



Strategic Action Plan for Artificial Intelligence

The Netherlands



Strategic Action Plan for Artificial Intelligence

The Netherlands

Table of contents

| | |
|--|---------------|
| Summary | 7 |
| Artificial intelligence is the key technology for societal and economic opportunities | 9 |
| <i>Track 1: Capitalising on societal and economic opportunities</i> | 13 |
| AI offers solutions for societal challenges | 15 |
| The government makes optimal use of AI in the performance of public tasks | 19 |
| AI entrepreneurship is stimulated | 22 |
| <i>Track 2: Creating the right conditions</i> | 25 |
| AI research and innovation in the Netherlands are of high quality and leading in Europe | 27 |
| The Netherlands has excellent training opportunities for living with AI and more talent for working with AI | 30 |
| The Netherlands has more usable data for AI applications to improve AI developments | 34 |
| The Netherlands is at the forefront of Europe in high-quality digital and intelligent connectivity for effective AI applications | 37 |
| <i>Track 3: Strengthening the foundations</i> | 39 |
| Public values and human rights remain protected | 41 |
| AI is used in such a way that everyone can trust it | 43 |
| Markets are open, competitive and offer good consumer protection | 47 |
| The safety of citizens, businesses and government entities in the Netherlands remains protected | 50 |
| Appendices | 53 |
| Appendix 1: Overview of actions | 54 |
| Appendix 2: Financial resources for AI | 61 |

Strategic Action Plan for Artificial Intelligence

The Netherlands is able to capitalise on AI's societal and economic opportunities, as well as to safeguard the public interests of AI, thus contributing to prosperity and well-being

Track 1

Capitalising on societal and economic opportunities



AI offers solutions for societal challenges



The government makes optimal use of AI in the performance of public tasks



AI entrepreneurship is stimulated

Track 2

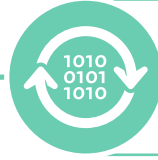
Creating the right conditions



AI research and innovation in the Netherlands are of high quality and are leading in Europe



The Netherlands has excellent training opportunities for living with AI and more talent for working with AI



The Netherlands has more usable data for AI applications to improve AI developments



The Netherlands is at the forefront of Europe in high-quality digital and intelligent connectivity for effective AI applications

Track 3

Strengthening the foundations



Public values and human rights remain protected



AI is applied in such a way that everyone can trust it



Markets are open and competitive, and offer good consumer protection



The safety of citizens, businesses and government entities in the Netherlands remains protected at all times

Summary

Artificial intelligence (AI) is radically changing the world. AI will make a substantial contribution to economic growth, prosperity and well-being of the Netherlands. It will also be of huge assistance in dealing with societal issues in areas such as ageing, climate change, food safety and healthcare. At the same time, we must not close our eyes to challenges such as the protection of fundamental rights including privacy, non-discrimination and autonomy.

If the Netherlands and Europe wish to be at the forefront of a globally competitive economy, we must accelerate the development and application of AI in the Netherlands. We can do so. The Netherlands is well positioned to take on this challenge, partly due to its high-quality connectivity, strong foundation for public-private partnerships (PPP) and world-class research. We must make good use of this head start to develop our international profile in this area.

The government is focusing on three tracks. Track 1 is that we must capitalise on societal and economic opportunities. This goal requires intensive PPPs, which will enable the Netherlands to make a difference on the European playing field and in global markets. From start-ups and scale-ups to small and medium-sized enterprises (SMEs) or large corporations, companies are crucial due to their innovative and competitive power. They will determine whether the Netherlands leads the way in AI or ends up following other countries in this area, and whether AI applications will really benefit the Dutch economy and Dutch society. Companies' added value comes from their ability to respond both to societal challenges and market demand. As a result, the government is developing this track in PPPs, particularly with the Dutch AI Coalition, while calling on companies and organisations to join in these efforts.

Track 2 intends to arrange the required prerequisites for a favourable AI climate in the economy and society at large. These prerequisites include the right knowledge, skills and training: top-quality scientific AI research as well as applied research that businesses and professionals can use. They also include usable data and high-quality and intelligent connectivity. In this context, we are investing in research programmes, increasing access to innovation funding for start-ups, investing in training, promoting data-sharing, and further developing digital connectivity with and for AI.

Track 3 is about 'Strengthening the foundations'. This track concerns the protection of citizens' fundamental rights as well as appropriate legal and ethical frameworks. As a result, people and companies will feel confident that AI will be used with care. It is important as well that markets remain open and competitive, and that national security is safeguarded in all AI developments. To this end, the necessary legislation and regulations are already in force or in the making. The government is also monitoring AI developments and making efforts to ensure the use of ethical guidelines (European and otherwise) for AI applications by companies and public organisations.

In other words, there is no time to waste. This Strategic Action Plan for AI describes the course that the Netherlands wants to take. It is a first step towards initiating concrete measures to achieve the intended acceleration and profile. The government cooperates with the Dutch AI Coalition, in which companies, government agencies, knowledge institutions and educational institutions join forces to implement new AI actions that help specific domains and sectors.

The following principles play a guiding role in the Dutch approach:

- We work together in public-private partnerships, including in the Dutch AI Coalition, to seize the societal and economic opportunities of AI.
- The Netherlands is committed to international cooperation, especially with European partners.
- We promote ourselves as a country that is at the forefront of AI applications which serve the interests of people and society.
- We opt for an inclusive approach that puts people first, in which we strive for reliable AI.

The Dutch AI approach has the following main objective: The Netherlands is able to capitalise on AI's societal and economic opportunities, as well as to safeguard the public interests of AI, thus contributing to prosperity and well-being. This objective is elaborated in three tracks, comprising a total of eleven objectives, as indicated in the following infographic.



Artificial intelligence is the key technology for societal and economic opportunities

AI¹ is a key technology that is transforming our world. Image recognition applications support physicians in the diagnosis of certain types of cancer. AI is also increasingly being used in the logistics sector and plays a major role in the development of self-driving cars. We also experience the convenience offered by AI in our daily lives, for example in the form of intelligent search engines, translation algorithms, navigation systems, webshop chatbots that automatically respond to questions and complaints, and algorithms that make recommendations to us or even develop tailor-made products that meet our personal needs. AI can also be combined with robotics or unmanned systems, for example in the manufacturing industry.

AI owes its huge societal and economic potential to the fact that this key technology can be applied in almost all domains and sectors. Eighty-six per cent of companies anticipate that AI will have a major impact on their sector.²

AI also has an impact on public interests and values such as fundamental rights, consumer protection and national security. Given AI's high speed of development, it is important to continue monitoring this impact, and to track and anticipate its effect on our public interests. Space for experimenting with AI applications is important in this respect.

WHAT IS AI?

There is no generally valid definition of AI that is consistently used by all stakeholders. We use the European Commission's description of AI: 'AI refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals'.

For an understandable explanation of what AI is, everyone is invited to take the National AI course <<https://app.ai-cursus.nl/home>>. This course briefly explains what this technology is all about. Participation is free.

Well placed

The Netherlands is well placed to take advantage of the opportunities offered by digitalisation in general and by AI in particular.³ We have world-class networks, data centres and hosting and housing providers, a digitally active and skilled population, a research community that is doing groundbreaking research on AI while applying it itself,⁴ and a favourable, PPP-intensive climate for entrepreneurs, start-ups and innovation. The Dutch government distinguishes itself by its many (often small-scale) pilots and experiments and an increasing focus on the development and promotion of key enabling technologies. According to research by McKinsey, the Netherlands scores above average in terms of AI readiness on all the different dimensions, with top scores for automation, digital readiness and innovation.⁵

¹ For more information on the definition of AI, see the Independent High-Level Expert Group on Artificial Intelligence, 'A Definition of AI: Main Capabilities and Scientific Disciplines', April 2019.

² EY and Microsoft, 'Artificial Intelligence in the Netherlands', October 2018.

³ Parliamentary Paper 26643, No. 623. For a detailed description of the current state of affairs, see 'Rapport AI voor Nederland' (Report on AI for the Netherlands) of the Confederation of Netherlands Industry and Employers (VNO-NCW), et al., November 2018.

⁴ Elsevier, 'Artificial Intelligence: How knowledge is created, transferred and used', 2018. One of the findings is that of the more than 100 Dutch AI scientists, approximately forty have an above-average citation index.

⁵ McKinsey Global Institute, 'Notes from the AI Frontier; Tackling Europe's Gap in Digital and AI', February 2019, p. 42.

Urgency to accelerate

The Netherlands will need to accelerate in the area of AI, as it is crucial for the efficiency and effectiveness of all sectors and domains. Other countries are also investing heavily in AI, for good reason. The Netherlands must facilitate AI, so that companies can keep their research and innovation in (and bring it to) the Netherlands.⁶ Companies will have to apply high-quality AI in order to remain competitive. After all, a ‘winner-takes-all’ or ‘winner-takes-most’ dynamic can arise, with a real chance that the Netherlands will become dependent on other parties.⁷ That could potentially damage our economic security, our autonomy and our well-being. And while the Netherlands is well placed for AI in certain respects, in other areas it needs to tighten its approach. Large companies are already using AI to provide better services and increase productivity. It is important that SMEs follow suit and that the number of start-ups and scale-ups⁸ in the area of AI increases considerably.⁹ The Netherlands must take action to position itself firmly in the AI playing field and create a thriving AI ecosystem.¹⁰

The Dutch approach: a strategic action plan for AI

This Strategic Action Plan for AI (SAPAI) contains the government’s intentions to accelerate AI development in the Netherlands and to raise its profile internationally. It examines AI developments in the Netherlands, the elements needed to further encourage AI innovation, and the fundamentals that are crucial to safeguarding public interests in AI developments. With this plan, the Netherlands aims to capitalise on AI’s societal and economic opportunities in the long term and to safeguard the public interests surrounding AI. Many countries have already drawn up an AI strategy, and the European Commission has published a coordinated plan for AI in which it calls on Member States to create their own AI plans.

This Strategic Action Plan for AI responds to that call. It was created in collaboration with public and private parties (the AI Task Force) and is in line with the 2018 Dutch Digitalisation Strategy¹¹ and other relevant policy documents. The Report on AI for the Netherlands and the recent white paper of the AI Task Force are important building blocks for this Action Plan. It sets out an integrated approach and general policies. Sectors or domains are included mainly for illustrative purposes. The exception to this is Track 1, where a non-exhaustive series of specific actions has been identified for a number of domains.

Governance

The Strategic Action Plan for AI is an agenda that is updated annually. The House of Representatives will be informed about the implementation of the policy actions set out in this Action Plan (see Appendix 1 for an overview) as part of the progress report and update of the Dutch Digitalisation Strategy. In addition, the various ministries apply their own evaluation and monitoring systems for the actions for which they are responsible. The progress of the AI approach is on the agenda of the National Council for the Dutch Digitalisation Strategy.

The government collaborates with the Dutch AI Coalition in specific areas. In this Coalition, companies, government agencies, knowledge institutions and educational institutions work together on generic issues in order to help specific application areas and sectors move forward. Examples include collaboration in the field of talent and knowledge development, access to knowledge, data sharing, societal acceptance of AI, promotion of new economic activity and a stimulating role towards application areas/sectors.

⁶ ‘Rapport AI voor Nederland’ (Report on AI for the Netherlands), Confederation of Netherlands Industry and Employers (VNO-NCW), et al., November 2018.

⁷ Ibid.

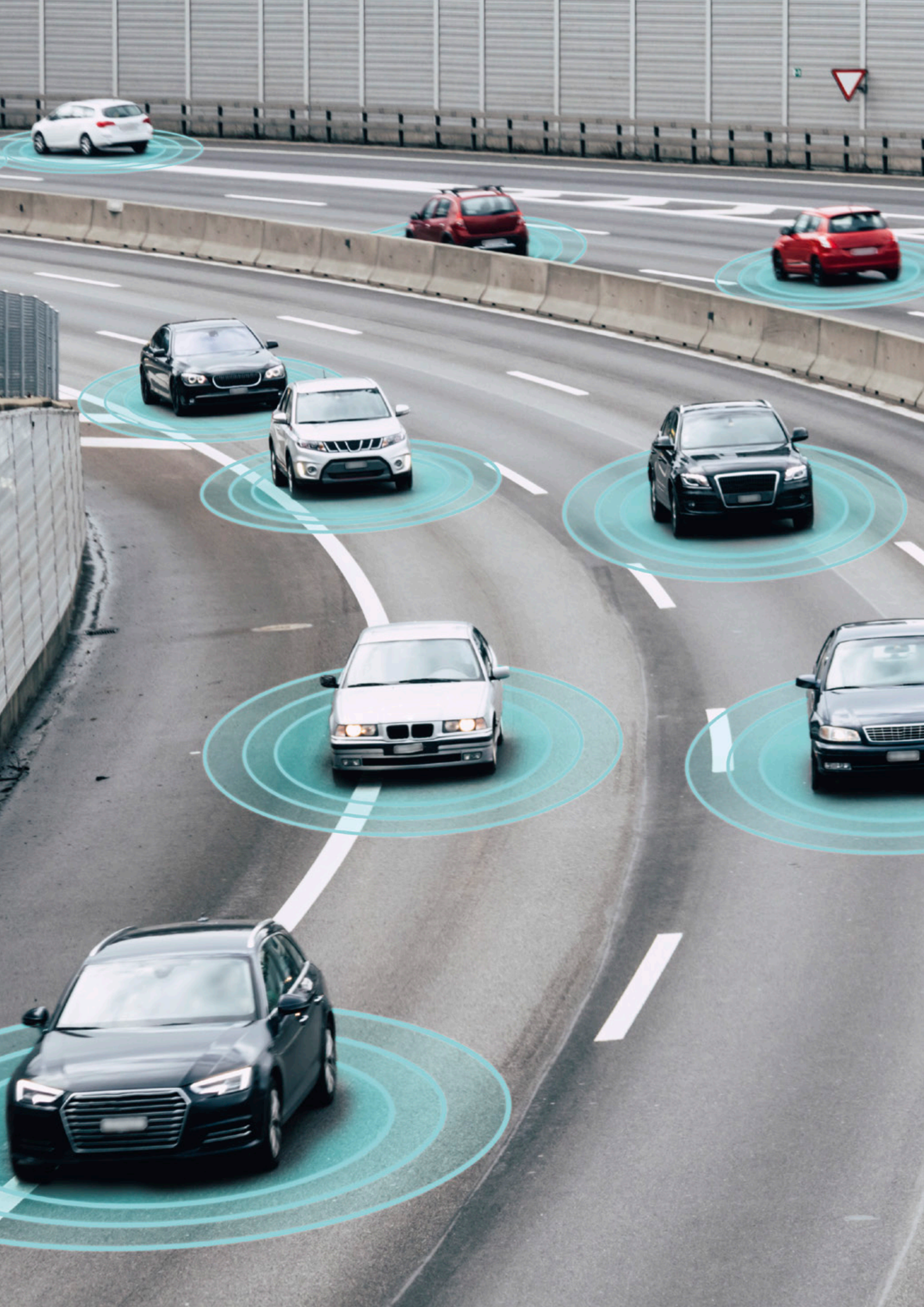
⁸ Start-ups and scale-ups are young, technology-driven companies with the ambition to grow into international innovative leaders.

⁹ Ibid.

¹⁰ Ibid.

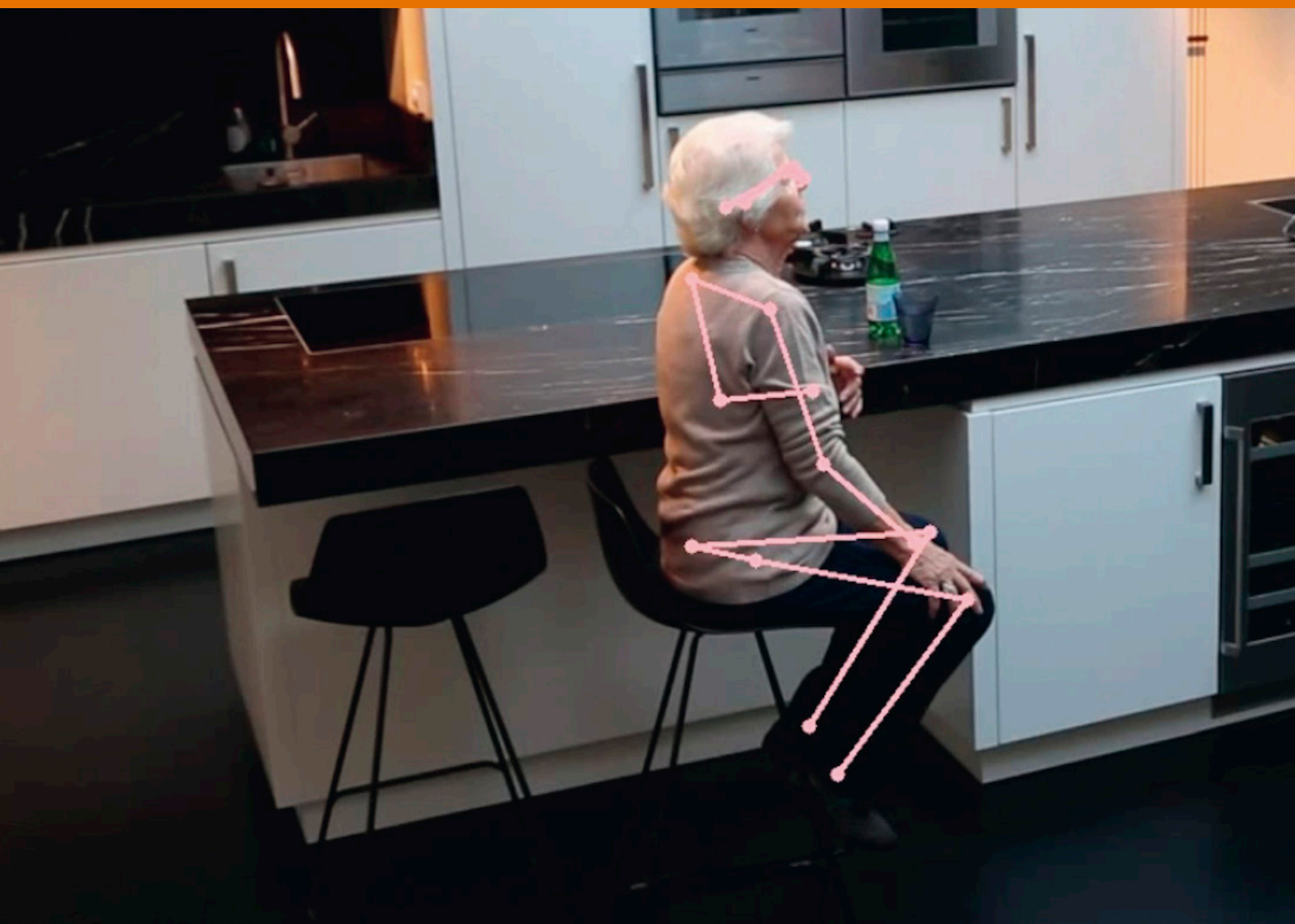
¹¹ Ministry of Economic Affairs and Climate Policy, ‘Dutch Digitalisation Strategy: Getting the Netherlands ready for the digital future.’ June 2018.





Track 1: Capitalising on societal and economic opportunities

AI offers great societal and economic opportunities. First of all, there are opportunities for solving societal challenges in which the government is involved as a partner. Consider, for example, the use of AI for more effective investigation and enforcement, new possibilities for prevention, diagnosis and treatment in healthcare, cultivation of crops without daylight, and predicting traffic jams. AI also has considerable potential in the provision of public services and can help improve work processes of government organisations. The government is also encouraging the business community to develop AI applications and utilise knowledge.





