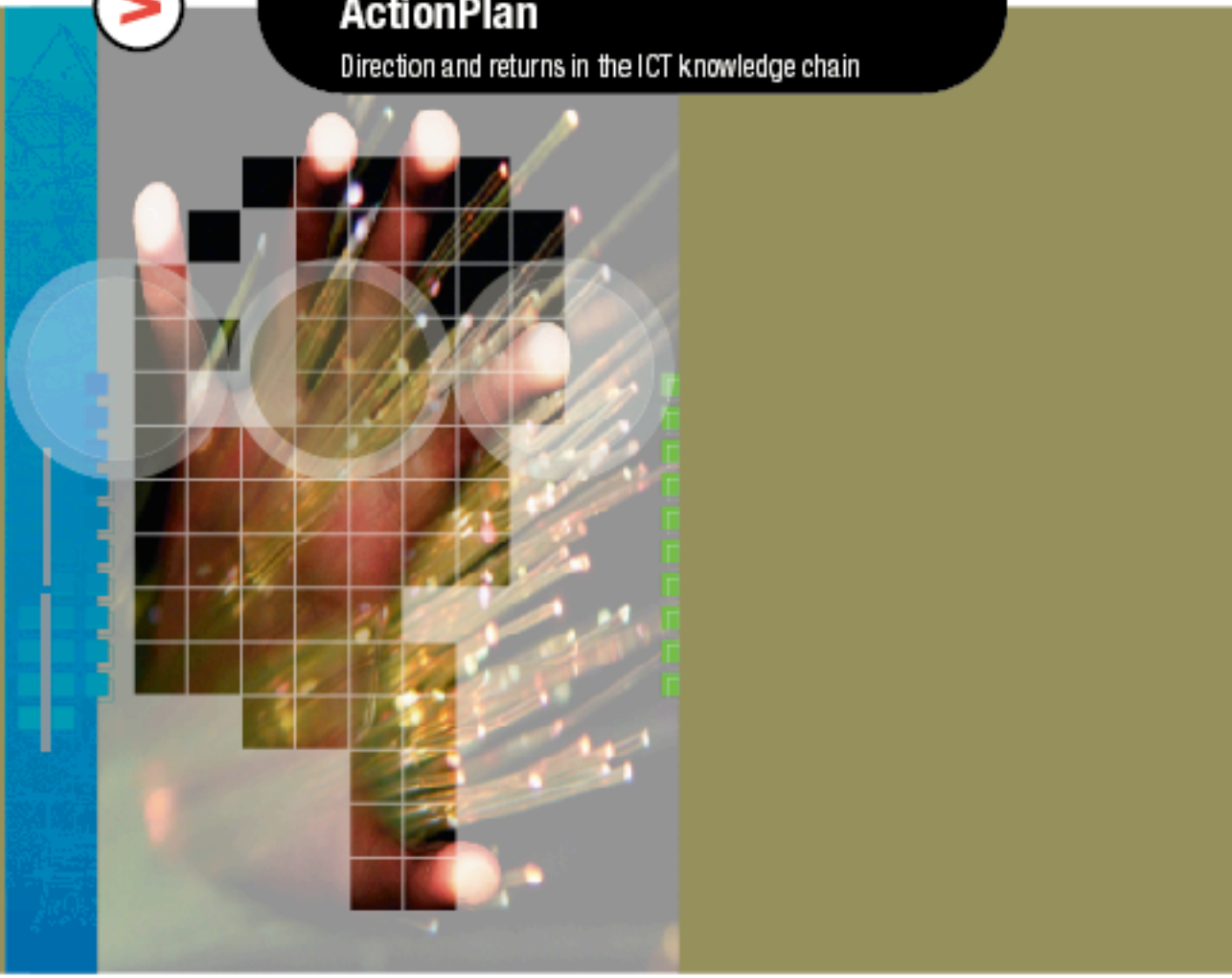
INNOVATION

Competing with ICT Competences ActionPlan

Direction and returns in the ICT knowledge chain



Ministry of Economic Affairs

ONDERSTEUNINGSTRAJECT

INNOVATION

Competing with ICT Competences Action Plan

Direction and returns in the ICT knowledge chain

May 2004

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Summary

This is the action plan for ICT knowledge and innovation, a concrete development of both the ICT Agenda of The Netherlands and the Innovation Letter. The nucleus of this action plan is setting up the ICT Research and Innovation Authority as was announced in the ICT Agenda of The Netherlands. Strong emphasis is also being placed on stimulating ICT applications in SMEs (small and medium-sized enterprises) and on the international embedding of ICT research and innovation.

This action plan is intended to address a number of weak points in the ICT knowledge chain in the Netherlands:

- *Weaknesses in public ICT research*
  The total volume of scientific ICT research is too meagre, and certain ICT research groups are sub-critical in size.
- *Insufficient interaction between knowledge institutions and ICT companies*
  Results from research are used insufficiently and lead too little to new products and services. Knowledge institutions and ICT companies do not collaborate enough, and the depth of their collaboration is often too shallow.
- *Insufficient involvement of ICT users*
  The supply of knowledge and ICT products and services has to be tailored to the needs of the market. ICT users must therefore direct the development of knowledge to a greater extent by formulating their challenging and innovative demand.
- *Too few leading companies*
  The application of relatively new ICT solutions continues to lag, especially in SMEs, despite these solutions offering many facilities for increasing competitive strength and productivity.
- *Insufficient international embedding of ICT R&D*
  Opportunities for international collaboration are not being exploited enough. Dutch participation in programmes such as IST and EUREKA could be better. Bilateral international collaboration also provides opportunities.

The ICT Research and Innovation Authority has been given the task of increasing ICT research and giving it focus and a critical mass. At the same time, the ICT authority must ensure proper international embedding of ICT research and better use of the results from research. We also want to realise returns on our investments in research. The ICT authority must therefore draw up a strong ICT research agenda with challenging questions, which gives direction to the entire ICT knowledge chain. The authority will therefore consist of managerial representatives from all parts of the knowledge chain, from companies as well as from the knowledge institutions.

The ICT knowledge and innovation policy will be crystallised in the next few years along the following four action lines:

Action line 1: Increasing and focussing ICT research
The ICT Research and Innovation Authority will be set up to ensure the structural increase in ICT research and the creation of centres of excellence. It will, inter alia, draw up a national ICT research agenda for this purpose. The ICT authority's tasks, skills and resources have been set down in a separate cabinet decree.

Action line 2: Accelerating innovation
There must be more interaction between knowledge institutions and companies. Bringing the users' needs for innovative ICT solutions into the open will require special attention here. The ICT authority will play a central role in this. A tool kit (including road maps) will be developed to advance this process further. In addition, active use will be made of the usual facilities (such as TechnoPartner for ICT neophytes).

Action line 3: Expansion into SMEs
A special awareness programme for SMEs will be developed by Syntens, Media Plaza and SenterNovem. Targeted seminars, workshops and advice will be used to provide SMEs with information about strategic visions of the future with respect to the significance of ICT, and inspiring ICT example projects will be shown. The ultimate goal is for SMEs to become aware of the strategic significance of ICT and to take subsequent steps.

Action line 4: Strengthening the international position of the Netherlands
Parties in the Netherlands have to participate more in international programmes (such as IST and EUREKA). The Netherlands will also have to achieve a strong position within the European Research Area and the European Technology Platforms. Work is also being done on setting up bilateral international collaboration (including with Flanders and Germany, among others).

These action lines are intended to lead to a stronger position of ICT knowledge and innovation in the Netherlands and to better use of knowledge by letting it lead to:
- new advanced ICT products and services, with which the ICT sector will generate revenue and high-quality employment opportunities;
- the wide-scale application of these advanced ICT products and services, thereby achieving innovation and product growth in business and the relief of social bottlenecks.

