

The IT-based Services of the Future

Report by the Nordic Council of Ministers IT-policy Expert Group





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Expert Group

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Nordic co-operation

Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and three autonomous areas: the Faroe Islands, Greenland, and Åland.

Nordic co-operation has firm traditions in politics, the economy, and culture. It plays an important role in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

Nordic co-operation seeks to safeguard Nordic and regional interests and principles in the global community. Common Nordic values help the region solidify its position as one of the world's most innovative and competitive.

Contents

Preface.....	7
Summary	9
1. Conclusions and recommendations	13
1.1 Conclusions	13
1.2. Recommendations	17
2. Introduction	21
2.1 Background	21
2.2 Purpose.....	21
2.3 Working method.....	21
2.4 Working group	22
3. Methodology	23
3.1 TAIDA	23
3.2 SCW analysis	23
4. Starting point and defined issue	25
5. Scenario analysis	27
5.1 The secure outside world map.....	27
5.2 The uncertain outside world	29
5.3 The two most important uncertainties	29
5.4 The scenario axis.....	31
5.5 The four scenarios	32
5.6 Reflections on the scenarios	41
5.7 Early warnings.....	42
Appendices	43
Appendix 1: The expert group’s mind map.....	43
Appendix 2: Scenario methodology	44
Appendix 3: Stages and sub-items.....	46
Appendix 4: Trends in the outside world	47
Appendix 5: Uncertainties as the basis for scenarios.....	50
Appendix 6: Criteria and outcomes.....	52
Appendix 7: Early warnings.....	55
Appendix 8: Analyses	56
Appendix 9: Proposal for Nordic input – 12 development areas.....	63
Appendix 10. About Kairos Future	71

Preface

Nordic ICT is characterised by successful applied research and entrepreneurship, and it is a sector in which the Nordic countries are well regarded. In several spheres, Nordic countries – indeed, the whole of the Nordic Region – are European or world leaders in IT. For example, the OECD recently named the Nordic Region the world leader in e-government, and Eurostat's regional publication showed that the Nordic Region is the European leader in e-trading and daily Internet usage. Several major multinational companies have emerged from the Nordic Region, and the general skills level and degree of ICT usage are high. In addition, the prerequisites for bolstering existing Nordic positions of strength are extraordinarily good. In an era of increasingly fierce competition, ICT also has major potential to improve the efficiency of working processes and resource management. A combination of the prevalence of IT and the generally high level of education and knowledge means there are plenty of opportunities for IT solutions and development in the Region.

Since it was accorded responsibility for co-ordination in the ICT sector in 2006, the Council of Ministers for Education and Research (MR-U) has striven to promote focused partnerships in specially chosen areas. One successful example of this is the work being done on a Nordic strategy and the implementation of e-science. This priority has just been designated a future globalisation project by the ministers for Nordic co-operation, and the various countries are now looking at how this sector can be a future flagship for the Region.

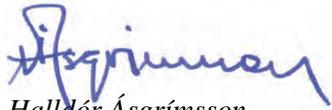
As part of its development work in this area, MR-U has decided to establish an independent group of prominent experts to advise the Council of Ministers on the IT sector. The group started work in the final quarter of 2008 by drawing up future scenarios based on the factors that trigger social change.

Scenario methodology is a tried-and-tested tool in both public policy and business strategies, one that is well suited to forward-looking strategic considerations in a changing world. Globalisation, climate change, the financial crisis, servicification and other external forces have a significant effect on the possible forms that Nordic co-operation may take in order to support the Region's ability to develop in a prosperous, knowledgeable and innovative manner in a world characterised by fiercer competition and particular framework conditions.

This report focuses on identifying ways of promoting the development of ICT-supported services. It can be used as an inventory of potential development areas; to identify and further develop candidates for Nordic

collaboration; and, first and foremost, to stimulate discussion on possible areas for Nordic IT partnerships.

The report will be sent to relevant official bodies for consultation in order to stimulate discussion and identify potential candidates for partnerships.



Halldór Ásgrímsson

Secretary General

Nordic Council of Ministers

Summary

The Nordic Council of Ministers (NCM) conducts studies that serve as supporting documents for the work of both the Council and the governments of the Nordic countries. An external IT-expert group representing all of the Nordic countries has been appointed to advise the NCM on IT issues and policy matters. This report, which arose out of the scenario project *IT-based services in the Nordic Region*, is one of the first outcomes of the group's work.

The objectives of the project are to work towards alternative future scenarios that have a positive impact on Nordic IT development towards 2020; to analyse the consequences of them for the Nordic countries; and, finally, to identify and describe suitable Nordic development areas. In this report, the concept of IT also incorporates ICT (information and communication technology).

The work followed Kairos Future's TAIDA™ method, which has been successfully used in public-sector administration, organisations and companies in the Nordic Region and elsewhere for 15 years (see the *Methodology* chapter). Two consultants from Kairos Future were responsible for process management, underpinning the methodology and documentation.

The work began with an analysis of the external circumstances based on the following statement (see the *Introduction*):

“Changes in the outside world have an impact on the prerequisites for IT-based services towards 2020.”

Based on an analysis of trends and uncertainties in the world, four alternative 2020 scenarios were drawn up (see Figure 1). The scenarios differ because they are based on genuine uncertainties – i.e. the degree of faith in IT among users, and questions related to how innovation is created in IT.

The 2020 scenario that the expert panel considers most desirable is the *Shopping Centre*. They also think that, in this scenario, IT-based products and services would be best developed in a Nordic Region that takes influences from the *VIP Club* scenario, as large companies have the power and the resources to drive the market in that scenario. The chapter *Scenario analysis* describes these scenarios in detail.



Figure 1: The four scenarios in bullet points.

Based on the four scenarios, the expert panel identified 12 important development areas for the Nordic Region to work towards in 2020 in order to be competitive in IT-based services. A number of development areas were (to a greater or lesser extent) important in multiple scenarios.

On the basis of several analyses, these development areas have been divided into three groups: *prerequisites*, *facilitators* and *direct IT benefits*. The *prerequisites* consist of the four areas that are basic to the development of IT-based services. They also counteract undesirable developments. The *facilitators* might be described as less critical prerequisites, i.e. they facilitate in one or more of the areas of *direct IT benefits*, but are not as fundamental as the *prerequisites*. *Direct IT benefits* comprise the areas in which the Nordic Region should be able to generate direct benefits from the use of IT, either in the public or the private sector.

The 12 development areas are shown in the figure below. The arrows between the groups represent their mutual interdependency, which by extension means the three groups are contingent on each other. For example, the Nordic Region creating the right prerequisites and being successful in terms of direct IT synergy will in turn contribute to even better prerequisites, thereby completing the circle.

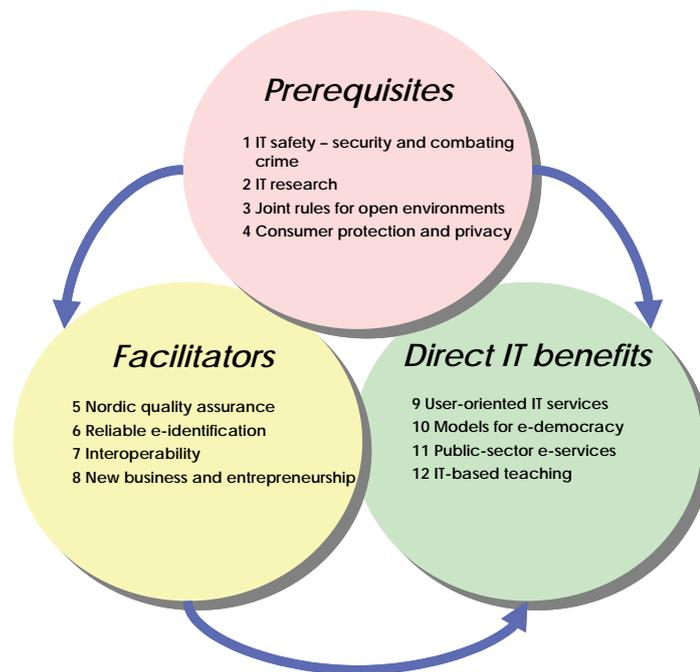


Figure 2: The 12 development areas, divided into three groups.

Based on the 12 development areas, the expert group presented policy and action proposals for how the NCM can proceed with these questions in its work to promote IT-based services. Summary descriptions of the development areas and policy and action proposals are contained in the chapter *Conclusions and recommendations*. For more detailed descriptions, please refer to *Appendix 9*.

The expert group's final recommendation is that the Nordic Region should promote *user-friendly IT-based services* in both the public and private sectors. With this objective in mind, it is critical that the NCM works to bring about the *prerequisites* and *facilitators* (at both Nordic and global level) that provide the basis for developing competitive IT-based services in the Region.

1. Conclusions and recommendations

1.1 Conclusions

The purpose of this report was, on the basis of possible future scenarios, to draw up proposals for initiatives that NCM could take to promote the development of Nordic IT-based services. The expert group used the scenarios to identify 12 areas for joint development work at Nordic level. Proposals for policy and practical action were defined for each area (see *Appendix 9* for complete descriptions). Several analyses were then conducted in order to obtain a better understanding of the different areas' roles in IT-based services in the Region, and the ways in which they are mutually dependent (the analyses are detailed in *Appendix 8*).

This chapter aims to summarise the outcomes of the work, draw conclusions and make recommendations for how the NCM can move forward. The graph below represents a summary of some of the analyses conducted.

The vertical axis shows what the Nordic countries need to do to match the scenarios, while the horizontal axis illustrates the Region's existing areas of strength.

The colours on the rings illustrate to what extent the area is dependent or a driving force in relation to the others. Red represents a very strong driver and yellow a less strong one, while green signifies dependency upon other areas.

The blue rings show how strongly the area helps business, and the red shadow illustrates the extent to which it counteracts undesirable social developments. The expert group has used the graph and the report as a basis upon which to draw up conclusions and recommendations it will present to the NCM.

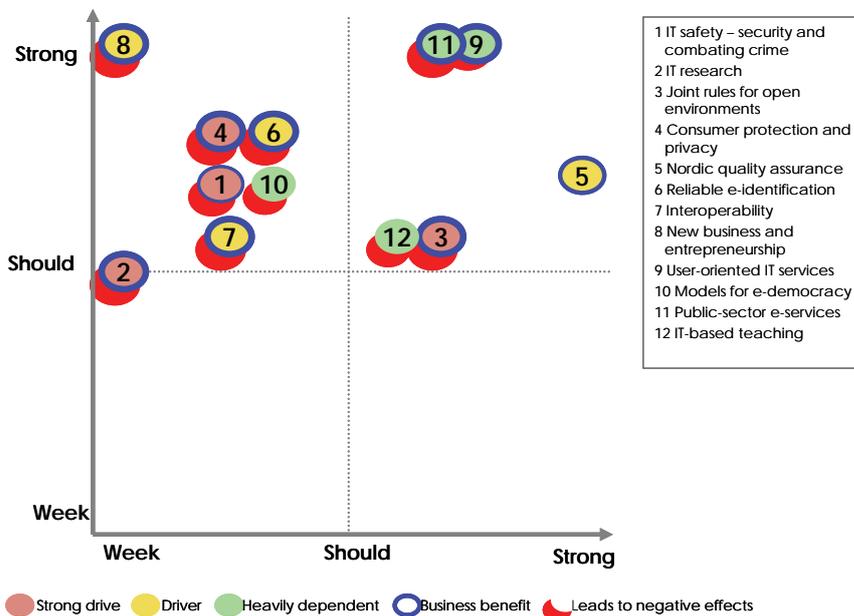


Figure 3: Summary of the analyses of the development areas.

Based on the analyses (Appendix 8), we note that the development areas can be divided into three groups: prerequisites, facilitators and direct IT benefits. The roles of the different groups in the development of IT-based services in the Region, as well as the development areas included in each group, are described below. There also follows a summary of the proposed policies and activities (for full details of the proposals, see Appendix 7.9).

1.1.2 Prerequisites

They are the four areas that are prerequisites fundamental to the development of the others. They counteract the less desirable developments sketched out in two of the four scenarios (*The Black Market* and, to some extent, *The Bazaar*), but also pave the way for desirable developments and create potential for the Nordic Region to successfully develop IT-based services.

Prerequisites

- 1 IT safety – security and combating crime
- 2 IT research
- 3 Joint rules for open environments
- 4 Consumer protection and privacy

The prerequisites comprise the following development areas: IT safety – security and combating crime; IT research; joint rules for open environments; and consumer protection and personal integrity. All of these areas are more drivers than dependents, and because they form the basis for avoiding negative and promoting positive development, they should be priority areas for the NCM. They also make a significant contribution to

business – and, to a slightly lesser extent, to IT safety. The expert group thinks that the Nordic Region is reasonably good (scoring two on a 0–3 scale) in three out of the four areas, but that joint rules for open environments are completely absent.

In order to create better conditions for IT-based services in the Region, the NCM should:

- conduct a mapping exercise of existing Nordic-level initiatives aimed at *combating cyber-crime* in the Region, and support existing partnerships in this area or start its own
- actively support *IT research* that contributes to greater confidence and safety in IT and creates business opportunities, set up a working group for information-exchange, and jointly focus on the areas in which the Region is a leader in terms of IT skills
- *attract more young people* (especially women) into IT-related studies, through PR campaigns and partnerships between schools and the industry
- *inform* Nordic citizens about their rights to privacy and consumer protection, and promote sustainable ethical rules and transparency in IT-based services
- work towards establishing *Nordic standards* for the exchange of information, e.g. patient and care data, vehicle data, etc.