Solving societal challenges



Cooperation on societal challenges

Actions include:

- Knowledge and Innovation Agendas 2020–2023 for missions and key technologies, including AI.
- Research into design principles for AI in the legal domain (CWI, the national research institute for mathematics and computer science, TNO the Netherlands organisation for applied scientific research, the UvA, University of Amsterdam and the OM, the Dutch public prosecution service).



Government's use of AI for public tasks



Organisational integration

Actions include:

- The digital course series on AI by the Academy for Digitalisation and Computerisation of the Government, is available for every civil servant in the Netherlands.



Better cooperation

Actions include:

- Ministry of the Interior and Kingdom Relations (BZK), Association of Netherlands Municipalities (VNG) and Netherlands Enterprise Agency (RVO) organise round tables on the public domain and the technologies applied there, such as chatbots.
- The government organises expert meetings on AI for various professional disciplines (technical and otherwise), such as architects, developers and data scientists.



The government experiments

Actions include:

- Ministry of the Interior and Kingdom Relations (BZK), Association of Netherlands Municipalities (VNG) and others experiment with AI, with a focus on ethics by design and algorithm transparency.
- Government agencies such as the police, the Netherlands Enterprise Agency and P-Direkt (the Shared Service Centre for HRM of the Dutch government) develop a chatbot.



Government encourages companies to perform public tasks

Actions include:

- Ministry of the Interior and Kingdom Relations (BZK), together with a regional party, publishes a second AI SBIRtender.
- Ministries participate in the largest AI and blockchain hackathon in the world: Odyssey.



Encouraging AI Entrepreneurship



Government stimulates start-ups

Actions include:

- Improved access to innovation funding and venture capital through Innovation Credits, the Seed Capital Scheme and the Dutch Venture Initiative.
- Stationing start-up Liaison Officers in San Francisco/Los Angeles, New York/Boston, Singapore, Berlin, Paris and London.



Companies use knowledge

Actions include:

- Plan of the Netherlands AI Coalition to enhance synergies between research, education and organisations.
- Regional smart industry hubs and data value hubs provide SMEs with tools and training modules for responsible use of AI.
- Chambers of Commerce offer hands-on AI information to SMEs..



AI offers solutions for societal challenges

AI can contribute to solving societal challenges in all sorts of areas such as safety, healthcare, agriculture and food, energy transition and sustainability. In order to seize these opportunities, the government is also focusing on an aspect that distinguishes the Netherlands from other countries: its excellent PPP environment. As a result the Netherlands has an attractive climate for larger pilot areas and hubs for data sharing and sectoral applications that are being set up at a European level. The Dutch AI Coalition is collaborating with stakeholders (including the government) on a domain-specific implementation.



The Netherlands organises public-private partnerships to work on societal challenges

In order to capitalise on the opportunities offered by AI for solving societal issues, the government has opted for the Dutch approach: organising good cooperation between government agencies, companies and knowledge institutions, with shared responsibilities. It is up to the government to create the right conditions, to promote innovation and to apply AI in its own domain and for achieving its own goals. The government is therefore committed to exploiting the societal and economic opportunities of AI in areas and sectors such as safety, healthcare, agriculture and food, the energy transition and sustainability, for example in the context of the mission-driven innovation policy. In addition, the government itself uses AI in the provision of public services. But it is ultimately the companies (from start-ups and scale-ups to SMEs and large companies), with their innovative and competitive strengths, that make the difference. They determine whether the Netherlands will lead or follow in AI and, especially, in its application in a way that offers economic and societal value. Companies generate such added value by responding to the aforementioned societal challenges, and to market demand. The government is further developing this track in PPPs, in particular with the Dutch AI Coalition, and calls on companies and organisations to join this effort in order to jointly turn the challenges and opportunities surrounding AI into effective action.

The Dutch AI Coalition and the Dutch Digital Delta 'Top Team', together with companies, ministries, knowledge institutes, 'Top Sectors', the Netherlands Organisation for Scientific Research (NWO), the Association of Universities in the Netherlands (VSNU) and the Netherlands Organisation for Applied Scientific Research (TNO), are developing long-term knowledge and innovation programmes for generic basic knowledge in combination with knowledge and cooperation in sectors such as healthcare, agriculture and food.

In its letter to the House of Representatives entitled *Naar missiegedreven Innovatiebeleid met Impact* (Towards mission-driven innovation policy with impact), the government broadly formulated a new approach for the Top Sectors and innovation policy. Here, too, the emphasis is on PPP in order to seize the opportunities it offers for tackling societal challenges.

► ACTIONS:

- In October/November 2019, the Knowledge and Innovation Agendas 2020-2023 will be published for missions and key enabling technologies, including AI. These missions are in the areas of safety, healthcare, agriculture and food, the energy transition and sustainability. The agendas contain a long-term financial commitment in the form of a Knowledge and Innovation Contract.
- Together with other parties, TNO is investing in in-depth knowledge, system development and the development of ecosystems and applications for AI, for example for cybersecurity, care, agriculture and security. The approach is multidisciplinary, combining knowledge about technology, behaviour, acceptance and applications.

Security

AI technology offers many opportunities in the fields of justice, security and defence. Security is not only a societal challenge, but also a public task.

Research is currently being carried out, often in collaboration with scientific institutions, into the opportunities for the application of AI in, for example, cybersecurity, police tasks and defence. Ethical aspects and proportionality are also explicitly taken into account.

In the police domain, too, there are great opportunities for using AI. In fact, it is already being applied in various ways, for example in the selection of relevant visual material for investigative purposes, in the selection of promising cold cases, or to improve the handling of reports. In order to further stimulate research into, and the development of, AI within the organisation, the police have established the National Police Lab AI. This is a systematic, long-term collaboration between police and science in the context of the Innovation Centre for Artificial Intelligence (ICAI), to investigate how AI can contribute to the effectiveness of the police, today and in the future. Research is also being carried out into explainable and transparent AI and into the ethical aspects of using AI in policing. The Lab has also proven to be a useful tool for the police to engage and retain AI top talent. In this way, the police are at the forefront of developing the ethical, social and societal responsible application of AI for its tasks.

Experiments with AI applications have also been started in the field of justice administration and law enforcement, for example to gain a better understanding of debt problems or to better detect child abuse or molestation. At present, the guiding principle for the application of AI in the administration of justice is that experiments should take place in small, clear and manageable steps outside the context, for the time being, of actual pending lawsuits or disputes.¹²

Under the heading 'Meaningful Control of Autonomous Systems' (MCAS), the Centre for Work and Income (CWI), TNO, the UvA Faculty of Law and the UvA Institute of Informatics, together with an endowed professor of Public Prosecution, are developing a series of system design principles for a new generation of intelligent systems within the legal domain.

The opportunities of AI for security cannot be dissociated from the international context. The European Commission, the United Nations Interregional Crime and Justice Research Institute and the International Criminal Police Organization (INTERPOL) are currently analysing the opportunities offered by AI in criminal investigation and law enforcement. The European Commission's Directorate-General for Migration and Home Affairs intends to draw up a strategy for AI in the security and migration domain. Within the Council of Europe, an 'Ethical Charter on the Use of Artificial Intelligence in Judicial Systems and their environment' has been adopted.

¹² See, for example, the letter from the Minister for Legal Protection to the Senate on artificial intelligence and algorithms in the administration of justice of 19 December 2018, Parliamentary Paper 34775-VI, No. AH.

On behalf of the Dutch Ministry of Defence, research has been carried out into AI and its implications for defence. In this domain, AI offers opportunities in the field of decision support, intelligence gathering, data analysis and accelerated responsiveness in the defence of Dutch territory. Another advantage of AI systems for the Ministry of Defence is the possibility of intervening in areas that are not accessible to people due to Anti-Access/Area Denial weapon systems. This application is already being implemented in a number of areas, such as underwater drones for mine control (Remus) and the missile defence system (the Patriot). The focus is on autonomous systems that can take over 'dull, dirty & dangerous' tasks. Ongoing research is focused on the further development of algorithms, command and control and the interaction between different unmanned systems. The Ministry of Defence is also developing a vision for AI.

► ACTIONS:

- Research on the effectiveness of the application of AI for police tasks and the ethical aspects of AI.
- Research into design principles for AI in the legal domain (CWI; Netherlands Organisation for Applied Scientific Research (TNO); University of Amsterdam (UvA) and the Dutch Public Prosecution Service).
- The Robotic Autonomous Systems unit of the Ministry of Defence translates developments in the field of robotics and autonomous systems into concrete national operations.
- The Ministry of Defence is developing a vision for AI in which attention will be paid to the use of AI in military functions (e.g. command and control, intelligence, protection and logistics). This vision will be published in 2020.

Health and healthcare

AI offers new opportunities for healthcare in the field of prevention, diagnosis and treatment, and logistics. For example, there are AI tools in use that can accurately analyse cancer cells, allowing better diagnoses to be made. AI applications can read X-rays, enabling faster detection and analysis of conditions. There are algorithms that can predict aggression in patients or calculate the chance of re-admission in intensive care. AI also holds a substantial promise as a decision support tool (DST) for the healthcare professional. In addition, AI is increasingly able to support citizens in self-management of their health through the many possibilities offered by portable technology and health apps. The possibilities of AI within the healthcare sector should therefore be stimulated. At the same time, however, these developments pose new challenges. Citizens and healthcare professionals must be able to trust AI applications. This is why the Ministry of Health, Welfare

and Sport has explored the risks and opportunities of applying algorithms and AI in healthcare – including legal and ethical issues, as well as the associated instruments – in four round tables with healthcare parties. Based on the outcome of these sessions, the Ministry is examining how the application of AI can be facilitated. However, basic principles for the use of health data, such as privacy and citizens' control over their own data, will have to be observed at all times.

► **ACTIONS:**

- At the end of 2019, the Ministry of Health, Welfare and Sport will issue a new letter to the House of Representatives on AI and Big Data in the healthcare sector.
- The Ministry of Health, Welfare and Sport is developing an AI Handbook to help parties orient themselves in this field.

Agriculture and food

AI offers great opportunities in agriculture, horticulture and food supply, for example through further automation, 'precision agriculture', selection of new varieties (phenotyping), crop cultivation without daylight and system integration. AI is also increasingly being used to better visualise purchasing and consumption behaviour. For example, Wageningen University & Research has developed an app that every two hours asks consumers what fruit and vegetables they have eaten in the past two hours. Together with TNO (Soesterberg), a Big Data tool has been developed to collect social media statements about fruit and vegetables and analyse the associated attitudes and behaviour of citizens. In addition, the Smart Dairy Farming project has led to the establishment of the JoinData Foundation, a non-profit cooperative that enables safe and transparent data distribution in the agri-food sector. This is a precondition for data-driven analyses that support livestock farmers in their daily operations.

► **ACTION:**

- The Ministry of Agriculture, Nature and Food Quality, together with the Dutch AI Coalition, will intensify the further development of a data infrastructure for arable farming.

Energy transition and sustainability

Mobility

AI can be applied at the level of the engine, the vehicle and the driver (and the interaction between them), all road users, the supply chain, the traffic and transport system and the environment. AI helps identify market trends, identify risks, reduce traffic congestion, reduce greenhouse gas and air pollutant emissions, design and manage transportation, and analyse travel demand and pedestrian behaviour. For example, the Directorate-General for Public Works and Water Management (Rijkswaterstaat) uses AI to predict traffic jams, prevent accidents and optimise the Dutch infrastructure.

AI AND GREENHOUSE TECHNOLOGY

The need for sustainable and safe production systems for fresh food is growing worldwide. The Dutch supply cluster of greenhouse technology has a leading position worldwide with an annual export value of €2.5 billion. The Hortivation Foundation and TNO are working on the further development of digital cultivation. Within the Data-Driven Integrated Growing Systems initiative, TNO has teamed up with 16 market parties to develop new analysis techniques in the field of Big Data and deep learning in order to give growers a framework for action vis-à-vis operational cultivation decisions. To this end, algorithms will be used and knowledge models will be developed that open up various data sources inside and outside the greenhouse (e.g. climate, hardware, cultivation activities). Co-creation and new business models are supporting the implementation and scaling up of the innovations developed in the market.

Energy transition

The switch to sustainable energy supply under the government's Climate Agreement calls for smart solutions to make good use of the various variable energy sources. The solutions developed for these types of flexibility and congestion markets range from energy source selection in buildings, the role of electric cars in the energy system, error detection in electricity networks and providing highly detailed insight into the energy networks. The focus is currently shifting to system design, to create a system of systems. Energy will have to be available under any circumstances, irrespective of weather conditions and transition choices; preferably as sustainable and affordable a manner as possible. This increasingly complex puzzle requires the use of new technology – for operational management, but also for solid investment decisions.

In this regard, special attention is paid to the transition to sustainable industry and to multiple use of space in the North Sea. If industrial parties switch to hydrogen, for example, this will have consequences for the required infrastructure and supply of hydrogen, but also for the energy balance in the immediate vicinity of these industries. A well-timed transition offers many opportunities but also requires insight and overview. Early explorations in the Rotterdam port area are the first of their kind.

With the arrival of offshore wind farms, the North Sea is another area where many interests are at stake – from fishing to the cultivation of seaweed. There is a need for information about the North Sea, the seabed and how they develop over time. The construction and maintenance of wind turbines in bleak conditions far away from the coast has led to many Dutch innovations, such as inspections with drones, maintenance robots and vertical piling of foundations. A coordinator commissioned by the Energy ‘Top Sector’ and Dutch Digital Delta ‘Top Team’ will design and accelerate the use of AI with respect to the above-mentioned themes.

SELF-DRIVING CARS

The use of AI is increasing strongly in the automotive world, from ‘under the hood’ (predictive maintenance) to the environment. Cars are evolving into programmable, connected platforms full of sensors that exchange data with other vehicles and with the infrastructure. Alongside the traditional car manufacturers, parties such as Google are becoming increasingly important. In the years ahead, we will see a strong development of autonomous systems for real-time estimation and prediction algorithms for vehicles, drivers and environmental conditions. This development will be based on existing and newly acquired data sources. An integrated approach to this data, including the context and environment of the autonomous vehicle, will result in a more complete but also more complex and possibly ambiguous picture. This is expected to increase safety, but also raises questions, for example about dealing with uncertainties within autonomous systems. Who is responsible for controlling the vehicle? How can autonomous driving AI algorithms be checked and explained to the various stakeholders for acceptance and safety, etc.? The National Research Institute for Mathematics and Computer Science (CWI), the Netherlands Organisation for Applied Scientific Research (TNO), the University of Amsterdam’s (UvA) Faculty of Law and Institute of Informatics have joined forces to find answers to these questions within a collaborative project named ‘Meaningful Control of Autonomous Systems’.



The government makes optimal use of AI in the performance of public tasks

The government aims to use the potential of AI for the performance of public tasks, e.g. in public space and the social domain, to maximum effect. For example, AI applications can contribute to better work processes of various government organisations and better solutions to societal issues. This requires effective cooperation, for example to combine data collected by different parties. It is also important for governments to experiment with AI applications and challenge market parties to come up with innovative solutions for better execution of tasks.



The government can integrate AI applications organisationally

In order to be able to integrate AI applications from an organisational point of view, the government will first need to ensure that sufficient knowledge and expertise are available. This is particularly important because, as explained in Track 3, the application of AI must meet high standards especially in the government domain, for example in terms of care, transparency and proportionate deployment. In AI applications for government functions, public values such as equal treatment, privacy, human dignity, autonomy and security must be taken into account right from the design phase, a principle known as value-based design. This requires technical, legal, ethical and organisational expertise. Supported by good communication, this can contribute to acceptance by the public of AI in government functions. Organisational integration and administrative support are needed to scale up AI solutions. AI can lead to fundamental changes in work processes. It may require new forms of collaboration, or a complete redesign of business processes. Concrete cases can contribute to a structural and responsible embedding of AI in the organisation, enabling a smooth roll-out.¹³ The experiences gained can be shared within the knowledge networks in order to enable governments to properly integrate AI into the existing organisation.

► ACTIONS:

- The national government is enhancing knowledge of AI among civil servants in various ways. Examples include the digital course series on AI that is available at the Governmental Academy for Digitalisation and Computerisation of the Government (RADIO) for every civil servant in the Netherlands, and attention to AI in the development of employees' competences.
- The national government is looking for organisational structures (including PPP) that will consolidate knowledge within government organisations.



Dutch governments work better with each other, companies and knowledge institutions

In the use of AI in the public domain, interdisciplinary collaboration and collaboration between organisations are crucial in order to safeguard legal and ethical preconditions, share knowledge, make common facilities available and support the removal of specific obstacles to a further roll-out. A number of government organisations, universities and companies have AI knowledge in specific areas which is also interesting for other government agencies.

The government is constantly looking for ways to strengthen collaboration among government bodies, the business community and knowledge institutions. This includes promoting example projects in the public domain and making data available and sharing it for those projects. This is in line with the activities of the Dutch AI Coalition.

¹³ For the actions relating to example projects, see the sub-target: 'The government is experimenting more with AI and is rolling out more successful example projects'.

► ACTIONS:

- The Ministry of the Interior and Kingdom Relations and the Netherlands Enterprise Agency are developing an implementation toolkit for innovative technologies. This also involves seeking interdisciplinary cooperation with, among others, the Chief Information Officers of other government agencies and with contractors.
- Together with the Association of Netherlands Municipalities (VNG) and the Netherlands Enterprise Agency, the Ministry of the Interior and Kingdom Relations organises meetings on experiences in the public domain and the AI technologies used there, such as chatbots.
- The national government organises expert meetings for professionals in various technical disciplines that deal with AI applications on a daily basis. These include architects, developers and data scientists from various organisations.
- Active participation in European public sector initiatives within the framework of the coordinated Action Plan for AI. These may take the form of calls to realise AI example projects.



The government is experimenting more with AI and is rolling out more successful example projects

The government is already experimenting with AI extensively, with a view to its successful roll-out. A risk assessment survey by TNO on the application of AI in the public sector shows that experiments with AI applications such as chatbots, decision algorithms and translation algorithms are taking place at various locations within the government.

► ACTIONS:

- In collaboration with other government organisations and the Association of Netherlands Municipalities (VNG), the Ministry of the Interior and Kingdom Relations is conducting two experiments with AI in 2019, focusing on ethics in, by and for design and the transparency of algorithms. The ambition is to build up a portfolio of example projects, which will be shared in the knowledge network.
- Many government bodies, including the Ministry of Social Affairs and Employment, the Ministry of the Interior and Kingdom Relations, the Ministry of Justice and Security and several municipalities, pursue poverty reduction policies. Initiatives are combined as much as possible in order to come to high-quality proposals. This involves the early identification of potential poverty, which can prevent suffering and high costs.
- Various government organisations are experimenting with text mining, for example to make it easier to search archives (JustID) and council documents (Ministry of the Interior and Kingdom Relations, VNG). The intention is to use AI in follow-up projects.
- Several government organisations are exploring the possibilities of new technologies in procurement, with a focus on blockchain and AI. The 'Sustainable digitalisation of public procurement' (*Duurzame digitalisering van de Rijksinkoop*) programme focuses on AI. This concerns the purchase of generic services from the government and the systems that have been set up for this purpose.
- Various government agencies, such as the police, the Netherlands Enterprise Agency and 'P-Direkt' (the Shared Service Centre for HRM of the Dutch government) are developing a chatbot.



The government is using more resources to encourage companies to develop AI for its public tasks

When it comes to procurement, the government is a major player in various sectors. With a procurement volume of €73.3 billion, the government invests considerable amounts, mainly in the physical environment, the social domain and security. As such, the government has a major influence on the degree of innovation and the utilisation of the opportunities offered by AI.