The government is not doing this on its own. The lead is being taken by companies and the knowledge institutions, with the ICT Research and Innovation Authority playing a central part. The government is deploying its tools and organisational power and is working closely with the parties involved in achieving these objectives.

1 Introduction

1.1 The power for innovation, a condition for economic growth

The Netherlands has to generate more growth, which requires more than wage restraint, labour market policy and healthy government financing. We need to stress productivity growth through innovation, and that is the very area where we are losing ground. The intensity of R&D in companies is falling and we have too few knowledge workers. The Netherlands possesses a great deal of high-quality knowledge, but insufficient use is being made of this knowledge for generating new products and services. The problem is pressing, because the country is not in a leading position economically at the moment. Furthermore, we are confronted with major social problems that require innovative solutions.

The Innovation Letter[1] shows how the Cabinet is facing these challenges by strengthening the innovation climate. This is being done by, inter alia, striving towards a greater number of innovative companies and by selecting focus and mass in strategic areas of innovation, in what are known as the key technologies. ICT is one of these key technologies. ICT was also named in the Wetenschapsbudget [Science Budget] 2004[2] as a national research priority. This is intended to lead to concentration, focus, and most of all to expanding the best ICT research groups. Finally, the ICT Agenda of The Netherlands[3] shows how the Cabinet wants to achieve better use of ICT, how the ICT basis will be managed and, where necessary, strengthened. ICT research and innovation is an important part of this ICT basis.

This action plan is a further interpretation of ICT research and innovation in the Innovation Letter as well as in the ICT Agenda of The Netherlands.

1.2 The importance of ICT

ICT is an enabling technology with major impact on the economy and society. A study of the Netherlands Bureau for Economic Policy Analysis[4] shows that business can achieve considerable

1 Minister and Secretary of State for Economic Affairs: Action for Innovation (October 2003)
2 Minister of Education, Culture and Science: Science Budget 2004, Focus on Excellence and Greater Value (November 2003)
3 Minister of Economic Affairs, Minister of Government Reform and Kingdom Relations and Secretary of State for Culture and the Media: ICT Agenda of The Netherlands "better performance with ICT" (February 2004)
4 Netherlands Bureau For Economic Policy Analysis: CEP-op-maat ICT 2002-2004 (April 2003)

productivity improvements by using ICT. A one-off increase of at least 0.3 of a percentage point is attainable through a 10% increase in ICT.
Productivity can also be increased by combining ICT with other innovations and by making better use of ICT.
ICT is highly significant for the extent of private R&D in the Netherlands. The ICT sector is good for no less than 38% of the total private R&D[5] and invests a considerable proportion of its added value in R&D. This means that the sector makes an important contribution to the EU objective of increasing R&D expenditure up to 3% of GDP, with 2% being privately financed.

Box 01: ICT knowledge and innovation

We are using the following definition in the innovation policy for the concept of ICT knowledge and innovation: the entire chain of development of ICT knowledge up to and including its application. ICT is thereby defined as the dynamic area of science and technology that extends from microelectronics through hardware, software, information technology, communications technology and ICT services to multimedia and combinations of all these.

ICT is inseparably linked to the innovative strength of the business world. This is not only because of the enormous variety of applications, but also through the opportunities ICT provides for the updating of products, services and processes. ICT is a multidisciplinary knowledge domain and is enabling for innovations in other knowledge domains. It also increases productivity and the creation of knowledge.
In addition, a targeted use of ICT can relieve social bottlenecks in areas such as care, education, security and mobility. A major objective the Cabinet has laid down in the ICT Agenda of The Netherlands is for the Netherlands to perform better with respect to ICT.

1.3 The international dimension of ICT

ICT plays a leading role in the objective for the EU to develop into the world's most competitive and dynamic knowledge economy within ten years. This European ambition has led, inter alia, to the Action Plan for e-Europe 2005 and is emphatically at the forefront of the EU Framework Programme. ICT, with the theme of Information Society Technologies (IST), is one of the priorities in this programma, and is thus very important in realising the European Research Area (ERA).

ICT networks don't stop at national borders, and the market for ICT products is also international. International collaboration is necessary in ICT research and development as well. Furthermore, ICT R&D is becoming increasingly footloose, with companies concentrating their world-wide R&D activities into a limited number of locations Finally, the market for ICT knowledge workers has a

5 Statistics Netherlands: De Digitale Economie 2003 [The Digital Economy 2003]

strong international character. ICT specialists are welcomed with open arms in many countries, as creative talent contributes a great deal to economic growth[6]. The EU and the Member States must therefore provide an internationally-competitive knowledge climate.

These European ambitions provide a starting point for Dutch policy in the field of ICT knowledge and innovation, all the more because the Netherlands has much to offer the ERA when it comes to ICT.

1.4 The aim of the action plan

The Netherlands has a good position in the field of ICT knowledge and innovation. The Cabinet wants to strengthen this position and at the same time make much better use of it for increasing productivity and welfare. In this way, the Netherlands will contribute to the aims of the EU.

A strong ICT knowledge position in the international field of strength is important for knowledge-intensive ICT business in the Netherlands. These companies generate revenues, added value and high-quality employment, with advanced ICT products and services. They are also needed for tailoring ICT innovations to the situation in the Netherlands, which means items such as language and culture, as well as specific Dutch challenges. The use of ICT is necessary in any case for reinforcing competitive strength and the growth in productivity in the business world employing it and for relieving social bottlenecks. This leads to the following aim:

Box 02: The aim of the action plan

This action plan is targeted at strengthening the position of the Netherlands with respect to ICT knowledge and innovation and to better use of knowledge by letting it lead to:

- new advanced ICT products and services, with which the ICT sector will generate revenue and high-quality employment opportunities;
- the wide-scale application of these advanced ICT products and services, thereby achieving innovation and product growth in business and the relief of social bottlenecks.

Innovation happens in the boundary region between fundamental knowledge and invention on the one side and concrete profitable applications in the market on the other. Knowledge has little economic value in itself when it does not lead to applications. Conversely, the flow of advanced applications diminishes when insufficient knowledge that is relevant to the market is becoming available. This action plan is targeted at the ICT knowledge chain and is intended to form the bridge between a strong knowledge position and applications in the market.

6 Demos (Richard Florida & Irene Tinagli): Europe in the Creative Age (2004)
Richard Florida: The rise of the creative class (2002)

2 The current position in the Netherlands

The Netherlands possesses recognised scientific ICT points of excellence. The country also contains a number of large international ICT companies and companies using ICT applications. At the same time, public ICT research is vulnerable and displays weak spots. Moreover, the world of research and the market do not connect with each other well enough. Insufficient use is made of knowledge, and the market makes too few challenging and innovative demands of the knowledge infrastructure. All of these aspects can be improved, especially as ICT and the ICT sector are subject to a considerable international dynamic. Appendix 1 describes where we stand and what challenges are facing us. A comprehensive qualitative description can be found in the strategic analysis of the ICT innovative system in the Netherlands7. Cap Gemini Ernst & Young, The Strategy Academy and Zenc carried out this analysis in a commission from the Ministry of Economic Affairs at the beginning of 2004. The innovation system was in that context considered as the result of a combination of companies, knowledge institutions, intermediaries, end users, infrastructural facilities and boundary conditions.

2.1 Conclusions for the ICT innovation system in the Netherlands

If we draw up the balance sheet, then our innovation system in the field of ICT is certainly not in a bad position with respect to a number of items. There are matters that do require special attention, however.

- **Weaknesses in public ICT research**
  The scant volume of public scientific ICT research, the subcritical size of some research groups and insufficient harmonisation and focus within the field of research are still bottlenecks. More direction is needed to achieve the necessary expansion, excellence and centres of excellence.
- **Insufficient interaction between knowledge institutions and ICT companies**
  Insufficient use is made of knowledge and does not lead enough to new products and services. Universities and ICT companies are too little oriented towards one another and their collaboration if often too superficial. The ICT knowledge market is not transparent enough, which is a point requiring constant attention.

