aanbeveling ethiek

11 August, review

Considerations arising from the letter to parliament on the introduction of 'CoronaMelder'

12 August, Message to Parliament

Gaat de hybride aardappel Afrika voeden?

24 August, article

In gesprek over de toekomst van het internet

20 August, article

Goede uitgangspositie Nederlandse wetenschap, maar versteviging is nodig

25 August, article

Laten we ons wapenen met kennis en diplomatie

27 August, article

Hoe kan de wetenschap zich toekomstbestendig verder ontwikkelen?

28 August, article

Kunst en wetenschap onderzoeken samen urgente vragen

28 August, article

Terugblik: fokken met dieren: voor wie doen we dat?

3 September, review

Belanghebbenden van het voorzorgsbeginsel

4 September, article

Gemeenteraden kunnen gericht aandacht geven aan digitalisering

17 September, article

Denk mee over de toekomst van internet

18 September, article

5G-debat behoeft meer diepgang

21 September, Message to Parliament

Voorzorg bij innovatie met onzekere risico's: wat vindt de Nederlander?

21 September, article

Precaution innovation for innovation with uncertain risks: what do Dutch people think?

21 September, article

Integraal beleid nodig voor faciliteren gentherapie

24 September, Message to Parliament

Slimme stad heeft veel voeten in de aarde

29 September, article

Hoe vult Europa het verlangen naar technische soevereiniteit in?

30 September, article

De sleutel voor verantwoorde AI ligt bij interdisciplinair onderwijs

2 October, article

Vrij baan voor coronamelder-app, maar pas op

8 October, article

Groefonds vraagt om zelfbewuste partnerschappen in kennis en innovatiesystemen

8 October, article

Digitale wereld bedreigt Nederlandse economie

13 October, article

Rathenau live event: ondergedompeld in AR, VR en spraaktechnologie

14 October, article

Digitale instrumenten maken nog geen democratie

15 October, article

Desinformatie bestrijden, censuur vermijden

19 October, Message to Parliament

Als een chefkok urgente maatschappelijke vragen voorschotelen

21 October, article

Rathenau Instituut stelt 10 ontwerpeisen aan de digitale samenleving

22 October, article

Kennisecosystemen kunnen gemeenten helpen bij nieuwe taken

23 October, article

Discriminerende algoritmes leggen bloot wat niet klopt in de samenleving

20 October, article

Een oplossing op zoek naar draagvlak: opslag van CO2

27 October, article

Leren digitaliseren (1)

27 October, article

Augmented reality in de neurochirurgie

29 October, article

Tijdelijke contracten bij universiteiten in perspectief

30 October, fact sheet

Augmented reality in de Haagse duinen

3 November, article

Artificial intelligence in healthcare: who decides

4 November, article

Meer discussie nodig over digitale monitoring van werkenden

5 November, article

Augmented reality in een distributiecentrum

6 November, article

Augmented reality bij de bouw van de Boekelose brug

6 November, article

Leren digitaliseren (2): ethiek als motor van digitale onderwijsinnovatie

9 November, article

Policy for AI in healthcare: a balancing of values

9 November, article

Sneller en gericht naar proefdiervrij onderzoek

11 November, Message to Parliament

How AI helps a person with dementia to eat their sandwich on time

16 November, article

Relatieadvies voor gemeenten, hogescholen en universiteiten

17 November, article

Maatschappelijke routekaart nodig voor het Covid-vaccin

18 November, Message to Parliament

Augmented reality bij demarkeering op een scheepsdek

18 November, article

Responsible AI in healthcare: the value of examples

23 November, article

Growing old with dignity: which role for e-health?

20 November, article

Essay: waardevol digitaliseren voor de energietransitie

24 November, article

Leren digitaliseren (3): bescherm de ruimte om te kiezen

25 November, article

Werk aan de winkel voor een schoon Europa

27 November, article

AI in care: implications for education

30 November, article

Maak Nederland klaar voor de digitale samenleving van morgen

1 December, Message to Parliament

It's not a crime to be old

1 December, article

Patiëntgegevens benutten voor ieders gezondheid: het knelt

3 December, news

Maak werk van opgavegericht innovatiebeleid

3 December, Message to Parliament

Online platformen, offline impact

7 December, Message to Parliament

Leren digitaliseren (4): houd maat met lesgeven op afstand

7 December, article

Entrepreneurship with AI in healthcare: need for cooperation and strategy

7 December, article

Rathenau Live 2020

8 December, review

Relatief veel Nederlanders hebben weinig vertrouwen in wetenschap

10 December, article

Technologies in care for older people: international report

10 December, article

Leren digitaliseren (5): personaliseer de lessen met de leerkracht aan het roer

14 December, article

How an investment fund can contribute to responsible AI in healthcare

14 December, article

Grootste voordeel van AI zit in samenwerking mens en machine

15 December, article

Greatest benefit of AI is the human-machine collaboration

15 December, article

Burgers zijn essentieel voor succes Europees innovatiebeleid

16 December, article

Derde geldstroom belangrijk voor universiteiten

17 December, article

Innovating with AI in healthcare: 'So people can participate in society'