Many innovative applications are developed by innovative SMEs. By making good use of the range of instruments offered by public procurement legislation, innovative companies can also be given a chance. This may include things such as innovation partnerships (deployed in 'Startup in Residence' programmes), Small Business Innovation Research (SBIR)¹⁴ and instruments that finance the development of innovations, particularly by SMEs. Governments can also enter into a dialogue with the business community before the tender procedure takes place.

► ACTIONS:

- The Ministry of Justice and Security and the Ministry of the Interior and Kingdom Relations have accepted 21 proposals for feasibility studies in phase 1 of SBIR AI in the public sector; proposals for phase 2 will be accepted in 2020. A second SBIR with a regional party is being prepared.
- Over the next few years, various government ministries, including the Ministry of Justice and Security and the Ministry of the Interior and Kingdom Relations, will take part in Odyssey, the world's largest hackathon in Groningen, in various different tracks. In Odyssey, the business community is challenged to develop initiatives for AI solutions in response to specific government needs.
- In the coming years, ministries will use the various instruments within procurement legislation to promote innovation in the market. In addition to SBIR, this also concerns innovation partnerships, market consultation and the competitive dialogue.

¹⁴ SBIR is a form of tendering in which companies can develop innovative solutions to the societal demands of the government by means of a stepped innovation competition (first phase feasibility study, second phase prototype development).



AI entrepreneurship is stimulated

AI offers enormous opportunities for service and technology companies, for example helping them increase productivity, set up flexible production systems and provide customised solutions. AI makes companies more competitive, more future-proof and strengthens the competitive position of the country as a whole. AI opens up possibilities to automate complex tasks. It enables companies to predict machine maintenance needs, ensure product quality and better plan processes that save costs and resources. In addition, AI can help to make more efficient use of raw materials. Finally, AI-driven companies are very important for solving societal challenges, as indicated earlier in this chapter.

Many large Dutch companies are already working on deepening their knowledge of AI and using it to improve their services and productivity. However, most of these AI activities are still in the planning or pilot phase. Adoption among SMEs and the number of start-ups and scale-ups needs to increase significantly. Large companies can help SMEs, start-ups and scale-ups to develop and apply AI-driven innovations and new business models. Some of the problems faced by these companies are characteristic of problems in other technical sectors, such as access to knowledge, scarce risk capital, scarce talent and internationalisation. A strong AI industry is important for the Netherlands, also in view of the ambition to seize the opportunities of human-centric AI for the economy and society. That is why extra attention is devoted to AI entrepreneurship, especially within existing policy actions. In addition, the AI Coalition plays an important role in creating a favourable business climate for AI in the Netherlands.

PROCESS OPTIMISATION

A number of companies have already implemented AI to optimise their processes. For example, VORtech is using AI to detect and locate leaks in pipeline networks. Dutch water companies use large networks of pipelines, so any leakage can have major consequences. The AI application analyses deviations in pressure and flow rates within the pipeline network day and night in order to detect leaks. It ensures that any problems are solved quickly so that water 'simply' continues to flow from the tap.

Another company, EPCOR, uses AI to predict maintenance needs on Auxiliary Power Units (APU) for 30 different airlines worldwide. By collecting data from the APU and then analysing it with AI, flight operation is more reliable and the costs of maintenance are lower. It also contributes to flight safety and the prevention of flight delays.



The government encourages AI-related start-ups and scale-ups in the development of applications

The more than 300 AI-driven start-ups and scale-ups in the Netherlands (over 9000 FTEs) operate mainly in the field of business software, care, marketing and fintech.¹⁵ They benefit from a favourable environment for technology-driven entrepreneurship and access to talent, capital, knowledge, networks and markets. AI start-ups and scale-ups face specific obstacles. It is particularly difficult for them to recruit AI staff, as they are often unable to pay high, fixed salaries.

In order to stimulate technology-driven entrepreneurship, a new government-wide start-up and scale-up strategy was published in June 2018, with an implementation budget of €65 million. This will improve the business climate for start-ups and scale-ups, and StartupDelta will be continued for four years under the name TechLeap.nl, with more focus on the further growth of start-ups and scale-ups. The new programme includes a centre of expertise and a national growth programme. This provides approximately 50 promising Dutch scale-ups per year with access to international networks. It is expected that many AI start-ups/scale-ups will participate. The strategy also includes measures to improve access to diverse talent (AI-related and otherwise).

It is important for start-ups to find their first customers and clients. Governments and large companies play a role as launching customers or clients, involving start-ups in solving their innovation issues. This may take the form of challenges, competitions, 'Startup-in-Residence' programmes, experiments or a consortium. In addition, AI start-ups and scale-ups require a great deal of capital, even more than 'regular' start-ups and scale-ups¹⁶, in order to be able to scale up quickly in an internationally competitive market. It is also important for AI start-ups and scale-ups to be able to grow rapidly internationally and gain access to international networks and markets. The trade and innovation departments in the foreign missions support them in these efforts.

► ACTIONS:

- The Ministry of Economic Affairs and Climate Policy is increasing access to innovation financing for start-ups (AI-related and otherwise) through early-stage financing and the Innovation Credit (*Innovatiekrediet*), and is facilitating access to risk capital for start-ups with the 'Seed Capital Scheme', the 'Dutch Venture Initiative', the scale-up fund and via the Regional Development Agencies (RDAs) (*Regionale Ontwikkelingsmaatschappijen*, ROMs)¹⁷.
- In the supplementary agreement concluded between the Ministry of Economic Affairs and Climate Policy, the Ministry of Finance and Invest-NL, AI is included as one of the focus areas for Invest-NL. The Ministry of Economic Affairs and Climate Policy and the Ministry of Finance are exploring a change in the tax rules which will make it more attractive to pay out in stock options – and thus to work for a start-up or scale-up.
- The Ministry of Justice and Security, the Ministry of Social Affairs and Employment and the Ministry of Economic Affairs and Climate Policy are drafting legislation relating to the right of residence for essential employees of start-ups and scale-ups. The legislation will enter into force in the summer of 2020.
- The Ministry of Foreign Affairs will appoint six start-up liaison officers to its posts in San Francisco/ Los Angeles, New York/Boston, Singapore, Berlin, Paris and London by 2020 at the latest.
- TechLeap.nl (formerly StartupDelta) organises missions to start-up and technology fairs and prominent tech hubs, and start-ups and scale-ups are more closely involved in trade and innovation missions and 'Top Sector' missions.

¹⁵ StartupDelta, 'Artificial Intelligence in the Netherlands – Startup Report 2018', 2018.

¹⁶ Roland Berger & Asgard, 'Artificial Intelligence – A strategy for European startups – Recommendations for policymakers', 2018.

¹⁷ The RDAs are an instrument of the Ministry of Economic Affairs and Climate Policy and the provinces involved for the regional implementation of economic and innovation policy. They provide a regional stimulus to innovative SMEs in business development, strategic acquisition, trade facilitation and investments in start-ups and scale-ups.



Companies (including SMEs) make use of knowledge and applied research

The exchange of knowledge and the sharing of tools between researchers and businesses, for example via research labs, field labs and smart industry hubs, is crucial for the valorisation of AI research and innovation. Wherever possible, the research labs seek cooperation with relevant Smart Industry field labs¹⁸ to share knowledge and tools more broadly. The six RDAs have dozens of AI companies in their portfolios and play a role in strengthening AI-driven entrepreneurship. For example, the Limburg Business Development Fund of LIOF (the Regional Development Agency of the Province of Limburg) provided eight early-stage AI-related financings and grants totalling €3.8 million.

New AI-driven growth is also relevant for the broader, late-adaptors concerning innovation, SMEs. In this segment, AI helps to organise repetitive work more easily, planning and stockpiling are more accurate and demand-driven, and chatbots can help with customer queries. Businesses often find it difficult to keep up with the fast pace of innovation and to use technology and especially AI successfully in their company. The 'Accelerating the digitalisation of SMEs' (*Versnelling digitalisering MKB*) programme and an information programme of the Chamber of Commerce can help them with this. Higher professional education (HBO), with more than 15,000 Information and Communication Technology (ICT) students and a large number of ICT professors, can help (innovative) SMEs with useful and high-quality AI knowledge, for example by means of short-term and solution-focused research through the use of students and trainees. In addition, the European Commission is developing a network of digital innovation hubs for AI in Europe¹⁹ to accelerate the application of AI in SMEs, with TNO as the Dutch point of contact.

► ACTIONS:

- As of 2019, the government will scale up the 'Accelerating the digitalisation of SMEs' (*Versnelling digitalisering MKB*) programme, including five regional SME workshops in which education, the government and the business community collaborate.
- In 2019, RDAs will jointly explore how they can specifically stimulate entrepreneurship using AI.
- The Dutch AI Coalition is working out a plan to create more synergy between research, education and organisations.
- Five regional smart industry hubs and research centres (data value hubs) provide companies, particularly SMEs that are late-adaptors concerning innovation, with up-to-date knowledge, tools and training modules for the responsible use of AI and data. The hubs organise workshops for SMEs, issue feasibility vouchers and work with vocational education on the development of digital skills.
- In the smart industry approach, the sharing of knowledge and valorisation of research with respect to AI applications will be strengthened.
- TNO connects the Dutch field labs and hubs with the European AI Digital Innovation Network.
- As of 2020, the Chamber of Commerce will be providing SMEs with business-oriented information about AI, based in part on best practice examples from the SME Workshops.
- The ICT research platform improves the visibility of practice-based ICT research in the Netherlands, together with the employers' umbrella organisations VNO-NCW (Confederation of Netherlands Industry and Employers) and MKB-Nederland (Dutch Federation of Small and Medium-Sized Enterprises), HBO-i²⁰, SIA²¹ and 50 HBO professors. Target: by 2020, 200 SMEs will be working with innovative ICT applications, including AI.

¹⁸ There are currently 39 of them, including Tata Steel, Philips and Campione, which are experimenting with effective production and preventive maintenance.

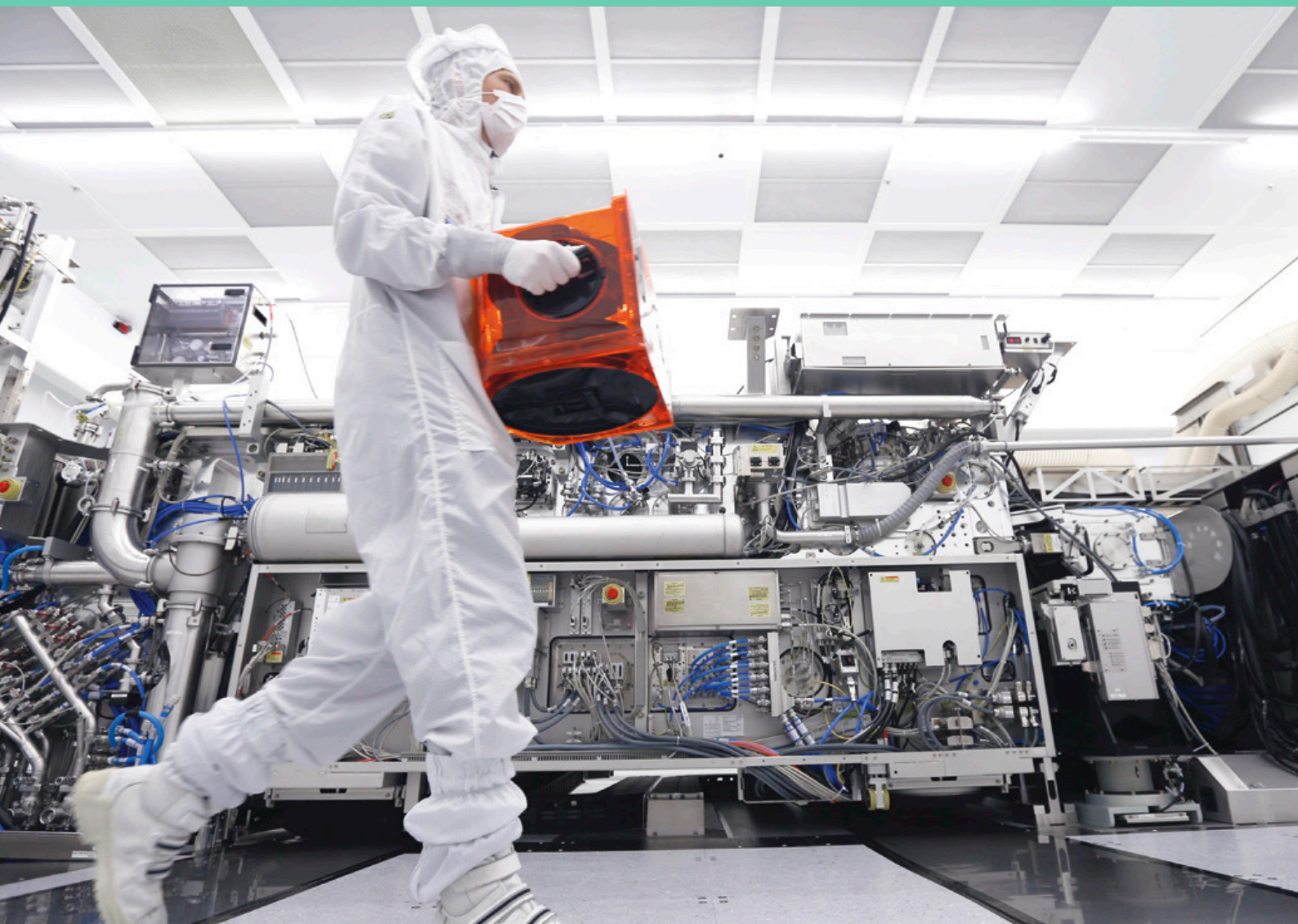
¹⁹ This is done in collaboration with the industry-driven European AI Public-Private Partnership, led by the Big Data Value Association and the European Robotics Association.

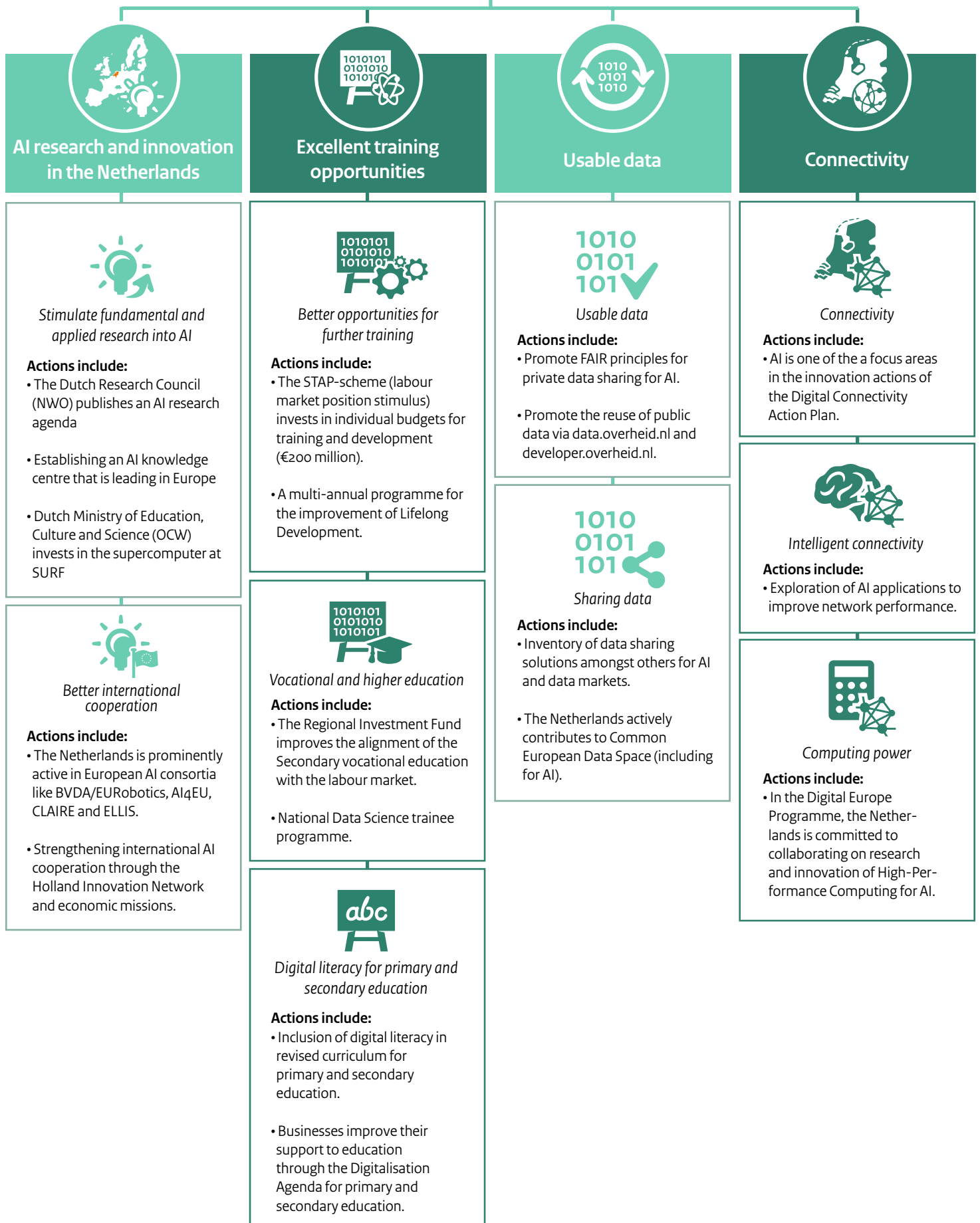
²⁰ The HBO-i foundation is a partnership of ICT courses in higher professional education in the Netherlands.

²¹ SIA is the National Coordinating Body for Applied Scientific Research (*Nationaal Regieorgaan Praktijkgericht Onderzoek*) of the Netherlands Organisation for Scientific Research (NWO).

Track 2: Creating the right conditions

In order to accelerate AI development, the government wants the Netherlands to have a vibrant AI climate with conditions that support and promote AI research and the development, marketing and deployment of AI applications. This requires a number of key ingredients: high-quality research and innovation, a workforce with the right knowledge and skills to develop and work with AI, access to sufficient high-quality data, and high-quality and intelligent digital connectivity. Given its aim to boost AI developments in the Netherlands, the government is fully committed to achieving these conditions.







AI research and innovation in the Netherlands are of high quality and leading in Europe

The Netherlands aspires to remain competitive in Europe and distinguish itself with top-quality AI research and innovation. Cooperation and investment in research are needed to attract additional researchers and many more AI companies, for new knowledge, talent and skills for the jobs, services, products and work processes of the future. The Netherlands must have an innovation system that stimulates both fundamental and applied AI research and promotes knowledge sharing. Pooling forces for a strong public-private knowledge base and synergy with European consortia are crucial. In this way, knowledge can circulate and be more effectively used ('valorised'). Small and medium-sized enterprises, as well as start-ups and scale-ups, must also be able to participate.