7 CAP Gemini Ernst & Young, Strategy Academy, Zenc; commissioned by the Ministry of Economic Affairs: ICT Innovatie in Nederland [ICT innovation in the Netherlands] (March 2004)

- **Insufficient involvement of ICT users**
  Intensive collaboration between ICT companies and knowledge institutions is necessary to achieve their proper interaction. The global trend is that attempts are being made to match the knowledge supply to the market demand. Users (business and government) have to give more direction to the development of knowledge, through the challenging and innovative articulation of their needs.
- **Too few leading companies**
  Application of ICT still lags behind, especially in SMEs. New ICT products and services that are tailored to the needs of the business world offer many possibilities for improving competitive strength and productivity. The group of leading companies must therefore be enlarged.
- **Insufficient international embedding of ICT R&D**
  Better use can be made of the opportunities for international cooperation. The ERA has much to offer companies and knowledge institutions in the Netherlands, and that applies vice versa as well. Dutch participation in the European IST programme has not been particularly strong, and shows that we still have to make an impact there. Furthermore, we must secure our position in EUREKA and enter into bilateral collaboration with other European countries. We must also do more about the positioning of the Netherlands as an ICT knowledge country: as a partner for R&D collaboration and as an attractive place to have an office.

2.2 Policy in recent years

A number of the above weaknesses in our innovation system have existed for a long time. In 2001, the realisation of the Concurreren met ICT-Competenties (CIC) [Competing with ICT Competences] action plan laid the foundation for improvement and for constructing an excellent ICT basis for knowledge and innovation.
This action plan, which derived from the Cabinet memorandum entitled De Digitale Delta [The Digital Delta], had as its central theme the entire chain from knowledge development to application. The principal results from this policy are outlined in Appendix 2. The establishment of the ICT Forum was a major milestone (see Box 03).

Box 03: ICT Forum
The ICT Forum was set up in 2002 by the Ministers of Economic Affairs and of Education, Culture and Science. The forum's core tasks included formulating an annual vision of ICT research in the Netherlands and stimulating cooperation in ICT research. The ICT Forum presented its first report[8] in May 2003. This contains a vision of ICT research that is to be put on the agenda and is intended to create a platform for collaboration between companies and the knowledge infrastructure. One of the ICT Forum's recommendations was that a ICT Research and Innovation Authority be set up.

8 ICT Forum: Innoveren door ICT; Visie ICT-Forum; [Innovating through ICT; ICT Forum Vision]; 2003 Edition (May 2003)

3 Policy actions

Section 2.1 describes the weak points in the ICT innovation system. Via inter alia the CIC action plan, considerable efforts have been made to establish R&D priorities, to encourage strategic collaboration among companies and knowledge institutions, to accelerate applications, and to invest jointly in centres of excellence within the European Research Area. We must continue building thereon to achieve grounding and wide application of ICT in the economy. That will strengthen our economy and contribute to growth. Policy enhancement is also needed as a response to the world-wide trends that experts consider necessary for the ICT innovation system[9]. This involves:

- the increasing importance of step-by-step solution-oriented innovations for the business world;
- the need for ICT customers, ICT companies and knowledge institutions to function as a tight-knit network;
- above all the need to integrate our ICT innovation system in a European sense.

This chapter describes how that will be achieved and which parties will be involved. The ICT knowledge and innovation policy will have the following four action lines in the next few years:

Box 04: Action lines

- Action line 1: Increasing and focussing ICT research
- Action line 2: Accelerating innovation
- Action line 3: Expansion into SMEs
- Action line 4: Strengthening the international position of the Netherlands

The government's role differs for the various action lines. Where Increasing and focussing ICT research are concerned, the government naturally has a role as the financier of public research. This action plan places responsibility for the details of the choices and bringing more direction into ICT research on the field to a large degree. The government plays a stimulating and facilitating role in encouraging interaction between the companies and the knowledge institutions. In the final analysis, the companies and the knowledge institutions have to take matters into their own hands. This applies to the strengthening of the international position as well. There are a number of problems with the transfer of knowledge to SMEs, which give rise to a knowledge and culture gap between the SMEs and the knowledge institutions. Size also plays a part; companies often being too small to be able to formulate their own knowledge needs. The government has a role here in spurring companies on, using organisational capacities, financial stimuli and communication. The government will collaborate in this with sector organisations and knowledge institutions.

9 CAP Gemini Ernst & Young, Strategy Academy, Zenc; commissioned by the Ministry of Economic Affairs: ICT Innovatie in Nederland [ICT innovation in the Netherlands] (March 2004)

3.1 Action line 1: Increasing and focussing ICT research

New ways and additional efforts are needed for the structural increasing, focussing and international profiling of ICT research. They are needed in respect of European ambitions in the field of ICT and the position the Netherlands wants to take up in it. Companies and knowledge institutions have to draw up, realise and maintain an agenda for ICT research and innovation. This will require robust direction. The ICT Forum[10] therefore recommended setting up a ICT Research and Innovation Authority. This approach has already led to good experiences in the field of Genomics.

The Cabinet followed this recommendation and set up the ICT Research and Innovation Authority[11]. This body's task is to increase the cohesion and dynamics of the knowledge chain from research to application.
It has therefore been given a mandate for the strategic supervision and structural strengthening of ICT research and for guaranteeing that use will be made of the results from research. The ICT authority will also fill an important role in realising this action plan.

The Science Budget 2004 provides the framework for increasing: a smart mix of performance costing, interaction and focussing. This means that additional money will go to the knowledge institutions, based on what they achieve in terms of performance and readiness to focus and concentrate, and the insight into the use of results from research. ICT was declared in the Science Budget 2004 to be a "national priority" and in the Innovation Letter to be a "key technology", and will therefore employ this smart mix.

Box 05:	Actions for Increasing and focussing ICT research	
Actions	Actions in detail	Status
1. Setting up the ICT Research and Innovation Authority	The ICT authority brings strategy into ICT research and ensures its expansion in terms of increasing volume, focus and excellence. It must also start the innovative articulation of demand and ensure the use of knowledge. Establishment by the Ministers of Economic Affairs and Education, Culture and Science. *Parties involved* Ministry of Economic Affairs, Ministry of Education, Culture and Science, ICT Forum, NWO, STW, SenterNovem, as well as companies and knowledge institutions.	Cabinet Decree to the Lower House at the same time as this action plan. Preparations in full flow (2nd half of 2004)

10 ICT Forum: Innoveren door ICT; Visie ICT-Forum; [Innovating through ICT; ICT Forum Vision]; 2003 Edition (May 2003)
11 Cabinet Decree concerning the ICT Research and Innovation Authority

Concrete objectives

The Ministry of Economic Affairs, the Ministry of Education, Culture and Science and the NWO will conclude a covenant about the design of the ICT authority. The authority's concrete, accountable and measurable performance criteria, based on its objectives, will be worked out in the covenant.

3.2 Action line 2: Accelerating innovation

Knowledge institutions and companies still collaborate insufficiently, and what collaboration there is is often too superficial, which means that the use of the knowledge that has been accumulated (valorisation) leaves much to be desired. There is every reason to allow knowledge to lead more quickly to innovative ICT products and services, particularly now that there is considerable public/private investment in ICT (including Bsik).

Box 06: From knowledge to innovation
Knowledge has to lead more quickly to ICT innovation, and • for user companies, to lead to increased productivity, flexibility and competitive strength; • to contribute to relieving social bottlenecks; • for ICT suppliers, to generate revenues and strengthen their international knowledge and competitive position.