21 December, article

Wereldwijde harmonisatie AI kan regionale waarden en normen schaden

21 December, article

World wide harmonisation AI can harm regional values

21 December, article

Beleidsmakers denken samen na over toepasbaarheid AI

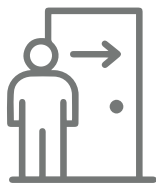
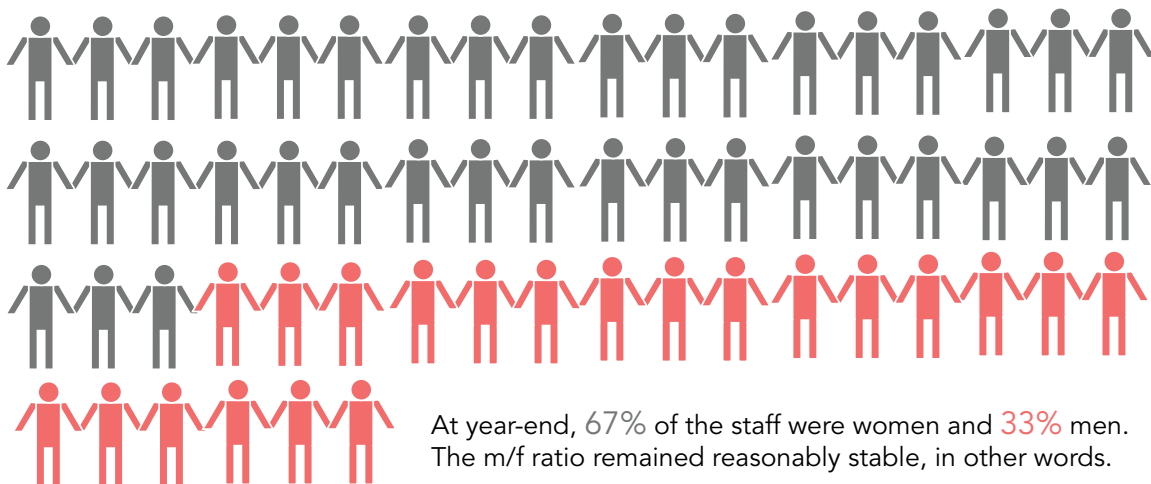
22 December, article

'It's easier to find a publisher when your research results are positive, and that in turn makes it easier to get funding for any new research. Scientists are caught in a vicious circle.'

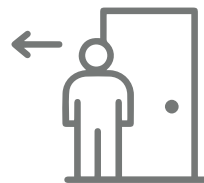
Researcher Alexandra Vennekens in *De Volkskrant*, 18 December 2020

Annual personnel report

On 31 December 2020, the Rathenau Instituut employed **60** people (52.20 FTEs).
In late 2019, it had 60 employees (50.89 FTEs).



12 employees left the institute's
employ in 2020.



12 new employees joined the institute's
staff in 2020.



The percentage of employees on permanent
contracts rose from 47% to **52%** (based on
number of employees).

52% of our employees were under
40 years of age in 2020.

We welcomed **6** student trainees in 2020.



The rate of absenteeism was **1.90%**.
In 2019, this was 3.15%.

Annual financial report

Income 2020

In 2020, the Rathenau Instituut recorded an income of €5,401,000, €99,000 more than budgeted. The institute received €4,639,000 in basic institutional funding from the Royal Netherlands Academy of Arts and Sciences, which distributes this funding on behalf of the Dutch Ministry of Education, Culture and Science. The institute supplemented this basic funding by undertaking projects financed by third parties.

Prior to starting an externally funded project, the institute reviews third-party conditions against its founding document and terms and conditions of

performance, one of which is that it must be able to publish the results. In 2020, the institute recorded €756,000 in external financing, €56,000 more than budgeted. This came from 29 projects funded by the EU's H2020 programme, Dutch ministries, Dutch Research Council (NWO), the Association of Netherlands Municipalities, and other organisations. It is the Rathenau Institute's aim to receive no more than 20% of its funding from external sources in addition to the basic institutional funding. In 2020, 16% came from external sources, the same as in 2019.