The Netherlands has an innovation system that stimulates fundamental and applied research on AI

Fundamental and groundbreaking AI research forms the basis for research and innovation and, by extension, for training, recruiting and retaining diverse talent. AI is innovating the way research is done in all areas of science, from medical diagnostics (cancer research), digital humanities (behavioural research) to astronomy (analysis of telescope data on black holes). AI is applied in all fields of science: from medical diagnostics to longitudinal file studies and from mobility research to media studies. AI also leads to new knowledge and innovation, for example through synergy between genetic, medical and AI knowledge. The Netherlands has world-class AI research within its borders, especially in the field of machine learning based on image, language, text, video and sound, and in the digital humanities.²²

Both fundamental and applied AI research are needed. To facilitate curiosity-driven fundamental research in the area of ICT and AI, the Ministry of Education, Culture and Science is investing in a broad knowledge base of universities and institutes, in the National Science Agenda, in sectoral plans and Top Sectors and ICT infrastructure. Within this broad scientific approach, the ministry is also investing in several larger AI-related initiatives: Commit2data, VWData and Prevention and Big Data. The National Science Agenda is a broad, social, connecting and innovative initiative, with an eye for the importance of promoting diverse talent. The emphasis is on fundamental research linked to applied and practical research. More research and innovation are needed to develop AI in such a way that it is human-centric, trustworthy, transparent and explainable; see also Track 3 of this Plan (the Netherlands is conducting more research into the development and application of responsible AI). Within the National Science Agenda, digitalisation in general is part of almost all routes and artificial intelligence is specific to the 'Value creation through responsible access to and use of Big Data' (*Waardecreatie door verantwoorde toegang tot en gebruik van big data*) route. The VWData programme originated from the impulse generated by the launch of the National Science Agenda. Ministerial departments have the opportunity to invest in AI-related research themselves. The Ministry of Health, Welfare and Sport has chosen to invest in Prevention and Big Data and this investment has been doubled from the National Science Agenda. To ensure that researchers have access to sufficient computing capacity, the Ministry of Education, Culture and Science is investing €18 million in a new national supercomputer at SURF.

In recent years, the relative share of Dutch publications on AI has dropped from 4% to less than 2% of publications worldwide, mainly because other countries have significantly increased their efforts. A broad AI research agenda, cooperation and targeted investments are important to be able to capitalise on the opportunities that AI research offers to Dutch science, economy and society.

²² Elsevier, 'Artificial Intelligence: How knowledge is created, transferred and used', 2018.

To utilise the results of AI research, collaboration between knowledge institutions, civil society organisations and the business community is crucial. Moreover, it calls for combinations of technological and non-technological disciplines. This is done for AI as a key enabling technology within the mission-driven innovation policy on the initiative of the Dutch Digital Delta 'Top Team'.

Field- and industry labs have been initiated by the universities, in collaboration with companies and civil society organisations that have joined forces in ICAI. There are now nine AI Labs, each with at least five PhD students, in which companies and government organisations collaborate directly. These include two AholdDelhaize retail labs (UvA and Delft University of Technology (TU Delft)), an ING fintech lab and a National Policy Lab AI. This is unique in Europe. The Ministry of Defence is running specific research programmes on AI applications in the security domain, in close collaboration with NATO partners, the business community and universities and knowledge centres such as TNO, the National Aerospace Laboratory (NLR) and the Maritime Research Institute Netherlands (MARIN).

The European Commission is encouraging large AI excellence research centres as part of the European AI approach for top research, talent, technology, applications and responsible AI use. Combining fundamental and applied research in value chains generates an important added value for a national and European approach. The Dutch AI Coalition is working on a plan to position the Netherlands as a leading AI research centre in Europe.

ACTIONS²³:

- After the summer of 2019, NWO will publish a broad AI research agenda for initiating new research programmes and tools and generating national and international synergy.
- Ministries are exploring the possibility of investing in an AI programme as part of Action Line 2 of the National Science Agenda (*Nationale Wetenschapsagenda*) in 2020.
- Within the framework of the mission-driven innovation policy, long-term programmes will be set up for the AI key enabling technology for innovative knowledge and solutions with and for relevant application areas.
- Based on Dutch strengths such as the AI research labs, a proposal will be developed in 2019 under the auspices of the Dutch AI Coalition for an AI knowledge centre in the Netherlands that is a leader in Europe.
- The Ministry of Education, Culture and Science is investing €18 million in the purchase of a national supercomputer for SURF.
- The TO2s²⁴ organise joint workshops on AI topics such as explainability, valorisation of research, and societal impact.
- Within the context of the interdepartmental programme 'Strengthening the IT workforce in the civil service' (*Versterking HR ICT Rijksdienst*) (coordinated by the Ministry of the Interior and Kingdom Relations), a cooperation plan will be set up with ICT educators in higher education. This plan aims to boost innovation and the development of the national government on specific themes (including AI) by setting up field labs.
- The Ministry of Defence is having its strategic knowledge partners (TNO, NLR and MARIN) carry out research programmes in which AI is developed and applied.
- The 'Data Science, Artificial Intelligence & Quantum Technology for Military Applications' knowledge centre is developing AI application possibilities for the Ministry of Defence and is collaborating with TNO.

²³ See Track 1 for the development of a long-term, public-private programme for AI research and innovation for societal challenges (part of the mission-driven innovation policy).

²⁴ TO2s are the applied research institutes united in Federation TO2. Federation TO2 consists of Deltares, ECN, Marin, NLR, TNO and Wageningen-Research.



Dutch companies and knowledge institutions will cooperate more effectively internationally, especially in European consortia

The European Commission is strongly committed to public-private investment in research and innovation in the field of AI.²⁵ It wants public and private parties to invest at least €20 billion in AI until 2020 and then up to more than €20 billion per year until 2027.²⁶ For its part, the Commission is making €1.5 billion available to AI under the current Horizon 2020 framework programme until 2020. For the EU's next long-term budget (2021–2027), the Commission has proposed to invest at least €7 billion from Horizon Europe and the Digital Europe Programme in AI.

The Netherlands is already benefiting from the European opportunities and will continue to focus on them. Within the European Horizon 2020 programme, €986 million was allocated to 580 AI-related projects from 2014 to 2017. Dutch parties received €61 million (6.1%) of this. Assuming the same share, a budget of €48 million per year will be available for Dutch parties in AI-related European projects in the coming years. This can only be achieved if Dutch parties are and remain well connected at the European level by highlighting and supporting European initiatives. Several large industrial companies, such as Philips, NXP and ASML, have indicated that they intend to invest heavily in AI-driven European research and development programmes, such as EUREKA, in the coming years.

The share of Dutch knowledge centres and companies in larger AI-related European programmes will be increased in the coming years, as will the cooperation with other member states on AI research and programmes. The aim is to increase the visibility of Dutch AI knowledge and expertise and thus to promote opportunities for Dutch industry and knowledge centres in research, innovation, trade, acquisition and security.

The Confederation of Laboratories for Artificial Intelligence Research in Europe (CLAIRE) is an example of such a European programme. CLAIRE is a European partnership of thousands of researchers, to which more than 300 Dutch organisations (universities, large companies and the European Space Agency in Noordwijk) are affiliated. CLAIRE focuses on the development of human-centric AI, which is an important Dutch and European core value for all areas of AI. With the support of the municipality, CLAIRE has recently established its headquarters in The Hague.

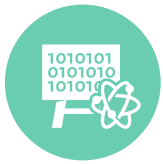
► ACTIONS:

- The Netherlands provides visible involvement in the major initiatives for broad European cooperation on AI, such as: the Strategic Research Agenda by BVDA/EURObotics²⁷ (with 300 industrial and academic partners), the establishment of a specific AI PPP on behalf of the European Commission and international academic initiatives, such as CLAIRE and ELLIS (European Lab for Learning & Intelligent Systems).
- The Netherlands will continue its current participation in future European programmes, such as Horizon Europe, Digital Europe and EUREKA, including through the Dutch National Contact Point for European programmes and innovation missions.
- The Netherlands is strengthening its cooperation with other Member States and European initiatives, including through the Holland Innovation Network and economic missions.
- The Netherlands is actively seeking collaboration on AI with other countries within and outside Europe, such as Germany, France, Singapore, the US and Belgium. For example, an innovation mission to Singapore will be organised at the end of 2019 for collaboration in the field of AI, and in 2020 opportunities will be explored for effective bilateral collaboration between the US and the Netherlands in specific AI areas.
- The Netherlands Foreign Investment Agency (NFIA) has included Artificial Intelligence as a primary focus area in its Strategic Action Plan, 'The Netherlands: Digital Gateway to Europe' and will focus a substantial part of its acquisition activities on it.

²⁵ See Appendix 2 for an overview of European funds.

²⁶ This represents all investments across the EU (including Norway, Switzerland and the UK).

²⁷ A partnership of the Big Data Value Association and the European Robotics Association.



The Netherlands has excellent training opportunities for living with AI and more talent for working with AI

The labour market is changing rapidly as a result of technological progress and digitalisation. This requires adaptability and flexibility in the labour market and in the education system. Workers not only need to keep their knowledge and skills up to date, but also to continue to develop them throughout their working lives. Vocational and higher education should train more and more diverse students, providing them with the expertise needed to work with AI. The foundation for this will be laid in primary and secondary education, where digital literacy will become part of the curriculum within the context of the comprehensive curriculum review.



Everyone has more and better access to continuing education for AI-related knowledge and skills

Contrary to previous technological breakthroughs, which mainly took over physical and routine tasks, AI will also take on mental tasks. It is still unclear whether the total number of jobs will increase or decrease as a result of AI. However, it is expected that the tasks that make up jobs and the skills that they require will change drastically. On the one hand this concerns AI-specific skills, on the other hand human and interpersonal skills that AI cannot replace.²⁸ AI-related skills and knowledge, such as digital skills, AI literacy, conceptual thinking and the ability to assess the implications of AI, are becoming important to all of us.²⁹ Different groups will also need to develop different skills, depending on how and to what extent AI influences their work.

‘Those who work don’t have to learn anymore’ is a thing of the past. The labour market is evolving and changing rapidly. Workers (together with employers and public authorities) need to invest in their training so that they can respond to rapid technological developments and the demand for new skills. This is also in the direct interest of employers, given the growing shortage of suitable personnel. At the same time, it is important to bear in mind that successful applications of new technologies are to a large extent explained by non-technological determinants.³⁰ In order to promote the success of innovation, therefore, it is important to invest not only in new technologies, but also in the soft side of innovation, such as in the skills of employees. In order to ensure an inclusive labour market, the entire labour force must be included in AI development, where everyone is given the necessary space and stimulated to invest in their development.³¹ This is not yet the case: at present, it is mainly those with higher education and permanent contracts who engage in courses, education or training.³²

²⁸ MacCrory, F., Westerman, G., Alhammedi, Y., & Brynjolfsson, E. (2014). Racing with and against the machine: Changes in occupational skill composition in an era of rapid technological advance.

²⁹ Ponce, A. (2018). Artificial Intelligence: A Game Changer for the World of Work. Brussel: ETUI.

³⁰ These non-technological determinants of innovation are also referred to as ‘social innovation’. Volberda et al. define social innovation as the development of new management skills, the use of innovative forms of organisation, the establishment of high-quality employment relationships and partnerships to improve competitiveness and productivity. See: Volberda, H., Jansen, J., Tempelaar, M., & Heij, K., ‘Monitoren van sociale innovatie: slimmer werken, dynamisch managen en flexibel organiseren’, Tijdschrift voor HRM 2018, 1, p. 85-110.

³¹ According to the think tank DenkWerk (2019), over the next ten years three million workers will need digital education, and between 40 and 45 thousand people will have to retrain every year. This will require an annual investment of 6 to 7 billion euros. So more seems to be needed.

³² Poulissen, D., van Eldert, P., Fouarge, D., & de Grip, A. (2018). Leren onder werkenden met een kwetsbare positie op de arbeidsmarkt (No. 005). Maastricht University, Research Centre for Education and the Labour Market (ROA).

► ACTIONS:

- A scheme that will structurally make more than €200 million available in the form of individual budgets for training and development will be presented to the House of Representatives after the summer of 2019. This 'STAP' (Labour Market Position Stimulus) budget replaces the current tax deduction scheme for training and is accessible to everyone up to the state pension age.
- In order to encourage employers to invest in individual learning budgets, the Ministry of Social Affairs and Employment is working with the Ministry of Finance, the Tax and Customs Administration (*Belastingdienst*), sectors and executives to clarify the tax treatment of individual learning and development budgets.
- The Ministry of Social Affairs and Employment is developing a scheme to implement the Wiersma motion, which will structurally make €48 million a year available from 2020 to promote a learning culture in SMEs, and the Heerma motion, which will make a total of €60 million available over a period of five years to provide additional support to the agricultural, hospitality and recreation sectors in order to attract more 'BBL' students (students in the 'work-based' VET learning pathway).
- With 'MKB!dee', the Ministry of Economic Affairs and Climate Policy is challenging SMEs to come up with ideas that will lead to more investment in training and development of workers. While intended for all SMEs, the scheme focuses in particular on the challenges of technical SMEs and digitalisation. It relates to the broad effects of digitalisation, not to the ICT sector as such. In 2019, €7.5 million is available.
- The Ministry of Social Affairs and Employment, the Ministry of Education, Culture and Science and the Ministry of Economic Affairs and Climate Policy are carrying out a long-term, action-oriented programme to improve the preconditions for Lifelong Development (LLD), including pilots with training and employment help desks (*leerwerkloketten*) in various regions, further flexibilisation of the range of courses on offer and assessment of the feasibility of a digital training overview.
- The Ministry of Social Affairs and Employment and the NWO are investing approximately €3 million in research to gain more insight into the impact of digital technologies (such as AI) on work and employment.



Vocational and higher education train more students with talent to work with AI

The education system will have to respond actively to the changing demand for labour and thus to new training needs. Collaboration between education, business and research institutions enables new technologies to be applied quickly in training. Within the Education Innovation with ICT Acceleration Plan (*Versnellingsplan Onderwijsinnovatie met ICT*), so-called acceleration zones are being set up to improve the connection of study programmes to the labour market and promote the professionalisation of instructors. The Digitalisation Agendas for Senior secondary vocational education and training (MBO) and primary and secondary education also include the ambition to make teachers digitally proficient.

There is a great need for (both male and female) AI experts and data professionals. The popularity of AI and Computer Science programmes is growing so rapidly that universities are finding it difficult to accommodate this growth. As a result, all universities with a bachelor's programme in AI have set an enrolment restriction for the coming academic year (2019–2020). They are struggling to find enough lecturers and the funds to pay them. This is undesirable. The universities have been asked, therefore, to include this capacity problem in their sectoral plans³³ and to seek cooperation with other universities and with companies and other employers. Following the advice of the Van Rijn Committee³⁴, the higher education sector will see a review of the flat-rate basic grant of education funding from 2020 onwards³⁵, based on the percentage of students in science and technology and other variables. The technical universities, together with the general universities and universities of applied sciences, will draw up a sectoral plan for STEM study programmes, in order to improve training capacity, study success rates and the connection with the labour market.

Even if all current capacity issues are resolved and the number of graduates continues to grow, the huge demand for AI experts and data professionals will not be met. Additional measures are needed, including encouraging boys and girls to opt for degree programmes in ICT, attracting foreign talent and retraining workers from shrinking sectors. Businesses can also help by investing in and freeing up capacity for education.

³³ Sectoral plans are being used to invest in strengthening the research base.

³⁴ Parliamentary Paper 31288, No. 726.

³⁵ Parliamentary Paper 31288, No. 744.

► ACTIONS:

- The Regional MBO Investment Fund (*Regionaal Investeringsfonds mbo*) scheme provides €25 million a year until 2022 for projects that improve the connection of Senior secondary vocational education (MBO) to the labour market, for example if the profession for which they offer training changes as a result of AI.
- The Foundation for Cooperation on Vocational Education, Training and Labour Market (*Samenwerkingsorganisatie Beroepsonderwijs Bedrijfsleven, SBB*) also pays attention to AI for senior secondary vocational education (*middelbaar beroepsonderwijs, MBO*) in the qualification files, where relevant. A recent example of a new qualification that includes AI is 'software developer'.
- Commissioned by the Minister of Education, Culture and Science, the universities have drawn up sectoral plans for the STEM, Social Sciences and Humanities sectors. The Ministry will contribute an extra €70 million to this, and the periodic resources for profiling can also be used for this purpose.
- The Ministry of Education, Culture and Science supports the Education Innovation with ICT Acceleration Plan for all higher education institutions (universities of applied sciences and research universities) by making €15 million available over four years.³⁶
- In 2019, the Learning Outcomes Experiment (*Experiment Leervuitkomsten*) will be evaluated, in which higher education and the business community experiment with more flexible, tailor-made part-time education for adults, in order to enable employees to learn effectively while working.
- In the summer of 2019, a subsidy scheme will be published to encourage Senior secondary vocational education (MBO) institutions to jointly develop innovative and flexible education programmes for workers and jobseekers.
- The Ministry of Education, Culture and Science is investigating how study programmes can better respond to rapid technological developments in the strategic exploration for Senior secondary vocational education (MBO) and the Strategic Agenda for Higher Education and Research (publication: autumn 2019).
- Through the Human Capital Agenda for ICT, the Ministry of Economic Affairs stimulates PPP with the aim to promote innovation and knowledge transfer for new technologies in education. This will be kicked off with the course, 'AI in a Day'.
- Starting in September 2019, a second batch of candidates will start working in the National Data Science Trainee Programme, in order to develop themselves as data scientists, from the interdepartmental programme 'Strengthening the IT workforce in the civil service' (*Versterking HR ICT Rijksdienst*) (coordinated by the Ministry of the Interior and Kingdom Relations).
- The Ministry of Education, Culture and Science, together with skills development researchers, is exploring how digital skills can be applied in HBO and MBO.
- In order to stimulate innovation and development in the national government, a study is being carried out in collaboration with ICT trainers in higher education into setting up field labs on specific themes, including AI, from the interdepartmental programme 'Strengthening the IT workforce in the civil service' (*Versterking HR ICT Rijksdienst*) (coordinated by the Ministry of the Interior and Kingdom Relations).

³⁶ Association of Universities in the Netherlands (VSNU), Netherlands Association of Universities of Applied Sciences (Vereniging Hogescholen) & Surf, 'Versnellingsplan Onderwijsinnovatie met ICT', May 2018.



Primary and secondary schools teach pupils digital literacy

For the current generation of pupils, the online and offline worlds are closely connected. However, this does not guarantee that pupils understand what is happening on a digital level or that they are actually digitally literate. Education has an important role to play in providing equal digital opportunities for all boys and girls, regardless of origin or background, and in inspiring enthusiasm among boys and girls for professions in which digital skills predominate. This calls for digitally literate teachers.

Digital literacy is one of the nine learning areas of Curriculum.nu, the revision of the curriculum for primary and secondary education. In the future, all schools will focus on basic ICT skills, information skills, media literacy and computational thinking (a collection of thought processes such as logical reasoning, systematic thinking and pattern recognition). These skills are essential to develop, understand and deal with AI.

The increase of AI, also in education itself, has made it important to understand the underlying processes. Pupils and teachers will have to develop their critical faculties in this area. This requires investment in the knowledge and skills of teachers. To this end, long-term connections with business practice are indispensable. Businesses can help by investing in and freeing up capacity for education. So far, this has not been sufficiently structured.

► ACTIONS:

- In the autumn of 2019, the government will review the curriculum for primary and secondary education and include digital literacy in it. Legal anchoring is planned for 2021.
- The government is investigating the possibilities of setting up an AI Lab for education.
- The Digitalisation Agenda for primary and secondary education³⁷ aims to provide more and better support for education in digitalisation issues by the business community in five key areas: innovative capacity, digitally literate teachers and pupils, digital learning resources, infrastructure and ethics.

³⁷ Parliamentary Paper 32034, No. 31.



