How to decide on the scope, priorities and coordination of information society policy?

Analytical framework and three case studies

Paper prepared for EuroCPR 2010

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1 – Introduction

Information and Communication Technologies are used intensively by ever more individuals and organizations. ICT is everywhere. Electronic communications can connect everyone and everything. The impact of ICT is everywhere, with many parallels to previous technological revolutions (Freeman and Soete 1997, Freeman and Louçã 2001, Perez 2002). ICT is influencing social habits, work processes, organizations, commercial industries such as retail and banking, and public sectors such as health and education. ICT also influences the location of economic activities and (hence) transport and financial flows.

Changes in institutional frameworks are required to effectively pursue political and policy objectives, in a new techno-economic context (Freeman and Soete 1990, Perez 2002). Changes in institutional frameworks can involve new priorities for - and boundaries between - directorates, ministries, agencies and regulators. A ministry can embrace new objectives, new policy instruments, a new role vis-à-vis other ministries, interacting with different stakeholders, etc. For example, it has become an important objective of European information society policy to stimulate the use of ICT by SMEs, public sectors and citizens (in addition to policy and regulation with a focus on the supply side of ICT and media). However, information society policy can not be everywhere; it can not address all economic and societal issues in which ICT plays a role. The policy challenge is to decide on the scope and priorities of information society policy.

Policy coordination can reduce - but not solve - the tension between the broad impact of ICT and information society policies that are effective and manageable. ICT cuts across vertical sectors and policy areas such as health, education and transport and horizontal policy areas such as innovation, enterprise and competition policy. The challenge of effective policy coordination is stressed by the EC (2009). Policy coordination is in the OECD's top 10 of policy priorities for ICT: "There is a greater need for a coordinated, horizontal government approach since ICTs are

increasingly addressing policy challenges as diverse as education, healthcare, climate change, and energy efficiency. Around one-third of OECD countries are attempting to centralize formulation and coordination of ICT-related policies to improve policy coherence. Efforts to improve coordination and reduce duplication are likely to intensify with the economic decline, greater strains on governments budgets, and pressures on long-term investments" (OECD 2008, p.20).

The Dutch Ministry of Economic Affairs invited us to develop *an analytical framework that assists policy makers in deciding on the scope, priorities and coordination of information society policy.* The underlying policy questions are: if ICT is everywhere, should ICT policy be everywhere? Which ICT issues may *not* need policy intervention, neither by information society policy nor by other policy makers? In addition to market failures and equity considerations, are system failures a rationale for policy intervention? What are the expertise and means that information society policy can offer to other policy fields and policy makers? How to operationalise 'coordination'? To what extent do the answers to these questions depend on the vision on ICT and on political ambitions? Given the economic crisis, how can information society policy have more impact with fewer budgets and less civil servants? How to make decisions in individual cases? For example, how to decide on the role of information society policy in addressing energy efficiency, smart grids, intelligent transport, e-learning? This broad set of policy questions was triggered by a mid term evaluation of the Dutch ICT agenda for 2008-2011.

We have translated the policy questions into a research question with a focus on the level of concrete policy issues: *what are the main factors and questions to be considered when deciding on the role of information society policy in addressing ICT related issues, and to inform decisions on policy coordination and policy instruments?*

The next section of this paper will present the seven factors and questions to be considered. This framework is based on public management literature (e.g. Peters 1998, Sabatier and Jenkins-Smit 1993, Lascoumes and Le Gales 2007), innovation theory (e.g. Edquist 1997) and communications research. The framework consists of seven questions and a set of typologies.

The third section of this paper presents the results for three case studies: e-skills, services innovation, and the use of ICT in health sectors. The results are based on three workshops with policy makers and experts. In the workshops, we have applied (and improved) the framework.

The fourth section summarises the main points, limitations and questions for further research. We will touch upon the research community that is working on information society policy. The discussion on the scope and priorities of information society policy (and the need for policy coordination) may be relevant for discussions on the scope and priorities of the research community for information society policy (and the linkages to other research communities).

2 – Analytical framework

We have developed the framework in cooperation with the Dutch Ministry of Economic Affairs, taking into account the following requirements:

- The analysis should start with societal problems, public interests and the rationale for policy intervention. This provides input to discuss collaboration and policy instruments.
- The framework must be clear, useful and scalable framework, e.g. to be applied in a workshop or an extensive study.
- It is tailored to the Dutch Ministry of Economic Affairs - the national coordinator of ICT policy - yet addressing other ministries and stakeholders.
- It is no computational model that leads to strict yes or no answers, but rather it supports well motivated and integrated decision making.
- The framework stimulates and underpins role differentiation for the policy coordinator: take the lead, advise (e.g. other ministries), explore (for new ICT issues) or neglect.

The analytical framework consists of seven factors and questions. The framework includes a number of typologies, e.g. a scheme of market failures and system failures. The framework also includes practical tools such as steps and schemes to explore relevant stakeholders and to explore the impact of policy interventions. As mentioned above, the framework should be applied to individual ICT issues. The seven factors and questions are:

- What is the rationale for policy intervention?
- Who are the main stakeholders and which policy makers do they know and trust?
- Is the ICT related issue relevant across sectors and/or is the issue linked to other ICT issues?
- How does the issue fit within the mandate and objectives of information society policy?
- What are relevant resources, capabilities and policies of other policy makers, e.g. other ministries, European Commission and local government?
- Which policy instruments can be effective to address the issue and how experienced are information society policy makers with these policy instruments?
- What are potential economic, social and environmental costs and benefits, and what are potential government failures?

The seven answers interact. For example, if an ICT related issue does not perfectly fit within the objectives of information society policy makers, they can still consider addressing the issue, if the positive impact of policy intervention can be substantial, with no other ministry picking up the issue. The set of answers is used to decide on the role of information society policy in a specific issue - explore, lead, advise or ignore - and the selection of policy instruments and partners. Application of the framework leads to nuanced and context-aware conclusions.

2.1 What is the rationale for policy intervention?

The rationale for policy intervention influences all subsequent questions. The extent to which the rationale is clear and well-founded influences the *degree* of government intervention by the ICT-policy coordinator and other policy makers. A thorough understanding of the rationale – such as system failures and underlying causes – also shapes the *mode* of intervention. The rationale

influences the selection of policy instruments and the type of collaboration with other policy makers and actors outside government.

The rationale for intervention can be determined via the concepts public interests, market failures and system failures. The realisation of public interests may be hindered by market failures and/or system failures. For example, why does sector X in the Netherlands innovate less than in other countries? Which types of market failures and/or system failures explain why the sector has fallen behind? Where is government intervention part of the problem or part of the solution?

The concept of market failures is mainly used as rationale in the context of existing markets, privatization and the division of roles between public and private actors (Teulings, Bovenberg and Van Dalen 2003). The focus is on market transactions, private organisations and consumers. The concept of system failures is increasingly used as a rationale in the context of innovation. Here, the focus is on embryonic markets, cooperation between public, private and public-private actors within the innovation system, possibilities to stimulate strong regions and sectors and preconditions for innovation (such as infrastructures or institutions). In some cases, system failures may offer a rationale for government intervention where market failures do not. The concepts of market and system failures are largely complementary, but a small overlap does exist. In scientific literature, there is increasing attention for the overlap between the two concepts and the mutual influences (Gustafsson and Autio 2006).

Equity considerations are also relevant when analysing the rationale for government intervention (WRR 2000, Teulings et. al. 2003). We did not explore equity considerations as a rationale for policy intervention in-depth. Still, we did mention when equity considerations were an additional rationale for innovation policy, for example R&D investments in health.

