ECP

Platform for the Information Society

Vision document ECP

An adult information society

The new normal

Vision document ECP

An adult information society

The new normal

CONTENT

3 **Preface**

4 **Chapter 1**
Introduction

8 **Chapter 2**
Effects of ICT-developments
2.1 Growth
2.2 Platform economy
2.3 Organisation and people in networks
2.4 Data, data, data
2.5 Anywhere, anytime, anyhow

24 **Chapter 3**
Preconditions and the information society
3.1 An excellent digital infrastructure
3.2 Security and trust
3.3 Work changes and a digi-capable society
3.4 Adjustments to regulations and institutions

38 **Chapter 4**
Summary and ECP's role
4.1 Summary
4.2 ECP's role

42 **Footnotes and sources**

PREFACE

As we speak about the information society

You are holding ECP's vision on the information society. We will discuss various ICT-technologies, but our focus is on the effects ICT has on people, society, and the economy. We'll see how important the preconditions are for the information society change with the arrival of ICT. We will formulate the questions that developments in the information society evoke.

This vision is a live document that we will continue to modify as we speak with stakeholders from the market, society, government, sciences and ethics, and naturally with an eye on international dynamics. Developments and opinions are in continuous flux, after all, and time will tell whether new technologies will be established in a next version, which effects we will perceive and how we will appreciate them.

We consider this vision, therefore, mainly as a conversation piece. This document offers a broad view on the information society. This means we will not be able to engage in an in-depth discussion about the effects of ICT on specific sectors or certain subjects. As many parties have very precise questions about the possible impact of the information society on them, this vision statement is an invitation to engage in a discussion. These discussions may lead to more elaborated, subject-specific visions of the information society that will be helpful in determining the right way to act.

ECP wishes you an interesting read and hopes to speak with you about it soon.

Arie van Bellen,
director ECP
Platform for the
Information Society

CHAPTER 1 - INTRODUCTION

The *enabling* technology of our time

It's quite impossible to ignore the reality of the information society. Developments pushed forward by data and the Internet are no longer merely relevant for experts, but touch all of our lives: individuals, organisations and society. This broad, and at the same time often disruptive impact requires an adult approach to the unprecedented opportunities and the new challenges we encounter. For this, we need both realistic knowledge about ICT, and of its effects on sectors where they have an impact. We will have to relinquish familiar modalities and institutions to do so. We must focus on the underlying strata: the basic values of people, society and the economy.

ICT can be considered the 'enabling technology' of our age, technology that sustains other technologies and applications. Like the combustion engine, the technology of which hasn't only made cars possible, but also a great number of different machines. Electricity, too, has led to an almost innumerable series of inventions. The same goes for ICT.

Fundamental technology

Carlotta Perez (see box) has studied these technological revolutions and distinguishes two phases: a phase of emergence with over-enthusiasm and disappointments (the internet-bubble and deflation), and subsequently the less spectacular, but more relevant implementation phase, in which all sectors of society apply the technology. This takes time and effort, as the new technology continuously has to adapt to sectors' requirements, while sectors, on the other hand, have to accommodate to the (im)possibilities of the new technology. But the implementation phase we are in now does lead to relevant applications.

Disruption and the new normal

ICT applications are visible everywhere, often literally at your fingertips. Mobile phones, searching on the Internet, online shopping, navigators: everybody uses them. ICT is fundamentally disruptive: markets have been shaken, products obliterated, and entirely new industries have emerged. This is how the PC displaced the typewriter in the eighties, which changed our way of working and communicating forever. Due to the rise of e-mail in the nineties, traditional mail changed face completely. More recently, smartphones and apps have caused serious drops in sales of digital cameras, watches, and mp3 players, for example. Distance-learning programs will change education, banks will substantially transform in ICT-companies, whose customers will bank at home or on the road through the Internet, while decentralisation allows people more and more to take care of things themselves, that required a shop or factory in the past (3D-printing, booking a holiday, selling things). Sooner or later each sector, at every level, will have to deal with the disruptive effects of ICT developments. ICT is a synonym for innovation and new solutions; businesses investigate how to innovate through ICT. We've set off on our (long) road towards 'the new normal'.

Dealing with disruption

The question is how we, as an information society deal with this disruption. How do we seize these opportunities and options best, and how do we deal with the problems that the new technological possibilities entail? ICT doesn't just happen to us; it remains the result of the interaction between supply and demand. A good example is Second Life, which, a few years back, was the biggest Internet hype. This virtual world attracted advertisers in no time, hoping to set up their own hang-out. But the ambitions pretty much disintegrated: curiosity on the part of users evaporated rather quickly. ICT developments, too, are impossible to predict. Another good example[1] is the movie Back to the Future 2 from 1989. In that film, leading character Marty McFly flies a time machine to just about now (21 October 2015). He lands in a world with floating drones and smart fabrics, but the impact of the internet, mobile communication and the 'Internet of Things' (see box) were not anticipated by the movie.

Disruption

For Carlota Perez ('Technological revolutions and techno-economic paradigms', 2009) disruption is nothing scary. She observes that economical growth comes about through many small innovations, and rather not through a single big one. As soon as an innovation is applied at a large scale, a situation of a '*new normal*' will enter into people's *mindset*. That's the phase that ICT has entered into: it's a driving force behind economic growth and change. Applications of ICT are visible everywhere in our daily lives in society, and have become normal.

‘ICT is basically disruptive: markets have been shaken up, products obliterated and entirely new industries have emerged’

Ethical discussions

Many ethical debates are fought over disruptive technologies, often around a basic theme that questions whether technology isn’t mastering man. These discussions are part of a long tradition, with Mary Shelley’s novel ‘Frankenstein’ (1818) being a famous example. It is understandable these discussions keep re-emerging: each innovation begs for an ethical reorientation. Often man and technology are juxtaposed for this purpose, though they are (also) always tied to each other. Man is utterly technical; part of being human means making and using technology. This doesn’t render our dealings with technology automatically unproblematic, but it does carry us further than theorising from the (too simplistic) contrast between man and machine.

Mutual adjustment

Optimal use of ICT requires mutual adjustments: technology must be adapted to man and society, and, vice versa, man and society have to modify their routines, learn new skills, and collaborate in different ways, so as to make good use of the applications. Instead of holding on to existing regulations, methodologies, and institutions, we will have to focus on society’s underlying values – which may vary from country to country, for that matter – and strive for a healthy economy.

In a world that, also due to ICT, has considerably integrated in networks, and in which divisions between sectors, between public and private, and between regions are becoming vaguer, this will not be a small feat.

An adult information society

The vision this document describes, and that aims to be an invitation for discussion, tries to contribute to an adult approach to disruption. In the next chapter, we will first address the socio-economic effects of ICT developments. We will also describe several important technologies, such as big data, cloud computing, web 1.0, 2.0, and 3.0, mobile, and 3D printing. The focus in this chapter will remain, however,

The typing room of the 1960s has been displaced by today's 'open office'

on the effects that this interplay of technologies has provoked. What are the actual changes, and how do they evolve?
In the third chapter the disruptions in the pre-conditions that cut right through the sectors will be central. Infrastructure, security, skills, and governance and regulations: we had to deal with all of them in the off-line world, but the arrival of ICT forces them to come up with something entirely new.
As mentioned before, ICT brings changes and innovations to all sectors. This vision statement is not the fore to address the issues in all sectors. We will use cases from certain sectors that will give an idea of the changes that are on their way over there. This vision could open a subsequent conversation with parties from various sectors, in which all involved can think through the consequences for a particular sector.
The final chapter will aim for conclusions, and will sketch how ECP, as a platform for the information society, contributes, and hopes to continue to do so, to the establishment of an adult information society in the Netherlands.

The four D's of digitalisation

René Penning de Vries, ICT champion of the Dutch Ministry of Economy, recognises three other aspects to digitalisation, besides disruptiveness. In an interview with Computable[2], he says: 'Digitalisation is disruptive because it upheaves traditional chains and models. It also is somewhat *deceptive*: there's a development you actually don't see coming, but then it's there, and rather prominently at that. I have another D, a D for *delocalised*, meaning: you keep all of this mobile technology in your back pocket, carrying it with you and connecting on the spot. In the past, you actually had to get behind your computer. The fourth D stands for *democratised*. Because it's accessible for use to anyone, to invent an application, or to set up a business. That's true here in the Netherlands, but also elsewhere. Out there in India, in your office, if you're connected to the Internet, you have the same access to knowledge and know-how, as people at the world's best University. These 'D's' have a huge influence on the way society will develop.'

CHAPTER 2

Effects of ICT developments

Technological developments are the driving force behind our information society. Far-reaching miniaturisation[3] has rendered managing information and data exponentially cheaper, and faster, over the past decades, as well as more compact. Subsequently, we saw the arrival of the (mobile) Internet, which has caused an enormous increase in the distribution of data faster, global, cheap, visual, textual, and vocal, through the air (frequencies), and underground (cable).
These technological innovations have produced a number of characteristic effects in our society, and in our economy. In this chapter, we'll describe the most important effects, identifying their technological drivers. We will also take stock of the questions these effects carry with them.

Anna Hoychuk / Shutterstock.com

2.1 Growth

ICT developments lead to different forms of growth. Naturally to growth as a result of de possibilities of new applications that previously were not available, but ICT also fuels (macro-)economic growth.

Economic growth

Contrary to ten years ago, nobody questions whether ICT contributes to the economy any longer. Research Institute Dialogic has calculated that ICT is the biggest driver of economic growth of the past decades.[4] The economic growth is mainly realised by using ICT, and by deploying it smartly, and not so much by the manufacture of ICT, that is for infrastructure or hardware. That's because we've reached the deployment phase of ICT: for each sector there are ICT solutions available that have proved their value.

As each sector, to a certain extent, is information intensive, ICT has an impact throughout the Dutch economy. According to Dialogic's calculations, approximately 36% of the economic growth of the past decades has been the result of ICT.

The Dutch ICT-sector

It is still worth-while to take a look at the ICT sector itself (defined by the Dutch Statistics Office 'CBS' as the ICT industry, wholesale of ICT appliances and the ICT services sector).[5] In 2013, 29.7 billion euros were spent on ICT in the Netherlands.[6] The ICT sector itself is one of the Netherlands' biggest sectors. Compared to other countries, though, the Dutch ICT-sector is relatively small (in 2011 ICT's share in GDP was 5.1%). The export of ICT, with its 2.3 billion of value, comprises only 1% of total Dutch exports (excluding re-export; re-export included it amounts to 12.8 billion, or 3%). In the period 2007-2013, the number of ICT businesses increased from a share of 3.6 to 4.4% of all companies.[7] This increase consists almost entirely of growth in the number of ICT service providers. According to 'CBS', on 1 January 2015, the Netherlands counted 58,990 ICT companies, an increase of over 6% compared to the previous year.[8]

Employment in the ICT sector will continue to grow the coming years with an average of 5% per year: well above the average growth of employment generally.

> 'Employment in the ICT sector will continue to increase by an annual average of 5% in the coming years'

Growth in usage by businesses

The growth in usage of ICT applications has accelerated enormously by the emergence of the Internet (see box page 11). In the manufacturing industries production processes can be organised more efficiently, durably, and more made-to-measure, machines are inter-connected and can be operated intelligently (*smart industries*). In agriculture, networks of sensors measure the humidity of crops, and ensure optimal use and saving of water. Sensors in dams monitor their solidity and continuously calculate the chances of flooding.

Climate control and energy consumption in greenhouses often are completely ICT-operated. By introducing more intelligence in electricity grids, households can feed their decentrally generated electricity back to the grid (*smart grids*). In health care, online consultation is no longer an exception, and patients increasingly have insight into their own hospital record.[9]

Growth in usage by individuals

Individuals also make use of the Internet increasingly. The most common transactions of internet users are online banking, online acquisitions in web shops, and online media consumption (radio and TV, newspapers, and magazines).[10] With the rise of the smartphone, these applications are literally at our fingertips. In 2011 already, 79% of Dutch individuals between 16 and 75 used online banking.[11] For the EU as a whole the average was 37%, and in 2013 'only' 51% of American adults did their banking online.[12] The excellent infrastructure has undoubtedly contributed to the Dutch being digital front-runners early: the nearly country-wide cable network coverage, parallel to the existing telecom network, brought about competition between infrastructures, with good access in nearly every home as a result. Besides, the Dutch are fast to pick up on new

> ‘The excellent infrastructure has undoubtedly contributed to the Dutch being early digital front-runners’

developments. On international ranking lists (such as those of WEF and the Economist) we are consistently leaders in the use of digital services.

Innovation

By its fundamentally enabling potential, ICT innovation creates possibilities for innovation everywhere. We can distinguish here between sectors that change their way of working but inherently continue to do the same, only differently and more efficiently, thanks to ICT (banks); or sectors that change in substance, following different business models and products (Airbnb, Kickstarter).

The question is how innovation policy anticipates to this. By picking particular leading sectors in which the Netherlands want to excel, the decision has been made to consider ICT, not as a sector of itself, but as an axis of innovation.