The Netherlands has more usable data for AI applications to improve AI developments

The advantage of data lies in application possibilities such as data-driven AI. Dutch businesses and consumers benefit from the societal and economic opportunities offered by data. Think of car manufacturers, who are more likely to find out whether a car is faulty and doctors who make better diagnoses. In order to develop high-quality and reliable AI applications, usable data (including representative, verifiable and shareable data) is crucial³⁸. By combining different types of data from different parties, valuable new datasets can be created that make new AI applications possible. In order to realise this potential, it is necessary for public, private and civil society organisations to be able to share more data with each other. It goes without saying that this must be done responsibly and, among other things, with due regard for privacy rules.



The Netherlands has more useful data for AI applications

An AI application requires, among other things, high-quality data. Aspects such as accuracy, completeness, reliability, representativeness and timeliness all influence the quality of data. Companies and governments benefit from high-quality AI applications for economic, ethical and safety reasons. This is because high-quality AI applications provide more reliable and accurate results, which improve forecasting and decision-making. Indeed, low quality data can cause bias and imbalances in AI³⁹: bias when the data itself contains prejudices (because people have them too), bias through prejudice in the algorithms, and imbalances when data is not representative. It is important, therefore, that the person applying AI is aware of the quality of the data used. This is also in line with the action under AI research and innovation in the Netherlands are of high quality and leading in Europe to make knowledge, tools and training modules available for the responsible use of data.

The required quality of an AI application and, by extension, of the data used in it is context-dependent. The required quality of data cannot be determined unequivocally; there is no single generic quality requirement that is optimal for every AI application. In some cases, for example in the case of data for a self-driving car, there is a⁴⁰ great need for high-quality data, because this is an AI application with a potentially large impact. For data used for an AI application that predicts the fastest queue in the supermarket, lower quality requirements may apply.

Finding high-quality data is often a challenge. Datasets tend to differ in terms of completeness, accuracy and format. Metadata can help AI developers understand the origin and composition of a dataset by providing information about, for example, the design of the dataset and the available data elements. The General Data Protection Regulation (GDPR) and the Police Data Act (*Wet politiegegevens*, Wpol) provide clarity about the conditions for the (possibly) further processing of data. Apart from that, the quality of data and datasets for use depends on the purpose for which they are used. If the purpose of the data processing changes, the quality (including the risk of bias) will have to be reviewed.

Common principles such as the internationally verified and accepted FAIR (Findable, Accessible, Interoperable, Reusable) principles offer a good basis for the standards, tools and training per domain or sector. This can be used to make data suitable, or to determine its suitability for reuse (sharing) by both people and machines under clearly described conditions. There is a great deal of focus on data standardisation in the healthcare sector, as evidenced by various initiatives around the Basic Data Set for Care (*Basisgegevensset Zorg*, BGZ) by Nictiz, the Registration at the Source (*Registratie aan de Bron*) programme of the university medical centres and *Zorggegevens.nl*. The latter is a register of all care data and their sources drawn up by the Dutch National Institute for Public Health and the Environment (RIVM). It does not give access to data, but promotes collaboration on the sharing of data by providing insight into which parties have access to which data.

³⁸ The terms 'data' or 'information' do not have an unambiguous definition. For the purpose of this document, we refer to information in digital form: data that is either raw or processed – cleaned, formatted, combined and/or structured – to make it suitable for analysis or use. In practice, it is increasingly difficult to distinguish between data and algorithms; both are also referred to as 'code'.

³⁹ For example, between men and women or persons with a different cultural background.

⁴⁰ Or data to support decisions in a job interview or in a procedure for the early release of a convicted person.

► ACTIONS:

- > The Ministry of Economic Affairs and Climate Policy is exploring the possibilities of stimulating the use of the FAIR principles in the sharing of private data for AI applications.
- > The Ministry of the Interior and Kingdom Relations is stimulating the provision of public sector information for re-use, for example via data.overheid.nl and through the further development of the API portal developer.overheid.nl.

THE ROYAL LIBRARY

The Royal Library of the Netherlands (KB, Koninklijke Bibliotheek) uses AI to remain in control of fast-growing information flows and to provide the user with better and more complete information. The KB is building AI-based search and find technologies by allowing the computer to read and analyse the millions of digital texts managed by the KB on subjects, persons, places and events.

Furthermore, the KB actively contributes to the development of AI techniques by making historical newspaper, book and magazine data available to researchers for text and data mining, including in the NWO research programme 'Common Lab Research Infrastructure for the Arts and Humanities'.

In addition, the KB is increasingly making data available as training material for international benchmark competitions, in order to contribute compensating bias to state-of-the-art algorithms. The library has the expertise to assess training material on the bias that can lead to discriminatory AI applications. To this end, it has developed an assessment framework to assess the quality of AI on the basis of seven principles: accessibility, inclusiveness, supervision, transparency, neutrality, safety and compliance.



Public, private and civil society organisations share more data with each other in a responsible manner

A barrier to AI developments is that developers may not have access to certain data, because it is technically protected or indirectly protected by being classified as intellectual property, trade secrets, state secrets or as a potential or actual security risk. Partly with a view to AI development, in its vision on data sharing between companies the government stated that responsible data sharing should become more common than it is now.⁴¹ In fulfilling its ambition to be at the forefront of promising and responsible B2B data sharing, the government is guided by three basic principles: (1) data sharing is preferably done on a voluntary basis, (2) data sharing is mandatory where necessary, and (3) people and companies remain in control of data.

HEALTHCARE

The Personal Health Train (PHT) is a metaphor for the set of agreements, the architecture and implementation for the responsible use of health data in, among other things, AI applications. The PHT builds on the FAIR data principles. Citizens, patients, healthcare professionals or researchers run the 'trains' (algorithms) to ask the 'stations' (datasets) questions and get answers. The key principle underlying the PHT is that data is not brought to the algorithm, but the algorithm is brought to the data. In this way, the data remains at the source, while algorithms can still learn from it. This is in line with the trend for data to be stored locally. PHT is an example of privacy by design, because it enables the use of personal data without that data being found in the (outcomes of) AI.

⁴¹ See also appendix to Parliamentary Paper 26643, No. 594, 'De Nederlandse visie op datadeling tussen bedrijven' (The Dutch vision on data sharing between companies).

The Netherlands distinguishes itself by its strong PPPs on data sharing. Where data sharing is an opportunity for Dutch society or the economy as a whole, the government should preferably promote data sharing by facilitating it and, if necessary, by regulating it. The government facilitates B2B data sharing (see box below). It has a lot of data at its disposal, which has been increasingly available as open data for a number of years now.⁴² In accordance with European directives, the Dutch government has made thousands of datasets available via the data register⁴³ and the Netherlands Space Office makes satellite data available free of charge via the satellite data portal.⁴⁴ There is also much to be gained from public-private and public-public data sharing.

The creation of a Common European Data Space for AI is being discussed at the European level in order to enable the seamless exchange of data across borders.

SYSTEMS FOR DATA SHARING

In order to be able to apply data-driven AI, it is important that companies start sharing data. In recent years, data sharing within specific sectors has been the subject of framework agreements such as 'Ishare' for the logistics sector and 'JoinData' in agriculture. Under the Medmij framework agreement for patient data, patients are in control of their own healthcare data and can decide for themselves who gets access to what data.

In addition to these sectoral initiatives, a declaration of intent was signed in May 2019 for a cross-sectoral data sharing coalition.

► ACTIONS:

Various actions are already underway, including those resulting from the Vision on Data Sharing Between Companies⁴⁵ and the 'Data Agenda Overheid' (Government Data Agenda)⁴⁶, as well as sector-specific actions (in the healthcare sector, for instance)⁴⁷. In addition, the following actions will be taken specifically for data sharing for AI:

- The Ministry of Economic Affairs and Climate Policy and the Dutch AI Coalition are organising sector dialogues on specific data sharing bottlenecks and needs for AI. The Ministry of the Interior and Kingdom Relations will be involved in order to better align supply and demand of public data with the needs of AI applications.
- The Ministry of Economic Affairs and Climate Policy will carry out an inventory of existing examples of solutions for data sharing for AI (such as the PHT) and ways to further stimulate data sharing for AI (such as data markets, rewards and innovation tools).
- The European Commission has announced its intention to invest in a Common European Data Space to increase the availability of data for AI and other purposes. The Netherlands will actively contribute to the implementation of this initiative on the basis of the Dutch vision.

⁴² See also appendix to Parliamentary Paper 26643, No. 597, 'NL Digitaal: Data Agenda Overheid (NL Digital: Government Data Agenda).

⁴³ <https://data.overheid.nl>

⁴⁴ <https://www.spaceoffice.nl/nl/satellietdataportal/>

⁴⁵ See appendix to Parliamentary Paper 26643, No. 594, 'De Nederlandse visie op datadeling tussen bedrijven' (The Dutch vision on data sharing between companies).

⁴⁶ See appendix to Parliamentary Paper 26643, No. 597, 'NL Digitaal: Data Agenda Overheid (NL Digital: Government Data Agenda).

⁴⁷ Parliamentary Paper 27529, No. 164.



The Netherlands is at the forefront of Europe in high-quality digital and intelligent connectivity for effective AI applications

Like other technological innovations, AI requires high-quality digital connectivity to get off the ground and function optimally. This is an important prerequisite for effective AI applications in sectors. The Netherlands already has a high-quality backbone infrastructure and mobile infrastructure that provides excellent regional, national and international connectivity. This infrastructure is expected to continue to evolve to meet the growing demand for connectivity. In this way, the Netherlands is positioning itself as an ideal location for AI development and applications. AI can also contribute to high-quality digital connectivity. Finally, it is important that the Netherlands has sufficient access to the computing power needed for effective AI applications.

HIGH-QUALITY DIGITAL CONNECTIVITY FOR EFFECTIVE AI APPLICATIONS

High-quality digital connectivity means that, depending on the application (AI-related or otherwise), the quality parameters latency, data rate, and reliability can be set. AI applications such as self-driving cars require high reliability and low latency. Augmented and virtual reality (AR/VR) applications require a high data rate and low latency. For effective AI applications, the availability of computing power and data processing (local or remote) may also be important.



The Dutch fixed and mobile networks offer high-quality connectivity for AI applications and are available anytime and anywhere at competitive rates

The government's Digital Connectivity Action Plan 2018⁴⁸ describes the necessary steps to ensure high-quality digital connectivity. First and foremost, the preconditions must be in place for market players to invest sufficiently in the further expansion of existing and new connectivity. An important development here is the arrival of 5G. This new generation of mobile communication is different from 4G in several key aspects. 5G can offer higher peak speeds, has lower latency rates, and can be tailored more flexibly and quickly to meet specific connectivity needs. As a result, this technology offers excellent opportunities for new, innovative AI applications such as self-driving cars, remote surgery and the further optimisation of production processes. The Digital Connectivity Action Plan's actions contribute to the high-quality connectivity that this requires.

It is also important that the networks used by AI applications are secure. To this end, the Dutch Telecommunications Act (*Telecommunicatiewet*) imposes a duty of care on telecom operators. In addition, a bill (the Telecommunications Sector (Undesirable Control) Bill (*wetsvoorstel ongewenste zeggenschap in de telecommunicatie*)) has been submitted to the House of Representatives for discussion. This bill offers the possibility of prohibiting or reversing unwanted control in the telecommunications sector.

► ACTION:

- AI will be included as a point of attention in the elaboration of the actions on innovation in the Digital Connectivity Action Plan.

⁴⁸ Parliamentary Paper 26643, No. 547.



AI contributes to high-quality connectivity for effective AI applications: 'Intelligent connectivity'

AI offers possibilities for far-reaching automation in the control, organisation and management of networks. As a result, those networks will become more or less autonomous and will respond in real time to changing conditions in the network or to changing user demand. In this way, the network quality and the customer experience can be optimised.

► ACTION:

- The Ministry of Economic Affairs and Climate Policy will discuss the possibilities of AI applications in networks with the parties involved.

POSSIBILITIES RELATING TO SPECTRUM

AI can contribute to better utilisation of the available frequencies, and thus to high-quality digital connectivity. Dynamic spectrum allocation makes it possible to allocate certain frequencies to a party in (alternating) time frames of a few seconds. For example, this will allow a party to meet its basic need for connectivity with a regular licence for exclusive use and, in times of excess demand, purchase extra frequency space. A model is also conceivable in which a private party fulfils this role or in which mobile operators rent out frequency space to each other. Spectrum sharing between parties may also become more dynamic with AI and can thus contribute to more efficient utilisation.



Companies in the Netherlands have access to sufficient computing power for effective AI applications

Computing power is an important component for many AI applications. The computing power (in combination with storage) currently available to parties in the Netherlands and in Europe may not be sufficient, given the ambitions with regard to the application of AI. More and more computing power is needed to perform and process increasingly complex tasks and extensive research and other data – not just for AI applications, but also in education and research. In time, developments in the field of quantum computing may accelerate AI developments. The government will monitor whether the availability of computing power is keeping pace with the growing demand for it (see also *AI research and innovation in the Netherlands are of high quality and leading in Europe*).

► ACTION:

- The Netherlands is committed to cooperation between the EU Member States in the field of research and innovation of High-Performance Computing for AI within the Digital Europe Programme, which will start in 2021.

CENTRAL COMPUTING VERSUS EDGE COMPUTING

Virtual assistants such as Siri, Google Now or Cortana have hardly any computing power in-house: it's 'in the cloud' (for example, a computing centre). This is known as 'central computing'. In AI applications that use central computing, the networks are important because they connect the AI widgets and gadgets to the remote computing power.

In mobile edge computing, the AI application does have its own computing power on board to process data, or the computing capacity is placed close by in the end-user's access network (for example in the providers' local data centres). One example is a self-driving car. Given the need for extremely low processing times for the real-time data, sending large amounts of data to a central location is not an option. A lot of data is therefore processed locally (e.g. sensor data about the traffic) and only some data is sent to central locations (e.g. for traffic management). The cooperation between these components (fixed and mobile networks on the one hand, and the Internet of Things, AI, robotics, AR and VR on the other) is referred to in the market as 'intelligent connectivity'.

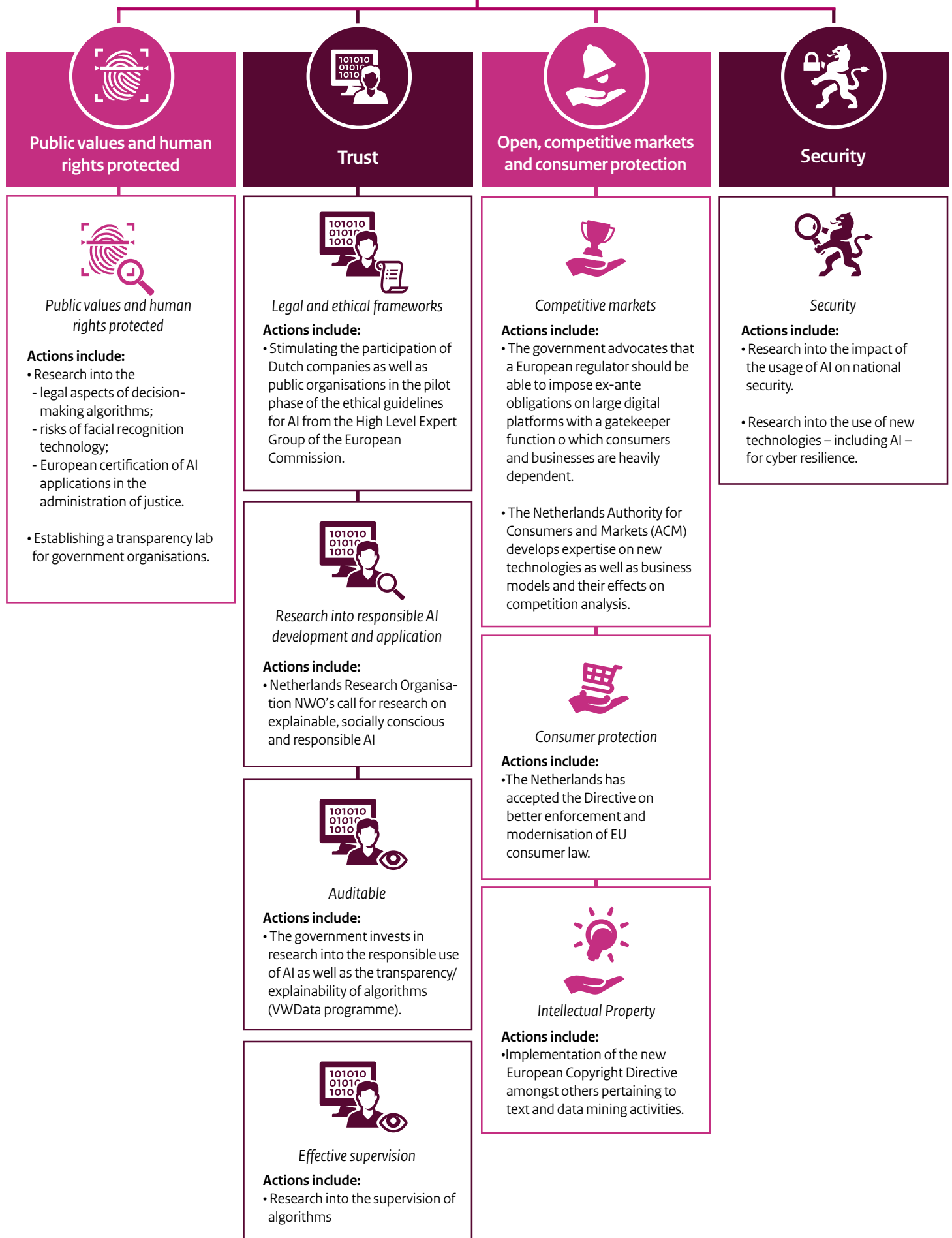
Track 3: Strengthening the foundations

The foundations need to be strengthened in order to be able to take advantage of the opportunities offered by AI and address the risks. In this context, the government is committed to the protection of citizens' fundamental rights and to appropriate ethical and legal frameworks. This allows people and companies to maintain trust in AI.⁴⁹ It is also of fundamental importance that markets remain open and competitive, and that national security is safeguarded in the AI developments.

⁴⁹ See also the 'Ethics Guidelines for Trustworthy AI' of the High-Level Expert Group on Artificial Intelligence.



Track 3 | Strengthening the foundations





Public values and human rights remain protected



Human rights are enshrined in the Constitution and in various human rights and other treaties and express the public values that we consider essential. In its response to the research report ‘*Algoritmes en grondrechten*’ (Algorithms and fundamental rights) of Utrecht University, the government indicated that the importance of human rights and their effective implementation by the legislator, the government and the courts are paramount, and that this is not fundamentally different in the digital age.⁵⁰

Concrete examples of human rights protection are the GDPR, the Equal Treatment Act (*Algemene wet gelijke behandeling*, AWGB) and the Equal Treatment (Men and Women) Act (*Wet gelijke behandeling van mannen en vrouwen*). If the government uses AI itself, restricting fundamental rights may be necessary and justified under certain circumstances. In such cases, however, a legal basis is always required which must be sufficiently clear and verifiable, serve a legitimate and proportionate purpose, provide guarantees against arbitrary use and provide adequate legal protection.

The letter from the Minister for Legal Protection to the House of Representatives about the application and use of algorithms and artificial intelligence in the field of justice administration⁵¹, and another letter from the Minister for Legal Protection to the House of Representatives about the transparency of algorithms in use by the government, have already been published.⁵²

At the same time as this Strategic Action Plan, the government sent a policy letter to the House of Representatives on AI, public values and human rights. In it, the government describes policy to safeguard public values and human rights in AI developments. This is a crucial but complex issue. For this reason, the government has chosen to devote more attention to it in this letter. The same applies to the government’s letter entitled ‘*Waarborgen tegen risico’s van data-analyses*’ (Guarantees against risks from data analyses), which was also sent to the House of Representatives at the same time

AI AND PUBLIC VALUES & HUMAN RIGHTS

Prohibition of discrimination

The prohibition of discrimination can be violated by bias in the underlying data, bias in the algorithm or by errors in classification. This could lead, for example, to unjustified distinctions being made between men and women.