To be careful with a potential increase or intensification of government intervention the concept of government failures can serve as a ‘sanity check’. Even if there are clear indications that market or system failures do exist (e.g. no standard emerges), the risks of government intervention may still be substantial. In other situations, policy intervention may just have limited positive effects, for example in the case of instruments that target already strong sectors. For this type of pro-active or ‘positive’ policy, the concepts of market and system failures also help to verify where government intervention could have maximum effect. For more information regarding the costs, benefits and risks of government intervention, see below question seven.

To get a clear picture of the rationale, the first step is to determine the public interests that come into play for a particular ICT issue. Examples of relevant public interests may be sustainability, economic growth, innovation, participation or high quality education. A well-defined public interest improves the analysis in subsequent questions. The level of aggregation is also important. For example, the public interest of electricity supply can be approached and defined in different ways. E.g. it can refer to national security, sustainability or universal service obligation.

The second step is to analyse market failures and system failures. The overview in Table 1 is based on Poel and Kool (2008). Underlying sources are Martin and Scott (2000) and Smith (1999). We distinguish four types of market failures and five types of system failures. The challenge for policy makers is to determine which type of market failures and/or system failures play a role in a specific ICT issue. The analysis can be based on the perception of stakeholders and experts. For example, what types of market failures and system failures are relevant for which type of actors? The analysis can also rely on objective information. For example, how well do existing actor networks in the innovation system function? How much capital is invested in innovation activities of firms by banks and venture capitalists, compared to the same type of investment in other countries?

Table 1: Overview of market and system failures (Poel and Kool 2008)

Market failures	System failures
Positive externalities (spillovers)	Failures in infrastructural provision and investment
Public goods and appropriability	Lock-in / path dependency failures
Imperfect and asymmetric information	Institutional failures
Dominance	Interaction failures
	Capabilities failures

Market failures

This concept has been applied to technology and knowledge production markets and has become mainstream in R&D and innovation policy (Arrow 1962, Hauknes and Nordgren 1999). This study follows Martin and Scott (2000), Oxera (2005) and the European Commission (2006).

- **Technological or knowledge spillovers**: the process of undertaking innovation, or the end result of the innovation process (e.g. a product), often generates wider benefits (positive externalities). Left to the market, projects that from a private perspective are unprofitable, but would generate large social benefits, may not be taken forward.
- **Public goods and appropriability:** knowledge and ideas are often non-excludable: it can be difficult to exclude others from using the innovation and to make them pay individually for the benefit they receive (for example the GPS-network Galileo). Again, firms may give up projects as a result.
- **Imperfect and asymmetric information**: this affects, in particular, financial markets. Due to information problems, SMEs engaged in high-tech innovative projects with good prospects may find it difficult to obtain funding.
- **Dominance**: this is mainly a issue for competition policy but market dominance - indicated by high market shares, entry barriers and switching costs - can reduce the incentives for innovation. This can be a rationale for governments to add incentives to innovate for the relevant sector and firms (small and large). Examples are stimulating the use of open standards and open source software, or stimulating radical innovations in

which dominant firms do not invest. Also note that so called ruinous competition may reduce the incentives (and the financial resources) for innovation.

System failures

This concept is rooted in the systems of innovation literature, institutional and evolutionary economics (Nelson 1993, Edquist 1997). The typology is adapted from Smith (1999).

- **Failures in infrastructural provision and investment**: This includes physical infrastructures (e.g. electronic communications and energy) and science-technology infrastructures such as universities, (public) research institutes, research and test facilities.
- **Lock-in / path dependency failures**: The development and adoption of new technologies and practices (elements) may be delayed or blocked because individual elements are part of technological regimes: "a complex of scientific knowledge, engineering practices, process technologies, infrastructure, product characteristics, skills and procedures which make up the totality of a technology and which are exceptionally difficult to change in their entirety" (Smith 1999). This includes coordination issues (e.g. to involve all stakeholders, that have different interests) and issues such as dominance, switching costs, standardisation and interoperability.
- **Institutional failures**: This includes so called hard institutions such as laws and regulations (e.g. standards, health and safety regulations, contract law and intellectual property rights) and soft institutions (such as political culture, social values, entrepreneurship and trust).
- **Interaction failures**: This includes strong network failures (closure, internal orientation, group think, lack of weak ties) and weak network failures (little interaction between complementary technologies, actors, knowledge, skills, know how and capacity; lack of shared vision of future technology developments).
- **Capabilities failures**: This concerns a lack of competences, capacity, flexibility, learning potential, and resources, e.g. for incremental innovation or for transitions to new technological regimes.

2.2 Who are the most important stakeholders?

Stakeholders are those individuals, groups and organisations that can influence policy or that can be influenced by policy interventions. Identifying and analysing the relevant stakeholders helps to define their main characteristics, such as their influence or power, or their opinions and positions. Knowing the stakeholders is important for various reasons: they can be partners for collaboration; they can influence the possibilities for policy intervention positively or negatively, and policy interventions can have impact by influencing the behaviour of key stakeholders.

The identification and analysis of the most important stakeholders are two separate steps. In order to identify stakeholders, brainstorming is often mentioned as a method to compose a long list of all possible stakeholders (e.g. Mitchell, Agle, and Wood 1997, Achterkamp and Vos 2008, Bryson 2004). Many different techniques for brainstorming exist, but regardless of the technique used it is important to keep the following issues in mind:

- Compose the long list together with a team, including experts in the policy issue in question as well as experts in interacting with stakeholders;
- Identify the stakeholders based on the content of the policy issue, rather than on their opinion or position (e.g. against or in favour of);
- Study the policy issue from different perspectives;
- Use an overview of possible influencing factors as inspiration to identify stakeholders;
- Start by identifying *types* of stakeholders instead of actual persons, groups or organisations;
- Identify actual persons, groups or organisations only after many different perspectives have been explored;
- Check for comprehensiveness:
    - Stakeholders in the value chain, policy and implementation chain, networks;
    - Stakeholders that can be influenced positively or negatively by ICT developments and policy interventions;
    - Stakeholders that need to change their behaviour, policy or strategy to realise policy objectives;
    - Internal and external stakeholders.

This long list of stakeholders offers an overview of various stakeholders that might influence policy or get influenced by policy intervention. The second step is to classify the identified stakeholders in order to define which of these stakeholders are the most important for the policy issue and possible policy intervention. The classification of stakeholders uses seven dimensions:

- *Influence*: to what extent can a stakeholder influence the policy issue, in a formal (through regulation, laws or official rights) or informal (through lobbying or media) way?
- *Interests*: what can a stakeholder win or loose because of policy interventions? How large is this interest?
- *Position*: what is the perspective of the stakeholder on the policy issue and policy intervention? Is the stakeholder in favour, against or neutral?
- *Knowledge*: to what extent has the stakeholder knowledge of the policy issue and policy intervention?
- *Alliances*: can the stakeholder form alliances with other stakeholders to increase his influence?
- *Available resources*: does the stakeholder have the resources (funding, political support, manpower) to increase his impact?
- *Existing relation with policy coordinator*: does the stakeholder already have a relation with the policy coordinator and what is the nature of this relationship?

The seven dimensions can be combined and contrasted to define the most important stakeholders. This is also called stakeholder mapping. The combination of influence and interest is widely used (Gardner, Rachlin and Sweeny 1986), but there are also three-dimensional approaches including influence, interest and position (Murray-Webser and Simon 2005, Mitchell et al. 1997). This stakeholder mapping can be used to balance the various interests and positions of stakeholders and to define various strategies for stakeholder management.

2.3 Is the ICT issue relevant across sectors and/or is the issue linked to other ICT issues?
To answer this question, the characteristics of the ICT issue in question need to be further explored and compared to other ICT issues. Although every issue is unique, similarities with other ICT issues do often exist. In addition, the approach or results on one ICT issue may be relevant for another ICT issue. For the ICT policy coordinator the following questions are relevant: does an ICT issue cut across several/all sectors (e.g. privacy)? Is the solution or innovation in sector A relevant for other sectors (e.g. identity management) systems)? The answers directly relate to the added value for ICT coordination. Strong interrelations or interdependence between ICT issues plead for strong coordination, the implementation of coordinated policy programmes, integrated regulatory trajectories and platforms, or at least to secure the knowledge and experience of individual policy makers. In order to explore the relevant characteristics of an ICT issue, we distinguish between network effects, learning effects and stakeholders.