1.1.3 Facilitators

Facilitators can be described as less crucial components. They affect one or more of the *direct IT benefits*, but are not as fundamental as the *prerequisites*. They counteract less desirable developments, but primarily serve as a solid foundation for the development of IT-based services.



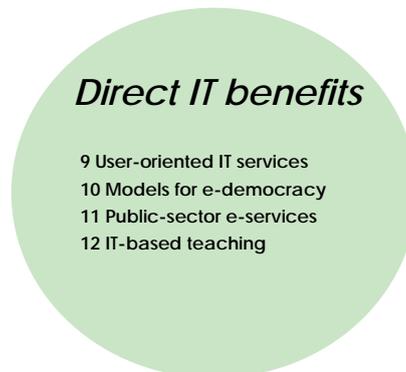
The *facilitators* group comprises the following development areas: joint quality assurance in the Nordic Region; reliable e-identification; interoperability; and new business and entrepreneurship. E-identification, interoperability, and new business are more dependent on other areas than joint quality assurance. They also contribute to greater business benefits and counteract negative trends. In addition, *facilitators* drive the development of other areas (e.g. new business) to a greater or lesser extent. All of these areas should be prioritised in the Nordic Region if IT-based services are to be successfully promoted, especially as the expert group considers these to be areas in which the Region is not as strong as it could be.

In order to better facilitate IT-based services in the Nordic Region, the NCM should:

- set up a working group to *exchange best practices* for quality assurance and work towards a joint Nordic standard for *quality certification*
- work towards *joint Nordic civil registration numbers* in 2015, and *e-identification from birth* in 2020, and develop joint software for digital certification, authentication and authorisation (in line with EU plans)
- employ legislation, as well as other means, to establish *open source* and *compatibility* as the public sector's basic IT principles
- proactively formulate and provide examples of *best practice* in the Nordic working group for interoperability
- preserve and strengthen *Nordic IT as a trademark*, with the help of, for example, a Nordic "internet marketing platform"
- develop joint approaches to facilitate *the emergence of Nordic start-ups in IT*, e.g. Nordic incubators.

1.1.4 Direct IT benefits

Direct IT benefits are areas in which the Nordic Region could derive direct benefits from IT, either in the public or private sector. Each area incorporates several specific IT-based services that could contribute to Nordic business and social benefits, as well as export opportunities.



The category *direct IT benefits* includes the following development areas: user-driven IT services; models for e-democracy; public e-services; and IT-based teaching. In relation to the other areas, they are more dependent than drivers, but direct IT benefits help to counteract undesirable developments in terms of low levels of trust and IT security.

Public-sector and user-friendly IT services make major contributions to business benefits and have great potential in terms of increasing export levels. E-democracy and IT-based teaching are considered to make less of a contribution to direct business benefits, but public-sector systems make a greater contribution in terms of increased IT use and social benefits. The area that should be afforded the highest priority is public-sector e-services. This is an area in which the Nordic Region is already considered strong, and which is also primarily dependent on two prerequisites the Region is already good at. User-driven IT services have potential, but the Nordic Region is not

as strong in this area; and it has not performed at all well when it comes to e-democracy. The Nordic Region is already strong in IT-based teaching, but we must prioritise this area in order to compete with the strong players already active in the global arena.

The NCM should do the following to promote direct IT synergies in the Region:

- Promote *open innovation* and the development of *Nordic IT exports* (e.g. by creating a Nordic IT-based platform)
- Identify *best practices* for various government IT services in the Nordic Region, and promote “self-service” and the paperless office
- Strive towards joint *e-democracy* through transparent and accessible user information for citizens and the production of reliable electronic identification
- Make the Nordic Region the *market leader in public-sector IT services*, and co-ordinate developments at Nordic level via a working group with decision-making powers
- Develop a joint Nordic *framework for pedagogy*, to be filled with national content
- Promote *IT-based teaching* via initiatives such as joint Nordic teacher training, pilot projects for IT-based courses, IT-based teaching for immigrants, etc.
- Develop guidelines for environmentally friendly IT. By imposing requirements for ecologically oriented public-sector systems and providing services that others cannot, the Nordic Region can take a lead in global environmental issues.

1.2. Recommendations

The section above outlines the factors considered by the expert group to be vital for making the Nordic Region a world leader in providing IT-based services. The length of time needed to implement the proposed initiatives may vary. These questions also, to a greater or lesser degree, fall within the remit of official Nordic co-operation, and therefore the Nordic Council of Ministers.

At its last meeting, the expert group reviewed the comments received from the Nordic IT directors and from the departments within the NCM, and agreed on the following recommendations to the NCM.

The recommendations fall into four strategic groups, all of which will contribute to IT-based services in the Nordic Region in 2020.

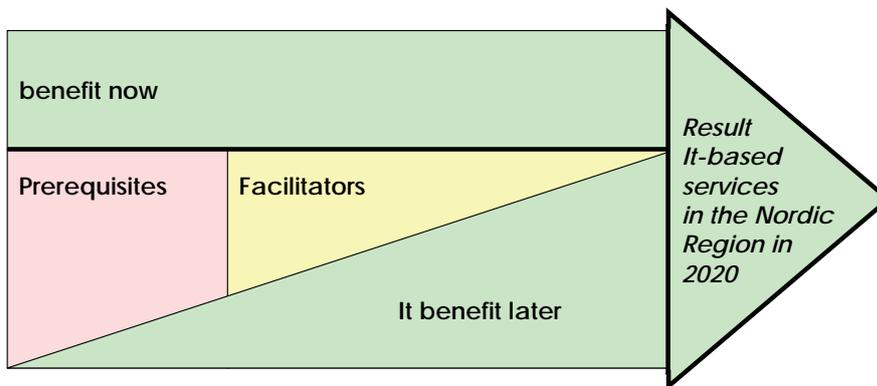


Figure 4: Recommendations for promoting IT-based services.

IT benefits now – recommendations that will have results in the short term

These are areas in which the Nordic Council of Ministers can directly support the desired development and achieve positive effects without the *prerequisites* and *facilitators* being in place. The NCM already possesses knowledge of both IT research and IT-based teaching. In addition, the NCM and Nordic governments exert considerable influence in these areas, and relatively few stakeholders are involved.

IT benefits later – recommendations that will have results in the long term

These are areas in which the Nordic Region must make greater efforts in order to be competitive in IT-based services. Work in these areas can already begin, but if it is to be successful then many of the changes described in *prerequisites* and *facilitators* must already have been implemented.

In this group, we find areas in which NCM has less influence, and which involve multiple other stakeholders to a greater degree. In the case of user-oriented IT services, the range of stakeholders is significantly wider, because development in this area is largely dependent on market forces. On the other hand, the development of e-democracy is controlled by the government, parliament and other public-sector bodies. Public e-services are also driven by the public sector, but are more dependent on partnerships with private stakeholders.

Prerequisites and facilitators – recommendations that will lay the foundation for IT benefits in the long term

This group contains the areas that the expert group considers to be the most important for promoting IT-based services in the Nordic Region. IT security, joint rules for open environments, consumer protection and privacy, Nordic

quality assurance, reliable e-identification and interoperability, as well as new business and entrepreneurship in IT, are all areas in which many stakeholders (including many located outside the Region) exert significant influence. It is not possible to promote IT-based services unless these basic prerequisites are in place.

In the first instance, a mapping exercise must be conducted of the Nordic knowledge base in these areas, on the basis of which the Nordic Council of Ministers will then be able to make decisions about how to proceed. Depending on the area in question, the NCM can then initiate or drive desirable changes and thereby influence on the actions of other stakeholders.

2. Introduction

2.1 Background

The NCM conducts studies that provide a basis both for its own decisions and for the decisions of the governments of the Nordic countries.

An external expert group has been appointed to advise the NCM on IT-related questions and policy matters. This diverse group comprises representatives from different parts of society, but retains an emphasis on IT expertise. The composition of the group is such that the members' skills complement each other.

At its first meeting, the group decided to work with scenario methodology and to use outside expertise. They also began to think about defining possible areas or themes for future scenarios (see *Appendix 1*).

Once the standard tendering process had been completed, Kairos Future was commissioned to assist the expert group by hosting seminars, conducting analyses and documenting the scenario project.

2.2 Purpose

The objectives of the scenario project were:

- to specify the theme for the study
- to describe alternative future scenarios for the selected theme
- to analyse the consequences of the various scenarios for the Nordic countries
- to identify and describe appropriate areas for joint Nordic policy and action.

2.3 Working method



The working method was based on interaction, as part of which the expert group, along with the consultants, hosted five one-day workshops to gather input and points of view from the group. After each meeting, the consultants worked on analysis, documentation and writing reports. They also maintained e-mail and telephone communication with the experts during these periods.

2.4 Working group

The expert group

The expert group consists of the following members: Thorolfur Arnason, director of Skyr, Iceland; Ulf Blomqvist, head of services and IT use at VINNOVA, Sweden; Pirjo-Leena Forsström, director of the Finnish IT Center For Science (CSC), Finland; Anders Gustafsson, IT consultant at Pedago Interaktiv, Åland; Ingvild Myhre, founder and director of Network Norway; Thomas Nordling, First Secretary at the Ministry of Education, Sweden; and Knud Erik Skouby, Professor of Information Technology at Copenhagen Institute of Technology/Aalborg University, Denmark.

Person responsible for the project

Kim Bärlund, Senior Advisor, NCM

Consultants

Kajsa Ahlgren, consultant and futures strategist, Kairos Future

Hans Bandhold, senior partner and strategic advisor, Kairos Future

3. Methodology

3.1 TAIDA

The work followed Kairos Future's TAIDA™ method, which has been successfully used in public-sector administration, organisations and companies in the Nordic Region and elsewhere for 15 years.



Figure 5: Kairos Future's TAIDA™ working method.

TAIDA stands for:

- Tracking – tracking trends and drivers of change
- Analysing – sensitivity analysis and scenario-building
- Imaging – desirable images/visions of the future
- Deciding – choices and strategies
- Acting – action plan, follow-up, etc.

This project utilises three of the five steps (Tracking, Analysing and Deciding). It falls to NCM to implement the proposals for action (Action).

3.2 SCW analysis

The chosen working method is based on three perspectives: *should*, *could* and *would*. This project is rooted primarily in the *should* and *could* perspectives. To some extent, the information on current NCM projects illustrates the direction in which NCM is heading (*would*). Based on this report (*should* and *could*) and NCM's vision (*would*), it will be possible to produce robust strategies for IT in the Nordic Region. Within the scope of this report, the model supports:

- the identification of future changes in the outside world that will have a global impact on IT, and which the Nordic Region ought to be good at coping with (*should*)
- the identification of unique, value-added approaches upon which the Nordic Region can build its future on in IT (*could*)

- the identification of approaches that the Nordic Region needs to develop in order to be prominent in IT in 2020 (*could*).
- informing the expert group about current projects under the auspices of NCM (*would*).

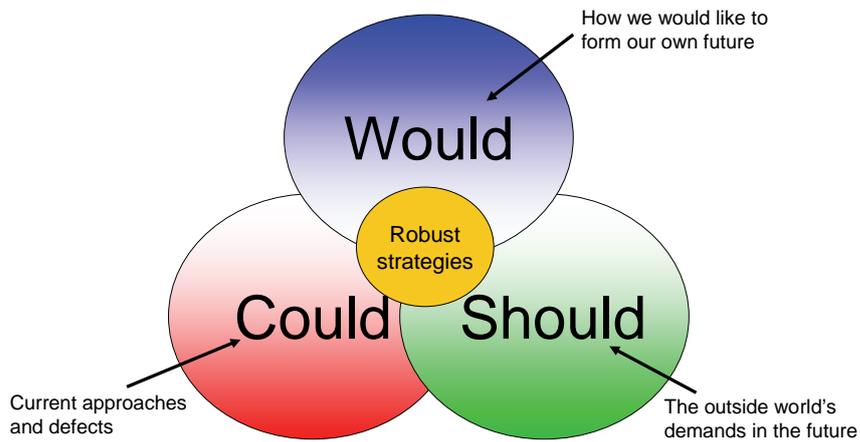


Figure 6: Working model for robust strategies.

4. Starting point and defined issue

At the first meeting of the IT expert group, the decision was taken to use scenario methodology to develop policy and action proposals for how the Nordic Region should work with IT in the future. In addition, work also began on defining potential areas or themes for future scenarios (see Appendix 1).

Experts at the first workshop, acting under the auspices of Kairos Future, used mind maps to identify individual priority areas that they felt had the greatest potential for Nordic business synergies, as well as the areas in which they currently considered the Region to be most competitive. On the basis of this prioritisation, the group decided on the theme *Promoting IT-based services in the public and private sectors*. Inspired by the mind maps, the group felt that the most important aspects to consider during the project were security and trust, infrastructure, legal structures, training, standardisation and green IT.

It is important for a scenario project to focus upon a clearly defined issue, and to establish time scale and targets for the work. These were also defined at the first workshop with Kairos Future.

The defined issue and time scale were as follows:

“External changes that will affect the conditions for IT-based services in 2020”

Result: Proposal for joint Nordic input in terms of both policy proposals and tangible proposals for action.

5. Scenario analysis

The scenarios presented in this report build on the extensive analysis and discussion that took place at the first meeting of the expert group. The four scenarios presented would all have a major impact on the prerequisites for IT-based services in 2020.