Protection of privacy

Privacy may be violated if the processing of personal data does not meet the requirements of fairness and transparency in the GDPR. Privacy issues play a role in areas such as facial recognition technology, big data and techniques in which personal data are derived from other data.

Freedom of speech

In the application of AI, freedom of speech may come under pressure. This concerns access to information (e.g. personalisation and ordering of search results) on the one hand, and the operation of algorithms that automatically remove content on the other.

Human dignity and autonomy

This includes the risk of dehumanisation and the influence of AI on making choices.

The right to a fair trial

This right applies, among other things, to automated decision-making. If it is not transparent whether, and if so which, algorithms have been used to make or prepare a decision, or what assumptions and data form the basis of this decision, there will be pressure on the contestability and substantiation of decisions and statements, and on the balance between the parties to the proceedings (equality of arms).

⁵⁰ Parliamentary Paper 26643, No. 601.

⁵¹ Parliamentary Paper 34775-VI No. AH.

⁵² Parliamentary Paper 26643, No. 570.

Developments in AI and its application can be fast. It is important, therefore, to look ahead, for example by means of research into medium- and long-term developments.

USING AI AGAINST DISCRIMINATION

In the Action Plan on Labour Market Discrimination it has been announced that the Ministry of Social Affairs and Employment will tackle discrimination in recruitment and selection. Increasingly, employers and their intermediaries use automated tools and algorithms in some or all stages of the recruitment and selection process. As part of the Action Plan, the Social Affairs and Employment Inspectorate (Inspectorate SZW) also wants to gain insight into these systems and wants to see how they can be supervised effectively in the future. In addition, in 2019 Inspectorate SZW will itself apply an algorithm (developed by the Netherlands Institute for Human Rights) to all vacancy notices from 2018 in order to detect age discrimination in them. It will be examined whether this algorithm could be used more often and whether it can possibly be expanded to also trace other forms of discrimination in vacancy notices.

► ACTIONS:

- Commissioned by the government, the Scientific Council for Government Policy (*Wetenschappelijke Raad voor het Regeringsbeleid*, WRR) will investigate the impact of AI on public values.
- Commissioned by the Research and Documentation Centre (*Wetenschappelijk Onderzoek- en Documentatiecentrum*) (part of the Ministry of Justice and Security), Utrecht University has started a research programme under the name 'Legal aspects of decision-making algorithms' (*Juridische aspecten van algoritmen die besluiten nemen*). This exploratory study involves a study of five cases to identify the key opportunities and risks of decision-making algorithms over the next five to ten years and how they relate to the existing legal frameworks (and the values that lie behind them). The cases to be examined are: the self-driving car, PzP energy markets, judges, 'doenvermogen' (self-efficacy) and content moderation on platforms.
- On 7 June 2019, the Minister for Legal Protection sent a letter⁵³ to the House of Representatives about the protection of horizontal privacy (or 'social privacy'). The letter contains measures that are partly related to the risks that the use of AI may entail for horizontal privacy.
- On behalf of the Minister for Legal Protection, Tilburg University is conducting research into the risks to our privacy associated with the use of facial recognition technology and into possible measures to limit these risks. This study is expected to be completed by the end of 2019.
- The Minister for Legal Protection is examining the desirability of establishing a system of certification of AI applications across all disciplines in the administration of justice, with the certification bodies being accredited by a body at EU level.
- The Ministry of the Interior and Kingdom Relations is setting up a transparency lab for government organisations, where knowledge is exchanged and support is provided in the areas of transparency, explainability and accountability.
- Together with the Ministry of Justice and Security, Statistics Netherlands (CBS), the Directorate-General for Public Works and Water Management (*Rijkswaterstaat*) and the Association of Netherlands Municipalities (VNG), the Ministry of the Interior and Kingdom Relations is mapping out the considerations for government organisations that play a role in whether or not algorithms should be made public.

⁵³ Parliamentary Paper 34926, No. 8.



AI is used in such a way that everyone can trust it

The trust of citizens and businesses in AI is necessary for the successful development and application of AI. And that trust cannot be taken for granted. Research⁵⁴ shows that citizens and businesses see all kinds of opportunities for AI, such as strengthening security or improving care, but also have many doubts about the admissibility of some AI applications, including for personalised ads. When it comes to safeguards, there are concerns about privacy, about wrong decisions being made based on inaccurate data, about errors that can no longer be corrected and about people who are left out in special circumstances. In order to maintain trust in AI, it is crucial that AI is people-oriented and that it is deployed in such a way that it contributes to prosperity and well-being.

This requires a broad approach in which everyone, including people for whom this is not self-evident, feels included. First of all, AI must be developed and applied within appropriate ethical and legal frameworks. It must then be possible to verify how parties have applied AI, especially when it comes to high-impact applications. The monitoring of compliance with the legal frameworks must also be well organised. Here, too, the principle of proportionality is important. And if, despite these safeguards, things go wrong and damage occurs, it is important that it is clear for whose account the damage is.



AI applications are developed within legal and ethical frameworks

In order to guarantee the fundamental rights of citizens as described above, these rights have in some cases been translated into laws and regulations such as the Equal Treatment Act and the GDPR. They can also serve as guidelines for formulating ethical frameworks. Alongside a national initiative by Netherlands ICT⁵⁵, the European Commission has set up an external AI High-Level Expert Group⁵⁶ that has developed ethical guidelines for AI based on seven essential requirements.⁵⁷ In the first instance, it is now up to the market to decide how to implement and apply these guidelines. Government, the business community and civil society organisations need this to be translated into practice. This is one of the reasons why the European Commission launched a pilot phase in June 2019 for companies and public organisations to explore whether the ethical guidelines for AI are workable in practice.⁵⁸ The Commission's evaluation of the results and possible follow-up steps are expected to be completed by early 2020. Of course, the market must also comply with existing laws and regulations.

The Netherlands is committed to the development and application of responsible AI, which means that the AI must benefit people, that fundamental (European) human rights are protected and that we strive to ensure that everyone is included. As such, the Netherlands is following the European approach to responsible people-oriented AI, which can be a unique proposition for Europe to profile itself internationally.⁵⁹ The ethical approach to AI should strengthen both citizens' trust in digital development and the competitiveness of European AI companies. It is important to gain knowledge and experience of this way of developing and applying AI. This is one of the reasons why the government is encouraging such research.

⁵⁵ <https://www.nederlandict.nl/ethischecodeai/>.

⁵⁶ High-level group with 52 representatives from science, business and civil society.

⁵⁷ Human influence and supervision, technical robustness and security, privacy and data governance, transparency, diversity, non-discrimination and fairness, ecological well-being and accountability.

⁵⁸ <https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai>.

⁵⁹ In the Council of Europe, the OECD, G20 and UN organisations such as UNECE and UNESCO.

⁵⁴ Kantar Public, 'Nederlanders over Artificiële Intelligentie' (The Dutch on Artificial Intelligence), October 2018.

► ACTIONS:

- With the Dutch AI Coalition, the government is making efforts to ensure that as many Dutch companies and public organisations as possible actively participate in the pilot phase of the High-Level Expert Group's ethical guidelines for AI.⁶⁰ The government is also cooperating in cases from the government domain (public tasks) and the public-private domain (mission-driven approach). In the government's approach to AI, the cases form an important part of the realisation of ethically responsible AI solutions. This will also build up knowledge that will be shared in the public-private network to be formed and will challenge the business community and knowledge institutions.
- The Netherlands chairs a working group of the European Commission that will issue an Opinion on AI and Gender in the spring of 2020.
- The Ministry of Foreign Affairs is investigating current regulations in international trade agreements on AI applications and the potential adaptations required to protect European values.

► ACTIONS:

- There will be thematic research calls for public-public collaboration, such as a recent call from the Netherlands Organisation for Scientific Research (NWO), initiated by the Ministry of the Interior and Kingdom Relations and worth €2.3 million, on explainable, socially aware and responsible AI (closing date 5 November 2019).
- It will be explored how new knowledge from fundamental and applied research projects on responsible AI can be quickly made available to researchers, companies, governments, educational institutions and citizens. Finally, the international dimension is also relevant here; in the future many AI applications will come from outside the European Union and may therefore be based on other values.⁶¹



The Netherlands conducts more research into responsible AI development and application

The Netherlands is following the European approach to responsible AI and wants European values and standards to be embedded in AI applications at an early stage (in the design and development phase). However, knowledge about this is scarce. This calls for more research, for example on design principles, explainability, ethical and legal frameworks, validating and explaining models and outcomes of algorithms, behaviour, cultural aspects, acceptance and trust.



AI applications with a high impact on people or society should be controllable

The government considers it important that the use of AI applications by governments and market parties is controllable. In many cases, this means that AI applications must be controllable if they have legal consequences, have a major impact on people or society, or if the possibilities for human intervention and control are limited. People need to be able to trust that AI applications are in line with legal frameworks.

Companies and governments can implement controllable AI applications in different ways.⁶² First of all, it is important that people know that a decision has been made with the help of AI. The parties can also provide insight into the procedures surrounding the deployment of AI: who is involved in the development, are the strengths and weaknesses known, who can intervene if necessary, who bears responsibility for errors and how to challenge the results of AI. Another option is 'technical transparency', whereby, for example, the training data, the model used and the source

⁶⁰ For Nederland ICT, a sector organisation of 600 IT companies, the EU ethical guidelines have already served as the basis for their ethical code of conduct for the development and use of responsible AI applications. In addition, the first party, a Dutch scale-up, has already applied to participate in the pilot phase.

⁶¹ On 3 June, the Minister for Foreign Trade and Development Cooperation published the Digital Agenda for Foreign Trade and Development Cooperation, which also deals with this international dimension of AI applications.

⁶² The Minister for Legal Protection elaborated on this in his letter on the transparency of algorithms in use by the government: Parliamentary Paper 26643, No. 570, on the occasion of the motion by Verhoeven et al., Parliamentary Paper 32761, No. 117.

code are made transparent.⁶³ In addition, explainability (in understandable language) can be sought, by explaining the entire AI system⁶⁴ or by making specific results understandable.⁶⁵ Some AI techniques however, such as black box algorithms, are inherently very difficult to explain. Various methods are being developed to solve this problem.⁶⁶

Companies and governments have a (legal) responsibility to provide sufficient insight into the AI applications that they use, and the associated procedures. For example, it follows from consumer legislation that consumers should be able to make an informed choice when purchasing a product or service. The GDPR contains transparency and disclosure requirements that are primarily intended to inform data subjects about the manner in which their personal data is processed. If the use of profiling is accompanied by automated decision-making, the data subject should be made aware of that and useful information should be provided on the underlying logic, the importance and the expected consequences of such processing for the data subject.⁶⁷ Supervisory authorities, such as the Netherlands Authority for Consumers & Markets (ACM) or the Dutch Data Protection Authority (Dutch DPA), can check in specific cases whether AI applications are designed in such a way that they comply with statutory regulations. Management bodies are subject to information obligations arising from, among other things, the general principles of good governance and the Dutch Public Access to Government Information Act (*Wet openbaarheid van bestuur*).

The government welcomes the fact that market players are taking their responsibility over and above the existing statutory requirements. One of the various initiatives in this regard is the appointment of trusted third parties that perform audits on algorithms or issue quality marks for

responsible AI.⁶⁸ The government aims to avoid a confusing situation with different quality marks by means of uniform requirements and consistent application. Internationally harmonised standards that reflect European values and standards are particularly important in this context.

If it turns out that companies do not fulfil their own responsibilities sufficiently, further legislation could be considered to safeguard the interests of society. Supplementary transparency or explainability requirements may be desirable for specific sectors or applications. Such sector-specific regulation, for example, is already in place in the financial sector, where various requirements are imposed on companies using trading algorithms.⁶⁹ Furthermore, the European regulation on the relationship between platforms and businesses, adopted around in the summer period, includes an obligation for online platforms and search engines to inform businesses about the main parameters that determine the ranking of goods and services.⁷⁰

► ACTIONS:

- Through research calls for PPPs, the national government is investing in research into the responsible use of AI and the transparency and explainability of algorithms, in collaboration with the VWData programme (NWA route).
- The Ministry of Economic Affairs and Climate Policy is investigating which algorithms are used for different sectors, what risks this entails, how companies manage these risks and what safeguards are in place.
- The NEN Standards Committee on AI shares good practices, develops frameworks for reliable and ethically responsible AI applications and contributes to the development of global AI standards by the International Organization for Standardization.
- In the use of algorithms by the government and in PPP arrangements, the Ministry of the Interior and Kingdom Relations experiments with and encourages the use of instruments such as the AI Impact Assessment and quality marks/audits.

⁶³ This can enable experts to check the AI and may contribute to wider deployment and further development. At the same time, this may involve protected trade secrets, the training data may contain legally protected personal data and the risk of undue influence must be taken into account if third parties also have an insight into the exact functioning of AI.

⁶⁴ This can be done, for example, by using the results of the validation. The AI is then fed with slightly modified input, in order to check whether this results in logical or illogical changes in outcomes.

⁶⁵ For example by means of counterfactual explanations, indicating which input should have been different in order to arrive at a different outcome.

⁶⁶ Guidotti, R., Monreale, A., Ruggieri, S., Turini, F., Giannotti, F., & Pedreschi, D., 'A survey of methods for explaining black box models', ACM computing surveys (CSUR), 51(5), 93 2018.

⁶⁷ The Minister for Legal Protection elaborated on this in his letter on the transparency of algorithms in use by the government: Parliamentary Paper 26643, No. 570.

⁶⁸ Several private parties are developing such a label or have already done so. In addition, an AI Impact Assessment has recently been developed by Electronic Commerce Platform Nederland (ECP), with the cooperation of the Ministry of Economic Affairs and Climate Policy, among others.

⁶⁹ This is included in the Markets in Financial Instruments Directive (MiFID II). For example, companies are required to carry out an annual self-assessment and validation of their algorithmic trading activity, and the results of these assessments can be requested by supervisory authorities. It must also be possible for a malfunctioning algorithm to be disabled by a human being.

⁷⁰ Regulation (EU) 2019/1150 of the European Parliament and of the Council of 20 June 2019 promoting fairness and transparency for business users of on-line trade services (OJ EU 2019, L 186)



Supervisory authorities use and monitor AI applications effectively

A major challenge for supervisory authorities is to get a grip on the deployment of AI in the areas they supervise. The use of AI can make it more difficult to understand what exactly is happening in a market. For example, in the case of personalised online retail platforms, it is extremely hard to prove a structural breach of consumer law. In addition, it may become less clear why certain behaviour occurs in a market and how it relates to, for example, privacy, competition and consumer law. This can make effective intervention in a market more difficult.

However, AI also offers opportunities to organise supervisory authorities' tasks more efficiently and effectively. For example, we can use AI to quickly and automatically detect violations, automatically share relevant information with the right people, deploy manpower in a more targeted manner using risk models, and automate time-consuming administrative tasks.

Supervisory authorities should supervise their respective fields on the basis of their own expertise. For example, the Health Care and Youth Inspectorate supervises software or AI that is used as a medical device and therefore falls under the new European Medical Device Regulation (MDR), which lays down requirements for software.⁷¹ In order to take into account the impact of AI in their supervision, it is important that supervisory authorities jointly consider the impact of AI on their work and field of activity and collaborate effectively based on a clear division of tasks. The Netherlands Authority for the Financial Markets, the Nederlandsche Bank NV and ACM, for example, work together in an Innovation Hub that companies can turn to with questions about regulation and supervision of innovative financial products and services. This will help financial institutions clearly identify legal boundaries before bringing their innovations to the market, giving them maximum scope for experimentation without the risk of inadvertent violation of the law. In addition, this will give regulators a better understanding and grip on innovation within the financial market.

► ACTIONS:

- The Inspection Council (*Inspectieraad*) initiates collaboration between supervisory authorities with the aim of building up expertise, sharing it and discussing the division of tasks with regard to the supervision of algorithms and of AI in general. The government will investigate whether supervisory authorities are sufficiently equipped to supervise algorithms and whether there are any persistent blind spots in the supervisory landscape.



In the event of damage, it should be clear who is liable

Where a decision is made or actual action is taken with the help of AI, questions may arise regarding responsibility and liability for damage. In the case of cross-border aspects, which are frequent with AI, such liability issues can best be considered in a European context.

EXPERT GROUPS ON NEW TECHNOLOGIES AND LIABILITY

The European Commission has set up two expert groups dealing with new technologies and liability. One group is concerned with the Product Liability Directive. The European Commission is expected to adopt guidelines in mid-2019 on how this directive should be interpreted in the case of products containing software or equipped with AI, for example. The other expert group focuses on new technologies and liability in general, including contractual liability. This group will report to the European Commission in the course of 2019. The findings of these expert groups will lead to more insight into liability issues in the event of damage caused by AI.

⁷¹ See: <https://www.igj.nl/documenten/brochures/2017/12/12/handreiking-nieuwe-regelgeving-medische-hulpmiddelen-en-in-vitro-diagnostics>.



Markets are open, competitive and offer good consumer protection

If the Netherlands wants to become a leader in the field of AI, it is important that the development of AI applications is financially rewarding. This means first of all that markets must be competitive and that it must be possible for AI applications to be developed by more than a handful of large companies. Competition creates incentives for companies to outperform each other by offering ever better value for money and more choice. This requires both effective competition policy and good consumer protection. After all, companies will only have incentives to constantly improve their offering if consumers are able to make informed choices. In addition, a stable and predictable system of intellectual property rights is needed, so that companies that come up with innovative solutions can also benefit from them.



Markets for AI applications are competitive

Many online platform markets – where AI is applied on a large scale – have, through network effects (reinforced by data), economies of scale and synergy benefits, a ‘winner-takes-all’ or ‘winner-takes-most’ tendency.⁷² In some online markets, this can lead to the concentration of power on or a few platforms. Once a platform has achieved such a powerful position, self-reinforcing processes can make it increasingly difficult for other platforms to challenge that position. Growth in terms of data, computing power and algorithms is easier to achieve for large platforms than for new entrants or SMEs. Combined with the excellent access to capital and highly skilled staff on these platforms, this may lead to a situation where a limited number of companies are better able to further develop their (already high-quality) AI than their competitors.

This may distort competition, for example if an entrant with a better but ‘untrained’ algorithm loses out to an established player because of an entry barrier such as the difference in data positions. Competition issues can also arise when a powerful platform can impose unreasonable conditions on businesses who want to use their training data or algorithms to develop AI applications themselves.⁷³ This could result in persistent concentration of market power. On the other hand, the concentration of users around one or a few platforms often leads to efficiency gains and innovation opportunities. It is important, therefore, to monitor the balance between efficiency and innovation on platforms, on the one hand, and sufficient openness about their infrastructure and opportunities for competition and subsequent innovation, on the other.

Another risk is that the increasing use of AI, for example to ensure that prices move quickly in line with changing market conditions, encourages new types of cartels to emerge. AI can be used to implement cartel agreements, for instance, and the risk of tacit collusion can increase when many companies use the same type of algorithms. Indeed, entirely autonomous algorithmic cartels may develop in the future.

When AI leads to new forms of abuse, competition lawsuits may take longer. New forms of abuse will be more difficult to prove, because in such competition cases there are no precedents from previous similar cases on which regulators and courts can rely. Such cases require more detailed analysis and recourse to the courts is more likely. At the same time, in cases such as these fast and effective enforcement is all the more important because behaviour in online markets, especially when using AI, can be difficult to reverse.