Network effects
If a solution or innovation in ICT issue/sector A can be directly applied to other sectors, and the number of users increases subsequently, network effects are maximized. For example, the identity management system to interact with the Dutch government, DigiD, can be used in many sectors (including healthcare, education, etc.). This allows for efficient (and cheap) use within sectors and between sectors, and it allows users to use one solution only. In several countries, plans are made to also allow firms and consumers to use the identity management system that was allowed for eGovernment services and public sectors. Network effects can be a reason for relatively strong coordination, with the ICT policy coordinator taking the lead.

Learning effects
Learning effects appear when a solution or innovation for a particular ICT issue/sector can build upon innovations or solutions in other sectors. This may concern the policy approach (e.g. the process and instrumemts such as creating establishing public-private partnerships) but it can also involve solutions from sector A that can be adapted for sector B. Policy coordination can increase these learning effects. An example is an ICT planning tool developed for healthcare; a process with users and providers, with attention for work routines with several technical adjustments. The lessons learnt from this process may be relevant for other sectors. Another example is the policy approach regarding privacy issues for electronic patient files and the potential lessons learnt for the implementation of road pricing. Even for newly emerging ICT issues, attention can already be paid to increase possible learning effects. The ICT policy coordinator (as explorer) can identify potential problems for emerging ICT issues and use relevant lessons from existing issues.

Stakeholders
If ICT issue X involves many of the same stakeholders as ICT issue Y, it is efficient when the same policy department takes the lead. As much as possible, the same target group should be addressed by the same ministry or department, instead from several ministries, programmes and agencies (for example coordinated programmes targeting SMEs or health care). The networks are there; the discourse is shared; and often, a high level of trust is established. This is not a fixed law.

For example, the main policy maker for a target group can be stuck in conflicts or self-interests. In these cases, it may help to involve a 'neutral' ministry or department to stimulate innovation, to discuss standardisation and interoperability, to bring in lessons from other sectors, etc.

2.4 How does the issue fit within the mandate and objectives of information society policy?
The mandate and objectives of the ICT policy coordinator are relevant in order to determine the priorities and roles of the policy coordinator for a particular issue. The ICT policy coordinator can, may, and should not always be in the lead. If the issue fits seamlessly with the mandate and policy objectives of the coordinator, it's obvious to take the lead. If an issue doesn't fit very well, it does not mean the coordinator cannot play any role at all. Mandates and objectives are not fixed. The societal or economic importance of a new ICT issue may create a reason to review the mandate, especially when other policy makers do not step forward.

The analysis of the mandate and objectives - and the underlying political ambitions - -also helps to legitimise government interventions and to communicate (both internally as externally) why an ICT issue is addressed by a particular ministry or directorate. The mandate and objectives should be analysed at different levels: first, the missions and strategy of the relevant ministry, and subsequently the objectives of a specific department/directorate. The mandate and objectives of the ICT policy coordinator need to be summarised. Important sources are strategy and policy documents. If desired, the analysis can be widened by taking into account the ICT strategies and objectives of local, regional and European governments. Policy areas and ministries other than ICT, will be addressed in question five. Table 2 provides an overview of the objectives of the Dutch ICT policy coordinator, the Dutch Ministry of Economic Affairs in 2009.

Table 2: Objecties of the Dutch Ministry of Economic Affairs, DG Energy and Telecom

Objectives DGET	
1	Availability and access
	- establish high quality communication networks
2	Optimal use of ICT by businesses, citizens and government
	- developing and implementing innovative ICT solutions and services, including electronic provision of services of government to businesses and citizens
	- help to solve societal problems by means of ICT
3	Create optimal preconditions
	- Promote an optimal functioning of the markets energy, electronic communications and post, including promoting a strong position of consumers
	- Garantuee secure and reliable electronic communication and energy supply
4	Sustainble energy supply

2.5 What are the relevant resources, capabilities and policies of other policy makers?
Since ICT is everywhere, ICT affects many different policy areas. Hence, ICT policy issues are relevant for different policy makers at national, regional or European level. Information about

fellow-policy makers and their programmes, resources and capabilities may help to define the specific role and instruments of the policy coordinator as well as to improve the collaboration and coordination with fellow-policy makers. Policy makers have a shared interest in preparing consistent, efficient and effective policy interventions.

The analytical framework includes two steps to address the question about relevant fellow-policy maker. The first step is to identify fellow-policy makers working on ICT issues. Some of these fellow-policy makers could follow from the identification of stakeholders in question 2, but also from the analysis in question 3 (is ICT issue relevant across sectors?). In general, fellow-policy makers can be found:

- In other ministries;
- At regional or local level;
- At European level;
- Within other departments of one's own organisation (ministry).

The notion of the policy mix can be useful to identify other policy makers that could be relevant for the policy issue in question. The policy mix perspective - developed in public management literature - is applied in innovation systems literature. Examples are Edquist (2003), Malerba (2004), Smits and Kuhlmann (2004), Lundvall and Borras (2005), and OECD (2005a, 2005b). ICT is often used as an example. The policy mix perspective acknowledges that ICT is an important driver for innovation in various sectors and societal challenges, with innovation being influenced by many different policy areas, programmes and instruments. Hence, the policy mix includes more policies than just ICT policy or innovation policy (Poel and Kool, 2008).

The second step is to define for each of the identified fellow-policy makers their resources, capabilities and policies. The following questions can be used:

- What are their responsibilities in relation to the ICT issue?
- What are their objectives in relation to the ICT issue?
- Which type of policy programmes and instruments do they use or are they planning to use? The typology of policy instruments mentioned in question six of the analytical framework can be used for this.
- How much experience and expertise do they have in relation to the ICT issue?
- How many resources do they have for addressing the ICT issue?
- What kind of relation do they have with the most important stakeholders?

A workshop with a diverse group is useful to identify the fellow-policy makers and their resources, capabilities and policies. However, more information is needed to answer the questions in the second step. Basically, the same approach can be followed as for question two in the analytical framework. Annual policy programmes, work plans and agendas provide details on ambitions, objectives, and priorities of other policy makers, the planned policy interventions and available resources. Interviews with fellow-policy makers can help to gain better insights.

2.6 Which policy instruments can be effective to address the issue?

To answer this question, the answers to all previous questions need to be used. The rationale helps to identify possibly effective policy instruments. For example, when interaction failures occur and actors do not know each other (nor each other's initiatives and projects), establishing a forum to exchange knowledge (an information instrument) will be more effective than to intervene with a financial instrument. Insights about the characteristics of the ICT issue (interrelations with other sectors or other ICT issues?), stakeholders and other policy makers also need to be used.

There is no one-on-one translation between rationale, policy instruments and the other five questions, e.g. there is no 'policy computer' that produces the perfect recipe for policy intervention. Still, 'logical' combinations between context, problems and solutions can be found. See above the example interaction failure; how one type of system failures suggests one policy instruments rather than another. Furthermore, policy makers can deploy more than one instrument at the same time. When a clear picture of possible effective instruments is obtained, the link can be made to what this implies for the ICT policy coordinator. For example, does the coordinator have previous experience with this type of instrument? Does a fellow-policy maker have more experience with the preferred policy instrument, and with the stakeholders involved? Again, the nuance is important. There sometimes are 'path dependencies in policy' with ministries not considering instruments that are new, at least for them. Other, new instruments might be effective and efficient as well.