5.1 The secure outside world map

The first step in building a scenario is to start with the current situation and the changes we see around us, and identify external trends that could have a major impact on the defined issue.

The trends described in this project were selected with a view to including both major world trends and trends closer to home (the arena) that may be significant to the defined issue (“External changes affecting the prerequisites for IT-based services for 2020”).

The *outside world* (see Figure 7) is defined as the area in which the stakeholder does not wield direct influence. Changes in the outside world can profoundly impact upon the stakeholder’s operations. The *arena* is the sphere or platform where the organisation is a key stakeholder. Here, the stakeholder has limited opportunities to exert influence, but others also exert major influence. The *inner world* is defined as the organisation itself. Here, the stakeholder wields great influence, but the inner world is still affected by changes in the outside world and the arena. The following is a summary of outside-world and arena trends selected by the expert group.

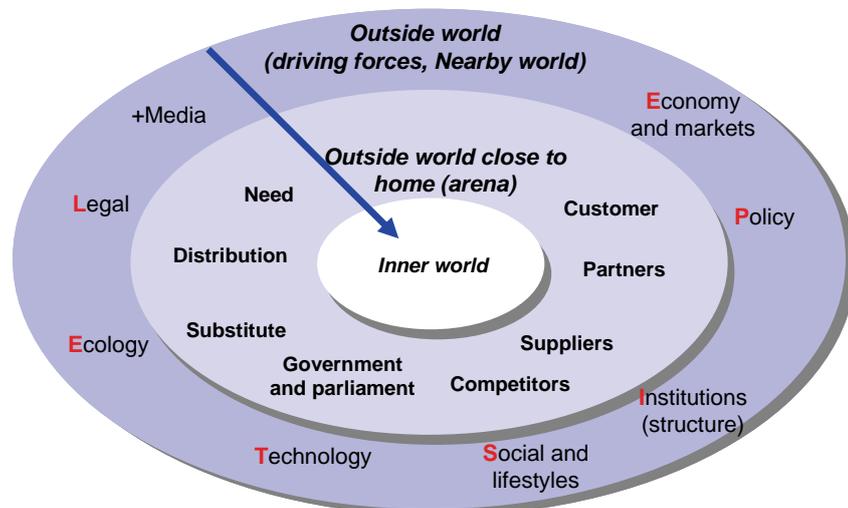


Figure 7: Map of the outside world.

The market in transformation

The IT market is rapidly changing. Ever-cheaper data communication and steadily falling prices for both communications and hardware have made IT an integral part of everyday life for most people. As a result, more and more goods are servicified, i.e. core products are being supplemented with or replaced by services that are often IT-based. At the same time, we see increasing user involvement, in which professionals assist clients in the suppliers' development and innovation work.

Social structures are changing

IT solutions provide opportunities for closer co-operation between official bodies. Cross-border working methods, both between sectors and between regions and countries, are growing ever stronger. At the same time, we see increasing privatisation of public services, which are increasingly operated under private auspices or as public-private partnerships. Breakthroughs in IT-based education also mean that training is no longer necessarily tied to physical location. Finally, we see how the growth in citizens' mobility increases the requirements for compatibility across national borders.

Social changes

We see increased levels of mobility as IT solutions emerge that make people's communication with others less dependent upon place. An important target group for IT-based services is the baby-boomer generation, now in their fifties and sixties. At the other end of this age range, we see a group of digital natives – i.e. those born and brought up in the IT world and who quickly adopt new tools. "Trust-hubs", in which groups of friends and businesses meet in both open and closed forums on the web, are increasingly common.

Technological progress

ICT and media convergence are increasing, which blurs the boundaries between media at the same time as information is becoming available via multiple channels. Information is also spreading faster and faster, with ever more and more intuitively user-friendly interfaces, involving, e.g. voice, eye and colour control. The rapid development of communications networks means faster interaction for all, and widespread IT competence means that the use of these networks is increasing. One consequence of all of this technological development is that, as more and more companies integrate their systems, IT environments are becoming increasingly complex.

Increasing importance of environmental questions

Increasing environmental awareness means that green IT is becoming more important. More and more IT products and services that are environmentally friendly and/or solve environmental problems are reaching the market.

Legal changes

The importance of intellectual property is increasing as more and more products and services become available online, which means that innovation is becoming increasingly expensive.

(These trends are described in greater depth in *Appendix 4*.)



5.2 The uncertain outside world

The next step is to identify the basic strategic uncertainties that will form the basis for describing the differences between the various scenarios. For the scenarios to be meaningful, it is important that these factors face a genuinely uncertain future. Otherwise, a situation arises in which one or two scenarios are perceived as “true”, which fundamentally undermines the principle behind scenario planning.

5.3 The two most important uncertainties

A number of possibilities were considered when the expert group assessed the uncertainties that could form the basis for the report's scenarios. Several

were at a relatively low level, and affected only certain aspects of what the scenario study sought to highlight. The uncertainties that the expert group finally settled on are at a more general, system-wide level, and also correlate with several of the non-selected uncertainties (all of the uncertainties assessed are included in *Appendix 5*).

One uncertainty is about confidence in IT among users. The second addresses the issue of how innovation occurs in IT.

Uncertainty 1: Trust in IT among users

The first uncertainty was about the extent to which the users have confidence in IT systems and solutions. In polarised form, the uncertainty looks like this:



When we look at the reasons for these respective extremes, the following picture emerges:

Low user trust: The financial crisis led to a deep and protracted recession. Users’ willingness to pay was also substantially weakened. For businesses, especially in the IT field, it meant a closer focus on savings and survival. In the public sector, it led to a loss of tax revenue. The result was that both private- and public-sector systems were patched up and their security compromised. This made them vulnerable to organised crime, and less scrupulous citizens began to commit cyber-crime. The gaps in public- and private-sector systems also caused many people to feel that integrity was threatened.

High user trust: The recession passed fairly quickly and did not cause any long-term harm to business or society. There was a recognised need to focus on building sustainable and secure systems in order to stimulate the growth of reliable IT-based services. Society’s focus on protecting citizens’ privacy and combating cyber-crime also did a great deal towards strengthening confidence among users.

Uncertainty 2:

The second uncertainty is about how innovation in IT is driven. The polarisation of the uncertainties looks like this:



Open innovation: A growing distrust of globally dominant multinationals has been witnessed in many parts of the world. This can largely be attributed to these companies' lack of transparency. These developments contributed to smaller companies and entrepreneurs strengthening their position in IT innovation. Moreover, the Asian IT companies' share of the IT market grew at a stable pace, and they joined the ranks of those who celebrated open-source software development.

Closed innovation: The dominant IT companies managed to maintain their grip on the market. We have seen an increasing number of acquisitions of medium-sized IT companies. Standards are owned and developed by a few companies rather than in open forums. Of course, this development has taken place in the context of the constant battle for increased market share, but in some cases it was driven by the fact that companies felt threatened by an increase in cyber-crime, e.g. intrusion and the theft of solutions. Another reason was that the customers did not dare trust open solutions.

5.4 The scenario axis

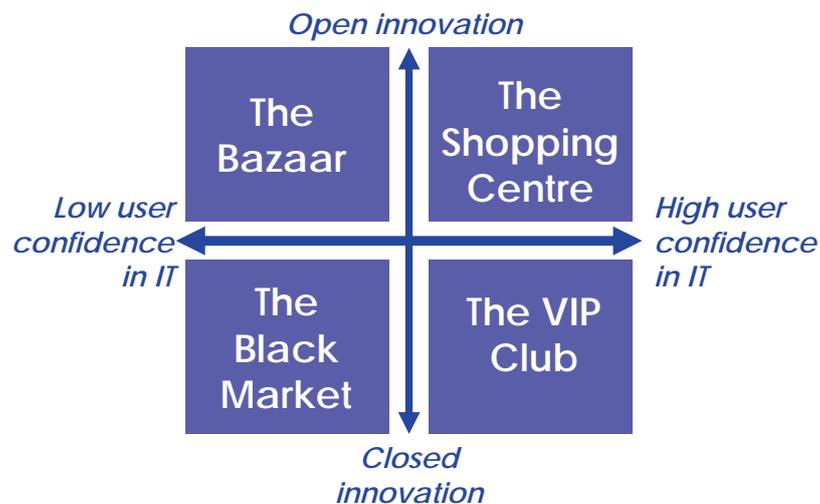


Figure 8: Combining the two uncertainties brings out the basis for the four scenarios.

The sole purpose of the scenarios is to draw engaging and interesting pictures of the future to inform NCM's decision on how best to promote both private- and public-sector IT-enabled services at Nordic level.

To make the scenarios more realistic, the authors have taken the liberty to describe the social developments for each scenario and attribute to various stakeholders a number of strategic priorities. These views and behaviour should not be seen as anything other than an attempt to make these images of the future more realistic. Similarly, the various chains of events that lead to the scenarios should not be seen as anything more than an example of how things could have turned out. Above all, nothing described in the scenarios

should be perceived as a reflection of the expert group’s desire or will, merely as potential developments that could become reality in 2020.

5.5 The four scenarios

Scenario 1: The Bazaar



The year is 2020, and the recession that hit at the end of the first decade of the century has become more protracted than even the most pessimistic thought. Businesses have expended most of their energy on survival. Several large companies have fallen behind the pace of product and technology development, which has been particularly rapid in Asia. It has been a long time since software and design produced the kind of profit margins that the big companies were used to.

In a recent interview, the former CEO of a global Scandinavian IT company recently put it like this: “The days when we were ahead of the Asians in terms of new technology and qualitative design are gone. The recession gave them an opportunity to overtake us, which they grasped enthusiastically. We need to seek out new ways of being competitive!” Consumers don’t mind refraining from buying new and expensive items. When it comes to new IT, users have become accustomed to it being cheap, and demand that it be open source. As a result, several of the major IT dinosaurs have found themselves extinct. There is now an extremely open attitude towards innovation. The new heroes are entrepreneurs in small companies who work closely together with each other. The lack of dominant players in the market has brought about a situation in which companies frequently come and go. Uniform standards are a mere memory.

Unfortunately, transparency also provides a good breeding ground for less serious players who promise the world and deliver nothing, not just unscrupulous IT geeks but also organised criminals who see the potential to earn big money from cyber-crime. This development was entirely unexpected, and not one shred of security and privacy remains. More and more people have experienced some form of online crime, and confidence in IT in general and the web in particular has reached an all-time low.

Few dare to store data outside their computer or server. Virtual social networks such as Facebook, which used to be so popular, now exist only in closed digital networks. However, many people are once again choosing to meet in person, and are willing to travel a considerable distance to do so. Not even national borders represent a barrier.



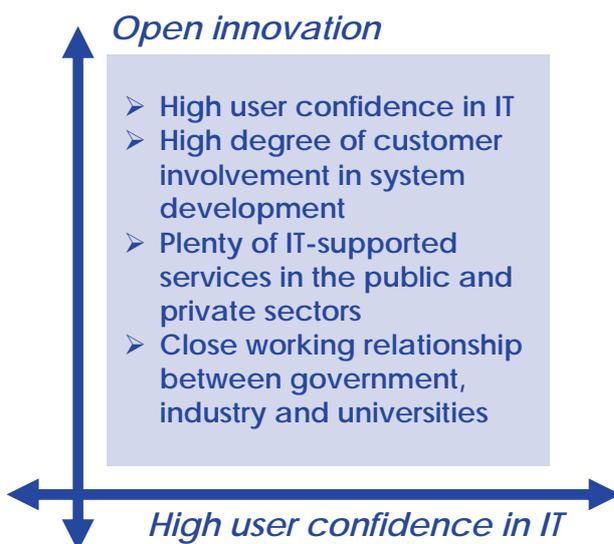
Companies make valiant, repeated attempts to involve users in innovation processes, but the lack of trust and the transience of companies mean that few people want to be involved. Instead, many people, particularly among the young, are now their own IT-developers. Per (16) says: “Being involved means developing gadgets that have to be paid for later. That’s not for me. Whenever I need something, some guys have usually already made it. It’s better – and free!” The loss of confidence also means that access to data communications is much greater than demand. Internet access is a cheap commodity, with companies presenting new offers and lower prices almost on a daily basis. Declining interest from citizens and a limited state budget mean that the government has chosen to postpone investments in digital infrastructure.

The lack of confidence means that IT as a facilitator for increasing the efficiency of private and public-sector services has been put on the backburner. Few see the benefit of developing services that nobody trusts. Many resources are therefore directed towards personal services that would

in the past have been digitised. This has a positive effect on employment levels, but the resources could have been utilised more efficiently.

Even in education and research, IT has not had the impact that was originally predicted. The research conducted in the Nordic Region is hardly groundbreaking. It has become apparent that the universities, industry and the public sector need to develop successful ways of working together. Previously, we could rely on big companies to fund and conduct much of the applied research. An increasingly fragmented IT industry places great demands on the public sector to assume greater responsibility for development. Above all, the objective is to rebuild citizens' trust in IT. Technical security systems need to be developed, legislation bolstered and methods of combating cyber crime made more effective. New and powerful visions for technology development in the Nordic Region are needed.

Scenario 2: The Shopping Centre



At the end of the last decade, the world economy got a taste of the dire consequences of a global financial crisis, but managed to recover more quickly than most experts had dared hope or believe. The collapse of the financial industries and revelations of bankers' astronomical bonuses led to uproar among citizens, who now demand longer-term thinking, both in the public sector and in business. Society is no longer willing to accept big companies that hide behind closed doors. This has resulted in clear rules for greater transparency in companies and financial institutions, the aim of which is to increase confidence in the market. Small businesses and entrepreneurs are in a stronger position because they have not abused the trust of the people.