Income (amounts x €1,000)	Actual	Budgeted	Difference
Funding from Ministry	4,639	4,587	52
External financing	756	700	56
Other revenue	6	15	-9
Total income	5,401	5,302	99

Year (amounts x €1,000)	2016	2017	2018	2019	2020
Total income	4,864	4,807	5,166	5,270	5,401
Basic institutional funding Dutch Ministry of Education, Culture and Science	4,157	4,241	4,346	4,519	4,639
External financing	660	525	783	703	756
External financing in %	16%	12%	18%	16%	16%

Expenditure in 2020

Total expenditure was €5,592,00, €44,000 less than initially budgeted. Staffing costs were €156,000 lower than anticipated. Material costs were higher than

projected (by €41,000) and projects costs were also higher (+€71,000).

Expenditure (amounts x €1,000)	Actual	Budgeted	Difference
Staffing	4,403	4,559	-156
Project costs	531	460	71
Material costs	658	617	41
Total expenditure	5,592	5,636	-44

Note: The Rathenau Instituut'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.

Board

Gerdi Verbeet (chair) \ Supervisory director for Novamedia and chair of the National 4 and 5 May Committee.

Noelle Aarts \ Director of the Institute for Science in Society (ISiS) at Radboud University and professor for Socio-Ecological Interactions.

Felix Cohen \ Chair of the supervisory board of Regina Coeli and of the central board of clients at health facility 'Haagse Wijk- en Woonzorg'.

Roshan Cools (until 1 sept 2020) \ Professor of Cognitive Neuropsychiatry at the Radboud University Medical Centre and member of the Royal Netherlands Academy of Arts and Sciences (KNAW).

Hans Dröge \ Supervisory director at BOM and AWWN, among others.

Laurence Guérin \ Professor of Global Citizenship at The Hague University of Applied Sciences and practical researcher on Citizenship at ROC Twente.

Janneke Hoekstra MSc \ Chair of the supervisory board of wellbeing organisation Rijnstad and owner of a consultancy firm.

Erwin Muller \ Dean of the Faculty of Governance and Global Affairs (FGGA) at Leiden University in The Hague, professor of Security and Law at the same faculty, director of Leiden University Campus The Hague.

Marijk van der Wende (until 1 sept 2020) \ Faculty professor of Law, Economics, Governance and Organisation at Utrecht University, visiting professor at Shanghai Jiao Tong University, China, member of Academia Europaea (behavioural sciences section).

Peter-Paul Verbeek \ Professor of Philosophy of Technology and co-director of the DesignLab at the University of Twente, honorary professor of Techno-Anthropology at Aalborg University (Denmark) and member of the Royal Netherlands Academy of Arts and Sciences (KNAW) and the supervisory board of TNO.

Rajash Rawal \ Member of the Executive Board of The Hague University of Applied Sciences.

Melanie Peters (official secretary) \ Director of the Rathenau Instituut, The Hague

For an up-to-date summary of our board members' positions and ancillary appointments, please visit <https://www.rathenau.nl/en/about-us/who-we-are/our-board>.

Programme Panel

Gerdi Verbeet (chair) is supervisory director for Novamedia and chair of the National 4 and 5 May Committee.

Annet Aris MBA teaches digital strategy at INSEAD Business School in France and serves as a supervisory director for several companies.

Marien Baerveldt is a strategic advisor on learning, development and change and provides leadership training for NGOs.

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

Kris Douma is a supervisory director at the insurance company NV Schade and at Oxfam Novib. He was previously active for FNV unions, as a member of the Dutch House of Representatives (for the PvdA party) and in the field of responsible investment.

Linda Duits is a researcher, publicist and teacher of Media Studies and Gender Studies at Utrecht University.

Bas Eickhout is a member of the European Parliament on behalf of the Greens/EFA and leader of the Dutch GroenLinks delegation in the European Parliament.

Bert Fokkema is part of an international team at Shell that develops policy and internal standards for the decommissioning of oil and gas production platforms.

Yuri van Geest is co-author of the bestseller Exponential Organisations and co-founder of De Buitenboordmotor, an open source solution for social cohesion and the future of work.

Peter Giesen is the Europe editor and commentator for national newspaper De Volkskrant.

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The Rathenau Instituut supports the formation of public and political opinion on socially relevant aspects of science and technology. It conducts research and organises debates on science, innovation, and new technology.

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