

Berenschot

Quantum Leaps in IT Infrastructure

Striking a Balance between Economic Policy and Competition Law

Prof Th.W.A. Camps, D.P.J. Schmidt, N. Kastelein
May 2010

Quantum Leaps in IT Infrastructure

Striking a Balance between Economic Policy and Competition Law

Contents	Page
1. The Netherlands a knowledge country?	1
1.1 Three ways in which to effect quantum leaps	2
2. The Netherlands as the best knowledge economy?	4
2.1 From knowledge economy to a competence-based society	6
2.2 Big promises...	7
2.3 Massive investments are required, but by whom?	8
3. What is there to learn from system changes?	11
3.1 A review of past system transitions	11
3.2 Transitions require a step back	16
4. We would like to do this, but how do you initiate a transition like this?	18
5. Authors	20

1. The Netherlands a knowledge country?

The Lisbon Agenda of the European Union was to bring the annual investment in research and development up to 3% of the gross domestic product (GDP) by 2010. This has not happened. It is furthermore likely that we will be surpassed in the near future in this area by the fast growing Chinese economy.

Europe is renewing its efforts based on an agenda that sets the course for 2020. This agenda is at least as ambitious as the Lisbon agenda. A quantum leap is required in the area of ICT investments. This agenda was presented by the European Commission on 19 May 2010. The Netherlands' ambitions are closely linked to those of the European Union: there is a great deal of interdependence between the European and Netherlands' ambitions.

Strengthening the knowledge economy is a core objective to bring the Netherlands' goal further within reach. Since the overall economy, as well as the 'knowledge economy' are now tightly linked to progress in the field of information and communications, the realisation of a superior ICT infrastructure would appear to be one of the most important conditions for making the Netherlands more competitive. Such a development would also be consistent with the role that the Netherlands has traditionally assumed as a European and global hub from a logistics perspective. This hub function dates back hundreds of years with a central role for the Netherlands in the physical logistics flow, monetary transactions and knowledge development. This role at one time arose on the basis of our natural location (our seaports and our links to the European hinterland) and was further expanded from there through the combined efforts of the business sector and government. It is not for nothing that the Dutch East India Company is continuously showcased as the first Western multinational with an interwoven public and private governance structure.

The assumption that ICT is a prerequisite for the economy to flourish is confirmed in a report produced by the Dutch government about the relationship between science, technology and innovation¹. The report describes the European knowledge paradox (p. 59), which in principle suggests that high knowledge production and a solid knowledge infrastructure do not just by themselves result in the effective 'conversion' of this knowledge into economic or social trends. A key obstacle is that in the Netherlands, the relationship between knowledge institutes and the business sector does not function properly. Although research institutions, in comparison to other European countries, make a reasonable average contribution to innovative companies, it is striking that higher education plays a minor role as a source of knowledge for these companies. The report reaches several conclusions (p. 79), including that the strengthening of ICT is of key importance as a means of providing an impulse to the knowledge economy. According to this report, the Netherlands government is primarily focused on the preconditions necessary for facilitating sound ICT and its concomitant use. To assume a leading role in the world, however, requires a quantum leap in ICT infrastructure and that is considerably more than just creating a basic set of preconditions.

¹ Science, Technology and Innovation in the Netherlands, June 2004. Ministries of Education, Culture and Science and of Economic Affairs.

However, it would appear that goals like this are becoming increasingly more difficult to achieve. Analogous to the construction of physical infrastructure for example, such as roads and railways, an increasing number of obstacles appear to be emerging in relation to ICT projects. These obstacles are generated by the growing scepticism about the completion of ICT projects within previously established costs and time, for example. The ability to control projects is not the only factor, however, the question as to who is capable of initiating and achieving such a quantum leap is also at issue. Indeed, a quantum leap requires investments of such major proportions that they can only be achieved through government interventions. And then all kinds of obstacles immediately rise to the surface concerning the division of roles among government and the business sector. Government action is constrained by regulations concerning tenders. Regulations that in the eyes of many constrain innovation and renewal. It would appear that the lack of clarity and obstacles in the relationships between different levels of government, private parties and social organisations are standing in the way of effecting quantum leaps.

Does a lack of clearly defined relationships by definition lead to paralysis or lost ground? Entrepreneurship generally finds its way quite well through the grey zone between government and the business sector. Achieving quantum leaps in ICT, however, entails such major investments and risks, that parties generally wait until it becomes possible to make a realistic risk assessment. To be able to arrive at a meaningful consideration of a potential quantum leap in ICT, we develop a few perspectives in this article. This includes a perspective of the added value and implementation of the knowledge economy, as well as the way in which a quantum leap in ICT infrastructures can be achieved. The following question is central:

How can Netherlands society achieve meaningful quantum leaps in ICT infrastructures?

1.1 Three ways in which to effect quantum leaps

The past offers interesting perspectives that are potentially useful for effecting changes in the future. A number of lessons can be drawn from the past. There appear to be three routes along which major system innovations, change processes and/or quantum leaps can be achieved.

First, the quantum leap achieved via a *Master Plan*. In 1961, US President Kennedy states: "We are going to the moon." The issue at stake here is a planned change designed by government. This approach is characterised by the fact that the public goals and approach are central, and that private initiatives and contributions are given a clear place by the president. Kennedy presents a national plan in which he describes the contribution expected from everyone, without unduly concerning himself about where the public domain ends and the private domain begins. This is a national challenge. Eight years later on 21 July 1969, Neil Armstrong, Commander of Apollo 11, is the first human being to set foot on the moon.