Knowledge supply and demand – or, in other words, research domains and areas of application - have to be linked to each other. Going forward together is essential. Leading ICT users must be challenged to specify their needs better and thus give direction to technological development. Innovative demand must therefore be more clearly visible. This fits in with the tendency for leading ICT companies to direct their innovation strategies more and more towards customer-oriented solutions. Examples are areas of application such as manufacturing industry, as well as social areas such as healthcare, mobility and security (see the ICT Agenda of The Netherlands).

The ICT Research and Innovation Authority will be working on making better use of knowledge. The knowledge institutions and companies are initially responsible for this themselves, of course, which is why Bsik is stipulating the relevant criteria and conditions to the consortia and a monitoring system is being set up. More attention to making better use of knowledge is also required in general. The Wet op het hoger onderwijs en wetenschappelijk onderzoek [Higher Education and Scientific Research Act] (WHW) also charges the universities with transferring knowledge to society. It will be established whether that valorisation is part of the transfer of knowledge, so that resources from the state contribution can be allocated to the universities for the purpose. An item will be included in the costing to cover this.

There are other additional tools for bringing knowledge to the market more quickly, such as

application and technology roadmaps, or brokerage events. There have been good experiences with these tools. They are suitable for strengthening the interaction between companies and knowledge institutions. The possibilities for experimental environments and lowering the thresholds for initial applications are also being examined. The ICT Knowledge Congress and the ICT Scan[12] (a scan of the ICT infrastructure in the Netherlands) can play a good part in making the knowledge market more transparent.

An important element in making use of knowledge within ICT knowledge institutions is the extent to which spin-offs in the form of technostarters are created. These companies starting up have the potential for growing faster then "ordinary" starters, are a source of creative renewal, and are of major significance for the future growth of labour productivity and employment in this country. The number of spin-offs from knowledge institutions in the Netherlands continues to be behind that in other countries[13]. The TechnoPartner action programme has been set up to improve the technostarter climate, and is a generic programme from which the ICT sector can and must profit.

Other parts of the generic policy and facilities (including subsidy facilities) will have to be used as well. This certainly applies to encouraging R&D, and also in the field of knowledge workers. A renewed approach[14] has been developed for the latter item, and the ICT field can profit from this as well.

Box 07	**Accelerating innovation**	
Actions	Actions in detail	Status
1. Charging the ICT authority with the valorisation task	The ICT authority also has a task in the field of valorising knowledge. This is in partnership with the relevant parties, using existing and new tools (see also Action 2) *Parties involved* The Ministry of Economic Affairs and the Ministry of Education, Culture and Science give the task to the ICT authority in close collaboration with the ICT Forum, NWO, STW and SenterNovem	Will be set forth in the establishment covenant (see box 05)

12 TNO-STB: ICT Scan 2003

13 Secretary of State for Economic Affairs and Minister of Education, Culture and Science: TechnoPartner Action Programme, "Van kennis naar welvaart" [From Knowledge to Welfare] (January 2004)

14 Ministers of Education, Culture and Science, and Economic Affairs and the Secretary of State for Social Affairs and Employment: Deltaplan Bèta/Technology (December 2003)

2. Developing toolkit and facilitating valorisation processes	Designing a toolkit that can be used by the Bsik consortia and the ICT authority, among others. The purpose of this toolkit is to bring knowledge to the market more quickly. It is essential that the tools (including roadmaps en brokerage events) contribute to the interaction between knowledge institutions, ICT providers and application areas. *Parties involved* The Ministry of Economic Affairs and SenterNovem will develop the toolkit in collaboration with the ICT authority and NWO.	Preparation in progress, the toolkit will become available in the 2nd half of 2004.
3. Active use of the technopartner's facilities	Considering the importance of technostarters as a spin-off from knowledge institutions and from the Bsik consortia, potential starters will be actively passed on to the Technopartner Platform. *Parties involved* Technopartner Platform, SenterNovem, Bsik consortia and the ICT authority.	Continuous activity
4. Active use of the normal subsidy facilities	Use of the normal policy and the subsidy facilities for the ICT key technology, including: • WBSO; • Innovation subsidy collaborative projects; • The Delta Bèta/Technology Plan provides a knowledge framework for ICT knowledge workers • Experiment in encouraging public/private mobility (mutual exchange of researchers in accordance with Innovation Platform recommendation); • In addition, Dutch employees will be directed to the European subsidy facilities (EC Liaison Bureau). *Parties involved* Including SenterNovem as a contractor in a commission from the Ministry of Economic Affairs.	Continuous activity

Concrete objectives

The concrete objective of Action 1 has already been set out in Action Line 1. Efforts will be made in Action 2 (toolkit for the valorisation of knowledge) to achieve at least the following numbers before the period 2004 to 2007 inclusive:

- 4 large-scale roadmaps;
- 8 brokerage events.

The objectives and indicators in the relevant subsidy regulations apply to the other actions (the use of normal facilities of the Ministry of Economic Affairs). Separate accountability applies to Bsik and technopartners.

3.3 Action line 3: Expansion into SMEs

ICT leads to new, innovative products and services, and plays an important role in increasing productivity[15]. There is a lot to gain in this area, especially in SMEs. Good use can be made of the NGSs (next generation scenarios) that have been drawn up in the context of the CIC action plan (see Appendix 2, Section 1) to stimulate them. Advanced ICT breakthrough projects that have already been realised in the business world can make SMEs enthusiastic about ICT.

The CIC awareness programme, which brings relatively new and advanced ICT products and services to the attention of the SMEs, was started up at the beginning of 2004. Syntens, SenterNovem and Media Plaza will be realising the programme in a commission from the Ministry of Economic Affairs. Sector organisations will also be involved. These organisations can expand the support base of the CIC awareness programme, and moreover can spur their members into action.

The Hoger Onderwijs en Onderzoekplan [Higher Education and Research Plan] (HOOP) states that it intends to promote the formation of networks between HBO [Higher Vocational Education] and SMEs. HBO establishments and the Regionale Opleidingen Centra [Regional Educational Centres] can build important bridges to this part of the business world.

Box 08	Actions for expansion into SMEs	
Actions	Actions in detail	Status
1. Realising the CIC awareness programme	Next Generation Scenarios and ICT breakthrough projects, among other things, will be brought to the attention of SMEs via seminars, workshops and individual actions, and companies will be spurred into action. There are three parts to the CIC awareness programme: 1. Increasing the number of early adopters of ICT under the "leading" SME. The aim is making better use of ICT for competitive strength and productivity. Companies will be approached actively. Selection will be by involving the sector organisations. A limited group of companies who want to take steps towards strategic investment can receive tailor-made advice. They will serve as an inspiring example for SMEs following technology. Syntens will be providing the tailor-made advice, and expertise from the market will be involved as required. 2. Promoting innovative articulation of demand. The aim is to encourage SMEs to formulate their need for new ICT solutions, so that ICT companies (in combination with knowledge institutions) will feel challenged to come up with renewed solutions.	Already started in January 2004 Starting in the 2nd half of 2004

15 Netherlands Bureau For Economic Policy Analysis: CEP-op-maat ICT 2002-2004 (April 2003)

	3. Expanding into the upper layer of companies following technology. These companies can improve the effectiveness of running their businesses and achieve higher productivity by using existing advanced ICT applications. *Parties involved* The implementers are Syntens, SenterNovem and Media Plaza, in a commission from the Ministry of Economic Affairs, in close collaboration with knowledge institutions.	Starting in the 2nd quarter of 2004

The links between the CIC awareness programme and the Nederland Gaat Digitaal [The Netherlands Goes Digital (NGD) programme will be investigated in the near future. The CIC awareness programme will bring relatively new technology to the attention of the SMEs. This distinguishes this programme from the NGD, which aims to promote e-commerce in the companies that follow technology. It primarily involves generally-applied proven technology. There is a strong connection between NGD and the ICT conditions (security and trust) part of the ICT Agenda of The Netherlands. NGD will be oriented more in the near future towards the total concept of e-business. This will create more opportunities for synergy with the CIC awareness programme.