To support the analysis a classification of policy instruments is used (based on Poel and Kool 2008). Table 3 provides an overview of five main instrument types and underlying subtypes. The analysis is scalable. It may take into account only the main instruments: government provision, financial instruments, regulation, information and demand by public organisations. Or it involves all underlying subtypes. During a workshop, a first impression can be created about possible effective instruments, followed by a more extensive study/research.

The analysis can be expanded by looking at best practices and experiences with specific types of instruments in other countries and/or other policy fields. Evaluation studies and impact assessments provide information about the measures and expected effectiveness of policy instruments. In addition, scientific literature provides information about in which context, and for which problems (such as specific types of market failures and system failures), specific types of instruments are effective. For example, ICT policy can benefit from (public management) literature on self regulation, and (innovation) literature on R&D programmes.

Table 3: Overview of type of policy instruments for ICT-innovation (Poel and Kool, 2008)

Government Provision	Financial instruments	Regulation	Coordination and information	Demand by public organisations
G1 By government institutes	F1 Tax incentives	R1 Laws and regulations	C1 Foresight and priority setting	D1 Demand aggregation for public organisations
G2 Dedicated public organisation	F2 Subsidies and grants	R2 Specific decisions, e.g. freq. allocation	C2 Provision of data and information	D2 Procurement
G3 Infra- structures and facilities	F3 Guarantees and loans	R3 Co-regulation	C3 Fora for consensus building	D3 Other
G4 Public-private partnership	F4 Investments, market principles	R4 Self-regulation	C4 Networks and platforms for information exchange and advice	
G5 Other	F5 Other	R5 Other	C5 Demand aggregation, e.g. for SMEs	

2.7 What are possible costs, benefits and risks of policy intervention?

A clear analysis of costs, benefits and risks requires a reflection on the answers to the first six questions, and the selection of a small set of possible policy interventions. A first qualitative ex-ante assessment of the costs, benefits and risks of (several) policy interventions provides clues for the (final) selection of effective policy instruments. It also provides information for the implementation of instruments, for involving stakeholders outside government, and the role of the policy coordinator. The qualitative analysis can be used to decide on the need for a more detailed analysis, quantitative or qualitative.

A common method to evaluate policy options - ex ante - is a social cost benefit analysis. This is a comprehensive method often used for large (infrastructural) investments, to identify and quantify all possible costs and benefits, and to compare various options. However, this method is not appropriate for a first assessment of the policy interventions used for ICT-issues. The cost benefit analysis is useful for policy issues that are well established and for policy interventions that are well-defined, with extensive information on costs and benefits, or sufficient possibilities for quantitative estimations.

More appropriate is a qualitative approach, based on a multi criteria analysis and following the basic ideas of cost benefit analyses. For example, one can explore the mechanisms via which a policy instrument influences the behaviour of target groups, and hence creates costs and benefits. The answers to the previous six questions of the analytical framework can be used to estimate the costs, benefits and risks. For example, the costs and benefits will probably affect the stakeholders identified in question two. The qualitative analysis can be prepared by policy makers, supported by fellow-policy makers and experts.

The qualitative analysis has six steps:

Step 1: Define the type of policy intervention and the related objectives

Using the information from question six, a policy instrument (or a combination of two or three instruments) should be selected and the related objectives should be defined. These objectives are the intended and expected effects of the policy intervention.

Step 2: Define the costs of the proposed policy intervention

There are different types of costs. A subsidy programme includes investment costs, but also operational costs for the ministries, agencies and other public organisations that will implement the programme. Costs can include the actual financial costs, but policy intervention will also require capacity and expertise from the policy organisations. Moreover, there are administration costs and transaction costs for companies and research organisations that apply for funding, that participate in platforms, that are involved in foresight studies, etc.

Step 3: Define the possible effects of the proposed policy intervention.

The question here is whether the intended effects will appear and to what extent. A table can be used to consider different type of effects (see Table 4). The intended effects follow from the objectives of the policy intervention. Effects can be economic, social and environmental. It is relevant to indicate the importance of the effect because not all effects will be equally strong.

Table 4: Defining the effects of policy intervention

Economic		**Social**		**Environmental**	
Intended effect	Importance of the effect (++/- -)	Intended effect	Importance of the effect (++ / - -)	Intended effect	Importance of the effect (++ / - -)

Step 4: Define the side effects

Policy intervention can also lead to side effects (indirect effects), positive or negative. These side effects may affect other actors, other policy issues and policy areas. Again, tables can be used to describe the effects.

Step 5: Define the risks

Policy intervention is not without risk. Substantial and unpredictable risks could be reasons not to intervene. Examples of risks are included in Table 5.

Table 5: Examples of risks of policy intervention (government failures)

Examples of risks
1. Lack of experience and expertise
2. Lack of capacity
3. Lack of information leads to sub-optimal solutions
4. Inconsistency in policy
5. Fragmentation of policy
6. Rent seeking: firms receive support while not delivering economic output in return
7. Capture by sub interests or sub sectors
8. Legal risks related to legitimacy, consistency and claims

Step 6: Balance the costs, benefits and risks.

The identified costs, benefits and risks of policy intervention can be balanced to define the attractiveness of the policy intervention. Do the benefits offset the costs and risks? How is this different for the (selected) policy interventions? Which risks can be minimised in the implementation of policy?

3 – Case studies

The framework was applied (and improved) in three cases. As mentioned above, the framework and its application must be scalable. We have tested a relatively efficient, light application. Each of the three cases was discussed in a three hour workshop. This implies that the analysis of costs, benefits and risks is less thorough than the analysis of the first six factors/questions.

3.1 E-Skills

E-skills has been on the Dutch policy agenda for a decade. January 2009, the policy programme Digivaardig & Digibewust (Digital skills and Digital awareness) was launched. Jointly initiated by the Dutch Ministry of Economic Affairs, industry and societal organisations, this programme aims to stimulate e-skills as well as awareness about digital opportunities and the safe use of digital means. With a budget of EUR 12 million for five years, the programme targets computer illiterates, young people and their tutors, small and medium sized enterprises, and seniors. The focus in the workshop was partly on improving and partly on legitimising the policy programme Digivaardig & Digibewust.

1 - What is the rationale for policy intervention?

System failures and market failures were mentioned by workshop participants as rationale for policy intervention in the case of e-skills. The most important system failure is the lack of skills amongst various groups in society. E-skills are considered essential for the adoption and use of digital services, as well as for the employability of people. Stimulating e-skills does not only result in economic effects, but also serves the public interest of inclusion (an equity consideration). Another system failure is the lack of interaction. There are several initiatives to stimulate e-skills, but not all local, regional and national actors are informed of each others initiatives or exchange information. Combining and coordinating these initiatives will result in more continuity and impact. An important market failure concerns positive spillovers: not only the organisation that invests in e-skills benefits from the advanced e-skills, but also others in the society benefit (this positive effect on the society is not taken into account by the organisation initially investing in e-skills). Participants in the workshop also identified public goods as a market failure: the actor investing in e-skills cannot exclusively capture the benefits. Although firms benefit from their employees' and clients' advanced e-skills and may invest in e-skills for reasons of image and corporate social responsibility, the identified market and system failures hinder investments by the industry significantly.

2 - Who are the most important stakeholders?

During the workshop a long list with stakeholders has been identified and classified according to their influence, importance, opinion and position and the other dimensions as mentioned in question two of the analytical framework. The following stakeholders have been identified:

- Computer illiterates (highly important)
- Public administration
- Employers and employers organisations

- Ministry of Education, Culture and Science (position, possibilities for collaboration and coordination with other e-skills programme)
- Electronic Commerce Platform (ECP-EPN) (influence, expertise)
- Ministry of Economic Affairs / internal organisation (influence)
- (Online) communities for specific social groups (influence, their participation is crucial)
- Private, commercial training enterprises (have a material stake)
- ICT-sector (e-skills of employees and clients)
- Parliament (position)
- Social Economic Council
- Ministry of Social Affairs and Employment (has a social stake, related to employability)
- Trade unions, employee organisations

The Ministry of Education, Culture and Science, the Electronic Commerce Platform (ECP-EPN) as well as the Parliament are considered as the stakeholders with the strongest influence.