Second, the quantum leap achieved via *Connectivity*: *Components* are created in various locations, either planned or unplanned, *that later in their entirety create a new dimension*. There are many examples of this. In the 15th century all key European trading nations were searching for alternative routes to the East. Columbus, searching for the East, discovered America and consequently provided international trading traffic with an unprecedented range of new opportunities. Another example is the emergence of the Dutch National Railways at the beginning of the 19th century. A wide range of railway initiatives emerged at the same time, in competition with one another or not, that were later interconnected. Mutual arrangements ensure that a cut and paste approach is

adopted, in other words: the ingredients required to develop a new structure exist without the presence of a prior master plan. Public control is focused on the possibility of interconnecting initiatives. Most large infrastructures in our society were developed along this route.

Third, the quantum leap achieved via *Serendipity*. An early example in Europe are the Vikings. They developed strong sailing/navigation competences in the 8th century and thereby created major opportunities for conquering new areas. The creation of opportunities is a feeding ground for scoring hits. Playing football like the Ajax football club in its heyday: no fixed plan, but making sure that opportunities are created that can be exploited. Focusing on the creation of an opportunity to score. Public determination of the competences to be developed, the creation of a feeding ground for opportunities, initiative and the creation of initiatives, and of course allowing initiatives to grow.

Can these three basic models inherent in major transitions be linked to the challenge of transforming our economy into an effective knowledge economy? The next section first defines the term knowledge economy for this purpose. Next, social transitions are discussed. An attempt is made here to use lessons learned from other major social transitions. This leads us to a new perspective on the situation in which social transitions can take shape. Finally, these are linked to concrete role changes for government, the market and society.

2. The Netherlands as the best knowledge economy?

The conditions for IT companies in the Netherlands are among the best in the world. This is evident from research conducted by the Economist Intelligence Unit (EIU), affiliated with The Economist weekly magazine. The Netherlands this year is in third place and is one of the few countries that rose in the rankings compared to 2008 (7th place). The Netherlands in particular scores high in terms of legal frameworks, accessibility and technological infrastructure, and use by customers and companies (incl. online banking)^{2 3 4}.

This positive starting position in the area of IT provides a solid foundation for the ambitions of being a successful knowledge economy. Indeed, agreement has been formulated at the European level that the EU in 2010 is to be a competitive and socially cohesive European knowledge community. This strategy, also referred to as the Lisbon Strategy, consists of three components. First the knowledge economy must be expanded; second Europe's social foundation is to be strengthened (by combating unemployment and poverty); and third, economic growth must be sustained.

This strategy was reviewed in 2005 and an action programme for economic growth and employment was developed. The action programme is designed to ensure that other nations want to invest in European countries, European companies increase their earning through means of inventions and new technologies, more and better jobs are created, better collaboration among member states is achieved, and that member states make sufficient funds available to the Union to achieve these objectives. The renewed strategy contains fewer objectives. The key objectives among these are that 70% of the potential labour force be employed, the creation of 20 million additional jobs and that 3% of the collective income of member states is spent on R&D. Furthermore an initiative, named i2010, was created in 2005 designed to stimulate growth and job creation in the 'information society' and media industry⁵. These plans in turn have been partially incorporated into the ICT Agenda published by the European Community in the spring of 2010. The goals are further refined in comparison to the Lisbon Accord, while the key share of the knowledge objectives formulated as part of that Accord has not been achieved.

From statistics for the period 2000 – 2008, it is evident that in the Netherlands, 11 of the 14 objectives set by the Netherlands government in 2000 will (potentially) not be achieved. According to the Netherlands Court of Audit, 4 objectives will probably not be achieved. For example, the Netherlands did not succeed in reducing the number of early school drop-outs, promoting the participation of women in the labour force and the number of people receiving reintegration support. Information is lacking for seven other objectives and it is not clear whether these objectives will be

² <http://www.nfia-singapore.com/nieuws.html?id=45>

³ <http://www.eiuresources.com/mediadir/default.asp?PR=2009061701>

⁴ <http://graphics.eiu.com/pdf/E-readiness%20rankings.pdf>

⁵ http://www.europa-nu.nl/9353000/1/j9vvh6nf08temv0/vh1ojm9imwz9?ctx=vq9xq0898jy5&start_tab0=40

met. The Netherlands on the other hand is succeeding in properly converting European legislation into national laws and to increase labour force participation in general⁶.

According to the European Innovation Scoreboard (EIS), the Netherlands occupies the position of that of an innovation follower. The EIS describes the Netherlands as *'unique in the Union, whereby high labour productivity is linked to high employment'*. However, the Netherlands should not consider itself rich. The Netherlands is not 'best-in-class' on all fronts. On the contrary, the Netherlands is only just above average. An important cause identified by the EIS is the lack of financial support provided by public and private parties for R&D^{7 8 9 10}.

The diagram below from the Innovation Platform shows that the Netherlands primarily scores weak in the 'Innovation and Entrepreneurship' category. In other words, the Netherlands business sector does not adequately succeed in investing and benefiting from R&D.

Working population with higher education	Strong knowledge base & use of knowledge	More innovation & entrepreneurship
2009 indicator	2009 indicator	2009 indicator
● Deprived pupils in preschool education	● Ranking of universities	● Global competitiveness
● Students leaving higher education/technical programmes	● Output of articles	● Fast growing businesses
● Ranking of primary education	● Citation impact of articles	● Private investment in R&D
● Ranking of secondary education	● More focus and mass of scientific research	● Onshoring of international R&D activities
● Ranking of secondary vocational education	● Innovative companies with cooperative ventures	● Share of innovation used in industry
● Young people with starting qualifications	● Public R&D investments	● Share of innovation used in services
● Movement from secondary to higher vocational education	● Share of researchers	● Innovative starters
● Diversity of higher education		● Attitude to enterprise
● Quality and availability of teaching staff		
● Working population with higher education		
● Lifelong learning		
● On-course	● Requires attention	● Off-course
	● Evaluation purely qualitative	