Another aspect of the long-term mindset has been investment in reliable and stable IT infrastructure. Given the high degree of IT-literacy among the inhabitants of the Nordic Region, it was not long before the potential to

make IT an invisible, integrated part of society was recognised. In addition, it became obvious that investment in security and privacy measures was needed to get users to trust and embrace new IT solutions.



Confidence in IT and the Internet is high – and on the rise. Data is stored on servers spread throughout the world, and the authorities have been careful not to restrict and monitor Internet usage, which has increased confidence among citizens. Companies and the public sector have both run several successful projects that have invited the public to contribute to the development of new IT-based products and services. User involvement means that the solutions developed are both in great demand and widely used.

User-friendliness is continually improved, and more and more functions are integrated. At international level, people talk about the Nordic Region as the market in which the supply of IT-based services has increased the most in the private sector and that the public sector has not lagged far behind either. Physical and virtual social networks exist in parallel and are well integrated. However, in a global world, it is difficult to resist the allure of physical travel, even though we see how the rich possibilities of IT-based communications are increasingly replacing unnecessary business travel. “The virtual meeting is today much more than a flat image on a screen – it feels as if everybody is in the same room. We have fewer physical meetings today, but they still exist because they are necessary to create good relationships,” says the HR manager of a company that has chosen to combine physical and virtual meetings in a manner designed to establish sustainable relationships as effectively as possible.

The Nordic Region is still striving to achieve its own visions of technological development. The public sector continues to play an important role in co-ordinating development in a world in which the IT industry consists of a large number of small stakeholders who work together. Listening to companies enables the public sector to understand where resources need to be in-

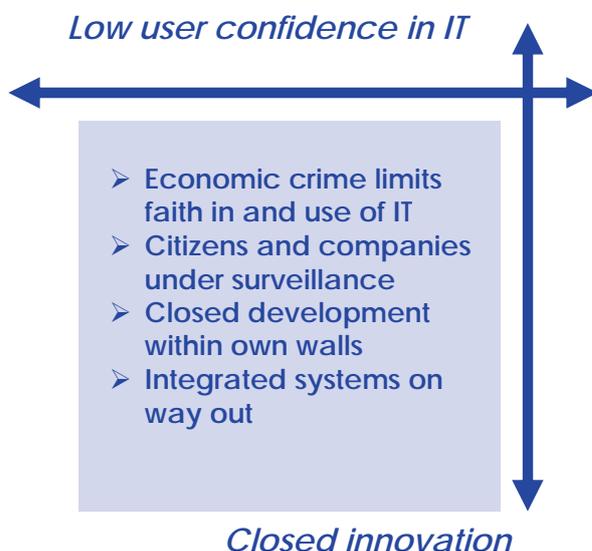
vested. One consequence is that private service providers are increasingly taking over public-sector IT-based services, which frees up the authorities to focus on drawing up guidelines for safety, adapting the regulatory framework and managing infrastructure investments.

Open innovation environments mean that more and more savvy users are able to use their energy and their desire to be seen to be participating in the development work for the benefit of both business and society. It is thought that the hackers who used to rampage around cyberspace are under control thanks to great efforts made in fighting cyber-crime. An initiative has been launched to promote different types of standardisation forums, the aim of which is to support industry in developing compatible products and services. The public sector has also started to invest in integrating its systems in order to maximise synergies and minimise duplication. Although few dared believe in e-democracy, it now seems that a breakthrough may be imminent, thanks to secure identification procedures based on a standardised system of civil-registration numbers. In addition, the Nordic Region has succeeded in developing a common standard for patient records, which has led, among other things, to an important breakthrough in cancer research.

In innovation and research, the focus has been on the areas in which Nordic companies are able to forge a global advantage. However, several of these initiatives have been entirely dependent on close co-operation with top universities around the world. A number of new models for IT-based learning are on the way, and some new educational institutions that are entirely based on e-education are in the starting blocks.

The Nordic Region has had great success in laying the foundations for a creative business climate, and there have been several successes. A Nordic e-school started by pupils achieved the highest rank in PISA, and there is talk of the Nordic e-democracy solution becoming the EU standard.

Scenario 3: The Black Market



The global economic crisis did not just lead to a lengthy recession. It marked the beginning of a long period of great change. Many previously successful countries were left behind, and nations in other continents are now catching up. In the Nordic Region, wealth is unevenly distributed, not only between countries but between the regions in each country. We also live in a world of growing tensions between rich and poor – as one provocative journalist put it, “It will soon be the law of the jungle around here.” Many see potential in globalisation, though for others it is the root of all evil.

Many people in the Nordic Region have personal experience of social injustice, and therefore economic crime enjoys good growth conditions. In the middle of the last century, fraud largely consisted of lone conmen passing bad cheques. Today, organised crime employs impoverished hackers to penetrate security systems. As a consequence, few people trust digital transactions over the Internet. Companies and government agencies have begun building their own closed systems to get around security issues. But this does not completely solve the problem – after all, criminals have a remarkable ability to remain one step ahead.

Previously, most development work was done in close co-operation between system owners, consultants and users. Several high-profile leaks from development projects led to many large companies considering carrying out their development work entirely in-house. Some of the older, integrated and highly complex systems are now on their way out. No single organisation is able to cope with the high costs incurred in maintaining watertight security. As each company is now looking inwards to a greater degree, interest in standardisation on the wane. In addition, general standards make it easier for cyber-criminals to understand the structure of the systems that they are breaking into.

What happened to all of our lofty ambitions? The plan to realise the ideals of “green IT” has been put on hold. As the head of development in one major Nordic company put it: “Who can afford the environment when we struggle to have effective systems that can keep thieves out?” The excellent IT infrastructure built up is more than enough to cope with a situation in which confidence in digital communication is tapering off. Once upon a time, many people argued that virtual tourism would replace or at least complement physical tourism. But it didn’t turn out like that. We still do things the good, old-fashioned way, even if border obstacles and tariffs increasingly restrict travel. Those who do travel are mostly fit young retirees with both time and money to spare. This has meant a boom for small, local, trustworthy travel agents.

A well-known political commentator recently argued that the rule of law has broken down and that the state considers its most important task to be the creation of better and more efficient monitoring systems: “The surveillance society depicted in George Orwell’s *1984* has long since been surpassed.” Certainly there is some truth in the comparison. We all know that “Big Brother” is watching us a little too closely, but we also know how

to avoid his gaze. Some semi-legitimate companies have emerged that claim to be able to help us evade surveillance and regulation.



The world of education is also characterised by a lack of communication. Traditional classroom-based teaching has taken off again, and we see a decline in exchanges between schools and universities. Few prioritise higher education, given that these days it is hard to see its worth. Knowledge has become a commodity – some people even buy their degrees. In the case of cutting-edge research, credible companies go their own ways. The universities' and politicians' impact on development has been reduced quite considerably. The lack of co-operation hampers the Nordic Region as a research area. Development and higher education most often take place within the business world. The entrepreneurs are the heroes in a world in which research is largely conducted inside big companies. It may be the case that a Nordic vision for the future of technology is needed, but this project remains relatively low on the agenda.

Scenario 4: The VIP Club

It has been over a decade since the global markets crashed in the wake of the credit crunch. Many were concerned that there would be a long, drawn-out depression, but the world economy recovered much faster than expected and was soon back to full strength. Already strong brands became even stronger during the recession, and many expanded through acquisitions and mergers with struggling companies. The market is consolidated and much of the innovation and development takes place within large corporations. As such, people talk about intreprenurship rather than entrepreneurship.

Standards are set through collaboration between dominant companies and smaller stakeholders with very little influence. This creates the prerequisites for proprietary solutions that are fully owned and controlled by the companies. Even though this creates a great lack of communicativeness on the market and means high costs when switching systems, it also has advantages. The small number of suppliers means that complex IT systems are more compatible and therefore more reliable.

A combination of user-friendliness and secure systems has led to a steady increase in confidence in IT. Citizens are frequent users of the products and services offered, and are happy to avoid being involved in development, even if they think that the process is a bit slow. They fully trust the companies – if a company says its IT product is green, then it is green.

The intensification in the use of digital-communication solutions places increasing demands on access to high-quality computer networks. In order to earn even more money, big companies are investing in the expansion of existing infrastructure and the development of new systems. The network has therefore never been faster, and all generations are characterised by a significant virtual presence. In a globalised world of international social networks, people often meet in the virtual sphere, to the extent that family

dinners can be held over the web. People now travel less, but physical meetings continue as a complement to the virtual world.

The market's great confidence in the IT industry has made it easy to offer top-down products and services. The public is totally dependent on business to fund investment in IT development. One consequence of this is that private service providers with closed systems control many of the public services. According to the NCM's IT expert, such solutions have both advantages and disadvantages: "The fact that private companies take care of IT-based public services is in itself good for efficiency, but it has its downsides. Closed systems limit interoperability and have also created a competitive situation that is close to oligopoly."



In general, each nation is left to control its own business giants, but collaboration at Nordic level is arranged when direct advantages are identified. For example, the Nordic countries have entered into close co-operation in order to combat cyber-crime. The power of the big companies is such that they attract a number of would-be intruders and fraudsters. A major joint effort is required in order to mount an effective defence against the world's most skilled hackers.

Within the world of education, few service providers have been able to carve out large market shares for themselves. E-learning has made a huge breakthrough, and the Nordic Region enjoys international renown as a world leader in this field. Unfortunately, intense competition between suppliers creates barriers to effective IT co-operation between Nordic educational institutions. The boundaries between the different licences are clearly defined, which means that only those with the same licence are able to communicate with each other. Business's strong role in research and innovation reduces the public sector's ability to influence development in this area. Instead, business works to draw attention to the positive aspects of its products.

IT-based services are undeniably flourishing, but are limited by the fact that the relatively small number of suppliers are strong enough to survive without collaborating. The big question we will soon face is how smaller stakeholders can enter the market and contribute to a much-needed revitalisation. Only when systems are able to communicate with each other will society reap all the benefits of a wide range of IT-based services.

5.6 Reflections on the scenarios

Once the four scenarios had been drawn up, the expert group considered the ways in which they related to the present, and whether any one particular scenario was more desirable than any of the others. For the scenarios to be useful, it is important that they are all equally credible, realistic, challenging and feasible.

Since NCM is in a position to influence the development of IT in the Nordic Region, it is difficult to devise scenarios that are completely independent of how NCM acts, which has led to some scenarios being more desirable than others. If we decide at an early stage to promote IT-based services at Nordic level, developments will be more desirable than if such initiatives are not prioritised.

The group of experts consider *The Shopping Centre* to be the most desirable scenario. However, they believe that IT-based products and services are best developed in a Nordic Region that also takes elements from *The VIP Club*, especially since the major companies have the power and resources to take the market forward. *The Black Market* is the least desirable scenario. *The Bazaar* is not particularly desirable, because security is compromised and confidence in IT is low. However, its market transparency makes this scenario more attractive than *The Black Market*.

At the time of writing, the expert group thinks that we are currently somewhere near the centre of the scenario axis (as shown in Figure 9). *Appendix 9* provides an overview of the various development areas that the expert group thinks the NCM should work with in order to secure a more attractive future and avoid undesirable developments.