⁷² See also the discussion paper of the Ministry of Economic Affairs and Climate Policy: https://www.internetconsultatie.nl/mededinging_platforms

⁷³ This may constitute a so-called gatekeeper position. The government argues in favour of new powers for a European supervisor to intervene in this respect, as can be read in parliamentary paper 27879, No. 71.

► ACTIONS:

- The government advocates that, supplementary to competition law, at the very least a European regulator should be able to impose ex ante obligations on large ‘gatekeeper’ platforms on which consumers and businesses are heavily dependent.
- At EU level, the government calls for guidelines to explain in more detail (in guidelines) how the competition rules in the Treaty on the Functioning of the European Union and in Sections 6 and 24 of the Dutch Competition Act can be applied and enforced in the digital economy, with a special focus on the role of data, market delineation in multi-sided markets and non-monetary prices.
- The government calls for the European thresholds for notifying a concentration to be adjusted in such a way that all relevant digital concentrations fall within the regulator’s scope.
- The ACM’s dedicated digital competition team, consisting of specialist lawyers, economists and data scientists, is developing expertise on new technologies and business models and their impact on competition analysis, including AI-driven platforms for legal services and the use of algorithms and app stores.

AI and algorithms can hinder consumers’ ability to make a conscious, considered and well-informed choice as they increase information asymmetry. Through large-scale data collection, companies have much more information than before about the behaviour of consumers and are increasingly aware of which nudges are effective to change that behaviour. Consumers, for their part, are less and less aware of the influence of AI on the information they receive and on their selection process. This can mean that certain choices are deliberately kept away from consumers and that the process is adapted to consumers’ ingrained (unconscious) behavioural patterns. This is problematic if it causes the consumer to behave in a way that they would not have done if they had made a conscious decision. If incorrect information is presented which leads the consumer to make a choice which they would not otherwise have made, this can already be regarded as an unfair commercial practice, even under current regulations.

► ACTION:

- In the spring of 2019, the Netherlands approved the directive for better enforcement and modernisation of consumer protection rules in the European Union (COM(2018)185). Pursuant to this directive, consumers should be informed when personalised prices have been generated automatically. The directive is expected to be adopted in the autumn.



Consumer rights must not be affected by the application of AI

Everyone must be able to make informed choices when purchasing a product or service. The consumer legislation designed to guarantee this also applies when AI is used: the provider of the product or service remains responsible for compliance with this legislation. For example, products and services must comply with the descriptions and information provided about them. If the AI algorithm creates additional expectations on the part of the consumer, the provider is responsible for this.



The Netherlands protects the intellectual property of companies that develop AI applications

The Netherlands has a solid intellectual property rights (IPR) system, as proven by the innovations discovered, developed and used in this country. The guarantees offered by the IP system in the joint development and sharing of knowledge are indispensable for the national and international collaboration that makes the Netherlands one of the most innovative and competitive economies in the world.

The rapid development of AI raises questions – and possibly generates uncertainties – in relation to the IP system in roughly two areas. On the one hand, this concerns IP protection for AI itself. AI systems are complex and consist – in short – of hardware, software and data. This raises the following questions, for example: do IP rights apply to AI systems? If so, what are these rights? Should IP protection be extended to encourage the development of AI? On the other hand, questions arise about IP protection for creations of AI. AI is able to generate creative works and inventions. If a creative work or an invention has been realised by or with the help of AI, how does that affect the ability to obtain copyrights or patent protection? Other relevant questions: who qualifies as the owner of such creative works or inventions, and should the bar for obtaining copyrights or patents be raised when AI becomes a standard tool for authors or inventors in a particular field?

Although there is no specific IPR protection for AI, a number of IPR, including patents, copyright and rights under database law, provide protection to AI components to a greater or lesser extent. The protection of trade secrets can also play a role here.

► ACTIONS:

- The Netherlands is actively monitoring developments in IP law and AI, in line with initiatives taken in a European or international context. For example, the Netherlands welcomes the new guidelines regarding the patentability of inventions based on AI, published by the European Patent Office in October 2018.⁷⁴
- With the implementation of the new Copyright in the Digital Single Market Directive (2019/790), the Netherlands will create more legal certainty for research organisations (including PPPs) about the extent to which they can carry out text and data mining activities thanks to a broad exception.

⁷⁴ https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3_1.htm



The safety of citizens, businesses and government entities in the Netherlands remains protected



AI technology offers opportunities to increase security, but can also have

(intentional or unintentional) adverse consequences. The chapter on exploiting societal opportunities describes the opportunities that AI offers for the security domain. This section discusses the security risks of AI developments in more detail.

The government aims to address the risks of AI in a timely manner, without hindering positive social-civil applications. This requires – at both national and international level – a commitment to the timely identification of risks, thorough research and threat analyses, security-by-design, the timely development of countermeasures and, where necessary, to increase resilience.⁷⁵

The increasing use of AI technologies in society is creating new types of vulnerabilities and security threats. For example, we have to anticipate the major potential impact of AI on cybercrime, system hacking and cyber-warfare. We must rule out any situation in which the control of autonomous systems (e.g. vehicles, logistics systems, vital infrastructures) is taken over by a party intent on carrying out disruptive actions. Hence, security/cybersecurity by design should be the guiding principle for the design and development of AI applications and autonomous systems. As the security risks of AI applications clearly call for an international approach, the subject is also on the agenda of international organisations such as the United Nations (UN).⁷⁶

Developments in AI can also have consequences for national security. Further linking of data and the further development of analysis and pattern recognition techniques result in user profiles becoming sharper and more comprehensive. In addition, AI-driven developments in audio and image manipulation technology are making it increasingly easy to produce text and audiovisual material that is virtually indistinguishable from real life. Such technology can be used, for example, for espionage, interference, influencing or manipulation. AI developments can also affect the economic security of the Netherlands. The government considers it important to minimise its dependence on ICT systems from countries that have been identified as conducting an offensive cyber programme against Dutch interests.⁷⁷ Another point of attention is that AI applications such as personal assistants, robotics, autonomous systems and Internet-of-Things products – often controlled by foreign or commercial parties – collect large amounts of data, such as environmental characteristics, input data, speech, images, behaviour and locations.

In addition, more collaboration between policy makers and scientists will be organised in the security domain in the coming period. For example, the General Intelligence and Security Service (AIVD) and Delft University of Technology have launched a joint research programme to increase our understanding of the digital threat to our national security, as well as of the technical, organisational and institutional ways of dealing with it. In this research programme, research questions about cybersecurity in an administrative context are studied.

⁷⁵ Integrated Foreign and Security Strategy (*Geïntegreerde Buitenland- en Veiligheidsstrategie*) 2018–2022.

⁷⁶ UN Policy Research Centre, 'The New Geopolitics of Converging Risks - UN and the Prevention in the Era of AI', 29 April 2019.

⁷⁷ Parliamentary Paper 30821, No. 72.

Cybersecurity

In the Dutch Cyber Security Agenda, AI is mentioned as a technological and societal development that entails both opportunities and increased vulnerabilities in the digital domain. In the cyber domain, AI technology will lead to new methods of attack and new countermeasures. AI technologies will make attack systems self-learning and less predictable. This development is expressed in malware that searches for system vulnerabilities of its own accord and is able to adapt its own shape to prevent detection. Traditional countermeasures will be increasingly ineffective. As a result, AI technology will also play a major role in the development of digital security systems, for example in automatic source code analysis to recognise errors in software, or in the detection of viruses or anomalies in networks. For the National Cyber Security Centre, new applications of AI are relevant both for existing policy and for further explorations. AI can also be seen as a relevant theme for the development of cyber security knowledge.

Defence

AI can also have significance for warfare and the protection of the Dutch territory. The party that has access to the most advanced AI is way ahead of the game, as it is able to make faster, better decisions. On an international level this means a battle between the haves and have-nots. The opportunities lie in the areas of decision support, intelligence gathering, data analysis and accelerated responsiveness in the defence of Dutch territory. In addition, AI systems can be used to make military work safer and to take over certain tasks, such as identifying deviant behaviour with image recognition, so that military operators can concentrate on other tasks. As stated in its letter of 13 May 2019 to the House of Representatives, the government is striving for an international framework of standards for the use of new technologies as part of weapons systems. Like the previous government, the government takes the view that all weapons systems and their deployment must meet the requirements of international law.⁷⁸

While the development of new weapon systems is nothing new, it is important to consider whether the new means and methods of warfare are permitted under international law. At present, the use of AI in autonomous weapon systems is a particular focus of international attention. In the UN meeting on autonomous weapons – the Convention on Conventional Weapons – there is a consensus between the countries that future autonomous weapons systems should continue to be subject to ‘meaningful human control’. This is also recommended by the Advisory Council on International Affairs, which is updating the AIV/CAVV advisory report ‘Autonomous weapon systems: the need for meaningful human control’ (*Autonome wapensystemen: de noodzaak van betekenisvolle menselijke controle*).

► ACTIONS:

- The impact of the use of AI on national security is currently being investigated within the framework of the National Security Strategy.
- Commissioned by the Cyber Security Council, research is being conducted into the use of new technology – including AI – for cyber defence.

⁷⁸ Parliamentary Paper 34300-X No. 109.



Appendices

Appendix 1: Overview of actions

Track 1: Capitalising on societal and economic opportunities

AI offers solutions for societal challenges

- In October/November 2019, the Knowledge and Innovation Agendas 2020–2023 will be published for missions and key enabling technologies, including AI. These missions are in the areas of security, health and care, agriculture and food, energy transition and sustainability. The agendas contain a long-term financial commitment in the form of a Knowledge and Innovation Contract.
- Together with other parties, TNO is investing in in-depth knowledge, system development and the development of ecosystems and applications for AI, for example for cyber security, care, agriculture and security. The approach is multidisciplinary, combining knowledge about technology, behaviour, acceptance and applications.
- Research on the effectiveness of the application of AI for police tasks and the ethical aspects of AI.
- Research into design principles for AI in the legal domain (CW; Netherlands Organisation for Applied Scientific Research (TNO); University of Amsterdam (UvA) and the Dutch Public Prosecution Service).
- The Robotic Autonomous Systems unit of the Ministry of Defence translates developments in the field of robotics and autonomous systems into concrete national operations.
- The Ministry of Defence is developing a vision for AI in which attention will be paid to the use of AI in military functions (e.g. command and control, intelligence, protection and logistics). The vision will be published in 2020.
- At the end of 2019, the Ministry of Health, Welfare and Sport will issue a new letter to the House of Representatives on AI and Big Data in the healthcare sector.
- The Ministry of Health, Welfare and Sport is developing an AI Handbook.
- The Ministry of Agriculture, Nature and Food Quality, together with the Dutch AI Coalition, will intensify the further development of a data infrastructure for arable farming.

The government makes optimal use of AI in the performance of public tasks

- The national government is enhancing knowledge of AI among civil servants in various ways. Examples include the digital course series on AI that is available at the Governmental Academy for Digitalisation and Computerisation of the Government (RADIO) for every civil servant in the Netherlands, and attention to AI in the development of employees' competences.
- The government is looking for organisational forms (including PPPs) that will consolidate knowledge within government organisations.
- The Ministry of the Interior and Kingdom Relations and the Netherlands Enterprise Agency are developing an implementation toolkit for innovative technologies. This also involves seeking interdisciplinary cooperation with, among others, the Chief Information Officers of other government agencies and with contractors.
- Together with the Association of Netherlands Municipalities (VNG) and the Netherlands Enterprise Agency, the Ministry of the Interior and Kingdom Relations organises meetings on experiences in the public domain and AI technologies applied there, such as chatbots.
- The government organises expert meetings for various technical disciplines that deal with AI applications on a daily basis. These include architects, developers and data scientists from various organisations.
- Active participation in European public sector initiatives in the framework of the coordinated Action Plan for AI. These may take the form, for example, of calls to realise AI example projects.
- In collaboration with other government organisations and the Association of Netherlands Municipalities (VNG), the Ministry of the Interior and Kingdom Relations is conducting two experiments with AI in 2019, focusing on ethics in, by and for design and the transparency of algorithms. The ambition is to build up a portfolio of example projects, which will be shared in the knowledge network.
- Many government bodies, including the Ministry of Social Affairs and Employment, the Ministry of the Interior and Kingdom Relations, the Ministry of Justice and Security and several municipalities, pursue poverty reduction policies. Initiatives are combined as much as possible in order to come to high-quality proposals. This involves the early identification of potential poverty, which can prevent suffering and high costs.
- Various government organisations are experimenting with text mining, for example to make it easier to search archives (JustID) and council documents (Ministry of the Interior and Kingdom Relations, VNG). The intention is to use AI in follow-up projects.

Track 1: Capitalising on societal and economic opportunities

- Several government organisations are exploring the possibilities of new technologies in procurement, with a focus on blockchain and AI. The ‘Sustainable digitalisation of public procurement’ (*Duurzame digitalisering van de Rijksinkoop*) programme focuses on AI. This concerns the purchase of generic services from the government and the systems that have been set up for this purpose.
- Various government agencies, such as the police, the Netherlands Enterprise Agency and ‘P-Direkt’ (the Shared Service Centre for HRM of the Dutch government) are developing a chatbot.
- The Ministry of Justice and Security and the Ministry of the Interior and Kingdom Relations have accepted 21 proposals for feasibility studies in phase 1 of SBIR AI in the public sector; proposals for phase 2 will be accepted in 2020. A second SBIR with a regional party is being prepared.
- Over the next few years, various government ministries, including the Ministry of Justice and Security and the Ministry of the Interior and Kingdom Relations, will take part in Odyssey, the world’s largest hackathon in Groningen, in various different tracks. In Odyssey, the business community is challenged to develop initiatives for AI solutions in response to specific government needs.
- In the coming years, ministries will use the various instruments within procurement legislation to promote innovation in the market. In addition to SBIR, this also concerns innovation partnerships, market consultation and the competitive dialogue.

AI entrepreneurship is stimulated

- The Ministry of Economic Affairs and Climate Policy is increasing access to innovation financing for start-ups (AI-related and otherwise) through early-stage financing and the Innovation Credit (*Innovatiekrediet*), and is facilitating access to risk capital for start-ups with the ‘Seed Capital Scheme’, the ‘Dutch Venture Initiative’, the scale-up fund and via the Regional Development Agencies (RDAs) (*Regionale Ontwikkelingsmaatschappijen*, ROMs).
- In the supplementary agreement concluded between the Ministry of Economic Affairs and Climate Policy, the Ministry of Finance and Invest-NL, AI is included as one of the focus areas for Invest-NL. The Ministry of Economic Affairs and Climate Policy and the Ministry of Finance are exploring a change in the tax rules which will make it more attractive to pay out in stock options – and thus to work for a start-up or scale-up.
- The Ministry of Justice and Security, the Ministry of Social Affairs and Employment and the Ministry of Economic Affairs and Climate Policy are drafting legislation relating to the right of residence for essential employees of start-ups and scale-ups. The legislation will enter into force in the summer of 2020.
- The Ministry of Foreign Affairs will appoint six start-up liaison officers to its posts in San Francisco/Los Angeles, New York/Boston, Singapore, Berlin, Paris and London by 2020 at the latest.
- TechLeap.nl (formerly StartupDelta) will organise missions to start-up and technology fairs and prominent tech hubs, and start-ups and scale-ups are more closely involved in the trade and innovation missions and ‘Top Sector’ missions.
- As of 2019, the government will scale up the ‘Accelerating the digitalisation of SMEs’ (*Versnelling digitalisering MKB*) programme, including five regional SME workshops in which education, the government and the business community collaborate.
- In 2019, RDAs will jointly explore how they can specifically stimulate entrepreneurship with AI.
- The Dutch AI Coalition is working out a plan to create more synergy between research, education and organisations.
- Five regional smart industry hubs and research centres (data value hubs) provide companies, particularly SMEs, with up-to-date knowledge, tools and training modules for the responsible use of AI and data. The hubs organise workshops for SMEs, issue feasibility vouchers and work with vocational education on the development of digital skills.
- In the smart industry approach, the sharing of knowledge and commercialisation of research with respect to AI applications will be strengthened.
- TNO connects the Dutch field labs and hubs with the European AI Digital Innovation Network.
- As of 2020, the Chamber of Commerce will be providing SMEs with business-oriented information about AI, based in part on best practice examples from the SME Workshops.
- The ICT research platform improves the visibility of practice-based ICT research in the Netherlands, together with the employers’ umbrella organisations VNO-NCW (Confederation of Netherlands Industry and Employers) and MKB-Nederland (Dutch Federation of Small and Medium-Sized Enterprises), HBO-i, SIA and 50 HBO professors. Target: by 2020, 200 SMEs will be working with innovative ICT applications, including AI.

Track 2: Creating the right conditions

AI research and innovation in the Netherlands are of high quality and leading in Europe

- After the summer of 2019, NWO will publish a broad AI research agenda for initiating new research programmes and tools and national and international synergy.
- Ministries are exploring the possibility of investing in an AI programme as part of Action Line 2 of the National Science Agenda (*Nationale Wetenschapsagenda*) in 2020.
- Within the framework of the mission-driven innovation policy, long-term programmes will be set up for the AI key enabling technology for innovative knowledge and solutions with and for relevant application areas.
- Based on Dutch strengths such as the AI research labs, a proposal will be developed in 2019 under the auspices of the Dutch AI Coalition for an AI knowledge centre in the Netherlands that is a leader in Europe.
- The Ministry of Education, Culture and Science is investing €18 million in the purchase of a national supercomputer from SURF.
- The TO2s⁷⁹ organise joint workshops on AI topics such as explainability, valorisation of research, and societal impact.
- Within the context of the interdepartmental programme 'Strengthening the IT workforce in the civil service' (*Versterking HR ICT Rijksdienst*) (coordinated by the Ministry of the Interior and Kingdom Relations), a cooperation plan will be set up with ICT educators in higher education, in order to boost innovation and the development of the national government on specific themes (including AI) by setting up field labs.
- The Ministry of Defence is having its strategic knowledge partners (TNO, NLR and MARIN) carry out research programmes in which AI is developed and applied.
- The 'Data Science, Artificial Intelligence & Quantum Technology for Military Applications' knowledge centre is developing AI application possibilities for the Ministry of Defence and is collaborating with TNO.
- The Netherlands provides visible involvement in the major initiatives for broad European cooperation on AI, such as: the Strategic Research Agenda by BVDA/EURObotics⁸⁰ (with 300 industrial and academic partners), the establishment of a specific AI PPP on behalf of the European Commission, and international academic initiatives, such as CLAIRE and ELLIS (European Lab for Learning & Intelligent Systems).
- The Netherlands will continue its current participation in future European programmes, such as Horizon Europe, Digital Europe and EUREKA, including through the Dutch National Contact Point for European programmes and innovation missions.
- The Netherlands is strengthening its cooperation with other Member States and European initiatives, including through the Holland Innovation Network and economic missions.
- The Netherlands is actively seeking collaboration on AI with other countries within and outside Europe, such as Germany, France, Singapore, the US and Belgium. For example, an innovation mission to Singapore will be organised at the end of 2019 for collaboration in the field of AI, and in 2020 opportunities will be explored for effective bilateral collaboration between the US and the Netherlands in specific AI areas.
- The Netherlands Foreign Investment Agency (NFIA) has included Artificial Intelligence as a primary focus area in its Strategic Action Plan, 'The Netherlands: Digital Gateway to Europe' and will focus a substantial part of its acquisition activities on it.