Figure 1.2 Netherlands score on 26 self-formulated criteria in the Knowledge Investment Agenda

Source: Photo of Knowledge Investment Agenda, Innovation Platform 2009

⁶ http://www.trouw.nl/nieuws/nederland/article2870935.ece/Lissabon-doelstellingen_niet_gehaald.html

⁷ <http://www.minocw.nl/levenlangleren/474/Lissabon-doelstelling.html>

⁸ http://ec.europa.eu/growthandjobs/key/index_en.htm

⁹ <http://www.europa-nu.nl/9353000/1/j9vvh6nf08temv0/vh7dotpnvfze>

¹⁰ www.ipa.nl/scripts/download.php?id=550

2.1 From knowledge economy to a competence-based society

That the importance of strengthening the knowledge economy has wide support is evident from the defined policy objectives and the corresponding evaluations. The fact that the Netherlands has not yet achieved the required level of success could be considered an example of the adage that the 'journey is more important than the destination'. Indeed, one could argue, making the effort required to become a strong knowledge economy is in and of itself already important. The precise results to be achieved, including any unforeseen or even unintended results, may be secondary. This is one way of putting the policy objectives into perspective.

At the same time, and even more important, the knowledge economy itself and its importance can also be questioned. The knowledge economy, in which the production factor knowledge becomes increasingly more important, fits into the general shift from labour in the agricultural sector via the industrial sector to the services sector. Having knowledge and applying it consequently plays an increasingly more important role in the success of individuals in society. Furthermore, a society that properly succeeds in generating and using knowledge has a comparative advantage in relation to other societies.

These observations also have their flip sides. Indeed, individuals or societies that comparatively speaking succeed poorly in making knowledge productive will also be less successful. Less successful in an economic sense, which for individuals can lead to relative poverty and consequently social deprivation as well. People may ultimately feel themselves excluded from society as a result. These are matters that are currently a topic of debate in the Netherlands. According to many, political fluctuations are an indicator of latent social discontent. Discontent that is primarily attributed to the middle class which feels itself excluded – and even robbed. A few authors, such as Hargreaves¹¹ link such trends directly to the knowledge economy concept. According to Hargreaves, the knowledge *economy* especially favours private sector values, while a concept such as the knowledge society is a better match for increasing public values. Our contribution to this is that knowledge as a concept also entails a high degree of exclusivity. Indeed, either you have knowledge or you don't. When an individual is a have-not, this significantly limits that person's opportunities for social success. The globalisation issue in the Netherlands runs along the same line of inclusion versus exclusion. The line that the Netherlands only has a future if it transforms itself into a knowledge economy in an increasingly intense internationally competing world excludes a large segment of the population. They are afraid they cannot maintain themselves in the international turbulence, primarily perceive the negative effects of globalisation (and immigration), and give preference to erecting borders around the Netherlands.

As a result of such trends, the demand for so-called inclusive concepts and perspectives is increasing. Inclusivity then means that everyone can recognise themselves in a certain perspective and that everyone can also profit from this. This is why the knowledge, as well as the economy concept must undergo further development. We would therefore like to advance the importance of the *competence-based society*. A society in which the competence of every individual is central – indeed, knowledge in these modern times is universally available – and therefore something in which everyone can participate in terms of social and economic activities.

¹¹ Hargreaves, 2003. Teaching In The Knowledge Society.

This is why the importance of ICT as the backbone for further development has not let up. On the contrary, its importance is rather increasing. Particularly the 'C' in ICT can play a very important role in the development of competences. The communicative competence reappears in many ICT innovations with a high level of expectation.

2.2 Big promises...

In spite of the big wave of ICT-driven innovations flooding our society since the eighties, it is time and again evident that it is not all that easy to realise them. For example, let's look back to the House of the Future, Living Tomorrow and the predictions made by the Das brothers concerning life in the future. Many of the predicted innovations are focused on 'e-Care', ingenious indoor gadgets. For example, mirrors that automatically indicate whether clothing that is part of a set is in the wash, hanging in the closet or whether it makes sense to wear that particular clothing. Or interactive wallpaper that at any given moment projects internet images of any desired size¹². This furthermore includes a home delivery box for suppliers to deliver their goods or a bathroom mirror that indicates whether traffic congestions have cleared up or not, while you are brushing your teeth. Or an intelligent refrigerator that automatically sends out orders, or a smart washing machine that sets off an alarm when the wash includes the wrong mix (think of a red sock in the white wash). And last but not least: a training programme or nutritional advice based on measurements in the bathroom, designed to stay healthy or improve one's health¹³. But there is also a great deal to be found in the area of infrastructure¹⁴. Things that come to mind for example, are the mini line-ups (in which cars are connected bumper to bumper, while their speed is controlled not by the driver, but by the motorway), trains without wheels (that travel from point A to point B in vacuum tubes and that attain much higher speeds)¹⁵, inhabitable bridges designed to provide an answer to wider rivers and the lack of living space, or double-decked motorways¹⁶.

It appears to be difficult to get the wonderful promises made by such innovations off the ground. This is sometimes true for internet applications as well. For example, the Home Shopping sector for years has been expecting shopping via mobile telephone to exhibit explosive growth. However, this has only gotten off the ground to a very limited extent. The previously quoted Economist Intelligence Unit annually measures the quality of the ICT infrastructure and the capacity of customers, companies and government organisations to leverage it for their own benefit. This research shows that the degree of digital progress in a country is dependent on a number of factors, such as a stable and transparent entrepreneurial climate, proper schooling, the promotion of innovation, a sound legislative framework, and a coherent government policy and vision. In addition to the availability and accessibility of ICT, last year's assessment also looked at the use of ICT. The conclusion is that the availability of ICT by itself is not sufficient to produce socioeconomic benefits. ICT must also actually be used, preferably in the most effective way possible. Use and application

¹² http://www.extendlimits.nl/index.php/nieuws/artikel/ons_huis_in_de_nabije_toekomst_volgens_microsoft

¹³ www.ev.nl/1231.pdf

¹⁴ www.ev.nl/1231.pdf

¹⁵ <http://www.personencyclopedia.info/D/das/das-gebroeders/view>

¹⁶ <http://noorderlicht.vpro.nl/artikelen/19548036>

are therefore central themes. At the same time, it is apparent that innovative applications, most definitely applications that are not linked to a computer with a display screen and a keyboard, are not all that easy to get off the ground.