So, as the heavy industry is transforming, by ICT-induced innovation, into a ‘smart industry’, other sectors too are facing the challenge to become smart. The ‘Team ICT’[13] in addition is committing itself to making people more familiar with ICT and its possibilities, with big data and human capital.

Beyond establishing ICT as an axis of innovation, the market has its own dynamics, of course, where young players can turn into world-leaders quite fast. Most cases come from the US. Apple, Google, Amazon and Facebook:

These are enormous Internet companies that subsequently have set foot in new markets, for example with the Self-Driving Car, or the Apple Watch (health data). On a smaller scale we can find some Dutch examples, too, such as Booking.com and TomTom. How do we get more of this type of players in the Netherlands, and what are the requirements? It all commences with start-ups, of course, but we’d like to aim for grown-ups. Keywords here are up-scaling, talent, and capital.

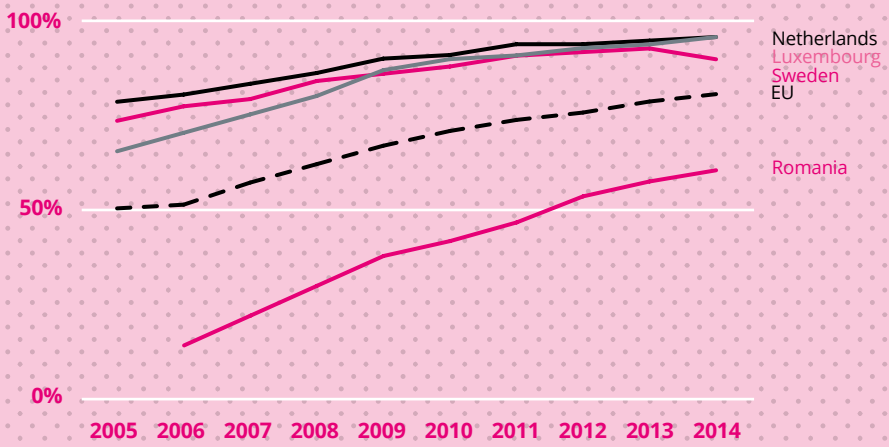
The innovation process is transformed by ICT. Suppliers get their feedback regarding their products or services a lot faster from both professional buyers and consumers. Perhaps valorisation of the sciences, from businesses to the market place, is too one-dimensional a thought, and does up-scaling also take place where market and companies interact. So the innovation model itself is not impervious to disruption. This does carry consequences for innovation policy, which could focus more on up-scaling by promoting co-creation with users, for example, and by ensuring new infrastructure is in order, and that effectively living labs come to being, if necessary including regulation-free areas.

Miniaturisation (Moore’s Law)

The enormous growth of ICT technology can be traced back to the invention of Integrated Circuits (ICs) at the end of the 1950s. This electronic circuit is the basis of all forms of ICT and it ensures that they’ll become exponentially cheaper, faster, and more compact. In 1965, Gordon Moore, later on the founder of Intel, published his prediction that the number of transistors in an integrated circuit will double every two years (‘Moore’s Law’). This growth is exponential, so storage, processing, and sending information have become approximately 100 million times cheaper over the past thirty years. This amounts to a yearly cost-reduction of 45%, or it translates into performance improvements of the same magnitude. Moore’s prediction has indeed withstood the test of time. This is partially due to the fact that this law has become *a self-fulfilling prophecy*: chip manufacturers consider the law as a target.

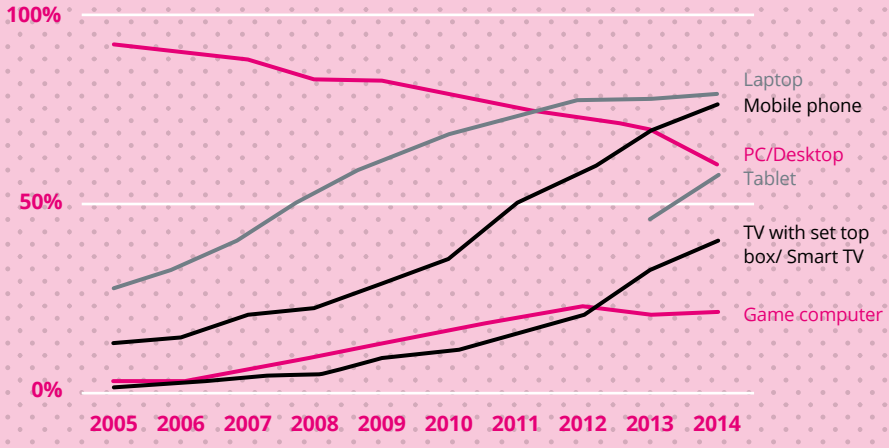
Internet

The Dutch, together with the inhabitants of Luxembourg, are the digital front-runners. At the moment, 96% of Dutch households has got a fixed internet connection. World-wide, the number of internet connections is close to 3 billion. This means that 40% of the world's population has access to the internet.



Source: Eurostat

Laptop and mobile phone are the most popular devices for Internet access; the number of tablets is increasing, while the use of PCs is dropping drastically.



Source: CBS

Questions

- How will economic growth develop?
- In what fields and in which (top) sectors can growth be expected? How can the Netherlands (government and businesses) anticipate on expected growth in particular sectors? Where are the obstacles?
- Does the Dutch economy dispose of sufficient capacity to adapt to deal with disruption?
- Is there a need for a different innovation policy now that ICT is the dominant driver behind innovation, besides the 'classic' approach of matching sciences and businesses?
- How do we create the right mix of talent, capital and above all up-scaling power to transform start-ups into grown-ups?
- If analysis of the leading sectors had to be repeated with a focus on the ICT-innovative potential of a particular sector, would it prompt a choice for different sectors?

2.2 Platform economy

Over the past decade, developments on the internet (see box page 11) and the rise of the cloud have led to the creation of a large number of digital platforms. These platforms are meeting places for offer and demand of products and services. Google, for example, brings search terms (demand) and websites (offer) together, Facebook its members (demand) and the content these members produce (offer). Platforms like Amazon, Bol.com and Marktplaats link the offer of products and services to consumers' demands, consumers that have the opportunity too, to propose products and services. An interesting question is whether these are ICT applications of a company, or whether we should speak of ICT businesses. In actual fact, neither one is the case. Platforms have created a new 'layer' that connects organisations and individuals, and discloses information about goods, services and prices to large groups of consumers. By making use of the cloud, furthermore, digital platforms are extremely scalable: in case of increasing demand, computer and storage capacity can simply grow along.

Everywhere

Digital platforms come about relatively easily, and we can see their fast arrival in all sectors. Through Uber, for example, customers can book and pay for a taxi. The app shows you exactly how long it will take before your taxi arrives, and it lets you rate your driver. Airbnb works two ways: individuals can rent out their guest room through the website to strangers, but they can also search and book a holiday accommodation.
On Thuisafgehaald, you can share a meal with people from the neighbourhood. On Werkspot, you can assign jobs to professionals. A shared economy emerges. Though less visible to consumers, platforms take shape between organisations as well. The world of banking has its own mobile payment platform (SixDots), and iDeal too, is an example of a digital platform.

Pros and cons[14]

Digital platforms offer new services to consumers that a few years back were unthinkable, or they offer existing services more efficiently, cheaper, and in a more user-friendly way. Ratings by users give insight into differences in quality, which forces suppliers to adapt, which in its turn tends to lead to positive results for consumers, for example in the shape of lower prices, or an improvement in quality.
But there is a down-side too: successful platforms can acquire a monopoly in no time, with the risk of abuse of power, and lower margins for suppliers. Hotels have become more and more dependent on platforms such as Booking.com for their reservations, and pay for it with a considerable part of their room rates. Digital platforms sometimes upturn the market drastically. For existing suppliers they are new competitors, or they render superfluous existing links in the value chain. Booking.com has practically rendered your visit to the travel agent for hotel accommodation obsolete. Internationally operative platforms, that are active all across national borders, often have issues to comply with national laws and regulations. The standardisation of regulations in Europe is on the move, but differences are bound to persist for a long time. Because of the enormous quantity of data that platforms collect about their users, they are furthermore at risk when it comes to cybercrime.
The platform economy forces policy makers to reflect on the benefits and necessity of existing laws and regulations, and to develop new ones that are appropriate for the situation that has arisen.

Prathan Chorruangsak / Shutterstock.com

Internet developments

Web 1.0

When, in the early '90s, it was becoming easier to build websites and browsers entered on stage, the network that previously had been mainly of and for academics and technicians, changed. In the first phase (also called Web 1.0) the main concern was finding and downloading information, and the simple programming language HTML was used. The speedily increasing popularity of the internet led to a proliferation of dotcom businesses and eventually to the bursting of the Internet bubble in 2001. At the same time, the information function of the internet is far from finished yet. The number of websites with informative content is growing, and, with them, the need for a powerful search engine such as Google.

Web 2.0

Web 2.0 stands for the rise of interaction on the Internet: users aren't mere consumers of information, but by now also decide on the content of what appears on the internet ('prosumers').
It's the start of the social networks (the now-defunct Hyves) and of digital platforms. Webshops too make their entrance. The development of new Programming languages makes it simpler to create 'real' applications. The function Web 2.0 has for its users is one that is going to stay: Facebook, LinkedIn, and Marktplaats are still widely used.

Web 3.0

The third phase in the development of the Internet is Web 3.0, encompassing amongst other phenomena the rise of the 'Internet of Things'. Not only more and more people, but also more and more 'things' are connected to the Internet, such as sensors in access gates, measuring devices, smoke alarms, GPS, wireless equipment (tablets, smartphones, 'smart watches'), surveillance cameras and even self-driving cars. This development has led, among other things, to an explosion of data ('big data'), and to new networks, that regulate connection s between devices outside the control of their users or owners.

Facts & figures

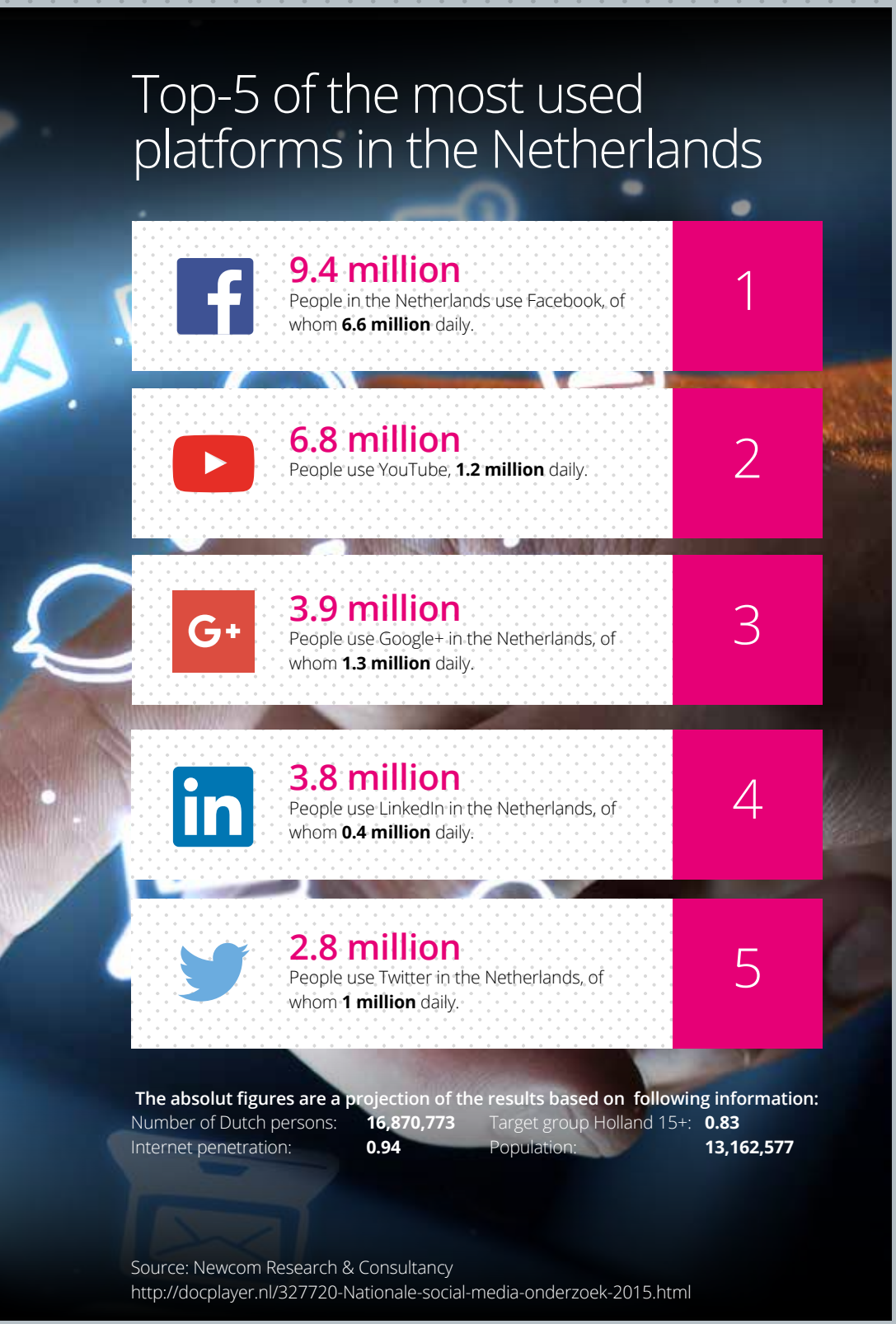
In 2014, Google received 2.66 million search commands a minute. In the same year, every minute, 5 million movie clips were watched on YouTube, and over 72 hours of new material per minute was unploaded.[15] To make sure that all new material on YouTube is watched from start to finish at least once, each of those 5 million viewers should watch at least 20 seconds of that unique, new material.