3. Is e-skills relevant across sectors and/or is e-skills linked to other ICT issues?
In general, e-skills concern a horizontal policy issue as e-skills can be used across all economic sectors. E-skills do not only result in positive spillovers, but also in positive network effects. Everyone benefits if people improve their e-skills. In addition, there will be learning effects, mainly as a result of experiences gained in previous e-skills programmes.

4. How do e-skills fit within the mandate and objectives of information society policy?
E-skills match the objectives of the Ministry of Economic Affairs in relation to ensuring an optimal use of ICT by companies, citizens government as well as stimulating safe and reliable communication. Also, the ministry as coordinator of the national ICT policies has increased focus on users. This strengthens the fit between e-skills fits and the ambitions of the ministry. E-skills also fit the ambitions and roles of other ministries, including the Minister for Youth and Family (digital awareness for children and tutors), the Ministry of Internal Affairs (e-skills for civil servants), and the Ministry of Education, Culture and Science (e-skills in education).

5. What are the relevant resources, capabilities and policies of other policy makers?
During the workshop several fellow-policy makers were identified. Some of them were already identified as the most important stakeholders. The two most important fellow-policy makers are:

- Ministry of Education, Culture and Science
    - Is responsible for education
    - Has its own policy programme focusing on media skills (*Mediawijsheid*)
    - Has more expertise with schools, media policy and broadcasting companies; for example in the Media Expertise Centre
    - Has less resources for e-skills than Ministry of Economic Affairs
- Ministry of Internal Affairs
    - Civil servants are import target group for e-skills
    - Has own policy programmes focusing on e-skills for civil servants
    - Has experience and expertise from own initiatives in e-skills for civil servants

    - Its resources for e-skills are unknown to the workshop participants
- Other fellow-policy makers:
    - Local governments (local civil servants)
    - Ministry of Social Affairs and Employment (social effects and employability)
    - Other ministries (civil servants)

6. Which policy instruments can be effective to address e-skills?
During the workshop various policy instruments have been discussed, including those that are already in use and those that could be effective considering the rationale for intervention. Some of the instruments used in the current programme Digivaardig & Digibewust aim to strengthen the interaction between involved actors (C4). Other instruments focus on initiatives dedicated to improving the digital awareness and e-skills (G4, F2 and C2). The instruments currently used are similar to the ones used in previous programmes, mainly because of experience gained and stakeholders' confidence in the coordinating role of the ministry. Instruments that could be effective include:

- Tax deductions similar to private PC arrangements (F1). The target group could possibly be too small and the financial barriers on the demand side could possibly be less crucial than a well-organised supply side with local and other initiatives.
- Regulation (R1), for example by including e-skills in citizenship tests, by means of special certificates or by means of the curriculum of regular educations.

7. What are potential costs, benefits, and risks of policy intervention?
The policy programme Digivaardig & Digibewust costs EUR 12 million for a period of five years. This programme is smaller than other programmes managed by the ministry, but the involvement of firms makes it a rather strong programme. The ministry as well as the national ICT platform (ECP-EPN) have sufficient capacity to manage the programme. It is not clear though if the other actors involved have sufficient capacity. A lack of capacity could be a reason for collaboration and sharing of experiences, expertise and resources.

Positive effects on employment, labour market participation and social participation are expected. One of the risks is unfair competition as the government is active on a partly private market for courses and trainings. This risk can be diminished by a careful use of public tenders.

Collaboration with the Ministry of Education, Culture and Science is important and effective as it brings together education and e-skills.

Conclusion
The lack of skills amongst various groups in society and the lack of interaction between existing e-skills initiatives, but also the positive spillovers and the characteristics of a public good are important rationales for policy intervention in the case of e-skills. The e-skills issue is cross-sectoral. Moreover, e-skills fits the ambition of the Ministry of Economic Affairs to stimulate the optimal and safe use of ICT by industry, citizens and public administration. The e-skills programmes initiated by the Ministry of Education, Culture and Science and the Ministry of

Internal Affairs, as well as the various local and regional e-skills initiatives offer a strong potential for learning effects. As policy coordinator, the Ministry of Economic Affairs can bring relevant stakeholders together, combine existing e-skills initiatives, collaborate with other ministries, and exploit the learning effects from other initiatives, to develop more efficient and effective policies. Given the cross-sectoral perspective by the Ministry of Economic Affairs, the fit with its own mandate and objectives, as well as its familiarity with one of the main target groups (SMEs), the Ministry of Economic Affairs is the appropriate actor for coordinating the policy activities in the case of e-skills. The current programme Digivaardig & Digibewust addresses the various rationales for policy intervention, and explicitly builds on experience gained in previous programmes. Moreover, the current programme includes policy instruments that were identified as the most applicable to the rationales for policy intervention.

3.2 Services innovation

In the workshop we discussed services innovation, the important role of ICT, and barriers that possibly require policy intervention. The discussion was future oriented rather than addressing an existing programme. However, one of the examples used during the discussion is a Dutch research programme on services innovation and ICT that was launched in 2009. This programme has a focus on services innovation in the financial sector and in creative industries. Preparation of the programme took more time than expected and the budget available is much smaller than expected. To a large extent, this is due to uncertainty on the added value of the research programme in stimulating services innovation.

1 - What is the rationale for policy intervention?

A nuanced picture emerged. Three types of system failures and three types of market failures were considered relevant, yet with uncertainties on the magnitude of the failures.

Institutional failures mainly concern laws and regulations that were drafted well before the emergence of ICT-based services, and that are creating barriers or at least uncertainties. This point is often made in the context of services innovation. Rules, definitions and implementations may serve clear policy objectives, such as the protection of consumers and employees. A new context, with new services, may require a redefinition of the policy objectives, and new rules, to meet the policy objectives and to minimise negative side-effects on innovation. An example that was mentioned is the tension between online payment systems and regulations on payments in advance (not always allowed, yet crucial for online services) and on consumer information that is required for payments (rich information and validation not always being possible online). Another example is copyright and especially the organisations and procedures involved, with differences between countries, and different solutions for music, images and text. This is a burden for pan-European service providers with multi-media services.

Interaction failures were also considered relevant. Services innovation can occur at the intersection of sectors, taking inspiration from other sectors, when combining existing or new services and when combining services and goods. Innovation networks are perceived as being too

much sector oriented. This can result in too much group think, missing new opportunities and combinations. This perception was backed up by examples, not by studies. Interaction failures have been one of the reasons to focus the new Dutch research programme on services innovation on two sectors that cut across other sectors. As mentioned above, the programme addresses the financial sector and the creative industries.

Capabilities failures were considered as possibly relevant. The discussion addressed innovation management skills. These skills can be more important and more scarce, compared to the innovation management skills that are required for formal R&D and innovation in goods (e.g. in R&D departments). The reason being that services innovation tends to be interwoven with process innovation, innovation in goods, and the day-to-day operations of organisations.

Lock-in and infrastructure failures were considered to be absent. It was mentioned that rather than lock-in failures - e.g. barriers relating to existing standards and procedures in value chains – a barrier could be the lack of standardisation and interoperability. In services sectors, standardisation procedures can be less evolved and formalised than in manufacturing sectors (although generalisation is difficult). To some extent, this reflects that standardisation can work differently in services sectors (e.g. high added value of flexible de facto standards, large number of stakeholders, need for very quick procedures). To some extent, delay in solving standardisation and interoperability issues can be hindered by weak networks between the stakeholders. In the context of infrastructure failures, it was mentioned that high broadband penetration in the Netherlands is an enabler of services innovation. Also, it was stressed than many service innovations do not require specific and expensive research infrastructures such as clean rooms for research on next generation chips.