This is particularly unfortunate, because the questions that preoccupy the competence-based society are precisely focused on areas that fall outside those computer screens and keyboards. Indeed, through the large-scale strengthening of society's communicative power, everyone can become involved and make an essential contribution, by (a) offering increased capacity, (b) greater variety and (c) ensuring mutual exchangeability. New opportunities for establishing connections result in new forms of communication.

- More than incremental progress is required. A next level digital infrastructure is essential to progress as a knowledge economy (see the European Agenda). This includes ambitions such as the fastest broadband in the world (fibre optic in the Netherlands and the rest of Europe), the virtualisation of meeting rooms, large-scale facilities that are part of new public spaces, or the creation of infrastructure links that can accommodate new services with the potential of leading to new added value models.
- An entire new generation of technologies and applications are to be developed when new large-scale infrastructures and/or quantum leaps in technologies are made.

If the Netherlands wants to be among the top in the world as a knowledge society, then the development of the infrastructure described above is an essential prerequisite.

2.3 Massive investments are required, but by whom?

It is clear that for a competence-based society to be realised, the large-scale renewal of ICT infrastructure is required. The question then is which parties are capable of initiating and achieving such renewal? An evaluation of the potential role of the business sector and government in this respect is examined below.

In terms of the business sector, this concerns individual companies and their motives. Companies are generally busily engaged in heavy competition for sustainable and profitable growth. They fight to achieve competitive advantage, a growing market share, strengthened continuity or profitability. According to the authors of the Blue Ocean Strategy¹⁷, this leads to so-called Red Oceans. In such Red Oceans there is fierce competition between direct rivals. Sectoral boundaries are set within the Red Oceans that are accepted by all companies, and the rules of the game are known by all. Growth and greater market share can only be attained by conquering portions of the existing pie. As the market becomes increasingly saturated with such 'sharks', the ocean becomes increasingly redder due to the murderous competition. This bloody battle, according to the book's authors Kim and Mauborgne, is a strategy that over the long term cannot lead to profitable growth.

According to Kim and Mauborgne, companies must therefore cease fighting competitors for the purpose of gaining a leadership position in the future and instead must specifically create 'Blue Oceans'. This means that companies must start looking for markets that do not as yet exist.

¹⁷ Blue Ocean Strategy, Chan Kim and Mauborgne, Harvard University Press, 2005

Innovation, rather than competition, is central to this strategy. Through innovation a company leaves his competition far behind by creating entirely new values for buyers. Such value-driven innovation puts equal emphasis on value as on innovation and requires a strategy that comprises the entire system of activities. In concrete terms this means that market boundaries have to be re-established, whereby the focus is not only on the figures, but where a broader perspective is applied instead. The strategy must also extend beyond the existing form, whereby companies start searching for 'non-customers'. While competition in the Red Oceans is highly relevant, this is not the case in the Blue Oceans, because the rules of the game and the boundaries are not fixed. The attitude and behaviour of people in the organisation nevertheless provide the foundation here: they must be able to commit to the chosen strategy, but should not follow it to the letter.

An example worked out by Kim and Mauborgne is that of the Cirque du Soleil. At the time of the debut of this circus, other circuses were attempting to increase their share of an already shrinking market by adapting traditional circus acts and by contracting even more famous clowns and lion tamers. This led to an increase in costs for all circuses, while the circus experience did not substantially change for the public. Cirque du Soleil succeeded in linking theatre to its circus. The pleasure and the tension of the circus were combined with the intellectual refinement and artistic richness of the theatre. By eliminating the boundary between theatre and circus, Cirque du Soleil was able to reach a new market comprising not only circus-customers, but non-circus-customers as well: the adult theatre public. Cirque du Soleil looked beyond the boundaries of the circus market and offered various perspectives that previously were not part of the circus: a story line and intellectual wealth, artistic music, dance and multiple productions. Furthermore, in terms of price they aimed for the theatre, the price of which is significantly higher than that charged by a circus, while at the same time they were able to scrap many typical circus cost elements.

At first blush, the Blue Oceans appear to provide a nice perspective on the possibility of considering the business sector as the driver of large-scale ICT developments. At the same time, we are forced to note that the potential of a single company to initiate a movement of this nature must be considered limited. Even Google's tremendous market power, for example, is limited by the opportunities that regulators and other market players will permit. Such limitations are on top of the fundamental limitations experienced by companies as they focus on achieving large-scale ICT innovations. Namely that the Blue Oceans that they must keep in mind require too much effort and investment in relation to the predictable revenues.

We therefore shift our sights to government. Government has powerful opportunities when it comes to planning, but partly as a result of this, limited opportunities as an initiator of change. Government also generally lacks the resources required to invest in large-scale ICT transitions. Add to this that in the present times, not only the recession extracts its toll, but worldwide energy and climate change issues are also battling for budgetary priority.