Per minute, 293,000 new status updates are posted on Facebook.[16] In 2015, there were 1.3 billion active Facebook users (meaning at least active on a monthly basis), of whom three quarters live outside of the United States . Every 20 minutes 2 million new friendship requests are sent.[17]

Estimates regarding the total number of devices that will be connected to the internet in 2020, range from 30 billion to 50, or even 100 billion.[18] According to a report from the British administration, there were 14 billion devcices connected to the Internet in 2015 already.

The time it takes for a new technology to have 100 million users is decreasing fast. After the telephone was invented in 1878, it took 75 years before this landmark was reached. For the mobile phone, a century later, it was only 16 years, and for the usage of the Internet 7 years. Apple's app store took only 2 years to crush the barrier.[19]

Top-5 of the most used platforms in the Netherlands



9.4 million
People in the Netherlands use Facebook, of whom **6.6 million** daily.

1

6.8 million
People use YouTube, **1.2 million** daily.

2

3.9 million
People use Google+ in the Netherlands, of whom **1.3 million** daily.

3

3.8 million
People use LinkedIn in the Netherlands, of whom **0.4 million** daily.

4

2.8 million
People use Twitter in the Netherlands, of whom **1 million** daily.

5

The absolut figures are a projection of the results based on following information:

Number of Dutch persons:	**16,870,773**	Target group Holland 15+:	**0.83**
Internet penetration:	**0.94**	Population:	**13,162,577**

Source: Newcom Research & Consultancy
http://docplayer.nl/327720-Nationale-social-media-onderzoek-2015.html

‘When will platforms become so important that they’ll be an effective part of public infrastructure?’

Questions

- What are the generic characteristics of the platform economy?
- Are there any platforms for which the Netherlands could be leading internationally? How do we support them, how can we get more of them?
- What do platforms mean for the industries in which they’re active? Is there enough space to innovate for the suppliers; is there sufficient protection for users?
- Where does (market) power reside? What about existing regulations? Does government have a specific role for platforms?
- What are the effects of the platform economy on the labour market (people are economically activated), what are the fiscal consequences (VAT-evasion)?
- When do platforms become so important that they make effective part of public infrastructure?
- Could platforms be a temporary phenomenon, a momentarily necessary intermediate layer that will become superfluous when products, people, and services will advertise themselves, and be directly accessible through the Internet of Things?

2.3 Organisation and man in networks

ICT has changed structures of and relations between organisations. More than ever before they have become part of a series of flexible networks, networks that easily expand to a large numbers of players. The relation of employees with organisations too, has changed comprehensively.

Work differently

obile technologies have enabled us to work at a distance (‘the open office’, or teleworking), so more tasks can be executed outside of the office and its opening hours. More often workers are assessed against results, and managers’ roles in controlling personnel are becoming less prominent. Organisations, therefore, are restructuring their model of governance. Fewer management layers, smaller units with an increased level of responsibility, for example regarding professionalism, integrity, know-how, trust, and transparency. ICT has also contributed to the growth of the number of self-employed. For many, an organisation is no longer necessary to have either colleagues or information available.

Network and chain collaboration

In the modern economy companies have long ago quit operating solitarily. Thanks to ICT developments and standardisation they are better able to exchange information with other organisations and with the authorities, and collaboration within networks and chains has seen an increase, both within and across different sectors. The Doorbraak- project MKB[20] (Breakthrough project for small and medium-sized businesses), for example, to promote the sharing of data in smart industries. The rise of digital platforms, that link parties from the chain and facilitate the exchange of information, strongly contributes to network and chain collaboration. What is often needed are standardization agreements, and a (sometimes neutral, third) party, that makes itself responsible for the digital platform.
The government, too, acquires a different position; it can no longer shape policies top-down, but also through networks.
An example of a digital platform is Flori-code, which intends to improve communication between trading partners in the floricultural sector.[21] Growers, upgraders, logistic suppliers, producers, traders and the wholesalers are able to exchange information more easily, and to process orders, logistics and administration, thanks to the coding of floricultural products, and the standard messaging that the foundation Flori-code develops and manages with and for all parties in the chain.

Public/private sector-private ICT-partnerships (PPPS)

In order to realise such digital Platforms, public/private partnerships (PPS) are indispensable: cooperation between government and private sector parties. An example is Portbase[22], founded in 2009 by Havenbedrijf Rotterdam and Haven Amsterdam (the Port facilities of

'Actually it is more accurate to describe our information society as PPPS: a partnership between public, private from the sector and private from ICT'

both cities). This Port Community System offers tens of services to about 3,600 customers in all sectors of the Netherlands ports. Businesses, organisations and authorities exchange logistic information through this platform, both with parties within the Netherlands, and in Europe. The platform is available for all kinds of goods that are handled in ports: containers, itemised cargo, dry bulk and liquid bulk. Government isn't connected to Portbase for nothing. Coordination is necessary, after all, in the field of customs handling, for example, for taxes and environmental permits. The authorities also want to know in time where obstacles might pop up so they can remove them. In PPP-constructions the authorities can also intervene as an impartial mediator between different parties. Actually, in the information society, it is more accurate to speak of PPPP. A partnership between public, private from the sector, and private from ICT. Initially, the ICT parties were the 'new kids on the block', but they're increasingly seen as obvious partners.

Supervision

The authorities have a supervisory task in many areas. Traditionally this means that the tax inspector, for example, checks the books, or that hygiene is scrutinised. One can observe that through the digitalisation part of the supervisory chain is being turned around. Companies give the authorities insight, for example, into their accounts, agreeing beforehand how they must keep them. In this way, the administrative burden is reduced for businesses, and the authorities have fewer problems in enforcement, and more security.

Another example is the Dutch tax office, de Belastingdienst that controls less and against 'compliance' (to the rules) and instead tries to condition behaviour. The office makes it as easy as possible for citizens and companies to comply with regulations, but they must prove they're following the rules. In case of doubt, inspections will take place.

Questions

Changing structures within and between organisations lead to questions, such as:

- If you change the way you work, do you also need different labour agreements and regulations?
- How do you speed up and strengthen the process of chain collaboration? Is there a

Big data

It is expected that the quantity of data produced in 2020, will have increased from 1.2 Zettabytes in 2015 to more than 44 Zettabytes per year, largely produced by sensors and devices.[29] If you wanted to store this on hard disks of 1 Terabyte each, you'd need 44 billion disks (or 6 pieces per earthling). In order to cost-efficiently store, analyse, and process these humongous quantities both structured, and unstructured data, the requirements for hardware, software (for analysis and visualisation), and data transport are extreme. Traditional processing and storage-methods aren't fit for big data. Special databases have been developed to store un-structured data (such as noSQL), and analyses are executed in parallel on different computers. Specific software is required for this (like Hadoop), and fast optical, high-capacity connections. The rise of this type of connection as well as the low cost of data storage in the cloud have contributed to the birth of big data.

neutral party with sufficient authority that can strike these deals? What arrangements do parties make regarding current, but maybe even more importantly, regarding future interests? To what extent will a partnership be open to entry by new entities? How is financial distribution arranged?

- ICT parties will play their part in all sectors, in whatever form. How do you structure a PPPS, so that it leads to innovation and positive results for everyone ('win-win-profit')?
- Where is this 'new' supervision applicable? What does it require from the supervisory services?
- How can we adjust laws and regulations in such a way that government will facilitate the behaviour it would like to see from citizens and businesses, instead of responding with enforcement and punishment after the facts?

2.4 Data, data, data

Over the past years, saving, storing, searching, analysing and visualising data have become exponentially cheaper. Organisations and businesses collect more and more data on their clients, suppliers, and operational processes, either in their own computation centres, or in the cloud. By using 'big data'-technologies (see box) they are able to combine their own data with those of others, and analyse them on a large scale.This creates opportunities for value creation, such as new concepts in private services. Take Google Ads and the AH Bonuskaart supermarket savings program. The latter enables the supplier to propose discounts tuned to individual customers. Some parties specialise in the collection of data, and their analysis. The data-driven society and economy have definitely arrived.

Data explosion

The quantity of data we produce and keep with each other is increasing so fast, that it's no exaggeration to speak of a data explosion. Add to this the fact that over the past years all kinds of sensors and devices have been hooked up to the internet, such as surveillance cameras,

'Analysing large quantities of data leads to new possibilities and insights in healthcare too'

sensors in dams, and smartphones that are in continuous connection with each other, and that communicate, the 'Internet of Things'. The rise of digital platforms, social network sites and web shops produces enormous quantities of data as well, often of private nature. And this is not just text, but also data in the shape of images, video, and sound.

Applications of big data

The new opportunities created by smart use of data, lead to new business models. The Danish company behind the website www.husetsweb.dk, for example, has created a profitable web application that calculates the energy-efficiency of your home, and subsequently gives advice on improvements. To this purpose, the application integrates information about government subsidies and data from the cadastral system and trade registers. A case from the Netherlands is GeoPhy.com, where people can find information about the quality and prices of real estate. The site is based on data from the cadastral system, amongst others.
Analysing huge quantities of data produces new possibilities and insights in healthcare too. Dutch-developed MammaPrint, for example, establishes what women with breast cancer can benefit from chemo-therapy. The test is based on research that established which of 25,000 genes are crucial to tumour behaviour – will a tumour be dormant over an extended period of time, or will it metastasise. Thanks to 'big data'-research at the Antoni van Leeuwenhoek/Nederlands Kanker Instituut[23], a third of women taking the genetic test are spared the ordeal of chemotherapy.

Open data

Authorities[24], net operators, the statisticians of CBS[25] and other institutions provide (anonymised) data. They might regard public transport, for example, or the cadastral system, or the licence plate registry of the motor vehicle office.[26]
These data are readily available, and may be consulted by anyone (consequently the term 'open data'[27]). The department of infrastructure ('Rijkswaterstaat') is by far the biggest supplier of open data, in the shape of so-called geodata (information that can be linked to a geographical location). The Break-through-project 'Open Geodata als grondstof voor groei en innovatie'[28] stimulates the recycling of open geodata by better synchronising supply and demand. The method has been applied to matters regarding water, sustainable energy, the smart city, and to smart logistics.

Big data and privacy

Collecting and using data often means collecting and using personal information. This can produce interesting applications, but it also leads to questions regarding the protection of our privacy. The processing of personal data is subject to legal rules (Law protection of personal data), but developments move so fast, that there's insufficient clarity about the link between the protection of personal information and the possibilities for deploying data to develop new products and services. This tension can be seen in new EU regulations, for example. Regulations are being prepared that will permit the processing of personal data only under strict conditions. This creates great competitive advantages for organisations outside the EU when they offer services inside the EU, or if they can be reached from it; we might miss out on opportunities here.

Besides the privacy problem, big data files are also attractive to criminals. From several view-points, offering secure access to data is an important challenge.

> 'Besides the privacy problem, big data files are also attractive to criminals'

Questions

- Where do we have opportunities as a country? What are the Netherlands good at? Is 'big analytics' an export product? How do we make sure that the Netherlands are an attractive location for setting up data-processing businesses?
- What are the opportunities for society? Can big data help us avoid unnecessary operations, for example? How could we combine relevant data collections?
- How do we get access to (open) data that are stored decentrally, at different organisations and on different locations? How do we deal with data analyses? What is their value? Do we have/need supervision on their quality?
- How do we guarantee our digital and economical security (consider digital attacks on banks or power plants), and protect privacy-sensitive personal information?
- How do we make sure that the expertise and skills required for big data will be available?
- How do we promote awareness about dealing with data and privacy, and stimulate the sense of opportunity and possibilities?
- Could the Netherlands develop privacy as an export product (the Netherlands as a 'safe harbour')?

2.5 Anywhere, anytime, anyhow

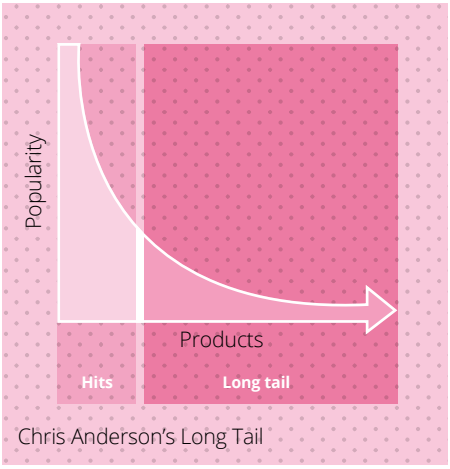
Technological developments in the areas of wireless communication, the mobile internet, and cloud computing (see boxes), combined with the large-scale use of powerful and portable devices, such as tablets and smartphones, have brought about the situation in which we're always, and everywhere, online. On the train, on the job, when we've gone out, or on our couch we make use of news apps, we check our bank account, we visit web shops, watch TV shows, and exchange the latest through the social media. We study online, and we order products that were made for us to measure, or even 3D-printed.