Concrete objectives

The numbers below show the objectives for this action line for the period of 2004 to 2007 inclusive:

Targeting the leading SMEs:	
60 seminars	reach: 2500 companies
80 workshops	reach: 1280 companies
400 individual consultations companies	reach: 400
Targeting the SMEs that follow technology:	
24 seminars	reach: 480 companies
70 workshops	reach: 700 companies
200 individual consultations	reach: 200 companies

The programme will be subjected to an intermediate assessment in the second half of 2005 The results of the assessment could lead to adjustment of the programme and the above objectives.

3.4 Action line 4: Strengthening the international position of the Netherlands

The accumulation of ICT knowledge has a strongly international character. Trail-blazing research takes place in the context of international collaboration and happens in many locations around the globe, which is why our ICT innovation system has to be linked properly to developments in the field of international research.

Box 09: Putting the Netherlands on the map

Strengthening the position of the Netherlands in the international ICT R&D field is important in profiling the Netherlands as:

- an attractive partner, for staying connected with excellent international research (European Research Area, EU Framework Programme/IST, EUREKA, etc.)
- an attractive ICT country: for attracting ICT companies and ICT knowledge workers to the Netherlands or keeping them there.

Countries such as France and Germany invest large amounts in strong ICT knowledge centres that comprise a source of high-quality research and production. The Netherlands also wants to play a substantial part in the European Research Area (ERA), which is why we have to strengthen our ICT knowledge position from the point of view of complementation and international collaboration. The incentive of Bsik is a good basis for creating centres of excellence for and increasing ICT research. Existing strengths in the country in the ICT field will therefore continue to be built on. Moreover, we in the Netherlands have major private R&D centres such as Eindhoven (with Philips, ASML and many smaller companies) and Nijmegen (Philips). Important tools for shaping the European Research Area are the EU Framework Programme and the European Technology Platforms, which are still under development.

The ITEA (embedded & distributed software) en MEDEA+ (microelectronics) cluster projects are of particular importance within EUREKA. Both these projects are intended to enable Europe to take a leading role in these areas. The major European ICT companies and leading knowledge institutions[16] are directing and implementing these programmes. Dutch participation is very important in order to be able to be linked with this leading research. Participants in EUREKA projects have to call on the national subsidy facilities. Supporting Dutch participants in the near future will be via, inter alia, the normal Ministry of Economic Affairs technology facilities[17].

16 Such as IMEC (B), Fraunhofer (D) and LETI (F)

17 Except for the participation of Philips, which is financed from the Philips Kaderafspraak [Framework Agreement].

Box 10: Bilateral collaboration between the Netherlands and Flanders
Collaboration does not have to be solely in the context of the EU Framework Programme or EUREKA. Bilateral collaboration with neighbouring countries, for example, offers good opportunities for strengthening our international knowledge position. In this way, the "knowledge triangle" of Eindhoven, Leuven and Aachen offers a knowledge climate with a powerful combination of technological strengths. The Minister of Economic Affairs and his Flemish counterpart recently signed a joint declaration of intent for strengthening collaboration in this region. The ICT Research and Innovation Authority will extend this collaboration even further. One of the initiatives begun is the joint programme called "Taal en Spraak Technologie" [Language and Speech Technology]. Embedded systems, microsystem technology and nanotechnology also provide opportunities for collaboration, including in a European context via an initiative for the ERA network.

There is a certain extent of awareness abroad that Dutch companies and research establishments possess high-quality ICT knowledge that applies internationally. Our image as a leading ICT country is not yet good enough, however. The Dutch presidency of the EU in the second half of 2004 will offer us an excellent chance of enhancing our profile. This can be achieved via, among other things, the large-scale IST Event 2004 that will be held in the Netherlands in November 2004.

The High Tech Connections (HTC) Forum took place in Silicon Valley at the beginning of 2004. This forum was an ICT initiative by the US ambassador in the Netherlands and the Secretary of State for Economic Affairs. Ten leading companies supported the initiative. The aim was to offer Dutch and American companies, institutes, universities and R&D departments a platform for technological collaboration, especially in the areas of broadband & grids, embedded systems and nanotechnology. The HTC Forum was most successful in this respect. The parties involved are working at the moment on a follow-up and on continuing the networks created. A second forum is planned in the US in May 2005.

Box 11	Actions for strengthening the international position of the Netherlands	
Actions	Actions in detail	Status
1. Promoting Dutch participation in the IST programme	The aim is to broaden and strengthen the participation of Dutch companies and knowledge institutions in the Information Society Technologies (IST) programme. This will be achieved by identifying opportunities, organising information events and providing guidance when submitting project proposals. This will make the thresholds for participation as low as possible. *Parties involved* SenterNovem (EC Liaison Office) in a commission from the Ministry of Economic Affairs, in collaboration with the ICT Research and Innovation Authority. Bsik consortia are themselves obliged to seek connections with international research.	Activities starting during 2004

2. Achieving a robust position within EU facilities	The results of the assessment of the new tools will become available during the Dutch presidency in the 2nd half of 2004. These are the Integrated Projects (IPs) and Networks of Excellence (NoEs). The results will be the basis of any changes to the EU tools to make them more attractive to industry. *Exploiting the opportunities the European Technology Platforms will be offering* The Dutch parties have to achieve a robust position on these platforms. *Parties involved* Primarily the business world and knowledge institutions (including the Bsik consortia). Encouraging role of the Ministry of Economic Affairs and the Ministry of Education, Culture and Science, with the involvement of the ICT authority.	2nd half of 2004, as soon as the plans have been crystallised out in an EU context.
3. Promoting Dutch participation in EUREKA	The aim is to promote participation by Dutch companies and knowledge institutions in ITEA and MEDEA+. Potential participants (both large and small companies) will be actively approached, and guided where necessary. *Parties involved* SenterNovem (EC Liaison Office) in a commission from the Ministry of Economic Affairs, and also the participation of the ICT authority and the Bsik consortia.	Starting during 2004
4. Setting up bilateral collaboration with Flanders and Germany	Work is being done in the Eindhoven, Leuven, Aachen triangle, among others, on strategic collaboration and strengthening of fields such as embedded systems, microtechnology and nanotechnology Exploratory talks with Flanders have already begun. *Parties involved* Ministry of Economic Affairs, Ministry of Education, Culture and Science, ICT authority, knowledge institutions, Flanders, the business world	Exploratory talks started. Regular harmonisation of research agenda.
5. Starting the Language and Speech Technology programme	Language and Speech Technology innovative programme. Concerns setting up basic language facilities, innovation-oriented research and stimulating demand. *Parties involved* Ministry of Economic Affairs, Ministry of Education, Culture and Science, NWO, Nederlandse Taalunie [the Dutch Language Union], the business world, Flanders.	Preparation in progress. Starting at the end of 2004.

6. Working on the ICT image of the Netherlands	The aim is to profile the Netherlands internationally as an ICT country. An important element in this will be the IST Event. Our strengths in the field of ICT will be shown in a Netherlands pavilion. The intention is that the Netherlands will be well represented by participants, speakers and stands. Information about the strengths of the Netherlands will be collected and distributed as a supporting measure. The ICT authority will as a result gradually position itself internationally as an authoritative point of contact for ICT research in the Netherlands. *Parties involved* Ministry of Economic Affairs, with the involvement of TWAs, NWO and the ICT authority.	The IST Event will take place on 15-17 November 2004. Preparations have begun.