With this context in mind, the perspective soon shifts to potential collaboration between public and private players. Forms of collaboration whereby the monitoring of mutual boundaries is important and in which the government assumes different roles at the same time: investor, regulator, policymaker, watchman and initiator. The rigid boundary between public and private, combined with the multiplicity identified above, causes problems in complex projects that are needed to achieve the quantum leaps. Indeed, complex projects are characterised by a consolidation of functions, additional regulations and a multiplicity of parties with ever changing roles, positions and

responsibilities. The restrictive way of working applied by government, however, leads to an emphasis on control and inspection mechanisms that are focused on keeping surprises out of the picture. External and new interests are given little or no attention and are not considered commercially or administratively interesting. This causes creativity and innovation to quickly become annoying cost items, whose commercial value is not recognised. The juridification of the relationship between government and the marketplace leads to rigidity. A new approach is consequently desirable¹⁸. Netherlands society will have to start looking for opportunities to level legal barriers as a means of facilitating pre-competitive collaboration.

¹⁸ Grond van Samenwerking (*Grounds for Collaboration*), Th.W.A. Camps e.a.(2008)

3. What is there to learn from system changes?

3.1 A review of past system transitions

3.1.1 The Amortisation Syndicate

An early method of public-private partnership for the purpose of realising large infrastructural projects can be found in the course of action adopted by King William I of the Netherlands. He established an Amortisation Syndicate in 1822 (a fund for the purpose of reorganising the State's debt). In fact the syndicate amounted to a scheme whereby he forced rich private individuals and banks to supply funds to a State fund via loans at non-guaranteed interest rates. The funds in this fund subsequently enabled the King to undertake all kinds of spending while circumventing parliament. The Zuid Willemsvaart, a canal between the cities of Maastricht and 's-Hertogenbosch, and the canal between the cities of Gent and Terneuzen were among the initiatives created using this financial route. Today we are primarily familiar with the call made on government by companies via grants. In times past, the reverse route under 'royal duress' was a legitimate route. The way in which Willem I, acting as an enlightened despot, exacted these contributions did not go unchallenged, although it was an effective way to quickly achieve results after years of attempts that came to naught.

Willem I's approach is an example of a planned change focused on bringing about a quantum leap. The Netherlands at the time was already behind in terms of laying out a railway network and further consolidating water-based transportation opportunities. There was awareness of the need for a quantum leap but it only came about following an unorthodox change in financing instruments: the Amortisation Syndicate.

3.1.2 Railways

Due to its excellent network of waterways, the construction of railways¹⁹ in the Netherlands was slow to take off. What is furthermore striking is that the railways that were constructed duplicated the existing infrastructure. Most of the attention was focused on a railway connection with Germany, while this destination was already served by intensive shipping traffic via rivers.

Nonetheless, the first railway line was focused on passenger traffic. This line was operated by the Hollandse IJzeren Spoorweg Maatschappij (*The Netherlands Steel Railroad Company*). In this respect, private investors preferred to focus on existing markets instead of on new markets. In the first 25 years, railroad construction was primarily effected by private investors. Only in 1860 did government decide to construct a national network. The objective was to link as many cities as possible using the minimum possible length of track. The construction of a national network by the State did not, however, signal an end to private investments. For example, an eastern railway line was constructed between Amsterdam and Winterswijk (via Apeldoorn) 'to be able to compete in terms of the business conducted with Germany'. Furthermore, holes were discovered in the network.

¹⁹ A number of sources were consulted for this portion of the article, including the website www.spoorweggeschiedenis.nl

The railways encountered the 'market organisation' dilemmas. A network was required to serve a number of customers. Furthermore there was (and is) a high degree of correlation between operation and infrastructure, with the infrastructure being extremely expensive. For this reason competition was difficult to get off the ground. Furthermore, the consumer complained about the poor cohesion of the network.

Around about 1880 it became clear that the existing structure was not working. Only in 1890 it was decided to restructure the railways in accordance with the British model; the railways were divided among two large operating companies in such a way that they should be well-matched and that competition for key customers should emerge. Only much later was a national public railway network constituted. And this public company was once again partially privatised in the eighties of the 20th century. In terms of the change processes, there first is serendipity. Entrepreneurs experimenting with new forms of transportation. The quantum leap subsequently proceeds on the basis of connectivity: railways and companies are connected together. Still later it transitions to a plan that leads to the creation of a national public railways company. Only to revert to a combination of serendipity (transporters) and plan (ProRail) in the very last phase, but then transformed into a free market system and competition.

3.1.3 Internet

The origin of the 'internet' can be traced back to the ARPANET (Advanced Research Projects Agency Network), a network initiated in 1969 by the Ministry of Defence and universities. The United States established a research agency to develop a new technology designed to guarantee a secure means of communication between the agency and universities²⁰. The intent was that if the 'regular' network between computers were to fail, the internet would take over.

The ARPANET was sufficient for local use. However, a new standard protocol was required for global use, the Internet Protocol (IP). This protocol specifies how messages should be packaged, sent and addressed. In addition, a Transmission Control Protocol (TCP) was developed that made it possible to connect different networks to the ARPANET.

TCP/IP quickly emerged as the standard used by other sectors. NSFNet took over the protocol and the technology and expanded it into a large international network²¹. NSFNet operated as the high-speed backbone for the internet in America²².

In 1991, the internet was made available for commercial use. This resulted in numerous networks creating considerable chaos. The Swiss CERN Laboratory then proposed to establish an organisation responsible for formulating a standard. The business community agreed to this proposal, which resulted in the birth of the World Wide Web. By establishing the WWW it became

²⁰ <http://www.willemwever.nl/antwoord?vraag=hjfsXsHrGmKvKoJibN>,
http://student.wdka.nl/pbloom/pages/internet_geschiedenis.html

²¹ <http://pc-en-internet.infonu.nl/geschiedenis/20554-het-ontstaan-van-internet.html>

²² http://student.wdka.nl/pbloom/pages/internet_geschiedenis.html

more accessible to the 'ordinary' person. As a result more and more companies ended up establishing themselves on the web. This created a snowball effect²³.