Online shopping

Online shopping has taken off seriously the whole world over. In the Netherlands, the mail-order company Wehkamp was the first when it offered part of its catalogue online in 1995; webshop Bol.com started in 1999. Even an internet-specific payment model has been developed: iDEAL. In 2010, the 100 millionth iDEAL-transaction was registered, by now the most widely used method of payment in the Netherlands. The market for purchases at a distance has grown enormously: 49% of the Netherlands population orders books online, or clothing, or the groceries. Online shoppers spent nearly 8 billion euros in the first half of 2015, a considerable growth of 18% compared to the first half of 2014.[30]

Long tail

Another phenomenon is the so-called 'long tail effect'. Physical shops have limited shelf space and tend to offer primarily better-selling products. On the internet, this limitation does not prevail, so the offer can be limitless. This goes even more for digital products like music (iTunes) and e-books. Purchasing behaviour changes, and web shops realise a big share of



their turnover on items in the tail of the curve. Thanks to the internet they can service quite small markets, against marginal costs. The bigger the offer, the bigger the turnover ('mass is cash'). After all, it doesn't matter to iTunes whether large numbers of top-ten songs are bought, or of single songs of obscure artists.

e-learning

Learning at-a-distance (e-learning) is on the rise too, due to the vast and broad acceptance of (wireless) internet technology. The private initiative Khan Academy[31], for example, encompasses over 3000 files of lesson fragments in the fields of math, history, physics, chemistry, biology, astronomy, and economics, made available through YouTube. More and more universities and academies record classes and provide them to their students through the digital environment. In addition, universities organise Massive Open Online Courses (MOOCs) that attract big crowds of students globally. Life-long-learning takes on new specifics. Also for businesses e-learning is popular: new co-workers follow training-courses online, process engineers are introduced new company processes through e-learning, and salesmen can get acquainted with new items and understand how to sell them through e-learning.[32] And anyone can learn how to program for free at the online Codecademy community.[33]

e-health and m-health

In healthcare, the arrival of the information society has been termed e-health: the use of ICT to support or improve health and healthcare. As in measuring and communicating blood coagulation parameters through the internet by patients to their healthcare provider, or in creating video links between the elderly or chronically ill, and their nurses, or in enabling tele-consultation between General Practitioners and Specialists (an example is tele-dermatology), and in the tele-monitoring of patients with chronic conditions. Medical apps (m-health) provide patients with guidance regarding interventions (as does the app Behandelpad), and a number of hospitals allow their patients online access to their medical records. What comes across from the e-Health Monitor 2015 is, that healthcare consumers are quite interested in using such facilities, but that actual practice is lagging far behind.[34]

Mobile Internet

Ordering goods or services digitally, at a distance, was possible for the rise of the internet. In 1981 already Thomson Holidays (UK) set up a data network using telephone lines, with which local travel agencies could request travel information through a modem, and book trips, as well as cancel them.[40] In 1994, the first pizza was sold through the 'worldwide web', that at the time was based completely on communication through fixed (phone) lines, by Pizza Hut. Wireless network technology such as Wi-Fi and 4G have accelerated the growth of mobile applications enormously. In 2014 mobile Internet use for the first time surpassed regular Internet usage through the desktop computer. Of the three billion people who globally have access to the Internet, two thirds are online through their smartphone.[41]

> ‘We can decide for more and more products what they should look like ourselves’

Made-to-measure for the masses

ICT technology offers great opportunities for goods made-to-measure for the masses, also called *mass customisation*[35]. We can decide for more and more products what they should look like, and suppliers align their products ever better to individuals, or to small niches. BMW, a ‘traditional’ supplier, claims that no two furnished cars are alike. Internet technology adds to it a whole new dimension. In the days that PCs were still a mass product that was manufactured in a limited number of standard configurations, computer supplier Dell pioneered by offering the possibility to compose your own PC online. We’ve seen similar initiatives since in other fields.
We can compose our own newspaper with articles from Blendle, and ‘lay out’ our own magazine with the app Flipboard, and read it, based on our own interests. An example from another sector is the postage stamp carrying your own picture (PostNL).

Printed arm prothesis

In the physical world 3D-printing (see box) is creating new opportunities for mass customisation. The originally Dutch company Shapeways offers 3D-printing as a service, so you can get your own designs manufactured fast and cheap, in various materials, such as plastic, ceramics, or metal, without needing to invest in your own 3D-printer. Besides the use by amateurs that want to make personalised, unique objects, more and more designers and artists are manufacturing and selling their products through Shapeways.

In the medical sector too, 3D-printing has been discovered. Dutchman Roel Deden made a light-weight arm prosthesis for an acquaintance, and won himself the Dutch edition of the James Dyson Award for young designers with it.[38] In 2014 a young woman had a complete, new and 3D-printed cranium implanted at the Academic hospital UMC in Utrecht.[39] The intervention

3D-printing

The technique to print objects, layer by layer from plastics, for example, or from steel powder, has existed for about thirty years.[36] The technology can be compared to that of the first inkjet printer. At first, most use of it was made in manufacturing. Subsequently it was deployed more and more for the production of prototypes, test models and mock-ups (‘rapid prototyping’). By now it has become a technique for the production of real final products. The process, too, is changing: a liquid printing process is under development that will make 3D-printers 25 to 100 times faster.

Manufacturing final products with 3D-printing has become possible because the variety in materials to be used has increased, the machines have become faster and more accurate, and of course because prices have dropped fast. Whereas the cheapest 3D-printer cost 45,000 dollars in 2000, a professional printer can be had now for 10,000 dollars. For barely 400 dollars you can get a consumer model.

Research bureau McKinsey expects the 3D-printing market to grow to 230 to 550 billion dollars in 2025.[37] That would mean a growth of many thousands of a percent compared to the current size (approx. 4 billion dollars). 3D-printing has various (economic) advantages: no stock of (spare) parts is necessary any more, no transport (printing is done on location) and a design is easy to scale.

was done to avoid the brain being crushed by the thickening of the skull, caused by a medical condition.

Questions

- The trend 'anywhere, anytime, anyhow' is fully persisting. What are the implications for sectors such as retail, healthcare, and education? Parties will have to learn to reason from the viewpoint of customers, patients, students: what is possible, and what is desirable?
- New (Internet) players will arrive on the market. How can, want, or must parties collaborate with them?
- Technology gives consumers the opportunity to become more powerful. Is this actually going to happen? Is government aiming for this?
- How do we deal with our dependency on the ICT infrastructure, and how do we ensure it'll be safe, as well as stable?

Cloud computing

The term cloud computing (or just 'the cloud') means disposing of hardware, software and information through the Internet, similar to the way we get electricity off the grid.[42] In this context, the internet is often represented as a kind of cloud within which computers, storage capacity, and programs reside, without you, as a user, knowing or needing to know where they are exactly. Organisations no longer need to physically own hardware, now that it's possible to lease it on the cloud. It is available from any computer you wish that has an Internet connection, and generally cheaper and more secure than your own storage. There is debate about the last point, definitely if the server is located in another country (consider the case of the U.S. with their controversial Patriot Act). Both private persons and businesses make use of cloud computing. One of the best known cloud services is Dropbox, where you can store, and share with others,

documents and computer files. The storage service is wildly popular: in May 2014 Dropbox announced that they'd reached the number of 300 million users.[43] Microsoft365 is a cloud service that allows you to use programs like Outlook, Word and Excel, without needing to install them on your own PC. Since its introduction at the end of 2013, between 9 and 15 million users have transferred to this service.[44] For businesses and organisations, cloud computing has the big advantage that this technology allows you to offer scalable online services: when the number of users of the service increases steeply, extra capacity can be rented easily, without the need to make big investments yourself.

Cloud computing is a disruption of the traditional view on ICT. It's changed the original role of ICT: it's moved from projects, customised solutions, and software packages, to chains and aggregations of existing online services. In addition, governments and businesses the world over are struggling with the question how the security and dependability of the cloud, in which generally many parties are involved, offering fractions of services in rapidly changing combinations, can be guaranteed.

CHAPTER 3

Preconditions and the information society

Effects of ICT developments on society can be seen everywhere, in all sectors. They entail new services and products, as well as a different way of work and life for organisations, people, businesses and government. This vision statement is not the right medium to elaborate the effects for each sector, but we hope some cases will give an idea. In this chapter, we'll further discuss the preconditions that cut right through sectors: matters like infrastructure, security, skills, and regulations.

3.1 An excellent ICT infrastructure

As ICT has penetrated all areas of society, authorities, businesses, and citizens have become dependent on a good digital infrastructure for all facets of the information society. Also to strengthen the competitive edge of the Netherlands, the digital infrastructure is essential. It is at least as important as the classical infrastructures, such as roads, energy, and water. An excellent digital infrastructure is safe and dependable, impervious to improper influences from the ill-intentioned; it incorporates the latest technologies, and is a precondition for (economic) growth.

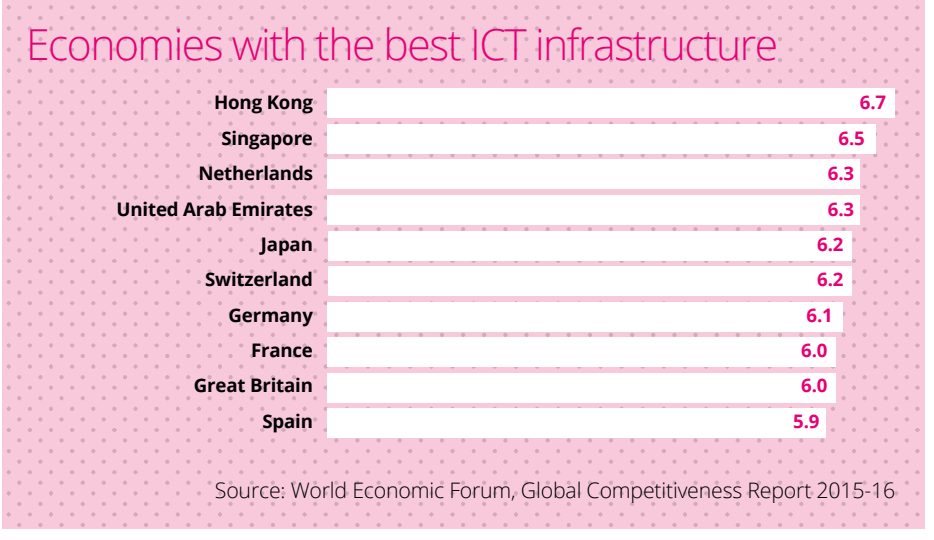
Mainport

The Netherlands digital infrastructure consists of, amongst others, the network (mobile and fixed), the network for higher education and research SURFnet, the Internet hub Amsterdam Internet Exchange (AMS-IX), the housing of data centres and the hosting sector. AMS-IX constitutes the 'Digital gateway to Europe' and is also called the Netherlands' third 'mainport', after the Rotterdam harbour, and Schiphol airport. It's the world's biggest internet hub, and it connects nearly 600 Internet Service Providers and internet businesses (such as cloud and content providers). According to the Global Competitiveness Report 2015-16 of the World Economic Forum, the Dutch digital infrastructure globally speaking is in third place, after those of Hong Kong and Singapore.[45]

With job opportunities in ICT and the internet sector increasing, and AMS-IX as the number 1 internet hub, the digital mainport has beaten both the Port of Rotterdam (container handling,10th) and Schiphol (number of passengers,14th).[46] Parenthetically, there's also a report on national digital development that states that the Netherlands finds itself in danger-zone (stall-out), because it's harder to stay ahead than to get ahead, and the Netherlands aren't keeping up the pace of digital changes.[47]

Net neutrality

Compared to other infrastructures, digital infrastructure has a particular position. A great number of parties (besides traditional telecom parties, internet and cloud providers as well) is responsible as a group for the open character, the reliability, and the security. The Netherlands are one of the few countries that have committed net neutrality to law. This means that the authorities, (telecom) businesses and other stakeholders should not be able to exert improper influence on the liberty of choice of users, and that all data traffic on a network should be treated equally. The Dutch authorities consider it their task to keep the internet free and open.[48] At the same time, this is a politically and economically controversial subject, both in Europe and outside. More and more countries – for varying reasons – want to regulate behaviour on the Internet.