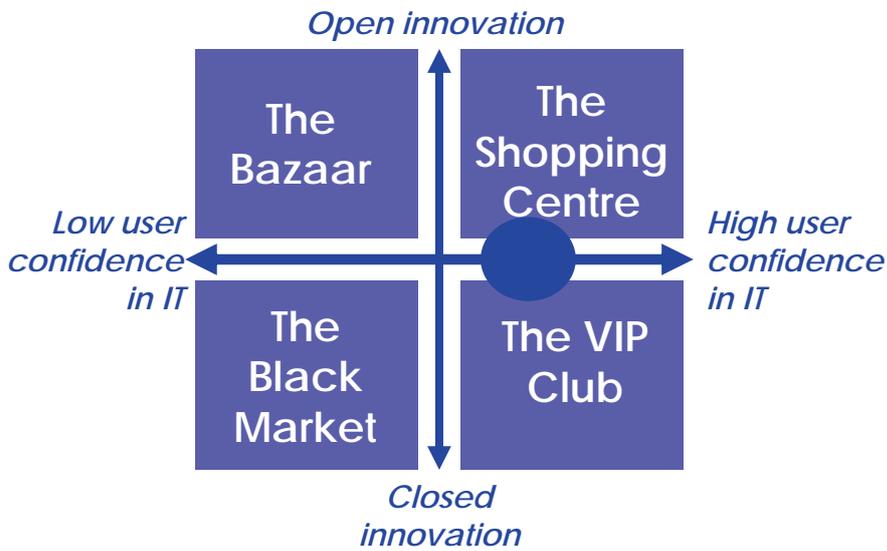


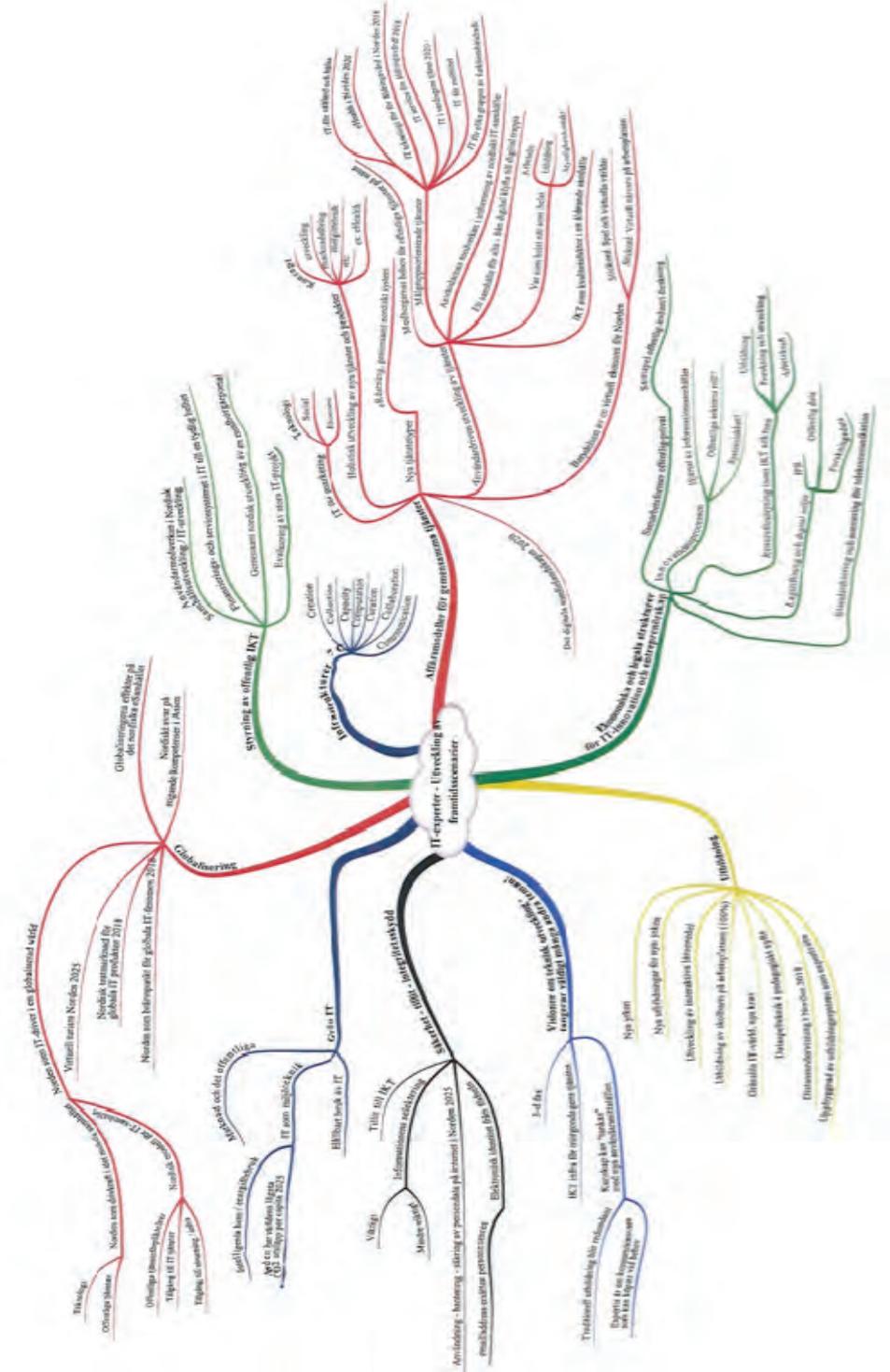
Figure 9: The scenario axis, with the current situation indicated.

5.7 Early warnings

The scenarios can be very useful for predicting where we are going. An early-warning system means that we can observe and analyse driving forces in society that suggest that we may be heading towards a particular scenario. The expert group has therefore drawn up a list of world events that may indicate the scenario(s) that seem most likely in 2020. This will make it possible to assess whether, for example, we are more likely to experience scenarios in which the main need is to limit the adverse impact or scenarios in which the focus is on taking advantage of new opportunities. The early-warning signals identified by the expert group are described in *Appendix 7*.

Appendices

Appendix 1: The expert group's mind map



Appendix 2: Scenario methodology

Trying to conjure up images of future prerequisites for IT-based services in the Nordic Region may seem like a dubious activity. Some maintain that nothing will happen before 2020 that will substantially affect IT in the Region. Yet we note that much has happened since the turn of the century – the IT bubble burst, digital banking emerged, the Net became an accessible source of information and communication for the masses, the credit crunch struck, etc.

A scenario is not a prognosis, i.e. a relatively accurate projection extrapolated from the present. Nor is a scenario a vision, i.e. a desired future. A scenario is a qualified answer to the questions “What might happen?” and “What if...?” In this way, the scenario differs from both the prognosis and the vision, both of which tend to conceal risks. The scenario affords us the opportunity to manage risk. Scenarios help us to understand the logic of development, driving forces, key stakeholders and our own ability to exert influence. Scenario planning is also an effective instrument that helps us to hone strategies, draw up plans for the unexpected, watch for significant signs and ask the right questions.

Examples of differences between prognoses and scenarios:

Prognosis

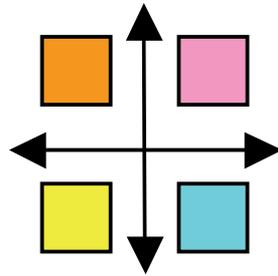
- Describes probable future outcomes by means of individual causes
- Identifies definite connections
- Conceals risks
- Is detailed
- Is static
- Quantitative descriptions
- We need it to dare to make decisions
- Encountered daily

Scenario

- Describes possible, conceivable overall pictures of the future
- Reasoned, and accepts uncertainty
- Identifies risks
- Is an outline
- Describes systems and connections
- Qualitative descriptions
- We need it to understand what we are making decisions about
- Rarely encountered

Scenario building

We can be fairly confident that some of the trends that we see today will continue to evolve and be strengthened in the future. The path taken by other trends is more uncertain – they may provide the basis for various developments, as expressed in alternative scenarios. The scenarios are differentiated by the two areas in which there is major uncertainty about future developments. These uncertainties are plotted on what is called a scenario axis. The end points of the axes represent the possible extremes in each development. The effects of these extremes are analysed and described, and take the form of a scenario in each corner. The most likely developments are represented in the form of trends.



The differences between the four scenarios are detailed in the accounts of the possible futures, in this case dated 2020, of the different “worlds” each scenario represents. Note that all four worlds described represent *possible* future developments. Any of these could potentially be a reality in 2020, but it might be the case that we will see a combination of several of them, or something entirely different that we cannot even begin to envisage at present. The point of scenarios is that they prepare us to act in the event of the unexpected – or even the unimaginable.

To illustrate this, we can compare the scenarios with a theatrical play. The most likely (i.e. relatively “safe”) outside world trends can be compared with the physical structure of the stage. The different scenarios (and uncertainties) may be likened to the stage sets for each act. When we work with scenarios, the stage and the set together constitute a group of circumstances to which the actors must relate.

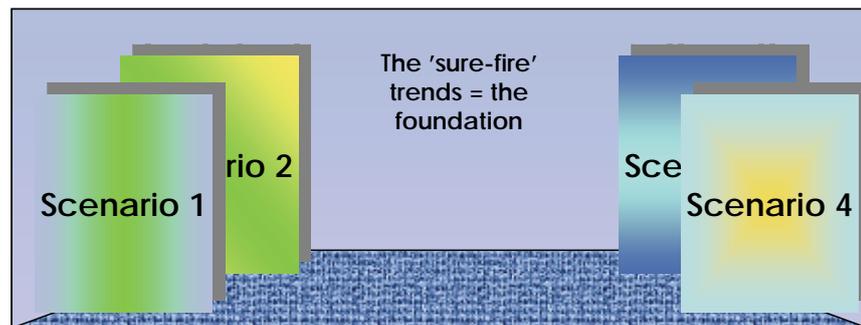


Figure 10: The relationship between scenarios and “safe” trends.

Strategies based on scenarios

Robust strategies (called “areas” and “proposals for action” in this report) that are expected to be sustainable in the long term (i.e. in 2020) must be based on circumstances that can be expected to apply in the future. It is not sufficient to base the strategies on current needs. When we are planning scenarios, we model the impact of the various scenarios and the steps that may be needed to respond to them. The actions are clustered as strategy “embryos” (proposals for action). These are then systematically evaluated on the basis of a number of different considerations. See the full analysis in Appendix 8.

Appendix 3: Stages and sub-items

*Workshop 1: Investigating the outside world*

The theme selected for the future scenarios determined the subsequent form of the scenario analysis. The defined issue and the time scale for the scenarios were set. An initial mind mapping of “safe” trends and uncertainties in the outside world was conducted, and formed the basis for further scenario work. Alternative scenario axes were prepared and evaluated on the basis of their impact on the defined issue.

Result: A delineated task with a clearly defined issue, as well as a mind map of changes in the outside world and scenario axes that formed the basis for further work.

Workshop 2: Scenario-building

The scenario axes were set. A list of criteria/questions that will be important for devising the scenarios was drawn up. The list was supplemented with the likely outcome of the criteria in each scenario. Based on the list of criteria, the group drew up a number of pictures that illustrated the outcome in each scenario. In this way, the expert group constructed a framework for each scenario. Based on the material from the workshop, the consultants drew up scenario descriptions.

Result: Scenario axis, content and illustrative examples for each scenario, which formed the basis for the consultants’ descriptions.

Workshop 3: Gap analysis

The workshop began with a group of experts approving the scenario descriptions drawn up by the consultants. Based on each scenario, the group assessed what it is important to be good at in the current, real world (i.e. *should* – success factors). An assessment was also made of the Nordic Region's strengths in the areas identified as important by the scenarios (i.e. *could* – assets to build on in the future). The results were then summarised in a GAP analysis that illustrated the difference between *should* and *could*.

Result: Fixed scenarios and clear images of the Nordic countries' prerequisites for success in each scenario.

Workshop 4: Choices and early warnings

With the scenarios (*should*) and the strengths (*could*) as starting point, we worked together to develop joint policy proposals, ways of acting and ideas for the Nordic countries. We also identified a number of signs that indicate the direction in which the world is heading (early warnings).

Result: Proposals for policy, action and measures.

Workshop 5: Recommendations to NCM and report

At the final meeting, the expert group reviewed the comments received from the Nordic IT directors and departments within NCM, and agreed to present the conclusions and proposals to NCM.

Result: Report for publication, featuring recommendations to NCM.

Appendix 4: Trends in the outside world

Below are descriptions of the trends mentioned in the section *Scenario methodology*:

Market in state of transformation

Ever cheaper data communication

The price of data communication and hardware continues to fall. This means cheaper IT for a greater number of people. We see a continual development towards the user not being willing to pay for hardware and data. This will necessitate a new business model, in which it is not necessarily the user who pays.

Servicification of goods

IT has been and remains a key driving force for industrial development. In industry, particularly manufacturing, services are an increasingly important

source of income, and functional value is becoming more important than the product/commodity itself. Increasingly, a company's range consists of a core product combined with added services (i.e. the expanded product). IT services, especially in the field of IT security, are an important part of this.

Increased user involvement

An ever more transparent information society gives consumers a better understanding of different products and technologies. Increased understanding of products and product development means that consumers want to be treated like professionals rather than customers. This places greater demands on consumer involvement in the innovation process and product development.

Changing social structures

Closer co-operation between official bodies

Increasingly often, official bodies work across sectors, geographic areas and national boundaries. Co-operation between the private and public sector is also becoming more common.

Privatisation

More and more services are moving from the public sector to the private. The public sector also increasingly outsources services to private companies, and "public-private partnerships" are becoming more common. In addition, the public sector takes elements from the private sector (e.g. functions, ways of working, processes, etc.) and uses them.

IT-based teaching

The Internet and IT create new prerequisites for teaching. Teaching is no longer tied to a physical location, which means that students have more control over their own learning. It also means that teachers' roles are changing. In addition, IT-based teaching facilitates teaching in multiple languages simultaneously.

Increased personal mobility

The increasingly close co-operation between the Nordic and European countries means that national borders are becoming blurred. This increases the mobility of all citizens, and makes society more and more multicultural. Freedom of movement also increases the need to communicate across national borders, and places greater demands on technological compatibility between nations and regions.

Social changes

Increased mobility

Technological developments have led to the use of the mobile phone and mobile broadband – IT solutions that make people independent of place. By extension, this means the development of virtual worlds in which we can meet and communicate. We are now available anywhere and anytime!

More baby boomers

Baby boomers (born between 1945 and 1954) make up a large part of our population. They have time to spare and money to spend, and are therefore an interesting target group to understand and target. They are healthy and fit for their age, and have greater opportunities to learn, see and do new things. It is important to understand how to reach this target group and provide the services it needs.

Digital natives

Young people do not see IT as anything extraordinary, but live with it as if it has always been there. They consume several types of digital media simultaneously, and continuously adapt to new communication tools (blogs, micro-blogs, chat, etc.). This will place demands on IT services, employers and educators.

“Trust hubs” increasingly common

Internet-based social and business groups (“trust hubs”) are increasingly used for information exchange and contact. As much of human communication takes place within networks, they are of increasing importance for maintaining both business contacts and a social life. If companies want to understand the consumer, they must engage with forums such as these.

Technological progress

ICT and media convergence increases

As the number of digital communication channels increases, print media loses its significance and culture migrates online. User-oriented development will therefore move towards the integration of functionality into a single product. When the same information is consumed via several different channels, the boundaries between different media are blurred.