Concrete objectives

The more detailed objectives of actions 2 and 6are difficult to translate into concrete objectives. The following general objective applies to the remaining actions:

increasing technological collaboration between Dutch companies and knowledge institutions on the one hand, and foreign partners on the other (including in the IST programme, in EUREKA, and in the context of bilateral collaboration)

This objective cannot be designated with target figures, because the effects of the government on it are limited. Companies and knowledge institutions will eventually decide for themselves whether they will participate in technological collaboration programmes. The government can influence this decision-making only to a certain extent.

4 Financial aspects

Budgets the Cabinet has already made available, such as Bsik and the normal facilities, will be used for this action plan. Specific funds will be deployed for a number of activities in this action plan. Below is an overview of the deployment of resources[18]:

- The budget for the specific activities in this action plan for the period from 2004 to 2007 inclusive is € 8.5 million (see Box 12).
- The budget available to the ICT Research and Innovation Authority. The ICT authority will have joint control of the resources that have already been made available from the Ministry of Economic Affairs and NWO for fostering and managing ICT research and innovation. Furthermore, additional resources will be released for ICT research. This involves an amount of € 10 million in the short term – up to and including 2006. This money will come from the knowledge envelope that the Cabinet has made available for investment in the knowledge economy. The NWO will also invest € 5 million during the same period. Additional resources from 2007 onwards will be determined later for details (see the cabinet decree for establishing the ICT authority).
- A budget is also available for Dutch participation in the ITEA and MEDEA+ EUREKA projects. This will be at least € 150 million for the period from 2004 to 2007 inclusive[19].
- For the sake of completeness, the promised subsidy for the ICT consortia in the context of Bsik can also be mentioned here. The total amount involved is € 215 million.

Box 12: Allocation of the specific budget of € 8.5 million for this action plan	
Action line 1: Increasing and focussing ICT research • ICT Research and Innovation Authority	token entry[20]
Action line 2: Accelerating innovation • "Accelerating innovation" toolkit	€ 1.50 million
Action line 3: Expansion into SMEs • CIC awareness programme	€ 4.00 million
Action line 4: Strengthening the international position of the Netherlands • Strengthening the international position of the Netherlands	€ 0.50 million
• Language and Speech Technology (supplement to amounts from the IOP [Innovation-Oriented Research Programmes] budget, Ministry of Education, Culture and Science/NWO and Flanders	€ 1.25 million
Other ancillary activities (such as the opening congress, communications, research, feasibility studies, etc.)	€ 1.25 million

18 Apart from the call that ICT will make on the generic facilities, such as the [Innovation Subsidy for Collaborative Projects], technopartners and so forth, because they cannot be estimated in advance.

19 Including the Philips Framework Agreement

20 Involves costs for the ICT authority bureau, for which detailed arrangements will be made in the covenant yet to be entered into by the Ministry of Economic Affairs, the Ministry of Education, Culture and Science and NWO.

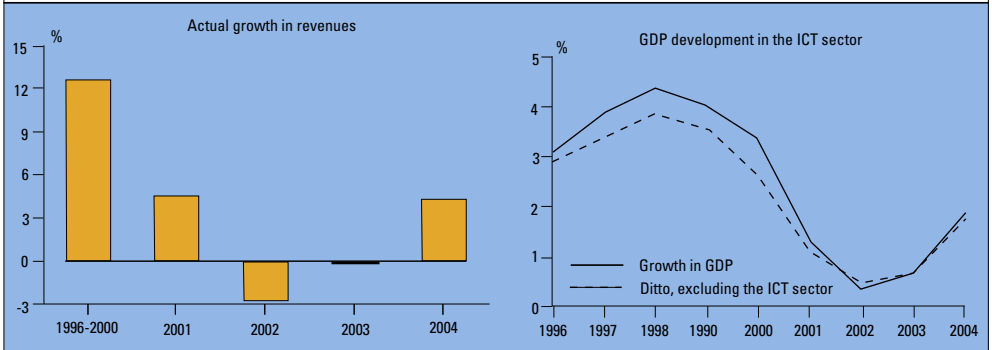
Appendix 1: *The current position in the Netherlands*

1. Dynamics and trends in the ITC sector

ICT companies have had to withstand heavy going all over the world. There was talk of stagnating revenues, reorganisations, consolidation and diluting R&D activities. Partly because of this, gaps appeared in the Dutch R&D environment, especially in the telecommunications field. With the end of the Internet hype, the boom in ICT starters has also ceased and financiers are holding back, which is one reason why the conditions for ICT starters is still difficult.
Nevertheless, the proportion of ICT among technostarters remains considerable, with 60% of them being ICT companies. In 2003, 47 of the 50 fastest-growing companies in the Netherlands[21] were active in ICT.

With companies such as Philips and ASML, the ICT sector contains the numbers 1 and 4 national R&D companies. The sector has a considerable share in our economy, growing from 4.5% of GNP in 1995 to 5.44% in 2004[22]. Its contribution to employment also grew in the same period by approximately one percent (from 3.53% to 4.60%). The economic malaise in 2002 caused talk of shrinkage; moderate growth is expected again from 2004. Box 13 shows the real growth in revenues in the ICT sector, as well as the effect of the ICT sector on the growth in GDP.

Box 13: Real growth in revenues in the ICT sector and the effect on growth in GDP



Netherlands Bureau for Economic Policy Analysis: CEP-op-maat ICT 2002-2004 (April 2003)

21 Deloitte & Touche; 2003 Technology Fast 50 winners (2003)
22 Statistics Netherlands: De Digitale Economie 2003

The ICT market is undergoing fundamental changes at the moment. There are three global trends that are closely intertwined[23]:

1. Falling threat from hypercompetition[24]
   The emphasis has moved from shortening time to market and first mover advantages towards more attention to quality, harmonisation with customers and collaborative partners and the durability of products and services.
2. Increasing maturity of the ICT sector
   Innovations are increasingly being driven by industry insiders and "experienced" starters.
3. Progressive globalisation
   The playing field for innovation is increasingly the world market. The same applies to production. Low income countries such as China and India are powerful attractive forces.

These trends have led ICT companies operating internationally to shift their innovation strategies. Box 14 shows an overview.

Box 14: Shifts in innovation strategy within the ICT sector[25]

	Emphasis in the 90s		***Added since then***
from	technology-driven	to	solution-driven
from	revolutionary innovation	to	step-by-step innovation
from	nationally-organised innovation	to	internationally-embedded innovation
from	standalone orientation	to	collaborative orientation

Tightly-knit collaboration with user companies and the international dimension of innovation strategy are therefore becoming increasingly important. Dutch companies and knowledge institutions will have to take advantage of this in the next few years.

2. International collaboration

The international ICT business world with R&D imposes high demands on the knowledge environment, which has to be internationally competitive and excellent.
Moreover, there has to be good links with international developments. After all, Dutch companies and knowledge institutions cannot develop all the knowledge in house, so international collaboration will have to provide it. The facilities for doing this are not yet used sufficiently.

23 CAP Gemini Ernst & Young, Strategy Academy, Zenc; commissioned by the Ministry of Economic Affairs: ICT innovation in the Netherlands (March 2004)

24 The situation in which companies invest continuously in new, revolutionary concepts in order to stay ahead of the competition, as a result of which less attention is paid to profitability.

25 CAP Gemini Ernst & Young, Strategy Academy, Zenc; commissioned by the Ministry of Economic Affairs: ICT innovation in the Netherlands (March 2004)

Important platforms for international collaboration are the EU Framework Programme (see Box 15) and EUREKA[26], but bilateral collaboration is also important.

Box 15: Promoting Dutch participation in the IST programme

Large companies as well as the knowledge infrastructure are reasonably well represented within the European Information Society Technologies (IST) programme. Nevertheless, with a share of the budget of approximately 6%, we are just below the proper level of return[27]. There is room for improvement.

If we look at the number of projects with Dutch participants, this picture does become somewhat changed. We are taking part in 42% of the projects, which means that Dutch participants have access to 42% of the results.