The success of the internet is attributed to the fact that the internet does not belong to anyone, while the physical components are very much owned by someone^{24 25}.

The quantum leap made by the internet initially started off with a plan that was quickly followed up by connectivity (components to be connected on the basis of a number of shared and established values, standards and protocols). It is precisely connectivity that makes the internet as big as it is. And all kinds of new concepts, ideas and business models are created on the internet. Serendipity: a great feeding ground for opportunities and chance.

In contrast to abroad, the ICT revolution in the Netherlands did not emerge in a military context. In the Netherlands it emerged in support of technical scientific computing by organisations such as the Mathematisch Centrum (*Mathematical Centre*), TH Delft, PTT and Philips. In the fifties, government systematically invested in scientific research. The first to embrace the idea of computers was the Mathematisch Centrum which established a Computing Department. In the fifties, the MC, PTT's Central Laboratory and Philips' Physics Laboratory built experimental computers. Experimentation was generally prevalent in the sixties and a second generation of advanced computers emerged. Automation took off. For example, the processing of the salary calculations for the Postcheque- en Girodienst (*postal cheque and payment service*) was automated. In addition, computing centres were established by companies and universities. In the seventies the third generation computers (IBM) emerged. Dutch computer scientists played a prominent role, the software sector emerged and government provided the impetus for establishing computer science education programmes. The first education programme was established only in 1981, however²⁶.

This created opportunities for a turbulent and far from depleted growth of technologies and applications for use in the private sector.

The management of IP addresses presents a very interesting situation. In the current governance mechanism a private, internationally organised, non-profit organisation (Internet Corporation for Assigned Names and Numbers – ICANN) is responsible for the administration (in the broadest sense of the word²⁷) of IP addresses. ICANN operates under a Memorandum of Understanding (MoU) with the US Department of Commerce issued in 1998²⁸. Attempts have been made for a long time now to delegate the administration of IP addresses to the international community, preferably the UN, and to remove this responsibility from the United States²⁹. The NL domain registration has

²³ <http://www.dvscene.nl/achtergrond/geschiedenis-van-het-internet.html>

²⁴ <http://www.ictenonderwijs.nl/Geschiedenis%20Internet.htm>

²⁵ <http://www.dvscene.nl/achtergrond/geschiedenis-van-het-internet.html>

²⁶ http://www.computer-erfgoed.nl/computergeschiedenis_volg_1.htm

²⁷ http://www.ward.nu/papers/wanrooij_juridische_aspecten_van_een_domeinnaam.pdf

²⁸ http://www.europa-nu.nl/9353000/1/i9vvh6nf08temv0/vh1ojm9imwz9?ctx=v9xg0898jy5&start_tab0=40

²⁹ <http://tweakers.net/nieuws/39196/vs-willen-internetbeheer-niet-bij-vn-leggen.html>

been assigned to the Stichting Internet Domeinnamen Nederland (*Foundation for Internet Domain Registration in the Netherlands* – SIDN).

3.1.4 Treuhand not as successful as originally thought

After the fall of the Berlin Wall in 1989 East German enterprises were privatised. Treuhand was the government agency responsible for overseeing the management and sale of East German and international organisations. The objective was to assess whether enterprises could still be rescued by shutting them down, restructuring or selling them. A large portion of the enterprises were rapidly sold, although they subsequently turned out to be largely obsolete and non-competitive. In two years time almost all planned-economy structures had been destroyed. Enterprises were shut down or downsized to a healthy core.

Although the sale of enterprises proceeded well, a number of enterprises should have been shut down on economic and environmental grounds. Keeping jobs in many considerations was given priority over creating healthy enterprises.

The German government introduced numerous measures, such as grants, allowances, tax reductions, work relief measures, etc, in their attempt to allow former state enterprises to smoothly transition to a market economy. The economic revival associated with this however turned out to be threatened by a confluence of circumstances, including weakened global economic conditions and the decline of West German exports.

It would appear that the German Ministry of Economic Affairs seriously underestimated the situation. The East was to become like the West and that turned out to be a fatal error. An example that attests to this is the rise in wages and the lagging productivity. The lack of foreign investors furthermore contributed to this situation. The question is whether keeping these enterprises artificially on their feet with grants was sustainable and desirable. Ultimately these enterprises cost more than they actually produced^{30 31 32}. This approach therefore did not turn out to be so successful, certainly not for the larger enterprises³³.

In terms of the three change strategies for achieving a quantum leap, the Treuhand can be characterised as a master plan, paradoxically enough a plan to abolish the planned economy and to

³⁰ <http://www.nrc.nl/W2/Lab/Profiel/Duitsland/oosten.html>

³¹

http://www.trouw.nl/krantenarchief/1992/01/17/2696435/Beheerder_Treuhand_en_lokale_politici_botsen_over_verkoop_bedrijven..html

³²

http://books.google.nl/books?id=xrtPZrLyCpkC&pg=PA117&lpg=PA117&dq=treuhand+oost+duitsland&source=bl&ots=FNFliboK35&sig=GsgDqt_7BN2HenvJcxVliir1d0_k&hl=nl&ei=pg_KSqKQO5Te-Qafn_1M&sa=X&oi=book_result&ct=result&resnum=5#v=onepage&q=treuhand%20oost%20duitsland&f=false

³³

http://www.trouw.nl/krantenarchief/1994/01/04/2632312/Oostduitse_economie_komt_langzaam_uit_het_dal_.html

transform it. Connectivity and serendipity likely would have brought about a more successful change.