Spillovers was the first market failure mentioned. Firms that invest in services innovation - same as firms that invest in new goods and processes - can not protect all results and appropriate all commercial benefits. Competitors, clients, suppliers and partners can observe services innovation. This allows them to copy or modify services innovations that appear to work, also because (incremental) services innovation is not easy to protect (e.g. via patents). Even other sectors can benefit from the lessons learned and the services and features that are developed. From a macro perspective, the risk is that the first firm does not invest heavily and risky, because it knows that others will also benefit, while the positive effect on the firm itself may be small. This classic case of positive spillovers/externalities - a rationale for policy intervention to increase innovation activities - was nuanced during the discussion. An example is online banking. Yes, other banks can benefit from the mistakes and services innovations of the bank that moves first. But the first bank still creates a competitive advantage, in this case a first mover advantage, including effects on reputation. The incentives for services innovation are there. Why add public money?

It was mentioned that the incentives for innovation are not strong in a market with high entry barriers and switching costs. Business users and consumers do not easily switch between banks. If so, the market failure appears to be a *lack of effective competition*, rather than

spillovers/externalities. It would call for policy intervention to reduce switching costs, not for subsidies for services innovation.

Information asymmetry was considered a relevant market failure. Banks, venture capitalists and other investors can have problems to grasp the content and the impact of services innovation. To some extent, this is caused by the rapid pace and the broad scope of ICT innovation, for services even more so than for goods and infrastructures. There are differences between services sectors and between different types of services innovation. For example, services innovation in creative industries can be more difficult to understand than services innovation in retail. Services innovation can involve a clear yet completely new service, e.g. based on examples in other countries or sectors. It can also concern new features of existing services, improvements in customer interaction and other incremental innovations, for which the results are difficult to protect and appropriate. This makes a difference in discussions with investors. Furthermore, services innovation can require small investments - e.g. new mobile entertainment services - or huge investments, e.g. the set of systems, services and organisational changes that are needed to provide online health services. Especially in the latter case, information asymmetry is a serious problem, with substantial investments needed and uncertainty on the outcome of the innovation process. To conclude the discussion on the rationale, is was stressed that services innovation can be closely linked to the day-to-day operations of firms, and hence to 'normal' investments. This touches on broader debates about access by firms - especially SMEs - to finance.

2 - Who are the main stakeholders?

The following stakeholders were considered relevant for stimulating ICT-based services innovation.

- Regions and municipalities, seeking to improve their competitiveness, e.g. Noord Holland, Amsterdam, Almere stimulating services innovation in selected sectors. Almere is hosting Exser, a centre for services innovation.
- Ministry of Economic Affairs, influencing the economic structure, including a new balance between manufacturing and services sectors, and the interfaces between sectors.
- Ministries that are responsible for specific (vertical) sectors such as health and education.
- Services sectors, services value chains and the many individual services providers. It was mentioned that system failures and market failures can be substantial on one services sector, and small in other services sectors. These differences are not studied widely.
- Consumers, citizens and professional users.
- The ICT sector, as a partner for services innovation in all other sectors (also including manufacturing sectors) and as a key stakeholder for services innovation in the ICT sector, media sector and creative industries.
- The Dutch Innovation platform and ICT-Regie (coordinator of ICT research), and their influence on research and innovation priorities, public investments and policy interventions.
- Universities and research organisations, in their role as researcher, consultant and partner.
- Advisory committees - and their individual members - of universities, research organisations and research programmes.

- Competition authorities, mainly for their assessment of policy intervention, e.g. the demarcation between services innovation and operational activities.

It was mentioned that the relative importance of stakeholders (and their role and interests) is different between services sectors, between different types of services innovation, and between different policy strategies, e.g. addressing leaders or laggards.

3 - Is ICT and services innovation relevant across sectors and/or linked to other ICT issues?
The answer to this combined question is yes. Services innovation - whether with a large or small role of ICT - is relevant for all sectors, and also occurs at the intersection of sectors. This includes manufacturing sectors, e.g. product-service bundling in ICT equipment, cars and aircrafts. It also includes private and public sectors. Public and private sectors can collaborate - or adopt each other's solutions - on service innovations such as payment systems, privacy, e-authentication and security solutions (e.g. holograms). This example also illustrates that services innovation can be linked to other ICT issues. When solutions such as e-authentication systems are used across several sectors, positive network effects emerge. In other cases, the advantages of collaboration across sectors are learning effects and efficient involvement of stakeholders. Rather than reinvent the wheel and organise workshops for each and every sector.

In the conceptual framework, the assumption is that information society can take the lead on ICT issues that cut across sectors, and that are linked other ICT issues. To some extent, his depends on the mandate of information society policy, and on the initiatives by other policy makers. For example, innovation and enterprise policy also cut across sectors and also address services innovation (see below).

4 - How does the issue fit within the mandate of information society policy?
It does fit, both at the level of the Ministry of Economic Affairs and at the level of the Directorate that is responsible for ICT. ICT-based services innovation is of great importance for the objectives for innovation, competitiveness, employment and economic growth. In Dutch ICT policy it is also stressed that ICT innovation - including services innovation - is relevant for addressing challenges in society and in public sectors such as health and education. Workshop participants stressed that the mandate is not the problem. Rather, the question is whether the rationale for intervention is strong enough, and how it can be translated into effective policy interventions.

5 - What are the relevant resources, capabilities and policies of other policy makers?
For some years now, services innovation is on the agenda of policy makers. The role of ICT in services innovation is acknowledged. The research programme on services innovation in the financial sector and in creative industries is mentioned above. So are the ambitions of North Holland, Amsterdam and Almere. Ministries are exploring the bottlenecks in services innovation and the close interaction with other types of innovation. The knowledge and capabilities are increasing. The next step is to assign resources and to design effective policy interventions.

The Ministry of Internal Affairs is preparing new interventions or giving services innovation more weight in existing programmes, e.g. on internet security and eGovernment. The Ministry of Finance has stimulated that the financial sector would become a key sector in the research programme on services innovation. The Ministry of Economic Affairs steered towards creative industries being the second sector in the programme. Representatives of the Ministry of Economic Affairs stressed that the ministries that address (vertical) sectors, should be involved. For instance, the Ministry of Finance has deep knowledge on the financial sector and knows the stakeholders in this sector. Sector knowledge is crucial, not only to understand and influence innovation dynamics, but also to address institutional failures that hinder (services) innovation. For instance, regulation of financial products is much needed, but there may be flexibility in the design and implementation of the rules, to allow for more online services and other services innovations.

The Ministry of Education, Culture and Science is perceived a follower in policy discussions on services innovations. The added value of scientific, fundamental research on services innovation is questioned. The relevance for education and culture (and creative industries) is acknowledges. The Free University of Amsterdam has developed a research programme on services innovation, e.g. management of services innovation. When talking about the ministries that collaborate with the Ministry of Economic Affairs - in stimulating services innovation - it was mentioned that personal relations between ministers and between policy makers plays a role.