Dutch companies have a leading role in the MEDEA+ (microelectronics) en ITEA (embedded and distributed software) projects in EUREKA. They are good for approximately 20% of the total volume of research. This gives the companies concerned access to very advanced international research in these fields, with major European research and development centres (such as Crolles (F), Dresden (D), Leuven (B), Nijmegen and Eindhoven) being involved. These projects are crucial for maintaining “high end” production and research efforts, forming a counterbalance to the competition from Asia and the United States.

Recent investments in the public/private accumulation of ICT knowledge (the Bsik subsidy scheme) have given the Netherlands the opportunity to achieve a strong position within the ERA. We have to also look for more collaboration with our neighbouring countries to combine each other’s strong points. Furthermore, the European Commission is busy setting up European Technology Platforms, including those in the fields of nanoelectronics and embedded systems. These platforms provide good facilities for putting Dutch interests and strengths on the agenda for the next Framework Programme.

As far as the climate for setting up ICT company sites is concerned, the Netherlands scores respectably within Europe, thanks to a good combination of cost and qualitative advantages[28] The United Kingdom, Ireland and Sweden are the major competitors.
Effective tax burden has been shown to be the most critical factor in location when it comes to a choice between regions, followed by the international ICT image of the region concerned.

26 Pan-European network for market-oriented industrial R&D

27 The proper level of return is that which corresponds to the share of the Dutch contribution to the EU budget.

28 Ernst & Young ILAS, in a commission from the van Ministry of Economic Affairs: ICT vestigingsklimaat, een internationale benchmarkstudie [ICT establishment climate, an international benchmark study] (August 2001)

the Netherlands has a number of strong research establishments and research groups. We have internationally-recognised scientific excellence, which is demonstrated by, among other things, the citation impact, where the Netherlands is among the best in the world in the field of ICT[29].The Netherlands is strong in the following five ICT areas: multimedia, embedded systems, software engineering, broadband technology and grids. Furthermore, in GigaPort we have one of the most advance research networks in the world, with outstanding international connectivity. Yet this doesn't mean that everything is in order. The volume of scientific ICT research must be considerably increased. Moreover, research in some areas is on too small a scale. The extent of private R&D is also lagging a great deal. Both the Task Force ICT-en-Kennis[30] and the ICT Forum[31] designate this increase as an important challenge. The Bsik incentive is a good spur for this, but more is needed for a structural increase. The underlying base of ICT knowledge must be increased sustainably, on the one hand to maintain a strategic focus using Bsik, and on the other to enable new insights to be developed constantly, and thereby ensuring the dynamic in ICT knowledge development. Initiatives have been taken in recent years in the context of policy and fostering research, but according to the latest ICT scan[32] they have had limited penetration into the structure and organisation of the research world.

Box 16: ICT Scan 2003, some findings

- The structure and organisation of ICT research has little dynamic, but IST and Bsik (even in the preparatory phase) have been shown to have more structural and stimulating significance.
- There has been a certain shift from fundamental to strategic research (especially within informatics).
- The technical universities have been more successful than the general universities in creating powerful centres of excellence.
- There has been modest growth in the number of dedicated researchers in informatics research.
- The collaboration between knowledge institutions and the business world has shown little growth and remains limited.
- The same applies to internationalisation. The IST programme has a stimulating effect, it is true, but the participation of Dutch researchers lags behind in other European programmes.

The ICT scan distinguishes two categories within ICT research: Informatics research and research in the fields of telecommunications, microsystem technology and hardware (TMH). Almost all universities are carrying out informatics research, often to support research and education in other

29 Ministries of Economic Affairs, Internal Affairs and Kingdom Relations, Finance, Justice, Education, Culture and Science: International ICT test 2002

30 ICT-en-Kennis [ICT-and-Knowledge Task Force] (Le Pair): Samen, strategischer en sterker [Together more strategic and stronger] (July 2001)

31 ICT Forum: Innoveren door ICT; Visie ICT-Forum; [Innovating through ICT; ICT Forum Vision]; 2003 Edition (May 2003)

32 TNO-STB: ICT Scan 2003

disciplines. The departments involved in informatics research are mostly of limited size. There is relatively little mutual task sharing and creation of centres of excellence. This was shown in ICT Scan 2001 and is still the case in Scan 2003. There is a moderate positive development, however, the growth in dedicated staff and the beginning of creation of centres of excellence.
The other category (TMH) is better when it comes to size and the creation of centres of excellence. There is a noticeable formation of establishments visible within and between the technical universities, and there is talk of a clear creation of centres of excellence that is increasing in significance. We have a modest number of researchers, however, when compared with international yardsticks.

4. ITC users

The Netherlands is in a leading position internationally when it comes to expenditure and investment in ICT (see Box 17). That is good for the application of ICT and for our competitive position. The banking sector, insurance bodies, manufacturing industry and the chemical industry, among others, invest heavily in ICT, but the growth of productivity in the Netherlands is nevertheless lagging. Although it is not dependent only on ICT, it seems that we make insufficient use of investment in ICT for making productivity grow. Section 1.2 of the action plan cites a study by the Netherlands Bureau For Economic Policy Analysis, which shows that there are still good opportunities here.

The increase in the complexity of ICT makes considerable demands on the level of knowledge in user companies. The manageability and integration of various ICT applications require a great deal of attention. Companies also have to make as much use as possible of the positive effects of ICT on productivity. In practice, they predominantly choose proven techniques. The opportunities for more innovative technology are seized to a much lesser extent. This applies particularly in SMEs, where just a small group is in a leading position.

Box 17: The application of ICT

The Netherlands is at the top internationally as far as ICT expenditure is concerned, with a total of approximately 8% of GDP[33]. The demand for ICT products and services had fallen as a result of the economic headwind. There was even talk of a fall in revenues from 2002 onwards. Modest growth was expected again in 2004[34]; the Nederland-ICT sector association is assuming 4.4%. The Dutch government is in the middle group in Europe as far as ICT applications is concerned, with twenty on-line government services, just below the EU average.. The Netherlands is one of the countries growing the fastest in this field, however[35].

33 Statistics Netherlands: De Digitale Economie 2002 (the figures quoted refer to the situation in 1999)
34 Netherlands Bureau For Economic Policy Analysis: CEP-op-maat ICT 2002-2004 (April 2003)
35 Statistics Netherlands: De Digitale Economie 2003

ICT users – together with ICT providers – must orient themselves more towards setting challenges for the world of ICT research. There is no clear demand for innovation in ICT applications, and this is a major cause of the lack of interaction between businesses and the knowledge institutions.

Appendix 2: *Policy in recent years*

The policy in the field of ICT knowledge and innovation has been shaped since 2001 by the Competing with ICT Competences action plan. This works along three lines:

- Forming networks of ICT clusters
- Knowledge and technology
- Knowledge carriers and the efficient use of ICT

The most important results are shown in brief in this appendix. More detailed information can be found on the www.cic-online.nl website.

1. Forming networks of ICT clusters

The aim was to encourage breakthroughs in important areas of application, which was done by working together with trendsetters in the market. Nine Next Generation Scenarios (NGSs) were drawn up to achieve this. These scenarios outline the situation that it is desired to achieve in these areas of application in a few years' time and the role that ICT can play therein. ICT breakthrough projects gave concrete detailing of the scenarios. These projects are about the multidisciplinary collaborative relationships of the innovative companies and the knowledge infrastructure.

Six brokerage events with some 800 participants were organised to promote the setting-up of breakthrough projects. Thirty ICT breakthrough projects have been subsidised with € 42.1 million. These projects involve companies from various application areas, such as the manufacturing industry, the care sector, transport and the communications sector. The total extent of the projects is € 105.4 million, and some 1291 parties are collaborating in them.
More information about the Next Generation Scenarios and the breakthrough projects can be found at www.cic-online.nl. The breakthrough projects, which are still in the area of pre-competitive research, will lead to commercial applications. For the moment they are mostly about generic ICT concepts that can already serve as inspirational examples.