International

Because of the international component, the Dutch Scientific Board, the Wetenschappelijke Raad voor het Regeringsbeleid (WRR), advises to consider the Internet a spearhead of foreign policy, and to strive for recognition of the Internet (the central protocol) as a 'global public good', that must be protected from infringement. How do we guarantee an (internationally) well functioning internet, even though there barely is any hierarchy on the Internet? No one, after all, (no state, business or organisation) governs 'the internet' in its totality.[49] That's why 2006 saw the founding of the Internet Governance Forum (IGF)[50], that wants to contribute to a safe, democratic, and stable internet through the international exchange of knowledge and cooperation. In order to introduce important Dutch issues, and in ordr to ensure that the conclusions of this international fore are well embedded in national policy, the Netherlands Internet Governance Forum (NL IGF)[51] was established.

Internet value web

An important discussion is to find the confines of the digital infrastructure. Conceptually, services and infrastructure are juxtaposed, where the idea of services suggests competition, liberty, market, short term, while the concept of infrastructure hints long term, government meddling, open access, and monopolistic structures (not to duplicate roads). From this perspective it is, also for policy, an essential question to establish what can be considered infrastructure and what cannot. In the Parliamentary letter about the vision on telecom, media, and the internet referred to earlier, mention is made of the internet value web. It consists, besides of the physical infrastructure (copper, wire or fibre and mobile networks), also of Internet connectivity, just as of online (communication) services and devices such as PCs, smartphones, tablets and TVs. These four components are interdependent, and link, as it were, to eachother through a web towards several different value chains.[52] One step further, and you could claim that platforms like Facebook, Google or Booking.com too, are endowed with the characteristics of infrastructure. The same goes for portals such as a future national patients record, or 'patiëntendossier', or a mobility platform. We're observing that the characteristics of infrastructure aren't merely applicable to the physical infrastructure, but also to the platforms that are created on it.

What assignments does 'an excellent ICT infrastructure' entail?

- How do we remain front-runners in the field of digital infrastructure? What type of policy is productive? And what type is counter-productive?
- How do we ensure that the internet remains safe, exempt from improper influences (neutral), and that it can continue to grow and flourish?
- What are the implications if the Internet

Student files

The tension between privacy and innovation is Snappet. This Dutch company rents out tablets with educational apps to elementary schools and grants students access to study content. Teachers can track the performance of their students in detail on a dashboard and see who is in need of more attention. The Board for the Protection of Privacy, or 'College Bescherming Persoonsgegevens' concludeded in 2014, however, thatthe way Snappet deals with student results of minors violates the law. Snappet used these personal data to evaluate and compare children to all others who used the Snappet tablets, without explicit written mandate from the schools. Neither did the schools receive sufficient information about what the organisation actually did with the data, and the service was insufficiently protected against illegitimate processing of personal data by the unauthorised. Snappet has modified its method and information provision by now.[54]

value web, or platforms, are included in our definition of infrastructure? Who will be responsible for it, the Authority on Consumers and Markets?
- How do we deal with the socio-economic dependency/vulnerability of the digital infrastructure? Can we leave it to the market, if this infrastructure is so important to our economic growth?
- How do we prepare the wireless infrastructure for new challenges such as the Internet of Things, which will increase the number of 'airborne' connections exponentially?

3.2 Security and trust

Massive and different use of ICT entails new requirements and questions regarding security. While in the past questions of security for us reagrded the dams that protect us against the water, or the alarmsystems that protect us against burglary, now digitale security is at least as important. Without digital security consumers will lose the trust they need to keep banking online, and businesses will stop introducing innovative services on the market. We'll consider two aspects: a sensible approach to information (including privacy) and cyber security.

Personal information

Data have become an important fuel for the economy: personal information, too, has an economic value, and is collected by businesses, authorities and platforms. In addition, various parties aggregate data that aren't directly linked to any individual, but may intrude into people's private lives. By combining data smartly, impersonal information is made attributable to individuals so that others will be able to create a much more embellished image of us than we probably think possible ourselves. It's also simple to create profiles that can be attributed to people, on which basis individuals can be contacted (profiling). There is, parenthetically, quite a variation of opinions regarding what renders data personal. Are your groceries personal, for example, your surfing behaviour, your phone patterns?
On the basis of data on Internet users, authorities and bussinesses introduce personalised services on the market: NS railways gives travel advice; the Belastingdienst tax office provides us with pre-filled-out forms; Amazon and Bol.com are preparing products that might be interesting to us; at schools where Snappet tablets are used, teachers can compare their students' results with those of all other Snappet users (see box); we get spelling advice during online gaming; tips for better behavior on the road; and our pictures are categorised automatically. This type of service is cheap, or even free, it offers people more possibilities to make their voice heard (like in user reviews), and it simplifies communication with organisations and friends or family.

Smart grids

An example of the importance of the digital infrastructure is the use of 'smart grids' in the energy sector. Alliander[53], a regional net provider for electricity and gas in the Netherlands, has launched a system that allows municipalities to simply monitor and control smart objects in public spaces through apps. By providing street lighting with sensors, the level of illumination can be adjusted to the situation, which creates opportunities for energy-saving measures.

Privacy paradox

The inherent ease of all these services is in contrast with the increasing need for privacy and (personal) data. People find it 'frightening' that 'they' know so much about them, that they're being followed, they don't understand companies' business cases, and tend to believe – sometimes with reason – that all data are sold off. But even if people realise their privacy is at risk, at the same time they're not willing to do something, or anything, to limit the danger, shows a study by EMC[55] (the privacy paradox). What probably is to blame, is the tension between privacy, user-friendliness, and innovation.[56] On the one hand, we want to be able to use new services with the greatest possible ease – preferably for free – but on the other hand we want our private data to be private. be be protected.
Privacy also takes on different meanings in different contexts. What might be normal to share in one environment, can easily be a violation of privacy in another. How much ease of use are we ready to sacrifice in order to safeguard our privacy? There's a similar tension between privacy and innovation: on the one hand, the innovative potential of Internet businesses may not be inhibited, on the other hand, privacy risks for users shouldn't become too big. This is a tough call: there are many uncertainties and there's no framework available to balance these factors against.

Privacy-by-design

Applying privacy-by-design consequently in the development phase of new products and services can avert a number of these. discussions. Devices can be designed in such a way, that the protection of the user's Personal information increases automatically, for example through passwords, or by fingerprint-based encryption. Or with the type of encryption used by SGP Technologies in their Blackphone for data, phone calls, and e-mail. In addition employers can structure processes and procedures in such a way that employees abide by privacy rules.

Parties such as Qiy[57] are working on a 'security-layer' on the Internet, where people have control over their data: they can store their data securely, and choose their trusted partners to share it with.
Privacy-by-design is largely unexplored territory, that offers a partial solution, but will certainly not bring an end to all privacy discussions.

Legal

Collecting and processing personal data is subject to legal regulations. In the Netherlands, we have the 'Wet bescherming Persoonsgegevens', that establishes that data that are retraceable to an individual, may only be collected and processed for previously established, explicitly described and justified

Credit records

In 2014, ING Bank announced the intention to experiment with selling banking data. By offering businesses insight into the credit records of the bank's clients that in their turn receive offers made-to-measure. From credit records, after all, can be deduced what people spend their money, and where they do it. ING wanted to start with a trial for a couple of thousands of clients, provided they'd give permission.
The plan, however, provoked great resistance among the general public and criticism from the likes of the Dutch Central Bank and Consumer Protection.
ING delayed the trial, and will involve consumer and privacy organisations in a discussion so as to acquire more information on the subject.

purposes ('purpose limits'). This means that data processing is limited to what is required for the purpose that is established ('data minimalisation'). As both principles are at odds with the use of big data, it is doubtful whether they have chances of survival in the new data economy. At a European level a Decree on the protection of personal data is being prepared, including the 'right to be forgotten', the right to data portability and a more binding obligation to inform consumers.

Cyber security

The attention for cyber risks, cyber crime, and cyber security – the second aspect of security and trust – is bigger than ever. World-wide it was expected that over 58.2 billion euros were going to be spent on cybersecurity in 2015.[58] And only a few years ago our biggest worry were confidential documents left out on some desk, or sensitive data put out with the trash. The emphasis is more and more on new threats, directly related to ICT that come from the outside: hackers that use malware to penetrate all kinds of systems, to gain control of these systems, with the aim of seizing intellectual property, DDoS attacks that render web servers unreachable, phishing of all shapes and sizes, and a considerable increase in 'ransomware'. This type of software (for example CryptoLocker) encrypts user data on PCs, after which the rightful owner is forced to pay a ransom to be able to use the information again. Incidentally many cases of cybercrime have a social aspect, tempting people to surrender crucial security information. Advanved types of cybercrime might start from here.

> 'How much ease of use are we ready to sacrifice in order to guarantee our privacy?'

Dependency

The many news items in the media show that the dependency on ICT entails great risks. According to the report Cyber Security Beeld Nederland 2015[59] cybercrime and digital espionage remain the biggest threat. We are all familiar with the DdoS attacks that Dutch banks have to deal with regularly.
The DdoS attacks on DigiD, the Dutch system for secure bureaucratic communications, in August 2013, demonstrated that an entire chain can be sabotaged: not only government services were limitedly available, but also patient portals for healthcare institutions, insurance companies, and other organisations that make use of the DigiD sytem. Though service providers have invested in protective measures after 2013's DDoS attacks, frequent and heavy DDoS attacks are still let loose on sites of authorities and private organisations.
For cyber criminals, cryptoware and other ransomware are the prime business model. Phishing is widely used for targeted attacks and in ways that can barely be recognised as such by users. Vulnerabilities in software still are the

Achilles of digital security. What further appears from the report Cyber Security Beeld Nederland, is that the number of digital espionage attacks continues to increase, as do their complexity and impact. Geo-political tensions more and more often are manifested through (the threat of) violations of digital security.

Prevention

Digital security raises different questions from those of physical security; attention for and investments in digital security remain important. Safety starts at the 'front door': a good, safe digital lock on people's home PC, on those of entrepreneurs, of businesses and the authorities. We depend on eachother for this: the authorities continue to offer more digital services to citizens, but businesses too make more and more use of the possibilities and ease of digitalisation, by offering digital services and digital products. And these, of course, are made use of in their turn. In addition, large companies and public organisations avail themselves of smaller suppliers.
Awareness is the first necessary step towards digital security. This awareness must be translated into the appropriate online behaviour by all of us. The human link often is the weakest in the chain of cyber security. This means that behaviour is at least as important as technical measures. This also requires providing proper guidance to individuals and businesses about how to secure privacy, and information, and the tools, for companies to comply with legal requirements, and to install privacy-by-design.

Dealing with risks

Besides focusing on prevention, we must also consider detecting and resolving security risks. In order to deal adequately with cyber risks, agreement between providers is needed, as is demonstrated by the code of conduct 'Notice and Takedown' (NTD)[60], that clearly indicates how they can respond to requests for the removal information (child pornography, improper use of logos or discrimination) that can be found on websites they are hosting. More examples of cooperation are the Nationaal Respons Netwerk (NRN) and the Nationaal Detectie Netwerk (NDN). For a quick and efficient response to (imminent) large-scale cyber security incidents, knowledge and know-how from public and private partners are being combined under the direction of the 'Ministerie van Veiligheid en Justitie', or Justice Department. In addition, there's the Board 'Cyber Security Raad' (CSR) that provides the authorities and private parties with advice, both on request and without it, regarding relevant

developments in the field of digital security. Last but not least, the 'Nationaal Cyber Security Centrum' (NCSC) develops knowledge and expertise in the area of cyber security.

What are the challenges 'security and trust' entail?

- How can we have an adult debate on the privacy paradox?
- Privacy legislation is designed on the basis of the (traditional) conception of personal information being static, and logged in records that are limited by the purposes for which they were collected. In the 'data driven economy' most information about our private lives by far is created by aggregating and combining data that are anonymous at their origins. How do we adapt the existing legislation in a sensible manner?
- Where can we make use of privacy-by-design and how do we implement it?
- How do we create awareness of cyber risks, and how do we take the steps from awareness to cyber-secure behaviour?
- How do we deal with the chain issue: how do we make sure that all players in long chains take responsibility for information security? How do we introduce transparency into these chains?
- How do we improve 'risk appetite': the assessment of what residual risk society is ready to accept?
- How do we improve the 'prevention – detection balance'?
- How do we prepare better for when things do go wrong (as in exercises, insurance, payment traffic, retrieval of data)?
- How do we increase transparancy regarding privacy and security, so that consumers can take it into consideration for their purchases?
- Storage obligations, tap obligations, and other mechanism show that government depends on the collaboration of businesses. How do we construct this, and how do we provide the foundation?
- How do we spread awareness on dealing with data and privacy, and how do we nurture awareness about the opportunities and possibilities? Can the Netherlands export privacy as a product (the Netherlands as a 'safe harbor')?

> The human link often is the weakest in the chain of cyber security, so valid guidance is needed'

3.3 Work changes and a digi-capable society

The arrival of new technology has an impact on the way labour is organised, but on the job market as well, naturally, including the number of jobs available and the skills that are required. In this paragraph we will discuss these strongly linked themes.