More and more user-friendly interfaces

Computers are shrinking and becoming more easily accessible and manageable. We have achieved a degree of maturity in our relationship with IT, which contributes to user-friendliness being a priority in development work. Making IT products with intuitive interfaces is a major success factor. Future developments will also include IT control by voice, eye and colour.

Faster Internet for all

IT use is increasing in all walks of life at global, national and regional/local level. Demand for faster communication networks is increasing at the same time as IT skills are improving. In addition, we are moving towards a situation in which *everything* is IT: services, products, information, etc.

Increasingly complex IT environments

Companies are developing ever more IT solutions for managing data. Using several separate systems within one company creates a complex IT environment, which makes exchanging information difficult. This particularly applies to large and global organisations and businesses comprising several merged companies.

Increasing importance of environmental questions

Green IT is becoming more important

The focus on climate issues is also relevant to IT. One aspect of this is finding more energy-efficient solutions for IT use. Another is IT as a facilitator of green solutions. IT solutions that regulate energy usage in various ways (e.g. temperature optimisation) can be an important factor for companies that want to cut down on energy consumption.

Legal changes

Increasing importance of intellectual property

More expensive innovation processes and more accessible information will increase the importance of IPR, both legally and contractually. Business dealings will become increasingly international and regulated by agreements rather than legislation.

Appendix 5: Uncertainties as the basis for scenarios

The expert group discussed a number of uncertainties in the outside world, which informed the choice of scenario axes. The group finally fixed on two uncertainties at a high system level. Together, these two uncertainties cover all of the scenario axes discussed (see Figure 11).

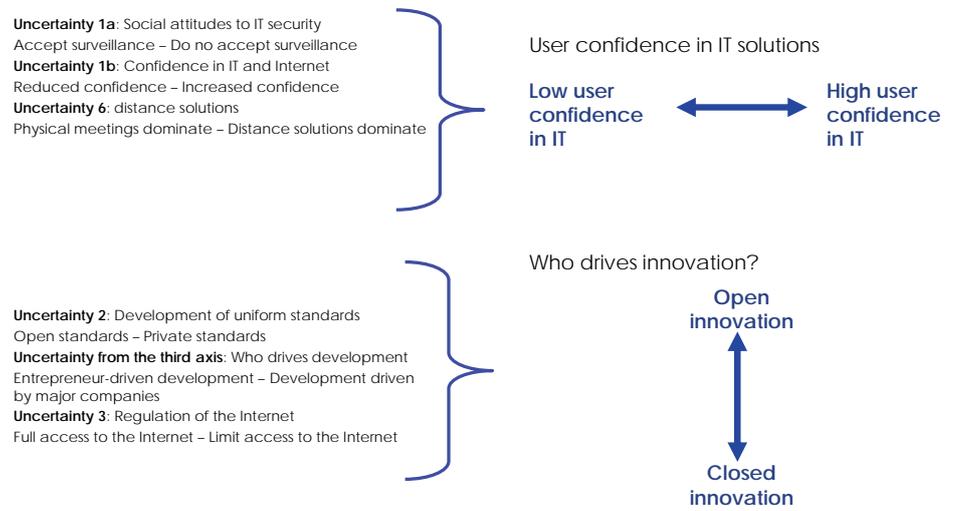


Figure 11: The emergence of scenario analyses.

Appendix 6: Criteria and outcomes

As part of the scenario-building work, each scenario's outcome is described by a number of criteria:

Criteria/scenario	The Bazaar	The Shopping Centre	The Black Market	The VIP Club
View of innovation Confidence in IT	Open Low	Open High	Closed Low	Closed High
Economic development	Weak, a protracted recession has meant that for a long time companies focused on survival and public-sector resources were reduced.	Good. The recession was over pretty quickly. Societies are making long-term investments.	Unequal distribution between countries and groups within countries. IT investments made in a few companies that cut themselves off from the world.	Extremely good economy after a temporary economic downturn that made strong brands even stronger.
Cyber crime	Cyber-crime became the new way to make money, both for organised crime and for unscrupulous IT geeks. As global countermeasures are required, the problems have still not been solved.	Great efforts have been made to fight organised cyber crime, both in the Nordic Region and internationally. Right now it seems that we have control over the situation. Openness in innovation attracts hackers.	The increasing problems of cyber-crime were significant drivers in the development of closed systems. But criminals retain the ability to stay one step ahead.	We see a growing number of systems that are closed and secured by the suppliers. Efforts are made to limit crime, both in the Nordic Region and internationally.
User involvement	Companies are trying to involve users in the innovation processes, but users lack the confidence to develop their own solutions. Outcome: fragmentation.	Businesses involve and work with users and jointly develop the solutions needed. Outcome: de-fragmentation.	Piracy is spreading as a result of companies and users not trusting each other or technology developed by someone else. Outcome: protectionism and surveillance.	Proprietary solutions, clearly segmented by markets. Confidence is high, with oligopoly-like markets.
Servicification of goods	IT-dependent services are developed in interaction with the users. IT's significance for servicification decreases. Less importance for e-government and increased need for staffing in public authorities to supply services with great transparency.	User-driven and IT-based services are developed as a complement to new and existing physical products. Structured and organised development process. E-governance. High user involvement and freedom for all to provide public services.	Formal and informal services are developed independently of both users and IT. Services are created to circumvent surveillance and regulation. The authorities' services are created independently of the users' wishes and IT support.	The market has great confidence in providers meeting their needs. Top-down solutions with high IT content.
Ever cheaper data communication	Reduced confidence results in large supply and low demand for data communication. IT is not important for innovation.	IT is the main driving force in users being involved in innovation processes. Contact costs to the customer are extremely low.	IT everywhere for surveillance purposes.	Limited supply, but reaches all.
Criteria/scenario	The Bazaar	The Shopping Centre	The Black Stock Exchange	The VIP Club
Closer co-operation between official bodies	Less importance for e-governance and increased need for staffing in public authorities to supply services with great transparency, in co-operation with other official bodies.	"No wrong door" on the Net.	The authorities have their own solutions. Big Brother is watching you. Reduced co-operation between official bodies.	As a user, you do not question the division of responsibilities between official bodies. The technology is good. Incentives for co-operation are largely lacking.

Criteria/scenario	The Bazaar	The Shopping Centre	The Black Market	The VIP Club
Privatisation of services	Less interest in rationalising services with IT leads to increased supply of service-providing (small) companies.	An explosion of private IT-based services replaces public-sector counterparts.	Private service providers competing with public-sector IT-based alternatives.	A few private service providers replace public-sector IT services with private IT-based alternatives.
IT-based teaching	Extremely low demand for IT in teaching. Collaborative learning without IT.	A wide range of IT-based teaching and high acceptance of collaborative e-learning. Many suppliers with interoperable solutions.	Traditional classroom teaching is once more dominant. Less exchange between schools and universities.	A few providers of IT-based teaching dominate the market for e-learning. Proprietary solutions with fierce competition. Could lead to price competition.
Faster internet for all	For what benefit?	IT is the biggest driving force in users being involved in innovation processes. Contact costs for the customers can be extremely low. Anywhere/anytime participation.	For what benefit? Few stakeholders benefit from them.	More efficient IT-based services. Few suppliers (or proprietary solutions).
Increased personal mobility	More physical travel.	Less physical travel.	Unchanged physical travel.	Less physical travel.
More baby boomers	The fear of IT use is increasing as a result of stories of fraud. Sales guarantees of various kinds are becoming more common.	A population that travels and plans journeys online. When they can no longer cope with physical travel, they will arrange virtual trips with friends.	The "haves" live well and travel around the world. They have plenty of time to go into the travel agent and book. Online booking systems cannot be trusted.	A population of travellers. When they can no longer cope with physical travel, they go virtual. Both physical and virtual tours are booked through a personal travel website.
Citizens' IT competence	Good, especially among the young, each one their own IT-smith.	Good, many contribute to development.	Skilled users of established systems.	Skilled and regular users of established systems.
ICT and media convergence	Reduced ICT and media convergence, more content providers.	Increased convergence. The user as co-producer.	Reduced convergence, increased protectionism	Increased convergence, fewer stakeholders and increased protectionism
More and more user-friendly interfaces	For what benefit? The companies want to create user-friendly interfaces, but users are not interested due to low levels of trust in IT.	Users are highly involved in the development of user-friendly interfaces.	For what benefit?	User-friendliness is defined by usability professionals.
Green IT is becoming more common	Not relevant	Citizens' demands for green solutions are met by companies in collaboration with the users.	Incentives to develop green IT solutions lacking.	Users have confidence in the supply. If the supplier says it's green IT, it is.
Criteria/Scenario	The Bazaar	The Shopping Centre	The Black Stock Exchange	The VIP Club
"Trust hubs" increasingly common	Can happen, but not virtually.	An important component, both physically and virtually.	A linchpin of the activities, physically.	The very definition of the concept.
Increasingly	Drives IT development to the grave.	Participation overcomes complexity.	Drives IT development to the grave.	Complexity no obstacle. Few suppliers.

Criteria/scenario	The Bazaar	The Shopping Centre	The Black Market	The VIP Club
complex IT environments				
Increased need to store data	Individual storage	Major demand, system integration	No need: "Forget what you have seen"	Specific need
Trust in IT and Internet	Low	High and active	Low, no interest	High and passive
Development of unitary standards	All are different	Interesting, and a prerequisite	No interest	Necessary
Net neutrality	People trust the Net	People have control over what they work with	No trust	People decide and draw up guidelines
Cloud computing	Not used	Used and important	Without control, therefore uninteresting	Closed, virtual Intranet and security controls
Importance of national borders	None	No borders without global co-operation	Borders have major importance	Borders are used when advantageous
Meetings (physical/virtual)	Physical common	Mixture of physical and virtual	Few physical meetings	Many physical meetings and use of technology for virtual meetings
Management of public-sector ICT	Does not exist	Important for credibility and infrastructure	Minimal and unwanted	Help for infrastructure and technical management
Development of infrastructure	Does not exist	Highly developed	Informal rules	Almost military (power-based)
Legal structures	Missing	If advantageous	Worked against	Needs rules
Introduction of security and privacy protection	Does not exist	Necessary	Opposed	Wanted
Globalisation	Uninteresting	Important	Opportunities	Could strengthen

Appendix 7: Early warnings

At the time the scenarios were being devised, the probability of each respective scenario being realised was more or less the same for each one. Ultimately, this will change and one or more scenarios will begin to seem more probable than others. This section is therefore about identifying early on the signs of a change, trends or breaks in trend in relation to the work done on scenarios. In this way, it will be possible to assess in which direction we are heading. What increases or decreases the likelihood that a given scenario will become a reality? How are the scenarios affected by new trends? What uncertainties may have an effect?

To make this assessment as objective as possible, one should first identify a number of indicators (i.e. events in the outside world) that increase or decrease the probability of each of the scenarios. With the help of these indicators, one can, in an easy and structured way, follow developments and assess the probability that something will be realised, in full or in part. The indicators are primarily based on the scenario axes in order to illustrate in which direction on each axis the outside world is heading.

The purpose of the table below is to inform probability assessments for the scenarios presented in the report.

Explanations:

The plus sign indicates that we are moving towards the scenario:

- + = to some extent
- ++ = to a great extent
- +++ = crucially

E and L signify the nature of the indicator:

- E = very early indicator
- L = very late indicator
- No indication = indicator has a medium-term time scale

Indicator	1 The Bazaar	2: The Shopping Centre	3 The Black Stock Exchange	4 The VIP Club
E-commerce reduced	++ E		+++ E	
Media reporting of security breaches increases	+ E		++ E	
Monetary transactions over the net increase		+++		+++
Number of reported IT crimes increases	+++		+++	
External data storage reduced	++		+++	+
Prolonged recession	++ L		+++ L	
Public services becoming wholly digital		++		+++
Number of new patents in IT security reduced	+++		+++	
High proportion of IT crimes solved		++		+++
Public debate about lack of transparency in major companies	+ E	+++ E		+
Increased number of IT suppliers involving users in development work	++ E	+++ E		
Increased number of new IT companies	+	+++	+	++
Increased number of acquisitions of medium-sized IT companies	+	++		+++ E
Lack of integration of public-sector IT systems in the Nordic Region	+		++ L	+++ L
Reduction in the number of PPPs (public-private partnerships)	+++		+++	
Standardisation of IT in public forums		+++ L		
Dramatically lower prices for data communication		+++		

Appendix 8: Analyses

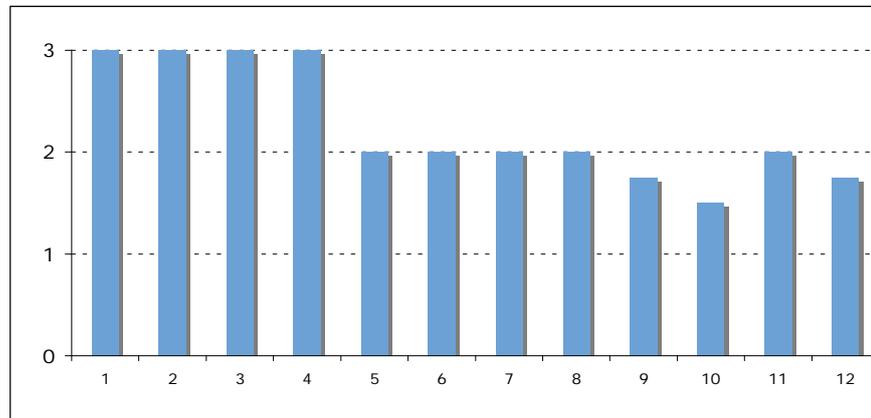
The methods used by the analysis group involve a series of small decisions and assessments. The assessments are made regularly on the following scale: 0 – Not at all; 1 – To a certain extent; 2 – Strong; and 3 – Crucial. The assessments are summed up as a whole. This approach addresses the risk of certain development areas being favoured or rejected in advance.