6 - Which policy instruments can be effective to address ICT and services innovation?
We discussed policy instruments that are launched and that might be considered. As much as possible, policy instruments were linked to the rationale for intervention and the other four questions mentioned above. A relatively rich policy mix was discussed:

- Foresight and priority setting (C1), to identity areas for service innovations with high economic and social impact, e.g. starting the analysis with economic, social and environmental challenges, and then assess the role of (ICT-based) services innovation. The foresight exercise should include all relevant stakeholders, reducing network failures. Part of the priority setting should be to list the main system failures and market failures, to back up the rationale and to steer policy interventions.
- Subsidies and grants (F2), including the research programme for services innovation in the financial sector and in creative industries. This is a response to the market failure of spillovers/externalities; the risk of under-investment in innovation. As a result of priority setting, sectors and interfaces between sectors can be added, e.g. in ambitious regions and in the context of living labs.
- Tax incentives (F1), mainly the existing tax credit scheme for firms with employees that are involved in innovation activities (WBSO scheme). This scheme has been adapted to better support services firms and others involved in services innovation. For example, the type of relevant innovations is stretched and the role of innovation outside formal R&D units is acknowledged. This is a response to the market failure of spillovers/externalities; the risk of under-investment in innovation.
- Networks and platforms for information exchange and advice (C4), to reduce network failures, within and between sectors, and to identify and discuss institutional failures such

as regulatory barriers. See for example the SAAS platform, Software As A Service. More platforms may be needed.

- Procurement (D2), governments being launching customer for new services such as e-billing and e-authentication.
- Data and information (C2), mainly to increase awareness of firms. This could be embedded in existing programmes such as the NDiV programme on ICT, eBusiness and digital value chains, and in generic programmes to promote innovation in SMEs. A more targeted example is Exser, a centre for services innovation in the Netherlands, linking business, consulting and research.

7 – What are potential costs, benefits and risks of policy intervention?
It was stressed that the policy mix can be different for different services sectors and for different innovation themes (e.g. the role of services innovation to increase energy efficiency). A targeted approach may increase the costs for policy design and policy coordination, but it avoids money flowing to, having little impact on other sectors and themes. This approach seems required to achieve the benefits and to reduce the risks, in addition to the horizontal tax credit scheme. For instance, in sector A, services innovation is closely linked to process innovation within firms and between firms (digital value chains is an example). This requires collaboration and money. In sector B, services innovation requires less collaboration and less investments, with institutional failures being the main system failure. This targeted approach reduces the risks that additional funding is provided to firms that would have invested in services innovation anyway, with the right partners and the right risk level.

Conclusion
The nuanced discussion on the rationale for policy intervention has influenced the rest of the workshop. Because of uncertainties, the added value of foresight was stressed. Participants prefer a policy mix that is relatively rich, including light policy instruments and financial instruments, mostly targeted at sectors and themes, with the exception of the horizontal tax credit scheme. ICT and services innovation fits the mandate and objectives of the Ministry of Economic Affairs. Because of sectoral and thematic approaches, collaboration with other (vertical) ministries is required. The discussion focused on firms. However, it was agreed that research organisations and consultants are relevant stakeholders, but not necessarily needing additional, dedicated funding to stimulate services innovation.

3.3 Health and ICT

The third case is the use of ICT in the healthcare sector. The sector is highly complex and dynamic. Consider for example liberalisation and the mix of public and private actors. Healthcare is one of the domains in the Dutch policy programme Public Sectors and ICT (Actieprogramma Maatschappelijke Sectoren en ICT). The programme was launched in 2005 by the Ministry of Economic Affairs to stimulate large scale adoption of ICT-applications in public sectors. With a total budget of 80 Million Euros - for a period of four years - the programme addresses four sectors: mobility, education, healthcare and security. The focus of the workshop was to help shape future policy programmes rather than evaluate the existing policy programme.

1 - What is the rationale for policy intervention?

High quality and affordable healthcare is clearly a public interest, involving equity considerations as well as economic aspects (such as a healthy labour force). Many actors share the benefits of healthy citizens (positive externalities). The focus of this workshop was on the importance of ICT use and (related) innovation in healthcare. Market failures and system failures were identified.

Market failures

Firstly, *positive externalities* are highly relevant: healthcare institutions, medical specialists, suppliers, researchers and other innovating actors know that a substantial competitive advantage is not guaranteed, especially with relatively risky innovation trajectories. Others will benefit. The risk is underinvestment. In addition, it is not always clear how the investing actors (for example a hospital) should share the advantages of the innovations (for example improved care) with other actors (such as health insurers and patients).

Secondly, *institutional changes* in the healthcare sector - partial liberalisation and a new mix of private and public actors - create uncertainties on viable business models. This is of concern for innovators but especially for investors. It increases the (standard) market failure of *information asymmetry* between innovators and investors. Compared to the innovating firm, it is (even more) difficult for investors to assess the risks of the innovation, what the outcomes will be, and whether this will lead to a competitive advantage.

Another relevant market failure is *market dominance*. Not all markets in healthcare are - legal or in practice - open for entry and competition. Incentives for innovation can be modest.

System failures

Four types of system failures were considered relevant. *Lock-in* occurs in the transition to electronic patient files and the implementation of other systems and standards that involve switching costs. *Institutional failures* (hard and soft) were also considered relevant by workshop participants. Current laws and regulation in the healthcare sector might hinder innovation. For example, in the Netherlands the ‘Diagnosis Treatment Combination’ assumes fixed combinations and requires a specific analysis and way of reporting, by one expert, in order to be reimbursed by health insurers. This can be a barrier for combinations of treatments and collaboration between experts. An example of informal, soft institutions is the culture of the healthcare sector which it is not always focused on innovation, cooperation and large scale adoption, but more on current processes and the own organisation. As mentioned above, changes in the formal institutions create uncertainty, also because the political consensus on healthcare liberalisation is less strong than five years ago. *Interaction failures* also occur: there is too little interaction between actors, to create new ideas, knowledge exchange and large scale adoption of successful solutions. There are many innovative activities, but not all actors are informed or exchange information. Possibly, medical specialists interact too little as well (they do not always have to time to cooperate with actors outside their partnership or department). In relation to *skills and capabilities*, participants of the workshop pointed out that ICT knowledge and ICT skills of directors, managers and professionals are not always optimal. Opportunities are not always recognised or acted upon.

2 - Who are the main stakeholders?

The participants identified the following main stakeholders:

- Patients (being ever more articulate and informed)
- ICT suppliers (hardware, software, systems, infrastructure)
- Healthcare providers (they share together with health insurance the most power)
- Health insurers
- Employees in healthcare: nursing staff, doctors and medical specialists, as well as the Chief Information Officer, the financial and general manager
- NICTIZ: the Dutch national ICT institute of healthcare
- The Ministry of Public Health, Welfare and Sports
- The Ministry of Economic Affairs
- Local innovation initiatives
- Local governments
- Professional and sectoral organisations
- Patient organisations (empowering patients)
- The combination of press and parliament, for example by drawing attention to medical failures and to the total costs of the healthcare sector. This possibly reduces the level of risk taking by healthcare actors.

3 - Is ICT in healthcare relevant across sectors and/or is linked to other ICT issues?

ICT innovation in healthcare is very specific to the healthcare sector. There is little room for errors and ICT solutions have to perfectly fit the complex and high quality demands of the sector. ICT solutions hardly ever create network effects and they seldom applicable in other sectors. However, there might be learning effects. The concepts, blueprints and solutions from the healthcare sector might inspire innovations in other sectors. Furthermore, the innovation process (the approach) might offer valuable lessons for other sectors. Certain aspects of ICT innovation in healthcare do have a broader relevance. Aspects like standardisation, interoperability, eskills, security, privacy and energy saving are relevant for other sectors. The ICT policy coordinator can make sure the lessons learnt are used for other issues and sectors. According to workshop participants, the Dutch Ministry of Economic Affairs currently does not always exploit the opportunities in this respect.

4 - How does ICT in healthcare fit within the mandate and objectives of information society policy?

ICT in healthcare fits generic, horizontal themes of the Dutch Ministry of Economic Affairs, such as employment, liberalisation, entrepreneurship and innovation. Innovation in healthcare is supported by the Ministry of Economic Affairs via R&D programmes. However, these R&D programmes focus on ‘pure’ R&D, rather than on aspects such as implementation, diffusion, large scale adoption and skills. ICT in healthcare also fits the ambitions and mandate of the Dutch Ministry of Health, Welfare and Sports. Therefore, actors in healthcare do not always recognize the Ministry of Economic Affairs as potential partner for innovation. The Ministry of Economic Affairs can play a relatively neutral role in stimulating innovation and involving relevant partners, as it is less involved in sector specific conflicts and interests.