3.1.5 A lesson from actual practice: a Delta Programme Commissioner with final authority

In all examples it is evident that an unusual approach emerges when there is sufficient support for it. When the affected parties feel a sufficient sense of urgency, the necessary level of acceptance emerges. A recent example of such an approach is the Netherlands 'Delta Programme Commissioner', an administrative officer who is given authority to tackle the Netherlands fight against the sea in the 21st century. The related press release of the Ministry of Transport, Public Works and Water Management reads as follows:

Press Release | 06-11-2009

The Council of Ministers at the proposal of the State Secretary for Transport, Public Works and Water Management agreed to the appointment of Mr W.J. (Wim) Kuijken (56) as the First Delta Programme Commissioner, the government's commissioner for the Delta Programme.

In Wim Kuijken, the Delta Programme will acquire a Commissioner able to operate with authority and persistence. He will be given the mandate to expeditiously shape and execute the complex Delta Programme in close collaboration with the involved ministries, as well as other parties such as district water boards, provinces and municipalities.

It is evident from the Ministry of Transport, Public Works and Water Management's press release that State Secretary Huizinga has a great deal of confidence in the new Delta Programme Commissioner.

'Wim Kuijken has broad and many years of experience in positions that require excellent interaction between politics and administration. In him we have acquired an authoritative Delta Programme Commissioner, with a proven ability to bring people together and where necessary take tough decisions. Furthermore, he is a Delta Programme Commissioner who wants to put his head and heart into improving water security in the Netherlands and securing the supply of fresh water.'

The tasks and responsibilities of the Delta Programme Commissioner are established in the draft Delta Act currently before the Council of State for advice. The appointment of a Delta Programme Commissioner even before the Delta Act goes into effect illustrates the sense of urgency on the part of Cabinet, as well as a majority of the Dutch House of Representatives, as expressed in a motion. The Delta Programme Commissioner is needed now to maintain momentum following the insistent advice of the Delta Commission.

The new Delta Programme Commissioner is happy and honoured with his appointment. Wim Kuijken, currently Secretary General for the Ministry of Transport, Public Works and Water Management: "I am taking on this new challenge with full conviction. I will be able to apply the knowledge and experience that I have gained in the public administration domain over the past 30 years for the future of our country. The Netherlands is a worldwide leader in the area of water management. It is with passion that I will devote myself as Delta Programme Commissioner to keeping the Netherlands secure and to securing a sufficient fresh water supply for the future."

The Delta Programme Commissioner steers the Delta Programme implemented under the political responsibility and coordination of the State Secretary for the Ministry of Transport, Public Works and Water Management. Furthermore he is the principal advisor for the Delta Programme to all

members of the ministerial steering group chaired by the Prime Minister. The following ministries are represented on the ministerial steering group: the Ministry of Housing, Spatial Development and the Environment; the Ministry of Agriculture, Nature and Food Quality; the Ministry of Interior and Kingdom Relations; the Ministry of Economic Affairs; and the Ministry of Finance.

A Spatial Economist, Kuijken will officially assume his position as Delta Programme Commissioner effective 1 February 2010 and is appointed for a period of seven years. Kuijken has been Secretary General of the Ministry of Transport, Public Works and Water Management since April 2007. Prior to this he performed the same function for the Ministry of Interior and Kingdom Relations and for the Ministry of General Affairs. In his current position he directs various departments including the Directorate-General for Water and the Directorate-General for Public Works and Water Management. He is Chairman of the working group that advises Cabinet on more efficient water management and Chairman of the Mobility and Water Innovation Council. Since 2006 he has also been Chairman of the Secretaries General Council.

This press release exhibits a number of elements:

- There is a shared sense of urgency about a major social issue;
- There is agreement about the objectives;
- There is no debate concerning resources and inter-relationships;
- There is agreement concerning an approach that overrules daily routine;
- Objectives, responsibilities and authorities are anchored in law;
- There is agreement concerning a longer term approach;
- The commissioning authority is anchored at a very high level;
- There is no possible doubt here that government has the responsibility and the lead. This is because it concerns an undisputed public task.

All of these elements would appear to contribute to a successful approach at the national level. The implementation of the Delta Programme can only take place through excellent collaboration and/or contracting between government and the business sector, with sufficient legitimacy in society (under the motto: other interests will have to yield for this).

3.2 Transitions require a step back

The Delta Commission demonstrates that there is room.

- The examples illustrate the importance of having clarity about objectives and roles from the very beginning.
- When things do not go well there is a lack of clarity about the relationship between public and private parties; furthermore the importance of social legitimacy plays a role in all examples.
- And sometimes government compels (Amortisation), but sometimes it is dependent on a spontaneous initiative within the public domain.

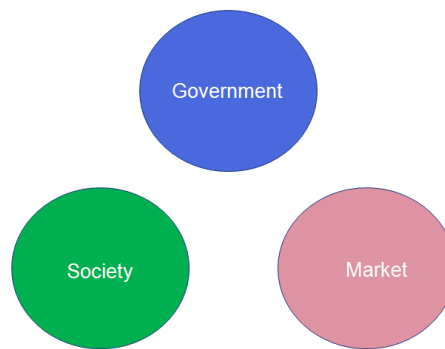
In other words: considering system changes, all assumptions concerning domain boundaries are up for discussion. In a transition anyone can still assume any roles.

However, as soon as a transition is underway and is incorporated into society (see internet), the classical division of roles once again emerges.

This not only applies to government, the business sector as well does not consider this easy. This is what the 'Red Oceans' teach us.



Transition



Development

4. We would like to do this, but how do you initiate a transition like this?

Major transitions have very different instigations or initial conditions. Sometimes there is some kind of a planning-based approach, however in many cases other ingredients would appear to be at play.

Factors of chance, windows of opportunity and recognition of opportunities appear to play a role that is at least as important. Which explains our focus on *serendipity*. And the possibility of developing various initiatives independently and to later interconnect them also appears to play an important role. Hence our focus on *connectivity*.