Should analyses

In the *should* analysis, the expert group has assessed the ability of each area of development to pave the way for each of the four scenarios.

The areas' ability to pave the way for the scenarios

Figure 12 shows each development area's ability to pave the way for the four scenarios.



- 1 IT safety – security and combating crime
- 2 IT research
- 3 Joint rules for open environments
- 4 Consumer protection and privacy
- 5 Nordic quality assurance
- 6 Reliable e-identification
- 7 Interoperability
- 8 New business and entrepreneurship
- 9 User-oriented IT services
- 10 Models for e-democracy
- 11 Public-sector e-services
- 12 IT-based teaching

Figure 12: The development areas’ ability to pave the way for the four scenarios

Reflections

- All four areas in *prerequisites* are crucial to pave the way for the overall picture of the scenarios.
- Areas in *facilitators* are also important.
- Among the areas in *direct IT benefits*, public e-services stands out as a bit more important than the others. The least important area for paving the way for the scenarios is models for e-democracy.

The areas’ overall ability to pave the way for each scenario

Figure 13 shows the average value for the areas’ overall ability to pave the way for each scenario.

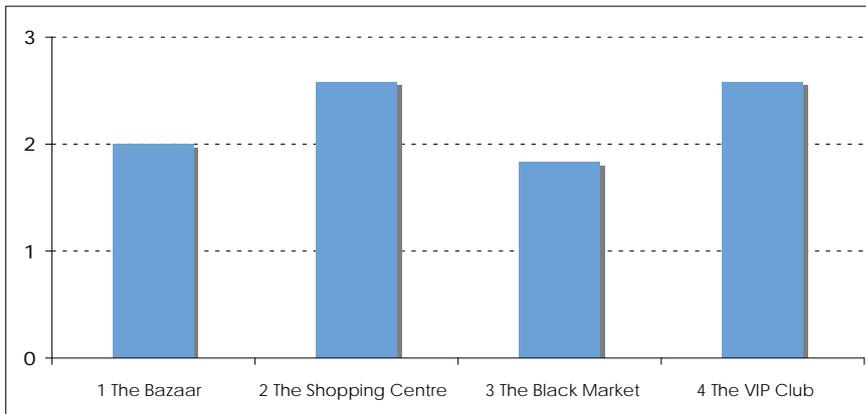


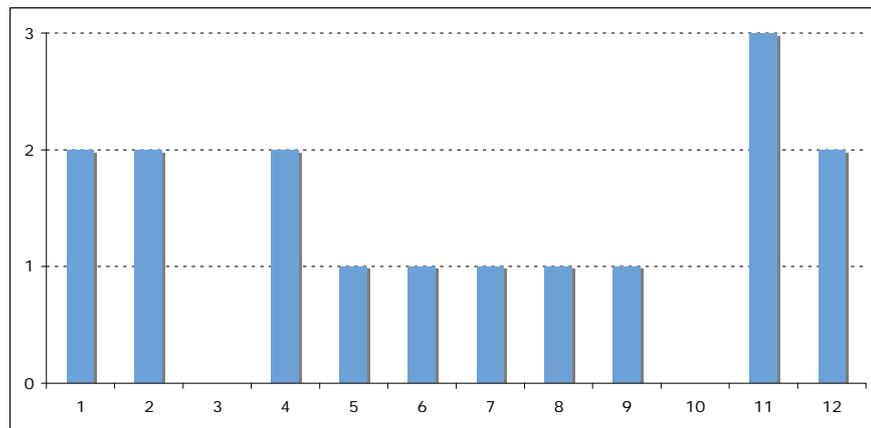
Figure 13: The importance of the areas for the scenarios.

Reflections

- The higher scores in *The Shopping Centre* and *The VIP Club* are due to the fact that almost all areas are important for the Nordic Region being able to benefit from and maintain an edge in these relatively positive scenarios.
- *The Bazaar* and *The Black Market* are largely about curbing undesirable developments. It is therefore mainly the prerequisite-creating and facilitating areas that are important. Less room is afforded for new services in worlds in which confidence in IT is low.

Could analysis

In the *could* analysis, the experts have, on the basis of a corresponding point scale, assessed the strength of the current assets in the Nordic Region as far as developing their respective areas is concerned. Figure 14 illustrates the strength of the assets in the respective areas.



- 1 IT safety – security and combating crime
- 2 IT research
- 3 Joint rules for open environments
- 4 Consumer protection and privacy
- 5 Nordic quality assurance
- 6 Reliable e-identification
- 7 Interoperability
- 8 New business and entrepreneurship
- 9 User-oriented IT services
- 10 Models for e-democracy
- 11 Public-sector e-services
- 12 IT-based teaching

Figure 14: Average value of the extent to which the areas benefit from the respective assets.

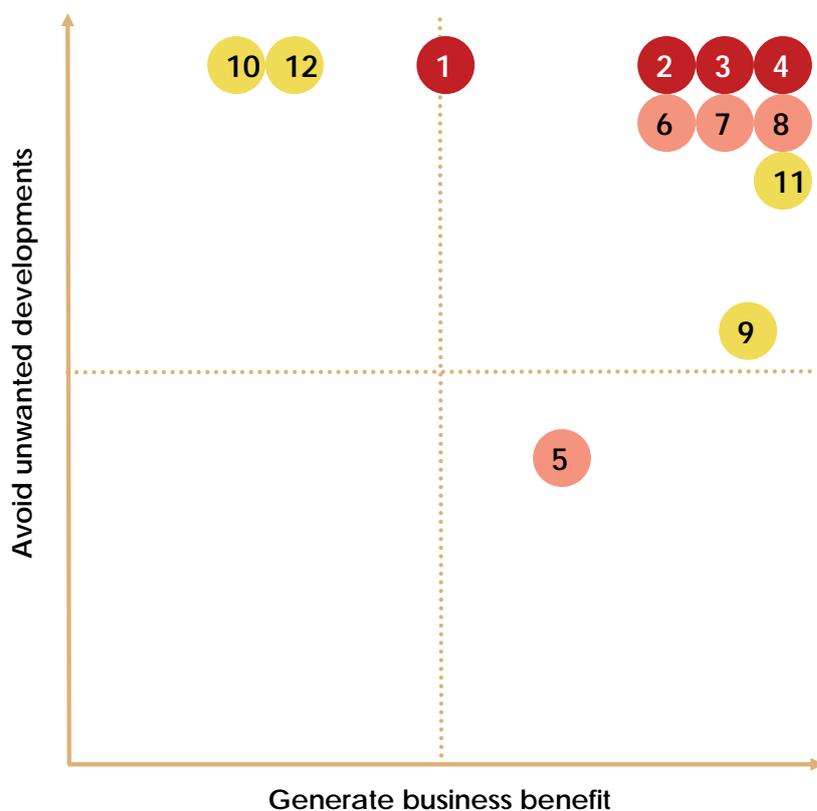
The picture that emerges reveals major imbalances between the development areas as far as Nordic strengths are concerned (*could*).

Reflections

- The *prerequisites* IT security, IT research and consumer protection and privacy are considered strong in 2009, which facilitates the development of these areas. However, joint rules for open environments is an area in which the Nordic Region has virtually no strengths at all, which means that developing this area will be more difficult.
- The *facilitators* are consistently weak. The experts have estimated that the Nordic Region has only limited assets to build upon in this group.
- The full range of scores is found in the area *direct IT benefits*. The Nordic Region is strongest in public-sector e-services, followed by IT-based education, while it is weak in user-oriented IT services and has no assets at all in models for e-democracy.

Creating business value/avoiding undesirable developments

Even if all the scenarios were assessed as possible in 2020, the group of experts noted that some are based on undesirable developments in the outside world. In other scenarios, it was easier to see business opportunities. The expert group therefore made an assessment of each development area’s importance in relation to avoiding undesirable developments and generating business value. Figure 15 illustrates the importance of the development areas in relation to both parameters.



- 1 IT safety – security and combating crime
- 2 IT research
- 3 Joint rules for open environments
- 4 Consumer protection and privacy
- 5 Nordic quality assurance
- 6 Reliable e-identification
- 7 Interoperability
- 8 New business and entrepreneurship
- 9 User-oriented IT services
- 10 Models for e-democracy
- 11 Public-sector e-services
- 12 IT-based teaching

Figure 15: Avoiding undesirable developments vs. generating business value.

It is interesting to note that three of the prerequisites and three of the facilitators are extremely important in both perspectives.

Reflections

- The *prerequisites* IT research, joint rules for open environments and consumer protection and privacy are extremely important in both perspectives. IT safety, security and combating crime are particularly important for curbing undesirable developments, but not nearly as important in relation to generating business value.
- The *facilitators* reliable e-identification, interoperability and new business and entrepreneurship are particularly important in both perspectives, while Nordic quality assurance does not contribute particularly strongly to any of the assessed parameters.
- In relation to *direct IT benefits*, public e-services are extremely important from both perspectives. User-oriented IT services are especially important when it comes to generating business value, while models for e-democracy and IT-based education are extremely important for avoiding undesirable developments.

Cross-impact analysis

Single development areas are rarely completely independent of other development areas. Sometimes it is even the case that development areas we would prefer to ignore constitute *prerequisites* or *facilitators* for the areas that we would prefer to implement. To get a clearer picture of these interrelationships, we conducted an analysis of the areas of mutual interdependence (a cross-impact analysis). In this type of analysis, the interdependence of all the strategies is evaluated. The degree of dependence is estimated on a scale from 0 to 3 and then added up. A total of 132 assessments were made. The results of the assessments are shown in the diagram in Figure 16. The vertical axis of the chart indicates the extent to which the development area is a driver (i.e. other development areas dependent on it) and the horizontal axis refers to how much the development area is dependent on other areas. The diagram is also divided into four parts. In the top left are areas that are mainly drivers; top right, ones that are both drivers and dependent (called “links”); bottom right, areas that are mainly dependent; in the bottom-left quarter, finally, are areas that are largely independent of all the others.

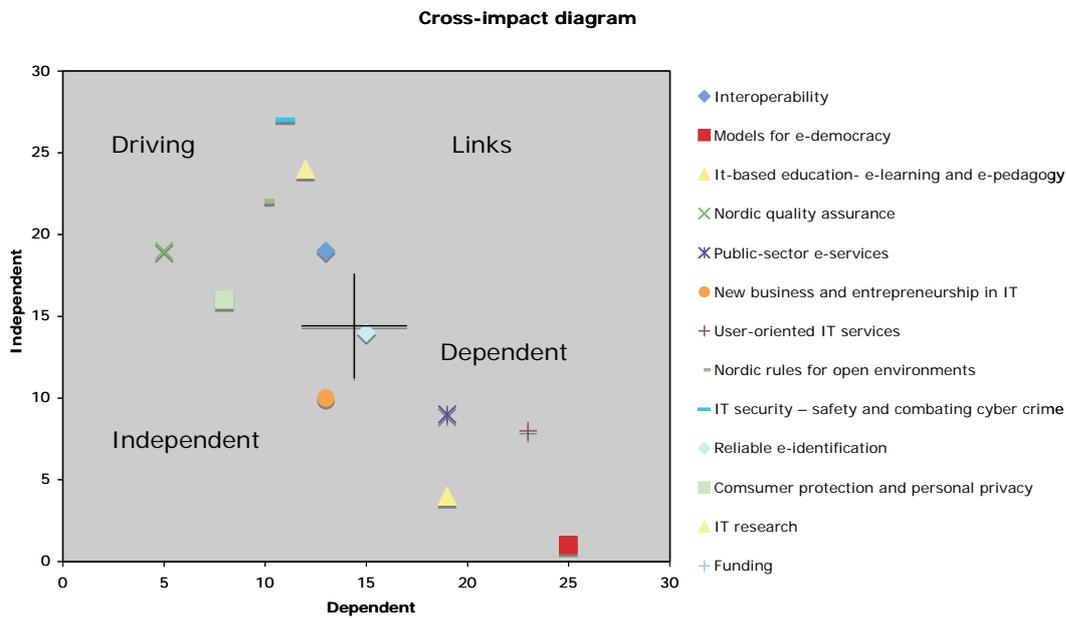


Figure 16: Cross-impact diagram.

There are many inter-dependencies between the different areas.

Figure 17 illustrates the complexity of the system that emerges. The arrows indicate which of the selected areas have critical (black arrows) or strong (grey arrows) connections. The arrowheads point at dependent areas.

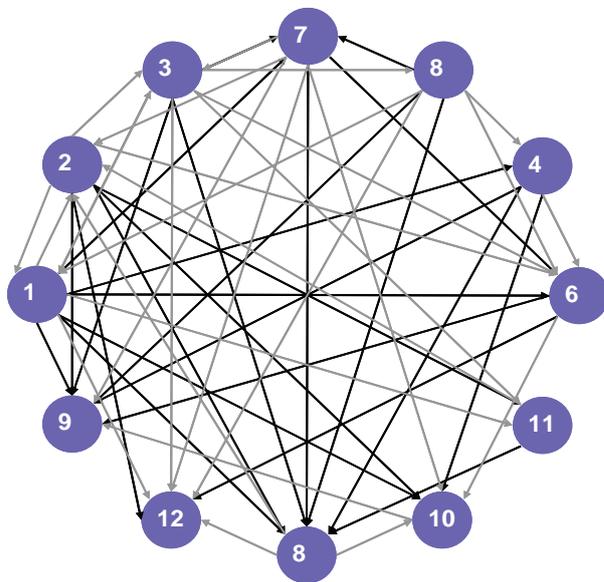


Diagram 17: Strong and critical inter-connections.