Digitalisation, robotisation

Due to all the different ICT applications, people play an ever role of decreasing importance in production. And there actually is no novelty to this: at the beginning of the 19th century, the same phenomenon pertained to the rise of weaving and knitting machines in the textile industry. At the moment, mainly the concept of robotisation provokes fear of unemployment (see box page 32). The term robotisation isn't accurate in the context, considering that robots only play a part in limited areas of ICT developments (though all influence labour). Nevertheless, the fears are understandable, because people actually are going to lose their jobs, just like the weavers in the past. At the same time we know that the arrival of new technologies, for the population as a whole, hasn't led to an increase of unemployment in the long run. Despite automatisation, unemployment has rather constantly floated around 7% over the past sixty years.[61] That's because new technologies also create new jobs.

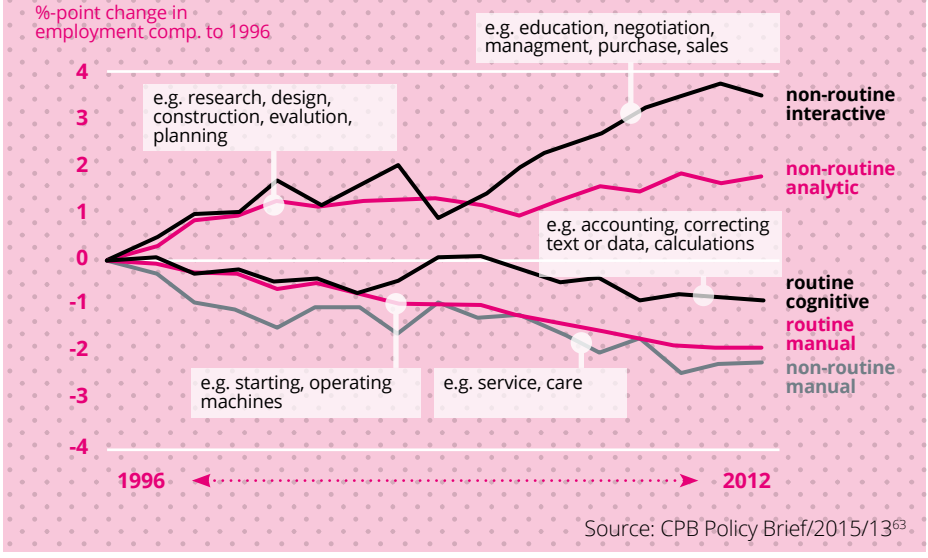
Middle class

This doesn't eliminate the fact that some people will lose their job due to ICT deployment and that they'll have to look for a different type of work with or without retraining. This mainly occurs in the middle segment of the labour market, where routine and productive tasks are substituted by ICT and machinery (robotisation). But in the segments of the labour market new jobs are created in the provision of services, and in the top segment interactive and non-routine, analytical tasks have become

Robotisation

Robots have been an inspiration for centuries. The Ancient Greeks built mechanically moving dolls and ducks already. Leonardo da Vinci too, was interested in the subject: he designed a robot in midieval Italian armour. By integrating ICs and associated 'embedded software' in mechanical structures, they are able to execute certain tasks autonomously. Heavy and spacecraft industries profit in the first place in getting to execute tasks faster, cheaper and more accurately: in automotive manufacturing welding robots have lined the conveyor belts since the 80s and the probes we send to planets actually are advanced robots that make observations autonomously, and send the results back to earth. Through miniaturisation and ever smarter software algorithms, robots have become smaller and smaller, which makes them fit for the inspection of radio-actively contaminated areas after nuclear disasters, and of suspect objects. ICT innovations, such as artificial intelligence, have led to the introduction of robots in our immediate living environment. In healthcare, nursing robots are deployed to entertain and inform the ill and the elderly[62], and at home we get our lawn mowed, and the floors vacuumed, entirely automatically. Robots nowadays are also called smart machines.

Interactive and analytical tasks become more important, while routine and non-routine, manual tasks decrease in number



Source: CPB Policy Brief/2015/13[63]

more important. So mainly the middle class is hit by the disruptive effects of ICT.[63] To get along on the job market, digital skills are an essential requirement.

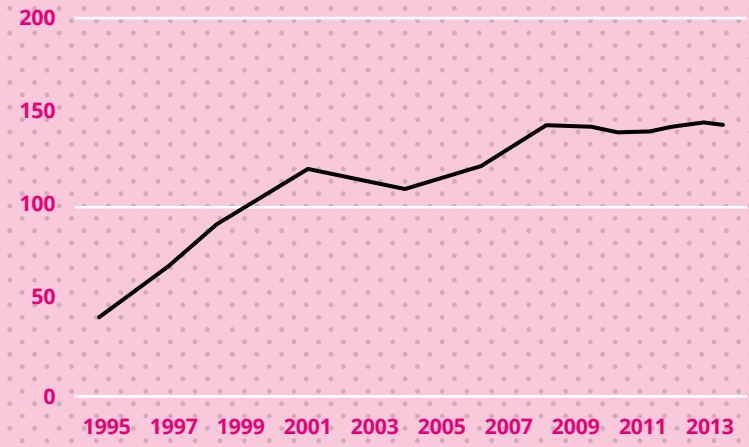
Shortage

At the same time, a shortage of ICT and information services personnel is looming. Contrary to the technical sector, employment in this sector has steadily grown over the past ten years (29% in ten years)[64, 65], just as the number of active ICT workers (in 2014 the Netherlands counted 300,000).[66] An analysis from recruiting and selection agency Yacht shows that the number of job opportunities for ICT professionals in 2014 incremented with 10%, against the previous year. Throughout 2014 more than 90,000 ICT professionals were sought.[67] Both suppliers and users are facing an increasing shortage of qualified workers that dispose of know-how and skills that are up to date. This isn't only due to fast-growing technological developments, but also to an insufficient match between education and job market, a low influx into ICT schooling, and a mismatch between the supply and the demand of ICT professionals, caused too by ICT knowledge becoming obsolete quickly, and a lack of transparency of the competencies of ICT workers.[68, 69]

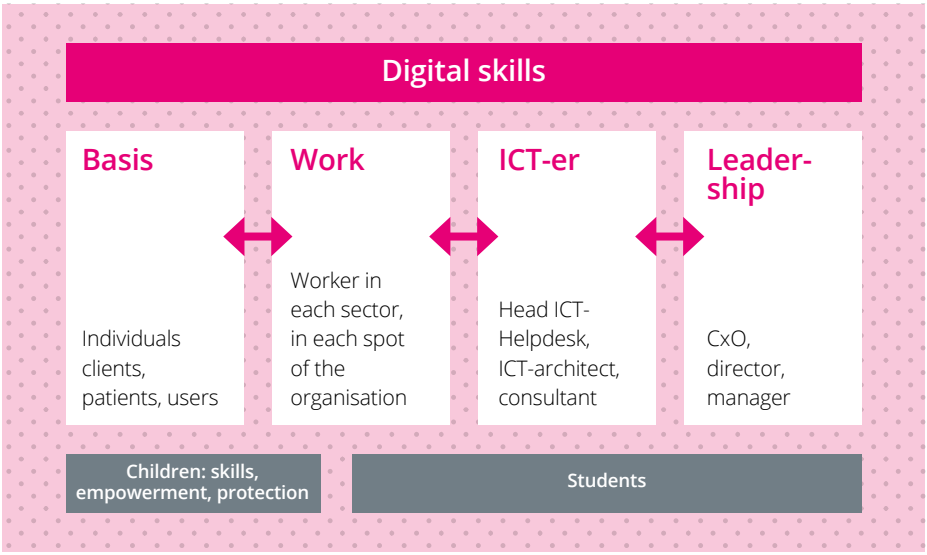
'Both suppliers and users face an increasing shortage of qualified workers with know-how and skills that are up to date'

Employment in ICT and information services

Jobs of workers 1995-2013 (x 1,000)



Source: CBS (Arbeidsrekeningen)



Digital skills

Digital skills are a relatively new concept. It never was a part of school curricula, and even today it isn't included in final qualifications. Still everybody understands what it means, and that it's important in the present information society. The scheme above categorises the skills according to function.

Basic skills

Everybody needs certain basic digital skills to function properly in the information society: as a citizen, as patients, consumers, clients. Just think of Internet banking, online shopping, receiving e-mails and replying to them, making online appointments at the hospital, reviewing information, monitoring and communicating your blood pressure, but also: savviness about the media for vulnerable groups. It is important to teach these skills particularly to the group of potential stragglers: those that do not work, nor go to school, such as the elderly and the unemployed.

ICT skills on the job

In order to let people, society and the economy function optimally, nearly all professions require digitally skilled workers. This means they have the ICT knowledge and skills that allow them to work with new, quickly changing

Healthcare

The above scheme can also be drawn up for a specific sector. In healthcare, for example, screen-care is in use. Though some patients are sceptical beforehand, most wouldn't do without it afterwards.
A condition is that patients know how to use a tablet. This goes as well, of course, for the nurses, but they have to be knowledgable about the systems of the healthcare institution as well. The third group, ICT workers in healthcare, are responsible for the systems being well applicable in this sector, and they assist the staff in their use. Directors of healthcare institutions and other members of management must have an understanding of the impact of ICT developments on the organisation: as in knowing what platforms there are, with whom they'd better collaborate, what the skills are their staff need, and assessing the usefulness and potential risks of new possibilities, such as big data.

Education

Developments in the ICT sector, and ICT applications ask for new skills and professions. Many projects familiarise students with the development of ICT skills, and/or programming, such as the Codeweek[71] and Kiezen voor Technologie[72] (part of the'Pact for technology). In addition, the initiative Geef IT Door[73] that gives students a clearer idea of the manifold career opportunities for ICT professionals. Students are stimulated to choose schooling that improves their possibilities on the job market. The retraining programme Make IT Work[74] prepares the highly educated without a job in the Amsterdam area for a career in ICT. By re-structuring the educational system – independent of the type of school and curriculum – students can become considerably more ICT-skilled (leaving aside the other advantage, such as more efficient and more attractive education).

technologies and ICT systems. Workers in all sectors must be able – besides their regular skills – to deal with generic software, like text-processing programs and CRM systems ('dual skills'). In addition, certain ICT applications are sector-specific, like the information systems in the transport sector and the digital patient records in healthcare. By dedicating attention to ICT skills already in primary education and highschools (including programming), students can be prepared for future society.

ICT-experts

In addition, the group of professional ICT workers needs up-to-date digital skills. Organisations in all sectors have an ICT department, small or big, where help-desk assistants, system managers, programmers en other ICT personnel take care of ICT support, innovation, and security. This group is going through a process of professionalisation, with the aid of the development of the likes of a European Competence Framework[70], which creates more clarity about all the different professions that are included in the single concept of ICT. Also, and perhaps even more for professionals in ICT, life-long studying is an important precondition to stay responsibly and persistently active.

Leaders

A different aspect of digital skills is the fact that the leaders of organisations must understand the impact of ICT on an organisation. This is a precondition to an organisation's continuity, both regarding the extent to which the organisation digitalises and follows the tendencies of market and customer, and the degree to which the organisation resists digital threats.
Where exactly is ICT a threat, and where an opportunity? Where does the competition come from, from traditional parties within the sector, or from new arrivals? How do partners change? How do the customers? What skills do staff need, how do organisations need to be restructured? What must be done for security and privacy? Social skills are part of it too: moving across different networks, knowing how to create links, and how to deal with insecurity. This is valid for all ICT organisations, even for 'new' ones like Google and TomTom.

Schooling

Finally, there is education, of course, where everything starts. For young children this happens partially by playing, but they also particularly need attention for the development of skills. On the other hand, they'll also encounter unpleasant things, such as cyber bullying, and fraud, against which they should develop resilience. For youngsters, it is much more relevant whether the acquired skills will lead to a proper application of them in society. Are they capable of what is required of them in the information society? For this, knowing how to deal with fast, technology-driven changes, might be a lot more important than (more or less static) knowledge.

What tasks do 'sufficient work and a digi-capable society' entail?

- What are the consequences of further digitalisation for the job market? How are we going to deal with the redistribution of work and wealth?
- Will the middle class problem persist, or is it merely a temporary phenomenon?
- How are we going to get the chain of basic skills, work skills, ICT skills and leadership in order?
- How do we take care of retraining, sufficient basic digital skills, and awareness?
- Do the effects vary according to the various sectors, and how can we pull up the stragglers towards a better level?
- Modern applications of ICT consist of chains and combinations of already existing services. This means an upturn of the entire ICT world. What is ICT's future in companies and government?
- How do you, as a citizen, take best care of yourself in the digital economy?

3.4 Adjusting the regulations and institutions

The rise of ICT innovations and comprehensive digitalisation of society lead to new products, services and business models, as well as to opportunities for innovation. Many of these innovations make our lives easier and our financial strength increase, as do Airbnb, Snappcar and Thuisafgehaald.
Other innovations that we have digitalisation to thank for, help us to deal with an ageing population, such as carebots and health-care-at-a-distance. They also assist us with durability (the intelligent thermostat Toon), and with other socio-economic challenges.