5 - What are the relevant resources, capabilities and policies of other policy makers?
The most important policy makers are the Ministry of Health, Welfare and Sports and municipalities. Within the Ministry of Economic Affairs the most important partner is DGOI, being responsible for most innovation and R&D programmes. Other relevant policy makers are the Ministry of Internal Affairs and the Ministry of Finance, and public agencies: SenterNovem (innovation), NICTIZ (ICT in healthcare) and the Healthcare Inspectorate (quality). Workshop participants did not have a clear view on the resources, capabilities and programmes of these stakeholders, and on the attention for ICT in existing programmes. This knowledge of the existing policy mix was considered crucial to prepare the potential successor for the Dutch policy programme Public Sectors and ICT.

6 - Which policy instruments can be effective to address ICT innovation in healthcare?
Since nearly all market and system failures were considered relevant, many potentially relevant policy instruments were explored. Instruments that could be effective include:

- Public private partnerships (G4): for both R&D-activities and adoption, to increase incentives (co-financing) and to stimulate cooperation between actors. Consider trajectories for four years. Collaboration takes time.
- Subsidies and grants (F2): to avoid underinvestment, for example via tenders, and taking into account how innovations can contribute to viable business models.
- Guarantees and loans (F3): to address information asymmetries. Guarantees by government can help to receive financing from private investors faster and more easily. Loans can be effective as well. Of course, selection criteria are highly important.
- Laws & regulations (R1), specific decisions (R2) and self regulation (R4): healthcare is based on a legal framework. By adjusting the financial and accounting framework, adding flexibility, innovation can be facilitated. Self regulation might be effective for creating more transparency about quality of care, health providers and health insurers.
- Priority setting & Foresight (C1) is important as innovations, especially in healthcare, are not developed in one year. Their development requires more time, because of quality demands and the wide variety of stakeholders. It is important that political priorities are well debated, well defined and relatively constant.
- Provision of data (C2) and Networks & Platforms (C4) can improve the interaction between different types of actors, but also within one group of actors (such as medical specialists in different medical disciplines and hospitals). It is not always necessary to establish new platforms as new tasks can be assigned to existing platforms.
- In relation to standardisation and interoperability a forum for consensus building (C3) might be effective.

7 What are potential costs, benefits and risks of policy intervention?
As mentioned above, the long list of possible policy instruments, and a three hour workshop, only allows for a first scan of costs, benefits and risks. The modest and fragmented policy initiatives in this field yield limited benefits (and limited costs and risks). Political ambitions in this field can be higher, the approach more solid, and fixed over a longer term, for example by creating public-

private partnerships, strengthening existing platforms and establish ‘regulation free zones’ to experiment. Possible effects are increased productivity, diminished costs and increased quality. Increased focus and scale requires more ‘top down’ decision making. Despite tools such as foresight studies this might still prove difficult, with incremental changes often being more feasible than big changes.

Conclusion
ICT innovation in healthcare is hindered by a variety of market and system failures, providing a strong but diverse rationale for government intervention. This requires a set of policy instruments. Network effects between sectors are limited. Stakeholders are highly sector specific. This favours a sectoral approach. The issue does not perfectly fit the ambition and objectives of the Ministry of Economic Affairs. This mainly concerns relations with key stakeholders. An strong role is needed - and played - by the Ministry of Health, Welfare and Sports, and its agency NICTIZ (Healthcare Innovation Platform). Therefore, the Ministry of Economic Affairs (as ICT policy coordinator) could take the role of advisor, and pass on the leading role to the Ministry of Health, Welfare and Sports. This Ministry can set (high) political ambitions, strengthen existing platform and take the lead in implementing new policy instruments (such as regulation free zones). The Ministry of Economic Affairs can focus on increasing learning effects for generic themes that cut across several sectors (such as standardisation, eskills, security and privacy) and secure the hands-on experience of on-going programmes, such as Public Sectors and ICT. It can also play a relatively neutral role in stimulating innovation and involving relevant partners.

4 - Conclusion

ICT is everywhere but information society policy does not have the mandate or resources to address all economic, social and environmental issues in which ICT plays a role. Policy coordination can reduce this tension. Still, information society policy makers have to choose on which ICT issues to lead, advice, explore (or neglect). An analytical framework was developed. The framework consists of seven questions and includes a typology for rationale and policy instruments, and suggestions on how to analyse the ICT issue. For example, how to explore whether an ICT issue is relevant across sectors and/or linked to other ICT issues?

The framework was applied to three ICT issues. The added value and the leading role of information society policy are most clear in e-skills. For ICT and services innovation, the rationale for policy intervention seems to be a more difficult question than the role of information society vis-à-vis colleagues. A number of system failures and market failures was identified, including institutional failures and spillovers/externalities. ICT is perceived crucial for nearly all service innovations. A leading role for information society is possible, yet it requires close collaboration with other ministries/directorates when targeting specific sectors and themes. The third case is health and other public sectors. The conclusion is to take the lead on issues that cut across sectors (e.g. privacy, e-skills, standardisation and interoperability) and to leave/make room for vertical policy makers to take the lead in stimulating ICT innovation in health, education, transport, etc. Of course, the role of information society depends on the ambitions, capabilities

and interventions by other ministries or directorates. One can only advice if someone else clearly takes the lead. At least in the Netherlands, there have been cases - such as ICT in health care and in education - where information society policy makers explored the ICT issues and triggered colleagues to pick up the issues in 'their' sector.

At the end of the project, we have discussed the results with the Ministry of Economic Affairs. A strength but also a limitation of the framework is its flexibility. The seven questions - and the answers - are linked. Still, there is no decision scheme with yes/no answers resulting in clear results such as yes/no intervention and suggesting specific instruments such as financial, regulation or information instruments. It was stressed that policy makers, stakeholders and experts should be strict and precise when applying the framework. If the questions and the links between the questions are treated seriously, it's difficult to make a case for bad policy

The framework is developed to structure discussions on the scope and priorities of information society policy, and to inform decisions on policy coordination and policy instruments. The framework could also be relevant for discussions on the scope and priorities of the research community for information society policy, and coordination with other research communities. To a large extent, the agenda of policy makers interacts with the agenda of research communities. The quality of the interaction between information society policy and research has been criticized, e.g. research not being timely, useful, constructive enough and - at the same time - not being critical enough (Melody and Mansell 1983, Noam 1993, Garnham 2004). The increased scope of information society policy amplifies the challenges of effective interaction between the information society policy and research community.

It requires a clear scope - and some focus - to provide research with high impact on policy makers. Conferences such as ITS, TPRC and EuroCPR, and journals such as Telecommunications Policy, Info and Communications & Strategies can not address all ICT issues in all sectors. A focus on the converged field of telecom, media and IT is already quite a challenge, especially when combining perspectives such as innovation, competition, equity, etc. There are differences between conferences and between journals. For example, the scope of EuroCPR is slightly broader than the scope of TPRC. This reflects the policy agendas in Europe and the US, and the institutional set-up (e.g. the FCC being a key player in the US with a focus on communications rather than ICT in general). The call for papers for the ITS 2010 biannual conference mentions e-health, e-education and e-commerce. Despite the differences between conferences and between journals, we make one suggestion. Information society research could continue addressing cross-cutting ICT issues such as privacy, e-skills, active users, standardisation and interoperability, and ICT driven changes in sectors and organisations. This is more narrow and precise than addressing the use of ICT in society. It allows for added value vis-à-vis (vertical) experts in education and transport, and (horizontal) experts in competition and innovation.

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