Figure 17 depicts the critical links that form the basis for the snapshot in Figure 18, which represents a gross simplification of the connections. The figure shows that the areas in the group we call *prerequisites* are extremely important to the success of both the areas in the group *facilitators* and those in *direct IT benefits*.

Similarly, the *facilitators* are important for success in the more tangible proposals for action contained in the group *direct IT benefits*.

Reflections

- Investment in dependent areas like *direct IT benefits* is unlikely to be fully effective unless the necessary *prerequisites* and *facilitators* are in place.
- This picture is broadly consistent with the picture that emerged from the *should* analysis. That which creates *prerequisites* or *facilitators* is also important when it comes to paving the way for the four outside world scenarios.

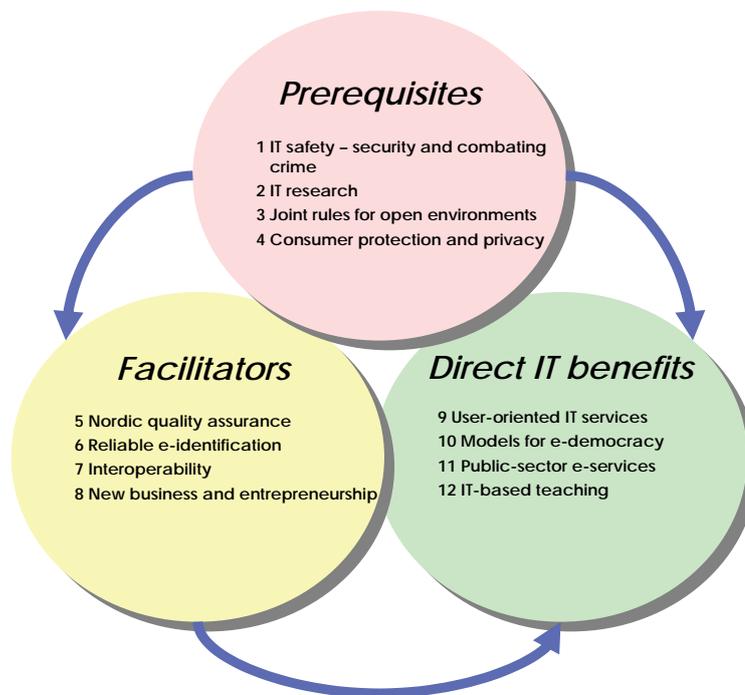


Figure 18: Simplified connections between areas.

Appendix 9: Proposal for Nordic input – 12 development areas

Based on the four scenarios, the group of experts drew up development areas that were important for the Nordic Region to be successful in IT-enabled services in each scenario in 2020. Some development areas were important in multiple scenarios. Duplicate and similar areas are clustered together, and 12 different development areas emerged (see Figure 2). This section describes each development area, along with policies and proposals for action to NCM for each of them.

*9.1 Prerequisites**Proposal 1. IT safety – security and combating crime*

Create trust in IT among citizens and the willingness to use IT-based services. Support the development of and introduce a transparent and “easy” system for the identification of individuals. Help to avoid the Nordic Region becoming a playground for cyber-crime and facilitate efforts to combat it.

Policy proposal:

- i. NCM supports Nordic co-operation on combating cyber-crime

Proposal for NCM initiatives:

- i. The Nordic countries should already be able to map existing Nordic-level initiatives to fight cyber-crime.
- ii. Support anti-cyber-crime projects with knowledge and monetary resources.

Proposal 2. IT research

Research on the development of IT in general, but particularly the use of IT in both public- and private-sector activities. Basic research is important, but to a large extent originates outside of the Nordic Region. The Nordic Region has historically been strong in applied research and therefore enjoy better prerequisites for assisting competitive development in this area.

Policy proposal:

- i. NCM should, towards 2020, support research that leads to developed or new business opportunities, as well as research that will increase confidence and security in IT.

Proposal for NCM initiatives:

- i. Identify IT areas in which the Nordic Region already has a skills lead.
- ii. Set up a Nordic group to exchange experiences and dialogue on joint research initiatives.
- iii. Run PR campaigns to increase the number of IT students, and work for closer collaboration between schools and industry.

Proposal 3. Joint rules for open environments

The Nordic countries work together to create transparent and consistent models for, e.g. charging for text messages, e-identification, etc. The development of Nordic standards increases global competitiveness and makes more effective use of the Region's IT resources. An important aspect of this is that the Nordic Region shares knowledge about information exchanges and standardisation.

Policy proposal:

- i. Strive for joint Nordic standards for exchanging information within a Nordic working group.

Proposal for NCM initiatives:

- i. From 2010, work towards a joint Nordic interface standard for the exchange of patient and carer data.
- ii. From 2010, work towards a joint Nordic standard for vehicle data.
- iii. Unique and personal e-identity (e.g. civil registration number, e-mail address), assigned to Nordic citizens at birth and used throughout life.

Proposal 4. Consumer protection and privacy

Consumer protection and privacy becomes more important as more data is stored and more services provided via IT communications.

Policy proposal:

- i. Increase awareness among consumers and users.
- ii. Create ethically sustainable rules and transparency for IT-based services.

Proposal for NCM initiatives:

- i. Joint information campaign for the Nordic countries' national consumer-protection agencies.
- ii. Joint Nordic initiatives towards legislating for the handling of consumer data and profiling in 2015.

9.2 Facilitators

Proposal 5. Nordic quality assurance

In order to aid IT development, the Nordic Region provides a quality function that verifies business's claims about the quality/characteristics and availability of their systems in relation to the consumer. The Swedish Consumer Agency and testing authorities play a more active and proactive role, including in the IT field, and work to ensure citizens' e-competence and reduce the "digital divide" in society.

Policy proposal:

- i. Joint formulation of the certification requirements for quality assurance, as per "INO 2020" (fictitious standard) for both business and the public sector.

Proposal for NCM initiatives:

- i. In 2010, initiate Nordic exchanges of experience about best practice.
- ii. Work to set requirements to meet "INO 2020" (fictitious standard) for broadband, PCs, etc.

Proposal 6. Reliable e-identification

Secure and standardised e-identification in the Nordic Region creates prerequisites for better and more reliable IT-based services. It also facilitates faster and more efficient development of IT-based services.

Policy proposal:

- i. Facilitate the mobility and development of IT-based services in the Nordic Region through joint Nordic identification, payment services, etc.

Proposal for NCM initiatives:

- i. Nordic civil registration numbers in use by 2015.
- ii. From 2010, develop software for digital certification, authentication and authorisation within ongoing international initiatives (EU STORK).
- iii. The goal is Nordic e-identification at birth by 2020 (hardware).

Proposal 7. Interoperability

Public-sector systems are becoming increasingly complex (more multi-system vendors, more data, more functions, etc.). By setting requirements for compatibility in public-sector procurement, the public sector can drive the development of interoperability. By communicating, clarifying and influencing market standards, the public sector can create a more open market and involve smaller IT players.

Policy proposal:

- i. Through Nordic best practice, open-source and open-access policies, promote a system of information exchange, financial information, IT solutions and open entrepreneurship. Countering the development of large closed systems benefits flexibility and innovation.

Proposal for NCM initiatives:

- i. To make open source the core principle in the public sector, including in legislative work.
- ii. Formulate and give examples of best practice at Nordic level.

Proposal 8. New business and entrepreneurship

The Nordic legal framework supports business creation and entrepreneurship, e.g. by strengthening the Nordic brand so that people feel proud of Nordic businesses and want to use them. Co-operation between the Nordic countries improves competitiveness. The countries are small, but are more visible when they work together.

Policy proposal:

- i. Facilitate the growth of entrepreneurship in IT with joint approaches/initiatives.
- ii. Highlight the Nordic Region as an IT brand.

Proposal for NCM initiatives:

- i. Initiate co-operation to develop Nordic “business incubators”.
- ii. Joint marketing to maintain and strengthen Nordic IT as a trademark, including using the Nordic “internet marketing platform”.

*9.3 Direct IT benefits**Proposal 9. User-oriented IT services*

In the Nordic markets an understanding exists of the virtual services that citizens would accept. Physical services are retained where there is a need to maintain citizens' confidence in them. In order to develop user-friendly IT services and increase the Nordic Region's global competitiveness, profitable payment models need to be developed in the form of hybrid models (multi-party financing), and models for advertising in digital media.

Policy proposal:

- i. Promote "self-service" in the public sector.
- ii. Implementation of paperless invoicing in the Nordic Region as per EU policy (free movement of goods/ services).
- iii. Promote open innovation.
- iv. Promote the development of Nordic exports in IT-based services.
- v. Nordic payment models that are reliable for the citizens, profitable, and promote entrepreneurship.

Proposal for NCM initiatives:

- i. Create an IT-based platform for open innovation of products and services.
- ii. In 2015, introduce Nordic standards for e-invoicing and Nordic e-coin cards.
- iii. Scenario group to brainstorm different payment systems and develop proposals for solutions.
- iv. Pilot project for new payment system.

Proposal 10. Models for e-democracy

Common models and rules for e-democracy, technological progress and trust among citizens make e-democracy possible in a growing number of areas.

Policy proposal:

- i. Increased use of IT in contact with the authorities, tax returns, referenda, elections, etc. All of the countries already have civil-registration number systems that will facilitate development.

Proposal for NCM initiatives:

- i. Include easy-to-navigate web-based background information as part of the public communication platform.
- ii. Work to secure electronic identification.
- iii. Towards 2015, conduct a technical experiment with voting procedures.

Proposal 11. Public-sector e-services

Investments are made to develop public services with a view to increasing efficiency and conserving resources at both national and Nordic level. Co-funding models are developed with business to meet the security requirements and user demands.

Policy proposal:

- i. Closer Nordic co-operation on the joint development of IT-based public services, to establish the Nordic Region as the market leader in public-sector IT.
- ii. Joint guidelines and standards for green IT solutions, which force the market to develop green solutions more quickly.

Proposal for NCM initiatives:

- i. Group to co-ordinate Nordic public-sector IT. The group will consist of people from each country who are able to make decisions about public-sector services.

Proposal 12. IT-based teaching

Compatibility between the various e-learning systems creates prerequisites for co-operation between Nordic institutions, as well as joint educational guidelines and goals. This increases the Region's global competitiveness in relation to larger countries that are already working in this area.

Policy proposal:

- i. Work for organised Nordic co-operation and a pedagogical framework with national content.

Proposal for NCM initiatives:

- i. Create a project to develop a joint Nordic programme for teacher-training lecturers.
- ii. Pilot projects for strong IT-based training approaches, e.g. in history or mathematics.
- iii. Develop IT-based language teaching that facilitates the integration of immigrants in the Nordic Region.

9.4 Environmentally friendly IT

At the conclusion of the scenario project, the group of experts reflected on the scenario work and the development areas. It was considered that the abovementioned development areas covered the need for action. However, green IT was highlighted as an IT-based service that required extra attention. Eco-friendly IT was mentioned in passing in several of the other areas, but has its own entry below.

The Nordic countries use IT to make private- and public-sector energy consumption more effective. However, IT consumes increasing amounts of electricity and harms rather than saves the environment. At the same time, IT can be made more environmentally friendly and can contribute to environmental solutions.

Policy proposal:

- i. With increasing demands for environmental friendliness, Internet-based services risk being criticised as polluters. By developing guidelines for green IT, the Nordic Region can work towards the ongoing development of IT-based services.
- ii. The Nordic Region can make an environmental contribution by demanding that public-sector IT systems must be environmentally friendly and provide services that others do not.

Proposal for NCM initiatives:

- i. Nordic working group to develop guidelines for environmentally friendly IT-based services.
- ii. Initiate work on green IT for a sustainable information society, e.g. by setting up a working group.

Appendix 10. About Kairos Future

Kairos Future helps companies and organisations understand and shape the future, through:

- research-based analyses of the outside world and the future
- future-based business development and innovation
- implementing strategies.

We combine the ability of the think tank and the research company to generate new insights and ideas with the consultancy's focus on what works in practice. Our work is built on knowledge development, as well as our own, thoroughly tested methods of analysis, strategy development and implementing change.

The work is usually done in close collaboration with the clients.

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The IT-based Services of the Future

Report by the Nordic Council of Ministers IT-policy Expert Group

As part of the stimulation and development of co-operation in the IT field, MR-U set up a group of eminent external experts to advise the Nordic Council of Ministers on IT issues. The group devised four future scenarios based on forces for change in the world a large. The scenarios are presented in this report, along with analyses and recommendations.

The scenario method is a tried and tested tool in both public policy and in strategic business contexts. It is well suited to making forward-looking strategic observations in a changing world. Globalisation, climate change, the financial crisis, servicification and other external factors influence the nature of Nordic co-operation and help our countries to continue to develop as prosperous, knowledgeable and innovative societies in the face of fierce competition and specific framework conditions. The report focuses on identifying priorities that will underpin the development of ICT-based services.

The report can be used as an inventory of potential areas, to identify and develop candidates for Nordic co-operation and, above all else, to stimulate discussion on potential areas for Nordic IT co-operation.