Box 18: Boderc, an example of an ICT breakthrough project

Océ Technologies' Boderc project, in collaboration with Philips, the Embedded Systems Institute, 3 universities and 3 small companies, is directed at the area of multidisciplinary design and development methods for embedded systems in complex machines (such as an advanced printer).
The predictability and reliability of this sort of intelligent product is determined largely by the quality of the collaboration between multidisciplinary development teams. It is intended to lead to new design and development methods, which will ensure a significant improvement in operating performance in the entire machine and equipment manufacturing sector.
It is a very advanced project that is being followed with great interest by interested experts well beyond the borders of the Netherlands. Its duration is four years and it involves seventeen man-years of research.

The various scenarios and breakthrough projects form a good basis for a strategic future-oriented application of ICT. It is important now that the results achieved in the project are disseminated widely, serve as an example and lead to innovative following-up by other companies.

2. Knowledge and technology

The aim was to increase the accumulation of knowledge attuned to market needs and to make better use of this knowledge. Several new research programmes that meet important priorities have therefore been started in collaboration with the business world and the knowledge institutions. Examples of such programmes are Freeband, for the new generation mobile Internet, Jacquard in the field of software engineering, and the Embedded Systems Instituut, which is important for our manufacturing industry[36]. NWO has structurally doubled the scientific ICT research budget for the period 2003-2007, which is a considerable step forwards.
The Nationale Onderzoeksagenda Informatica [National Informatics Research Agenda] (NOAG-i) has been realised and the Informaticaonderzoek Platform Nederland [Netherlands Informatics Research Platform] (IPN) has been set up with the aim of giving informatics a stronger position in the Netherlands as a scientific discipline.
A collaboration platform for research schools has also been created. Financial resources have additionally been employed to stimulate the robust participation of Dutch companies in the ITEA and MEDEA+ EUREKA programmes.

The annual ICT knowledge congress with its associated knowledge market has been shown to be a successful formula for stimulating research and determining the research agenda. It attracted some 1500 participants and provided for intensive interaction between the innovative business world and the research world. Bsik has given a considerable boost to the \ICT knowledge chain (see Box 19). Together with businesses, knowledge institutions and the ICT Forum favourable priorities for the Netherlands were established, and consortia of companies and knowledge institutions were created.
With these investments, we can strengthen our position in the European Research Area in combination with the excellence in other countries.

36 As well as the examples mentioned here, a number of Innovative Research Programmes have bee started, as well as the NWO's cognition, biomolecular informatics and computational science programmes.

Box 19: ITC strengths are being extended further with Bsik

Consensus has been reached in recent years about the ICT fields in which the Netherlands is strong[37]. This was confirmed by the ICT Forum in its [Vision 2003]. It covers five areas: multimedia, embedded systems, software engineering, broadband technology and grids. The Dutch position in these areas will be strengthened further in the coming period, thanks to the boost from Bsik (ICES/KIS-3) at the end of 2003.
Nine projects with a total of € 215 million in subsidies have been included in Bsik's ICT section . These projects will start this year. Three projects with a total of € 165 million have been included under microsystem technology and nanotechnology (closely related to ICT). The total investment involved in all of these projects is at least double this amount.

These results are a good start in strengthening the public/private ICT knowledge infrastructure. Certainly as far as the first and second money streams are concerned, this is not enough, however, to do away with the weaknesses in the too scant volume of public scientific ICT research and the too small scale of certain research groups. The boost from Bsik is considerable but incidental. Bsik does not lead intrinsically to structural grounding in the existing research order. Our research agenda must be maintained and needs strong direction.

3. Knowledge carriers and the efficient use of ICT

The aim was the expansion of ICT expertise and efficient use thereof. Collaboration between companies and educational establishments has improved considerably in recent years. As a result of the economic downturn, the employment market for ICT experts is by no means as tight as it was a number of years ago. The Netherlands Bureau For Economic Policy Analysis is nevertheless predicting that pressures can occur again when the economy improves. The shortage is a continuing problem in the sector with the real knowledge workers.
To encourage the efficient use of scarce expertise, an inventory of bottlenecks has been drawn up with ICT-intensive companies and a action plan established[38]. The companies themselves will implement the recommendations in house, including items such as the use of open standards.
A specimen open source programme especially for the SMEs has been started by Syntens and the sector organisations. The Ministry of Internal affairs and Kingdom Relations and the Ministry of Economic Affairs have themselves set up the OSOSS[39] programme for the government. The programme will run until 2006 and will promote the use of open standards and open source software within the government.

37 Task force ICT-en-kennis: Samen, strategischer en sterker (July 2001).
38 Ministry of Economic Affairs (in close collaboration with 11 companies): Strategische Inzet van Software in Nederland [The strategic use of software in the Netherlands] (May 2002)
39 OSOSS stands for "Open Standaarden en Open Source Software voor de overheid" ["Open Standards and Open Source Software for the Government"; see also www.ososs.nl for further details.

4. Lessons learned

One aspect stood out as extremely important in all policy actions in recent years: intensive collaboration with the parties in the field. This ensured a broad support base for those activities, but also led to the parties themselves becoming more active. What was new was that stakeholders in important areas of application were involved in setting up the Next Generation Scenarios (NGSs) in order to create an innovative ICT demand. This turned out to be an inspirational way of working that led to many breakthrough projects. Now that the NSGs are available, the time has come to disseminate the stakeholders' vision to the SMEs in the relevant areas of application. Going forward together was an essential factor in the creation of the ICT consortia for Bsik. All in all it can be concluded that the close collaboration between government and the field has led to a shared vision and to widespread readiness for action.

Appendix 3: *List of abbreviations*

BBP	Bruto Binnenlands Product	Gross Domestic Product
Bsik	Besluit subsidies investeringen kennisinfrastructuur (ICES/KIS-3)	Knowledge infrastructure investment subsidies decree
CBIN	Commissariaat voor Buitenlandse Investeringen in Nederland	Commission for Foreign investment in The Netherlands
CGEY		Cap Gemini Ernst & Young
CIC	Concurreren met ICT-Competenties (actieplan)	Competing with ICT Competences (action plan)
CPB	Centraal Planbureau	Netherlands Bureau for Economic Policy Analysis
ERA		European Research Area
EUREKA	Europees netwerk voor marktgeoriënteerde, industriële R&D	Pan-European network for market-oriented industrial R&D
EVD	Agentschap van EZ, ondersteunt bedrijfsleven bij internationaal ondernemen	Agency for the Ministry of Economic Affairs, supports the business world in international undertakings
EU	Europese Unie	European Union
EZ	Ministerie van Economische Zaken	Ministry of Economic Affairs
ICT	Informatie- en communicatietechnologie	Information and Communications Technology
IP		Integrated Projects (part of the IST programme)
IST		Information Society Technologies programme (part of the EU Framework programme)
ITEA		Information Technology for European Advancement (EUREKA programme)
MEDEA		Microelectronics Development for European Applications (EUREKA programme)
MKB	Midden- en Kleinbedrijf	Small and Medium-sized Enterprises
NGS		Next Generation Scenario

NoEs		Networks of Excellence (part of the IST programme)
NWO	Nederlandse organisatie voor Wetenschappelijk Onderzoek	Netherlands Organisation for Scientific Research
OCW	Ministerie van Onderwijs, Cultuur en Wetenschap	Ministry of Education, Culture and Science
R&D		Research & Development
TWA	Technisch Wetenschappelijk Attaché	Technical Scientific Attaché
WTCW	Wetenschaps- en technologiecentrum Watergraafsmeer	Science and Technology Centre Watergraafsmeer

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