The Netherlands has excellent training opportunities for living with AI and more talent for working with AI

- A scheme that will structurally make more than €200 million available in the form of individual budgets for training and development will be presented to the House of Representatives after the summer of 2019. This 'STAP' (Labour Market Position Stimulus) budget replaces the current tax deduction scheme for training and is accessible to everyone up to the state pension age.
- In order to encourage employers to invest in individual learning budgets, the Ministry of Social Affairs and Employment is working with the Ministry of Finance, the Tax and Customs Administration (*Belastingdienst*), sectors and executives to clarify the tax treatment of individual learning and development budgets.
- The Ministry of Social Affairs and Employment is developing a scheme to implement the Wiersma motion, which will structurally make €48 million a year available from 2020 to promote a learning culture in SMEs, and the Heerma motion, which will make a total of €60 million available over a period of five years to provide additional support to the agricultural, hospitality and recreation sectors in order to attract more 'BBL' students (students in the 'work-based' VET learning pathway).

⁷⁹ TO2s are the applied research institutes united in the 'Federation TO2'. The Federation TO2 consists of Deltares, ECN, Marin, NLR, TNO and Wageningen-Research.

⁸⁰ A partnership of the Big Data Value Association and the European Robotics Association.

Track 2: Creating the right conditions

- With 'MKBIdee', the Ministry of Economic Affairs and Climate Policy is challenging SMEs to come up with ideas that will lead to more investment in training and development of workers. While intended for all SMEs, the scheme focuses in particular on the challenges of technical SMEs and digitalisation. It relates to the broad effects of digitalisation, not to the ICT sector as such. In 2019, €7.5 million is available.
- The Ministry of Social Affairs and Employment, the Ministry of Education, Culture and Science and the Ministry of Economic Affairs and Climate Policy are carrying out a long-term, action-oriented programme to improve the preconditions for Lifelong Development (LLD), including pilots with training and employment help desks (*leerwerkloketten*) in various regions, further flexibilisation of the range of courses on offer and assessment of the feasibility of a digital training overview.
- The Ministry of Social Affairs and Employment and the NWO are investing approximately €3 million in research to gain more insight into the impact of digital technologies (such as AI) on work and employment.
- The Regional MBO Investment Fund (*Regionaal Investeringsfonds mbo*) scheme provides €25 million a year until 2022 for projects that improve the connection of VET to the labour market, for example if the profession for which they offer training changes as a result of AI.
- The Foundation for Cooperation on Vocational Education, Training and Labour Market (*Samenwerkingsorganisatie Beroepsonderwijs Bedrijfsleven, SBB*) also pays attention to AI for senior secondary vocational education (*middelbaar beroepsonderwijs, MBO*) in the qualification files, where relevant. A recent example of a new qualification that includes AI is 'software developer'.
- Commissioned by the Minister of Education, Culture and Science (OC&W), the universities have drawn up sectoral plans for the STEM, Social Sciences and Humanities sectors. The Ministry of Education, Culture and Science (OC&W) will contribute an extra €70 million to this, and the periodic resources for profiling can also be used for this purpose.
- The Ministry of Education, Culture and Science supports the Education Innovation with ICT Acceleration Plan for all higher education institutions (universities of applied sciences and research universities) by making €15 million available over four years.⁸¹
- In 2019, the Learning Outcomes Experiment (*Experiment Leervuitkomsten*) will be evaluated, in which higher education and the business community experiment with more flexible, tailor-made part-time education for adults, in order to enable employees to learn effectively while working.
- In the summer of 2019, a subsidy scheme will be published to encourage MBO institutions to jointly develop innovative and flexible education programmes for workers and jobseekers.
- The Ministry of Education, Culture and Science is investigating how study programmes can better respond to rapid technological developments in the strategic exploration for MBO and the Strategic Agenda for Higher Education and Research (publication: autumn 2019).
- Through the Human Capital Agenda for ICT, the Ministry of Economic Affairs stimulates PPP with the aim to promote innovation and knowledge transfer for new technologies in education. This will be kicked off with the course, 'AI in a Day'.
- Starting in September 2019, a second batch of candidates will start working in the National Data Science Trainee Programme, in order to develop themselves as data scientists, from the interdepartmental programme 'Strengthening the IT workforce in the civil service' (*Versterking HR ICT Rijksdienst*) (coordinated by the Ministry of the Interior and Kingdom Relations).
- The Ministry of Education, Culture and Science, together with skills development researchers, is exploring how digital skills can be applied in HBO and MBO.
- In order to stimulate innovation and development in the national government, a study is being carried out in collaboration with ICT trainers in higher education into setting up field labs on specific themes, including AI, from the interdepartmental programme 'Strengthening the IT workforce in the civil service' (*Versterking HR ICT Rijksdienst*) (coordinated by the Ministry of the Interior and Kingdom Relations).
- In the autumn of 2019, the government will review the curriculum for primary and secondary education and include digital literacy in it. Legal anchoring is planned for 2021.
- The government is investigating the possibilities of setting up an AI Lab for education.
- The Digitalisation Agenda for primary and secondary education⁸² aims to provide more and better support for education in digitalisation issues by the business community in five key areas: innovative capacity, digitally literate teachers and pupils, digital learning resources, infrastructure and ethics.

⁸¹ Association of Universities in the Netherlands (VSNU), Netherlands Association of Universities of Applied Sciences (Vereniging Hogescholen) & Surf, 'Versnellingsplan Onderwijsinnovatie met ICT', May 2018.

⁸² Parliamentary Paper 32034, No. 31

Track 2: Creating the right conditions

The Netherlands has more usable data for AI applications to improve AI developments

- The Ministry of Economic Affairs and Climate Policy is exploring the possibilities of stimulating the use of the FAIR principles in the sharing of private data for AI applications.
- The Ministry of the Interior and Kingdom Relations is stimulating the provision of public sector information for re-use, for example via data.overheid.nl and through the further development of the API portal developer.overheid.nl.
- The Ministry of Economic Affairs and Climate Policy and the Dutch AI Coalition are organising sector dialogues on specific data sharing bottlenecks and needs for AI. The Ministry of the Interior and Kingdom Relations will be involved in order to better align supply and demand of public data with the needs of AI applications.
- The Ministry of Economic Affairs and Climate Policy will carry out an inventory of existing examples of solutions for data sharing for AI (such as the PHT) and ways to further stimulate data sharing for AI (such as data markets, rewards and innovation tools).
- The European Commission has announced its intention to invest in a Common European Data Space to increase the availability of data for AI and other purposes. The Netherlands will make actively contribute to the implementation of this initiative on the basis of the Dutch vision.

The Netherlands is at the forefront of Europe in high-quality digital and intelligent connectivity and computing power for effective AI applications

- AI will be included as a point of attention in the elaboration of the actions on innovation in the Digital Connectivity Action Plan.
- The Ministry of Economic Affairs and Climate Policy will discuss the possibilities of AI applications in networks with the parties involved.
- The Netherlands is committed to cooperation between the EU Member States in the field of research and innovation of High-Performance Computing for AI within the Digital Europe Programme, which will start in 2021.

Track 3: Strengthening the foundations

Public values and human rights remain protected

- Commissioned by the government, the Scientific Council for Government Policy (*Wetenschappelijke Raad voor het Regeringsbeleid*, WRR) will investigate the impact of AI on public values.
- Commissioned by the Research and Documentation Centre (*Wetenschappelijk Onderzoek- en Documentatiecentrum*) (part of the Ministry of Justice and Security), Utrecht University has started a research programme under the name 'Legal aspects of decision-making algorithms' (*Juridische aspecten van algoritmen die besluiten nemen*). This exploratory study involves a study of five cases to identify the key opportunities and risks of decision-making algorithms over the next five to ten years and how they relate to the existing legal frameworks (and the values that lie behind them). The cases to be examined are: the self-driving car, P2P energy markets, judges, 'doenvermogen' (self-efficacy) and content moderation on platforms.
- On 7 June 2019, the Minister for Legal Protection sent a letter⁸³ to the House of Representatives about the protection of horizontal privacy (or 'social privacy'). The letter contains measures that are partly related to the risks that the use of AI may entail for horizontal privacy.
- On behalf of the Minister for Legal Protection, Tilburg University is conducting research into the risks to our privacy associated with the use of facial recognition technology and into possible measures to limit these risks. This study is expected to be completed by the end of 2019.
- The Minister for Legal Protection is examining the desirability of establishing a system of certification of AI applications across all disciplines in the administration of justice, with the certification bodies being accredited by a body at the EU level.
- The Ministry of the Interior and Kingdom Relations is setting up a transparency lab for government organisations, where knowledge is exchanged and support take place in the areas of transparency, explainability and accountability.
- Together with the Ministry of Justice and Security, Statistics Netherlands (CBS), the Directorate-General for Public Works and Water Management (Rijkswaterstaat) and the Association of Netherlands Municipalities (VNG), the Ministry of the Interior and Kingdom Relations is mapping out the considerations for government organisations that play a role in whether or not algorithms should be made public.

⁸³ Parliamentary Paper 34926, No. 8.

Track 3: Strengthening the foundations

AI is used in such a way that everyone can trust it

- With the Dutch AI Coalition, the government is making efforts to ensure that as many Dutch companies and public organisations as possible actively participate in the pilot phase of the High-Level Expert Group's ethical guidelines for AI. The government is also cooperating in cases from the government domain (public tasks) and the public-private domain (mission-driven approach). In the government's approach to AI, the cases form an important part of the realisation of ethically responsible AI solutions. This will also build up knowledge that will be shared in the public-private network to be formed and will challenge the business community and knowledge institutions.
- The Netherlands chairs a working group of the European Commission that will issue an Opinion on AI and Gender in the spring of 2020.
- The Ministry of Foreign Affairs is investigating current regulations in international trade agreements on AI applications and the potential adaptations required to protect European values.
- There will be thematic research calls for public-public collaboration, such as a recent call from the Netherlands Organisation for Scientific Research (NWO), initiated by the Ministry of the Interior and Kingdom Relations and worth €2.3 million, on explainable, socially aware and responsible AI (closing date 5 November 2019).
- It will be explored how new knowledge from fundamental and applied research projects on responsible AI can be quickly made available to researchers, companies, governments, educational institutions and citizens. Finally, the international dimension is also relevant here; in the future many AI applications will come from outside the EU and may therefore be based on other values.⁸⁴
- Through research calls for PPPs, the national government is investing in research into the responsible use of AI and the transparency and explainability of algorithms, in collaboration with the VWData programme (NWA route).
- The Ministry of Economic Affairs and Climate Policy is investigating which algorithms are used for different sectors, what risks this entails, how companies manage these risks and what safeguards are in place.
- The NEN Standards Committee on AI shares good practices, develops frameworks for reliable and ethically responsible AI applications and contributes to the development of global AI standards by the International Organization for Standardization.
- In the use of algorithms by the government and in PPP arrangements, the Ministry of the Interior and Kingdom Relations experiments with and encourages the use of instruments such as the AI Impact Assessment and quality marks/audits.
- The Inspection Council (*Inspectieraad*) is initiating cooperation between supervisory authorities with the aim of building up expertise, sharing it and discussing the division of tasks with regard to the supervision of algorithms and of AI in general.
- The government will investigate whether supervisory authorities are sufficiently equipped to supervise algorithms and whether there are still blind spots in the supervisory landscape.

Markets are open, competitive and offer good consumer protection

- The government advocates that, supplementary to competition law, at the very least a European regulator should be able to impose ex ante obligations on large 'gatekeeper' platforms on which consumers and businesses are heavily dependent.
- At EU level, the government calls for guidelines to explain in more detail how the competition rules in the Treaty on the Functioning of the European Union and in Sections 6 and 24 of the Dutch Competition Act can be applied and enforced in the digital economy, with a special focus on the role of data, market delineation in multi-sided markets and non-monetary prices.
- The government calls for the European thresholds for notifying a concentration to be adjusted in such a way that all relevant digital concentrations fall within the regulator's scope.
- The ACM's dedicated digital competition team, consisting of specialist lawyers, economists and data scientists, is developing expertise on new technologies and business models and their impact on competition analysis, including AI-driven platforms for legal services and the use of algorithms and app stores.
- In the spring of 2019, the Netherlands approved the directive for better enforcement and modernisation of consumer protection rules in the EU (COM(2018)185). Pursuant to this directive, consumers should be informed when personalised prices have been generated automatically. The directive is expected to be adopted in the autumn.

⁸⁴ On 3 June, Minister for Foreign Trade and Development Cooperation published the Digital Agenda for Foreign Trade and Development Cooperation on this international dimension of AI applications, among other things.

Track 3: Strengthening the foundations

- The Netherlands is actively monitoring developments in IP law and AI, in line with initiatives taken in a European or international context. For example, the Netherlands welcomes the new guidelines regarding the patentability of inventions based on AI, published by the European Patent Office in October 2018.⁸⁵
- With the implementation of the new Copyright in the Digital Single Market Directive (2019/790), the Netherlands will create more legal certainty for research organisations (including PPPs) about the extent to which they can carry out text and data mining activities thanks to a broad exception.

The safety of citizens, businesses and government entities in the Netherlands remains protected

- The impact of the use of AI on national security is currently being investigated within the framework of the National Security Strategy.
- Commissioned by the Cyber Security Council, research is being conducted into the use of new technology – including AI – for cyber defence.

⁸⁵ https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3_1.htm

Appendix 2: Financial resources for AI

Dutch public contributions

The Netherlands invests in fundamental and applied research mainly through instruments with a broad scope, such as the PPP allowance scheme, the SME innovation promotion scheme for the Region and Top Sectors (MIT scheme) and the Research and Development Promotion Act (WBSO). Within these instruments, no funds are earmarked in advance for specific subjects such as AI. In retrospect, it becomes clear how much has been invested in, for example, AI. For example, €19 million was recently allocated to fundamental research at six Dutch universities on how AI can strengthen human intelligence, including in the healthcare sector (part of the Gravity programme).

The MIT scheme offers SMEs opportunities to finance AI projects. In the 2013-2017 period, the number of AI projects increased to approximately 30 with a total contribution from the Ministry of Economic Affairs of €1.9 million. Within the WBSO, there is also a strong increase in AI-related projects over the 2014-2018 period.

In addition, there are specific programmes for research and innovation. For example, the long-term research programme for Big Data is operating in a PPP context, with more than 100 companies (Commit2Data) and with a total value of €51 million in public funds from the Ministry of Education, Culture and Science/NWO, the Ministry of Economic Affairs and Climate Policy and the Ministry of Health, Welfare and Sport (plus €18 million in private funds).

It is estimated that the national government's (basic) funding for AI research and innovation totals approximately €45 million a year, including €45 million for AI research and innovation:

- €15 million through the ESA international innovation grant scheme for business participation in EU technology programmes;
- The Ministry of Economic Affairs and Climate Policy has provided a total of €11 million for TNO, the use of the PPP allowance and the use of Regional Development Agencies;
- €10 million is available for the Ministry of Defence in AI-related security research by TNO;
- A total amount of €5 million is available for other departments, including the Ministry of Justice and Security, the Ministry of the Interior and Kingdom Relations and the Ministry of Agriculture, Nature and Food Quality;
- €4 million via the Ministry of Education, Culture and Science and NWO for PPP research.

In addition, the Ministry of Education, Culture and Science is investing €18 million in a new supercomputer for SURF, which is a prerequisite for AI-driven research.

At the beginning of this year, the government set missions for mission-driven innovation policy⁸⁶ and it has now also drawn up its Knowledge and Innovation Agendas (KIAs) for 2020-2023. AI as key enabling technology is part of that. The allocation of funds to the KIAs for 2020 and beyond is not yet known and will be effected through a Knowledge and Innovation Agreement 2020-2023 (November 2019).

The government's 2019 Spring Memorandum earmarked structural additional resources (€10 million per year) for long-term innovation programmes in the area of key enabling technologies. As promised during the general consultation on innovation of 19 June 2019, your House will be informed annually about the public investments in key technologies.

At the end of 2019, the Minister of Economic Affairs and Climate Policy will present a broad agenda to strengthen sustainable earning capacity in the long term. Key enabling technologies such as AI are included. The Ministers of Economic Affairs and Climate Policy and of Finance are also investigating the possibility of setting up an investment fund to strengthen earning power and are reporting on this to the House of Representatives at the beginning of 2020.

⁸⁶ Parliamentary Papers 33009 No. 63, No. 70.

European funds

The following section discusses the resources available for AI within European programmes.

Ongoing European research and development programmes for AI

Horizon 2020: A total budget of €600 million is available within the European Horizon 2020 framework programme for AI-related activities. Within the Leadership in Enabling and Industrial Technologies (LEIT) ICT programme, for example, approximately €300 million in EU support is available for AI excellence centres, AI on demand platforms, AI for manufacturing, big data technologies, blockchain, robotics and the Internet of Things. In the other Horizon 2020 work programmes on Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing (NMBP), Space and Societal challenges, approximately €300 million is available for AI research and development (R&D). The Erasmus+ exchange programme is also important in this regard.

EUREKA⁸⁷:

- The ITEA cluster programme (software-intensive systems) is already largely focused on AI (perception, advanced user interfaces, command/control, deep learning and digital twin). In the ITEA Call 2018, 10 of the 17 labelled projects are AI-related. An example is the use of AI for clinical medical applications.
- The PENTA programme (micro-electronics) focuses increasingly on AI. Of the fourteen projects labelled in Calls 1-3, five are aimed at AI. The number of AI projects in the current Call 4 is increasing.

Future research for AI through Horizon Europe and Digital Europe

Europe aims to catch up in the field of research and development for AI and calls on the Member States to do the same.⁸⁸ The Netherlands has previously supported this call through the Declaration of Cooperation on AI.

For the EU's next long-term budget (2021–2027), the EU has proposed to invest a minimum of €7 billion from the new European Horizon Europe programme and the Digital Europe Programme in AI. This year, the European Commission will present a common Strategic Research and Innovation Agenda for AI (to be launched in 2020). Horizon Europe is expected to include the Joint Undertaking Electronics Components and Systems for European Leadership (ECSEL) 2, with an increased focus on AI. European industry has indicated that it aims to double the size of the Joint Undertaking.

EUREKA: The EUREKA cluster programmes ITEA (software-intensive systems) and PENTA (micro-electronics) expire in 2020 and are expected to be succeeded by new clusters that will focus on AI in a coordinated manner. As part of its chairmanship of EUREKA, the Netherlands is endeavouring to realise a review and renewal of the EUREKA cluster programmes, with a focus on AI.

For the co-financing of the participation of Dutch companies and knowledge institutions in strategic, large-scale European R&D cooperation programmes via the Joint Technology Initiative (JTI) ECSEL (Horizon 2020) and the EUREKA cluster programmes ITEA and PENTA, an amount of approximately €40 million per year is available in national funds. The Brussels co-financing amounts to approximately €20 million per year. Through the JTI ECSEL and the EUREKA cluster programmes ITEA and PENTA, AI R&D projects with Dutch participation are supported. This means that a total of €60 million is available to support the R&D of Dutch companies and knowledge institutions.

Supplementary to the above-mentioned instruments, other means are being sought to stimulate Dutch R&D activities in AI. Dutch industrial companies are currently drafting joint investment proposals for research and innovation in this area. This concerns, for example, the participation of Dutch companies and knowledge institutions in related EU (ECSEL 2) and EUREKA initiatives. The use of Dutch resources in a tripartite JTI results in European co-financing that is equal to the national resources deployed.

⁸⁷ EUREKA is the European Research Coordination Agency.

⁸⁸ European Commission, 'EU Coordinated Plan on AI', 7 December 2018.

Dit is een uitgave van:

Ministerie van Economische Zaken en Klimaat

october 2019 | 122801