Collisions

At the same time, these developments regularly collide with the existing legislation and regulation, which slows innovation. The low VAT-rate for study material, for example, is not applicable to online study material. In order to categorise digital study material under the

same, lower, VAT-rate that is valid for 'physical' expenses, an Adjustment of European and Dutch legislation is necessary. Financing online consultations of a medical specialist is complicated, due to a combination of the system of compensation, and the lack of knowledge on the part of doctor and patient. Taxi services like UberPop, that conduct all business digitally, have issues with the mobility law 'Wet personenvervoer' of 2000 that obliges taxi drivers to have a paper rates-card and permit in their car, and to print a physical receipt. In the case of Airbnb it is not clear how disturbances and improper sub-letting can be countered, and whether – and if so, how – private persons are evading regulations for the hospitality sector. Similar questions prevail for the deployment of self-driving cars in order to improve the flow of traffic, drones for the inspection of crops, and for 3D-printed implants

Innovation boosting tools

The authorities are working hard to figure out how to make rules more flexible and more future-resistant - structurally as well - so they won't hamper innovation. Minister Kamp of the Department of Economy sent a letter to Parliament in the summer of 2015 in which he stated that, if the Netherlands wishes to profit first from the advantages of innovation, we should create the space for it between the rules.[75]
He considers a number of practical tools that would alleviate the tension between innovation and renewal, on the one hand, and the legislation and regulation on the other. hand, such as purpose limits, that has regulations specify purposes, but leaves space as to the way in which one must comply, so that innovative possibilities aren't excluded at the outset. One type of purpose limits is technique-neutral regulation. Another innovation-boosting tool is the 'Right to Challenge' principle. It establishes one way to meet the targets, but if an entity proposes an integral alternative to it, it is also allowed. And finally, by using experimentation guidelines, deviation from the legislation and regulation is possible to gain experience with new developments. Imagine 'experimental gardens' in which regions and businesses experiment with new taxi-projects, or healthcare areas that experiment with alternative compensation models, instead of the existing financing system.

Institutions

Besides the legislation and regulation, institutions also determine how we can and may innovate. Like the organisations that have a supervisory or advisory role.
An example of the challenges that these institutions are facing is the activities of the young entrepreneur Ben Woldring, who, at the hands of the CBS-statisticians, continued to be categorised in different groups, in accordance with the particular target his comparison sites were aiming for. For this type of institution, it is hard to accurately measure innovation. It also goes for centres of knowledge like CPB and SCP. Many institutions in the Netherlands will have to be restructured, and perhaps new ones need to be founded. One could conceive of an Advisory Board for the Information society, next to existing advisory boards, and of a Committee for Innovation & Privacy, besides the 'College bescherming persoonsgegevens' (CBP). Also at the Ministerial level, the question how policymaking regarding the consequences of the information society should be approached is relevant.
ICT changes policymaking, too. The dialogue between (local) government and citizen could be a lot more direct. The unchallenged position of representatives of sectors, unions, and employers will be considered less of a given. Possibly inspiring is the horizontal multi-stakeholder-model that is used by the Internet Governance Forum.

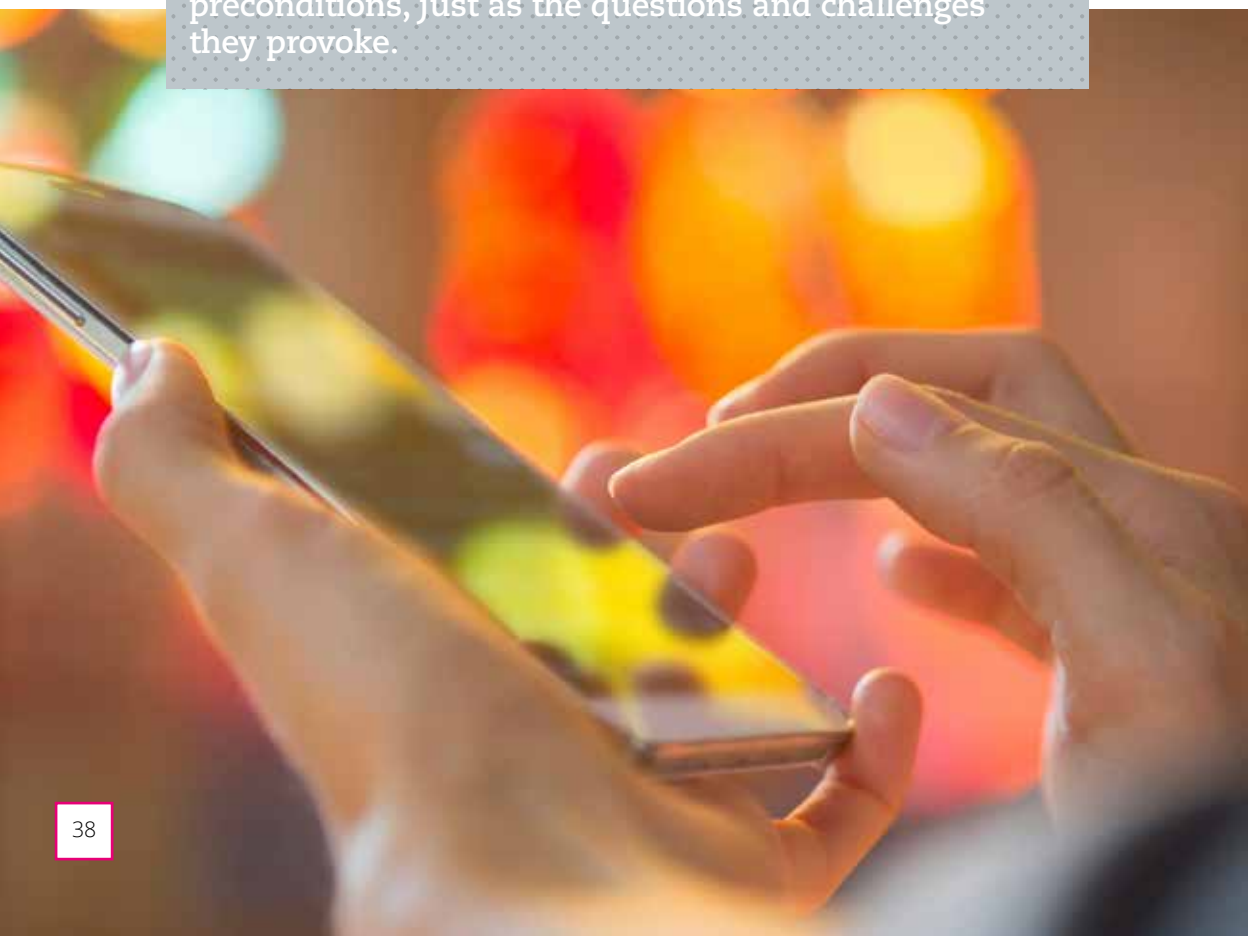
What tasks do 'adjusted regulations and institutions' entail?

- How do the legislation and regulation deal with (disruptive) innovations brought about by ICT developments?
- How do we guarantee good legislation that ensures the rule of law and democracy, but still goes with the flow of innovation?
- Legislation and regulation for the digital economy run right across Departments. How do we make sure that laws and rules match, are coordinated, and in balance?
- What are the implications of the information society for institutions?
- Is IGF's multi-stakeholder-model also useful in the Netherlands when drawing up policy, legislation, and regulation in the area of the digital economy?

CHAPTER 4

Summary and the role of ECP

We've seen that ICT is a disruptive technology that keeps breeding new technologies, time and time again, that have an enormous impact on our society. And the effects, in their turn, have an influence on all sectors of society, as well as on important preconditions that cut through these sectors. In this vision, we have made explicit effects and preconditions, just as the questions and challenges they provoke.



4.1 Summary

The disruption caused by ICT developments leads to questions about growth and innovation, both within the ICT sector and throughout the Netherlands economy, which is an economy that has partially become a platform economy. And these lead to other questions still, for example regarding its monopolostic character, and concerning customers' (stronger) position. And what is the significance of a platform for hotel owners, or for taxi drivers? How do organisations develop at all? It's about more than a number of walls, in any case, about the network, or the chain around it. This pertains to big data, too, because data only get really big when they're being shared.

> 'Just as citizens need basic digital skills, leaders must understand what the information society means for their organisations'

That's when fantastic applications come into sight, like preventing unnecessary operations. Although by far most big data research does not use information that is deductible to a specific individual, the potential abuse of data, particularly personal data, remains an issue. The availability of data, anywhere, anytime, and anyhow, has its influence on entire sectors: how does education change, if time and place matter less, what are the consequences for shopping and healthcare? Will the promise of increased power for the user be kept?

Preconditions

As to the preconditions, we do know what we want for the information society: an excellent infrastructure, good digital skills for all, in a safe environment with excellently matching legislation and regulation. But this carries difficult challenges for us.
To be ahead, also regarding the infrastructure, while other countries too are at full speed, is only one of them. The discussion about what we consider infrastructure to include, another. In the field of security, we can see tension between privacy, user-friendliness, and innovation. Relevant here too, is the fact that cyber security truly is a new field, where criminals, agents and espionage services try to outsmart each other. 'Digicops' with digital skills are indispensable there, but then this really goes for any profession. Just as a citizen needs basic digital skills, leaders need to understand the significance of the information society for his/her organisation, assisted in the quest by ICT professionals. What remains is the legislation and regulation which characteristically are several paces behind transforming reality. Regulation with purpose limits, technique-neutral regulation, and the space to experiment could change a lot in these areas already.

Sectors

The information society poses many questions and carries with it many tasks. These are further multiplied when we focus on a particular sector. Whether they are leading sectors such as chemistry, water, energy, agri & food, logistics, or the more social sectors like education, healthcare or governance, ICT developments will provoke their (disruptive) changes everywhere. And the answers too will have to be searched for everywhere, similar, on the one hand, as they all have to do with ICT, but, on the other hand, quite specific, as each sector has its peculiarities.

4.2 The role of ECP

As the platform for the information society, ECP aims to contribute to the Dutch information society and knowledge development and dissemination within that society. New opportunities and developments and the associated risks are explored and shared. Where common challenges arise, ECP contributes to a solution. ECP is not doing this as an oracle, but from a joint search process.
ECP is a platform of hundreds of people and parties. They all share a fascination for the information society and the changes it brings. And they share a deep conviction that we only can achieve that when we work together, if we are willing to listen to other parties during meetings and invest together in solutions. ECP contributes based on tripartite awareness, connecting platforms and vision building.

Awareness

The information society will be the new normal, but isn't normal yet, and it is still new. With ECP´s focus and the people involved, we'll always be ahead of society as a platform when it comes to the effects of ICT developments. And at ECP we consider it our task to introduce people to the information society.
It's an important drive for many of our participants, too. Over the past years this has led to many different activities in the area of awareness. Through the Codeweek we brought to the attention the importance of coding at school. A password-campaign has been launched, e-mail courses for entrepreneurs on the 25 most important aspects of ICT (use by over 10,000). The same course is being developed for the specific target group of nurses.
There's a DQ-test to assess your digital quotient, at the 'digital assistance square' you'll be referred to the nearest computer course, or iPad class. There's a city relay through which communities share each other's knowledge about e-health.
Veiliginternetten.nl answers a variety of questions about home-use of Internet, and hundreds of businesses and institutes are involved in the campaign Alert Online in order to show the meaning of being alert. 'Dutch Digital Delta' also focuses on fame, but in connection with innovate, foreign businesses.
These are examples of activities with a broad support, with the aim to spread information about the information society. Many themes will present themselves the coming years, too, begging for a broader explanation. As an independent platform, ECP is the ideal spoor to face these challenges together.

PPS-platforms: connections

ECP is a platform that creates platforms. And it always does so from a perspective of Involvement in the information society. This generally means that private and government entities get together for a common goal.
An example is the Platform Internet Veiligheid (Internet security), in which both competing entities and hosting providers are represented, and the Ministries of Economy and of Justice. They've developed a common approach to botnets, have reached an agreement on 'Notice and Takedown' (the removal of improper content from the internet), amongst other things.
Also in the area of skills there is a long-term cooperative unit, in which ICT operators and libraries, the Ministries of Economy and of Social Affairs and Jobs, research institutes, and the Foundation for The Job market and Training for ICT are involved. For long-term healthcare, there is a platform for the first time where both ICT and healthcare representatives and the authorities convene for the e-health theme.
For the Internet Governance Forum ACP coordinates the Dutch contribution.
ECP is sometimes asked, and at times is pro-active. It enjoys being the intelligent platform for various subjects, as long as they match three standards: they have to concern the information society, there's readiness to take common action, and parties unite for a socio-economic purpose. Proceedings of meetings are, as a matter of principle, public.