But what does this mean in terms of the possibility of effecting large-scale ICT infrastructural quantum leaps that would appear so important for the Netherlands?

A comparison with the new Delta Plan and the appointment of the Delta Programme Commissioner demonstrates that the ICT quantum leaps are nevertheless somewhat different from the background variables related to the new Delta Plan, as follows:

- ICT infrastructure is not by definition a public responsibility; it also a responsibility of the business sector and society.
- The need for investing in ICT infrastructure does not enjoy broad social support.
- ICT infrastructure projects are not predictable: we do not know what the benefits are and what would happen if we don't do it.
- ICT infrastructure and the knowledge economy are not basic values of Netherlands culture (the fight against water and for clean water is rooted far deeper than the need for innovation and renewal).
- ICT infrastructure projects are not comparable to a clearly imaginable goal. In other words, there is no president who during a cold war announces that within a decade we will put a man on the moon, and there is no population that believes in this goal, derives hope from it and lends it its universal support.

This has major implications for the way in which the ICT infrastructural quantum leaps can be achieved. Let us therefore derive our inspiration from:

- The internet: from serendipity, via connectivity to plan.
- The Delta works: from plan to serendipity (linked opportunities emerge), to connectivity with biological goals.
- Railways: serendipity (parallel different but comparable initiatives), connectivity and planning.
- But furthermore, and this is somewhat riskier, the Mao plan for the ecological zones (the plan is overarching, and serendipity and connectivity play a role within it).

We provide three different insights in this regard:

The first is to work on an inclusive concept for the Netherlands. Not a knowledge economy that excludes and comprises winners and losers and provides fear-based stimulation (if we are not the best knowledge economy, we will disappear from the battlefield), but a competence-based society that involves many and that provides stimulation based on enjoyment, a good feeling and commitment. The binding strength is inherent in society itself, in neighbourhoods, academic associations, small-scale initiatives, NGOs and sector organisations. They have the ability to create confidence.

Second, the separation and division of roles between the public and private sectors is not all that strict. There is no clear public customer and there is no clear private implementer. The field is far more varied. It involves companies, associations, communities and different levels of government. They must all work together to accomplish this. They jointly are and will become customer, developer, financier and user. Level playing field rules and statutory guarantees for a fair market and a fair distribution of risks impede actual quantum leaps. Small-scale operations on the basis of trust in which chances are created offer more opportunities. Make the large infrastructural ICT projects a thousand times smaller, but carry out a thousand times as many of them and link them up at a later stage.

Third is the realisation that a master plan for the Netherlands is not realistic in the current political and social climate. Quantum leaps based on connectivity and serendipity will probably work much better. In other words, starting out on a much smaller scale, experimenting in local alliances in which the value that applies is that later connection and linkage must be feasible, offers perspective. In which government can and must provide important stimuli by:

- Creating regulation-free zones;
- Strengthening education;
- Creating techno-valleys in which government itself invests in large-scale innovations;
- Assume a leading role in refreshing global ambitions (not: the plan for the 2028 Olympic Games, but the Netherlands to Mars in 2030);
- Oblige the business sector to collaborate (think of the Business Investment Zones [BIZ], but then at the national level);
- Provide room for refreshing government initiatives;
- Be open to allowing private parties to achieve benefits through government initiatives;
- Embrace surprising parties (not just science, but defence as well).

The paradigm that is at the basis of a 'level playing field' has a paralysing effect on quantum leaps. This paradigm is to such an extent dominant in regulating and regulations that new initiatives are not primarily judged on their potential added value but on the risk of legal proceedings that can be instituted by the parties that are not as fast or less creative.

This paralysis can only be overcome when concepts such as trust, collaboration and joint experimentation are adopted as central themes.

5. Authors

Theo Camps studied Public Administration and economics at what is now Radboud University Nijmegen. In 1995, he obtained his PhD from the Technical University of Twente. Theo Camps is Chairman of the Board of Berenschot Groep B.V. He primarily provides consulting services related to strategic issues, organisational development and organisational change for profit as well as non-profit organisations. Furthermore, he is a professor of Organisational Science & Public Administration at the TiasNimbas Business School. In recent years, he has primarily been involved in radical organisational changes in the care sector and organisations in which service provision by highly educated professionals is a central theme. Theo Camps is also chairman of the supervisory board of a number of organisations.

Niels Kastelein studied Public Administration at the Erasmus University Rotterdam and the School for Public Administration at Indiana University. In 2003, he obtained his Masters degree. He has been a consultant in the public sector for seven years, working on themes relating to innovation and cooperation between public organisations and private enterprises. Although not an IT specialist, he has advised on the organisation of ICT services, the use of internet 2.0 applications and the safety and reliability of online shopping. Publications by Niels Kastelein include scientific articles on the management of complex projects and processes, the workings of (branch) associations (such as employers' associations) and new forms of collaboration between private enterprises and governments to achieve public goals. He is currently working as a strategist for a large local government body in the Netherlands.

Dedan Schmidt studied Public Administration at Erasmus University in Rotterdam. During his studies, he specialised in organisation and cultural change, HRM and Public Administration & Business. He has spent over 15 years as a business advisor, focusing in the last five years on sector organisations, associations and midfield organisations as process manager and consultant. He organises vision and strategy processes, supports executive boards and management teams in decision making, reorganisation and restructuring, and acts as a process manager in internal professionalization programmes and external collaboration issues. He is used to operating at executive and management level and can also relate to members and professionals. He recently helped NVZ, NLingenieurs and Thuiswinkel.org develop a new strategy at executive and management level and for the last two years has been acting as process manager for ANKO with regard to the professionalization process of the board and organisation of the association and office.