Vision

ECP is not a knowledge institute that has expertise on anything. Our expertise is a function of the participants, that have lived and learned in all sectors of society, in business, government, privately, and have amassed great know-how, and especially experience. On the basis of these, and enriched, of course, with reports and available research, platform ECP develops its vision. For example, by organising a dinner at Des Indes a few times a year to discuss a particular theme.
The past years security was discussed with Minister of Justice, a national knowledge-agenda with the statisticians of CPB, and Government and ICT with CIO Rijk (responsible for correct deployment of ICT at national government level). The Board and the Advisory Committee are also important sources when the varieties of vision are discussed.
ECP also contributes to visions of other parties. It is ECP's independent vision on the information society that may have an added value for others. In this manner, ECP plays its part in the ICT team of Economic Affairs, as it assisted for the Vision on Telecom, Media and the Internet, and it engaged in intense discussions with the Ministry of Health to develop a future-scenario exercise.
ECP is always ready and willing to think or work along, on the exciting themes that are in store for organisations and for individuals. And when we talk about ECP, it is meant to include all our participants and network.
Drawing up this document is part of our vision activities, too. As far as we are concerned, it is

a conversation piece, to which much can be added, and perhaps detracted. Our target is to gain, together, a better understanding of the information society, and to be able to take action when we deal with risks, but above all, to seize the unprecedented opportunities, whether virtual or real.

Footnotes and sources

1 Coen van Zwol, 'Dit kwam (niet) uit van Back To The Future', NRC 21 oktober 2015, te vinden op www.nrc.nl/handelsblad/2015/10/21/de-toekomst-van-reagan-niet-van-orwell-1547991
2 Citaat overgenomen van http://www.computable.nl/artikel/expertverslag/overheid/5201069/1277202/ren-penning-de-vries-boegbeeld-ict.html#ixzz3mHSwMQ00
3 Bedoeld is: van elektronische schakelingen (IC's, Integrated Circuits)
4 Dialogic, 'De impact van ICT op de Nederlandse economie, november 2014, te vinden op www.dialogic.nl/documents/2014.062-1430.pdf
5 CBS en het ministerie van Economische Zaken, 'ICT Kennis en economie 2015', 2015, te vinden op http://download.cbs.nl/pdf/ict-kennis-economie-2015-pub.pdf
6 Nederland ICT, 'ICT-marktmonitor 2013', te vinden op www.nederlandict.nl/Files/TER/Infographic_Marktmonitor_2013.pdf
7 CBS en het ministerie van Economische Zaken, 'ICT Kennis en economie 2015', 2015, te vinden op http://download.cbs.nl/pdf/ict-kennis-economie-2015-pub.pdf
8 Nederland ICT, 'ICT-marktmonitor 2015', te vinden op www.ictmarktmonitor.nl/ict-marktmonitor-2015/inleiding/#3
9 Voorbeelden afkomstig van ICT Office, 'ICT en Topsectoren. ICT als innovatie-as', te vinden op www.nederlandict.nl/files/ter/ict_en_topsectoren_ict_als_innovatie_as.pdf
10 Panteia, 'Literatuurstudie Trends in digitalisering', mei 2015, te vinden op http://kennisopenbaarbestuur.nl/media/196341/Literatuurstudie-Trends-in-digitalisering.pdf (mei 2015)
11 CBS, 'Nederland in Europese top met internetbankieren', 1 augustus 2012, te vinden op www.cbs.nl/nl-NL/menu/themas/vrije-tijd-cultuur/publicaties/artikelen/archief/2012/2012-3662-wm.htm
12 PewResearchCenter, '51% of U.S. Adults Bank Online', 7 augustus 2013, te vanden op www.pewinternet.org/2013/08/07/51-of-u-s-adults-bank-online/
13 'Connect & create', interview met René Penning de Vries, Boegbeeld Team ICT, te vinden op http://topsectoren.nl/interviews/rene-penning-de-vries
14 Zie ook www.argumentenfabriek.nl/nl/nieuws/argumenten-voor-en-tegen-online-platforms-zoals-airbnb-marktplaats-en-peerby/
15 http://blog.qmee.com/online-in-60-seconds-infographic-a-year-later
16 http://blog.qmee.com/online-in-60-seconds-infographic-a-year-later
17 www.statisticbrain.com/facebook-statistics
18 www.ironpaper.com/webintel/articles/internet-things-market-statistics-2015/#.VbDb0RFxm70
19 Voorbeelden overgenomen uit de Kamerbrief over ruimte voor vernieuwing door toekomstbestendige wet- en regelgeving, 20 juli 2015, te vinden op www.rijksoverheid.nl/documenten/kamerstukken/2015/07/20/tk-brief-ruimte-voor-vernieuwing-door-toekomstbestendige-wet-en-regelgeving
20 www.doorbraakmetmkb.nl/
21 www.floricode.com
22 www.portbase.com
23 Ellen de Visser, 'Het genetisch profiel van een borstkankertumor', Volkskrant, 29 augustus 2015, te vinden op www.volkskrant.nl/wetenschap/het-genetisch-profiel-van-een-borstkankertumor~a4131143/
24 www.data.overheid.nl
25 www.opendata.cbs.nl
26 Algemene Rekenkamer, Trendrapport open data 2015, 31 maart 2015, te vinden op www.rekenkamer.nl/Publicaties/Onderzoeksrapporten/Introducties/2015/03/Trendrapport_open_data_2015
27 https://opendatanederland.org
28 http://doorbraakmetopendata.nl

29 EMC, 'The Digital Universe of Opportunities', april 2014, te vinden op www.emc.com/leadership/digital-universe/index.htm
30 GfK, Thuiswinkel Markt Monitor, september 2015, www.thuiswinkel.org/bedrijven/nieuws/2871/online-consumentenbestedingen-groeien-in-het-1e-halfjaar-van-2015-met-18-4
31 https://nl.wikipedia.org/wiki/Khan_Academy
32 www.te-learning.nl/omzieninverwondering.pdf
33 www.codecademy.com
34 Nictiz en NIVEL, 'Tussen vonk en vlam', e-Health Monitor 2015, te vinden op www.nictiz.nl/SiteCollectionDocuments/Rapporten/eHealth%20monitor%202015.pdf
35 'Mass customisation, Combining elements of mass production with those of bespoke tailoring', Economist, 22 oktober 2009, te vinden op http://www.economist.com/node/14299807
36 Robert Schuckink Kool, '3D-printing: enorme groei verwacht', te vinden op www.iex.nl/Beleggingsidee/Trend-Invest/150993/3D-printing-enorme-groei-verwacht.aspx en www.3dprintwereld.com/13
37 McKinsey & Company, '3-D printing takes shape', januari 2014, te vinden op www.mckinsey.com/insights/manufacturing/3-d_printing_takes_shape
38 Beeld van de week, Volkskrant, 12 september 2015, te vinden op www.volkskrant.nl/wetenschap/beeld-van-de-week~a4140368/
39 'Vrouw krijgt in UMC een schedel uit 3D-printer', Volkskrant, 26 maart 2014, te vinden op http://www.volkskrant.nl/wetenschap/vrouw-krijgt-in-umc-een-schedel-uit-3d-printer~a3622342/
40 https://nl.wikipedia.org/wiki/Webwinkel
41 https://mediaweb.nl/blog/15-mobiele-trends-2015/
42 https://nl.wikipedia.org/wiki/Cloud_computing
43 http://thenextweb.com/insider/2014/05/29/dropbox-reaches-300m-users-adding-100m-users-just-six-months
44 http://news.microsoft.com/bythenumbers/ms_numbers.pdf en http://windowsitpro.com/blog/comparing-office-365-numbers-total-exchange-installed-base
45 World Economic Forum, 'Global Competitiveness Report 2015-16', oktober 2015, te vinden op https://agenda.weforum.org/2015/10/these-economies-have-the-best-infrastructure/
46 Deloitte, 'Digital Infrastructure in The Netherlands', november 2014, te vinden op http://dinl.nl/Digital_Infrastructure_-_Driver_for_the_Online_Ecosystem__2014__v_1_1.pdf
47 The Fletcher school (Tufts University), 'Digital Evolution index, The Next Billion Consumers Move Onto the Global Stage', te vinden op http://fletcher.tufts.edu/eBiz/Index
48 Kamerbrief over middellangetermijn visie op telecommunicatie, media en internet, 23 december 2012, te vinden op www.rijksoverheid.nl/documenten/kamerstukken/2013/12/23/kamerbrief-over-middellangetermijn-visie-op-telecommunicatie-media-en-internet
49 WRR, 'De publieke kern van het internet. Naar een buitenlands internetbeleid', 31 maart 2015, te vinden op www.wrr.nl/publicaties/publicatie/article/de-publieke-kern-van-het-internet-1/
50 www.intgovforum.org
51 www.nligf.nl
52 Kamerbrief over middellangetermijn visie op telecommunicatie, media en internet, 23 december 2012, te vinden op www.rijksoverheid.nl/documenten/kamerstukken/2013/12/23/kamerbrief-over-middellangetermijn-visie-op-telecommunicatie-media-en-internet
53 www.alliander.com/nl/activiteiten/nieuwe-markten/smart-society-services
54 www.nationaleonderwijsgids.nl/basisonderwijs/nieuws/27661-cbp-snappet-overtreedt-wet-niet-langer-bij-verwerking-leerresultaten.html
55 EMC Privacy Index 2014, te vinden op http://netherlands.emc.com/campaign/privacy-index/index.htm
56 Kamerbrief met kabinetsvisie op e-privacy, 25 mei 2013, te vinden op www.rijksoverheid.nl/documenten/kamerstukken/2013/05/24/kamerbrief-met-kabinetsvisie-op-e-privacy
57 www.qiyfoundation.org/
58 www.security.nl
59 NCSC, 'Cybersecuritybeeld Nederland CSBN 2015', 1 september 2015, te vinden op https://www.rijksoverheid.nl/actueel/nieuws/2015/10/14/cyber-security-beeld-nederland-2015-grensoverschrijdende-cybersecurity-aanpak-noodzakelijk

60 https://ecp.nl/werkgroep-notice-and-take-down
61 Dialogic, 'De impact van ICT op de Nederlandse economie, november 2014, te vinden op www.dialogic.nl/documents/2014.062-1430.pdf
62 Vincent van Gogh voor geestelijke gezondheidszorg, 'Hallo mijn naam is ZORA! Hoe heet jij?', te vinden op http://www.vvgi.nl/include/files//Over%20VVG/Publicaties/Hallomijnnaamiszora.pdf.pdf
63 CPB, 'Baanpolarisatie in Nederland', 9 juli 2015, te vinden op http://www.cpb.nl/publicatie/baanpolarisatie-in-nederland
64 Ministerie van Sociale Zaken en Werkgelegenheid, 'Arbeidsmarktbeschrijving Technische en ICT-beroepen', 11 september 2015, te vinden op www.onderzoekwerkeninkomen.nl/rapporten/u80hwpgn/arbeidsmarktbeschrijving-technische-en-ict-beroepen.pdf
65 CBS, 'Banen en vacatures naar bedrijfstak: banengroei in zakelijke dienstverlening', 24 september 2015, te vinden op www.cbs.nl/nl-NL/menu/themas/arbeid-sociale-zekerheid/publicaties/arbeidsmarkt-vogelvlucht/korte-termijn-ontw/2006-arbeidsmarkt-vv-bedrijfstak-art.htm?RefererType=RSSItem
66 Ministerie van Sociale Zaken en Werkgelegenheid, 'Arbeidsmarktbeschrijving Technische en ICT-beroepen', 11 september 2015, te vinden op www.onderzoekwerkeninkomen.nl/rapporten/u80hwpgn/arbeidsmarktbeschrijving-technische-en-ict-beroepen.pdf
67 Emerce, 'Ondanks recente ontslagen in ICT sector sterke groei in vacatures', 12 januari 2015, te vinden op www.emerce.nl/nieuws/ondanks-recente-ontslagen-ict-sector-sterke-groei-vacatures
68 Dit blijkt o.a. uit European Commission, 'Does digital technology create or kill jobs? Do Europeans have the digital skills needed to get a job and keep a job?', 28 mei 2014, te vinden op http://europa.eu/rapid/press-release_MEMO-14-383_en.htm, http://eskills-monitor2013.eu/fileadmin/monitor2013/documents/Country_Reports/Country_Report_The_Netherlands.pdf
69 UWV, 'Informatie en Communicatie, Sectorbeschrijving', 5 september 2014, te vinden op www.werk.nl/xpsitem/wdo_014483
70 www.ecompetences.eu
71 http://codeweek.nl/
72 www.kiezenvoortechnologie.nl/home
73 www.geefitdoor.nl
74 www.hva.nl/makeitwork
75 Kamerbrief over ruimte voor vernieuwing door toekomstbestendige wet- en regelgeving, 20 juli 2015, te vinden op www.rijksoverheid.nl/documenten/kamerstukken/2015/07/20/tk-brief-ruimte-voor-vernieuwing-door-toekomstbestendige-wet-en-regelgeving

EDITORIAL INFO

This vision document is published by ECP | Platform for the Information Society

Version
December 2015

Editor and idea:
Daniël Tijink, ECP

Editor:
Daphne Riksen, Ediction

Design/Production:
Onlineblad.nl
Len Blonk, Ruud Slagmolen

Platform for the
Information Society

Overgoo 13
Leidschendam

Postbus 262
2260 AG Leidschendam

(070) 419 03 09

info@ecp.nl
Twitter: @Platform_ECP

www.ecp.nl