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Feasibility Study for the Design and Implementation of Demand-side Innovation Policy Instruments in Estonia

Final Report part 2 – Policy Recommendations

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Introduction

This second part of the final report is the second report of the feasibility study for the design and implementation of demand-side innovation policy instruments in Estonia. The first part of the final report focused on analysing market potential and international experiences. **The aim of this report** is to introduce policy recommendations for implementing demand-side innovation policy as well as recommend action plan to implement the demand-side instruments and assessment model for measuring impact of demand-side instruments in Estonia.

The key question of the feasibility study was how to integrate demand-side instruments into existing innovation policy mix. The approach from generic to specific was followed: first global aim of the innovation policy (economic growth) was identified, followed by thorough analysis of the state of play of implementing demand-side instruments in Estonia. Then an analysis of international experiences of using demand-side innovation policy instruments was provided and complemented by international benchmarking. Knowing the existing situation in implementation of innovation policy (only supply-side innovation policy instruments are implemented and no demand-side innovation policy) as well as policy context (necessary preconditions for implementing demand-side instruments) and general objective of innovation policy (economic growth) a missing piece – demand-side innovation policy instruments – were developed.

During the first part of the final report it was concluded that **the most used demand-side instruments have been the public procurement of innovation and pre-commercial public procurement**. There are fewer national level cases of using regulations or standardisation to influence demand conditions or measures fostering private demand. The most popular, recent areas of innovation procurement programmes are in health, transport and environmental solutions across the EU countries.

The recent European Innovation Scoreboard 2013¹ places Estonia among the **innovation followers** – its innovation performance has been increasing at a steady rate since 2007 although the growth rate has slowed down since 2009. Estonia's performance is above the EU average for international scientific co-publications, non-R&D innovation expenditures, innovative SMEs collaborating with others and Community trademarks (IUS, 2013). The story behind this success is the supply-side innovation policy, which Estonia has been using. There is **no direct demand-side innovation policy** implemented in Estonia so far – government funded support measures lean to the supply side of innovation involving mainly grants. However, the new R&D strategy 2014-2020 introduced a number of growth areas – ICT horizontally across other areas, health and health technologies as well as the more effective use of resources, as the most potential areas for Estonia.

The **Government role** in creating market demand has been rather modest and its biggest role has been in the ICT sector itself (rather than in the ICT sector as an enabler in other sectors) as well as in the construction sector (as a customer). Nevertheless, the government (including local municipalities) has generally purchased the most cost efficient products and services rather than taking risks and procuring innovative solutions. The Government organisations' annual planning cycle with its four-year perspective, supports short-term solutions, which tend to prefer a supply-side approach to innovation policy. Nevertheless, there are some attempts to use demand-side aspects in all the smart specialisation areas, but they are ad hoc and any

¹ Innovation Union Scoreboard 2013, European Commission (2014), http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf

solution to specific problems have been serendipitous, rather than the result of a long-term strategy.

A further rationale for introducing demand side elements into innovation and other policies originates from the need to **address societal challenges**. On the national level, this means developing innovative products, services and solutions to address national challenges (e.g. ageing population, rising cost of healthcare, social divide, environmental concerns, etc.) and in doing so, control public sector expenditures. On the global level, new growth opportunities will emerge and develop for innovative products, services and solutions as other countries address similar challenges.

Developing more systemic innovative solutions related to, for example, smart cities, ambient assisted living (especially of elderly people), more efficient use of resources (including life-cycle considerations, recycling, effective utilization of waste, etc.), or smart and efficient transport systems, requires coherent mixes of policies that extend from R&D and innovation policy across several sector policies. **Demand side measures can be quite effective** especially in these more extensive policy mixes in enhancing the demand for innovation and lowering the market access barriers for innovative products, services and solutions.

The Estonian market is small and therefore typically not very interesting for potential growth companies. However, even **small markets can be interesting**, if they are innovative, i.e. driven by sophisticated demand for new and improved products, services and solutions. A further requirement is that the demand for innovation is consistent with the potential existing and future demand in the international markets.

The **demand for innovation should be developed in a way** that allows companies to recognise that developing new products, services and solutions to Estonian markets will eventually make them competitive internationally.

Developing demand side elements within the national innovation policy should therefore take into account the specific characteristics of the Estonian markets (e.g. small size, relatively low international visibility, currently not very sophisticated demand, low awareness and adoption capability both among policy makers and market actors), and the need to design potential measures to enhance the demand for innovation that has also recognisable potential in international markets.

The **adaptive capability** for demand side innovation policy and related policy measures is currently relatively low in Estonia. This is mainly due to the lack of experience, lack of overall awareness, problems related to existing governance models, perception of risks involved in innovation, lack of competences and methods to manage risks, and lack of competences to design and implement demand side measures.

On a more practical level, there are a **number of barriers** for introducing demand side measures into the R&D and innovation policy domain. Most of these are related to the current low adaptive capabilities. Overcoming of these barriers is the subject of current report.

Current report starts with benchmarking Estonia's policy culture and practices relevant for implementation of demand-side instruments with other countries (section 2), followed by introduction of necessary preconditions for implementation of demand-side measures (section 3) as well as recommending a sustainable policy mix for stimulating smart specialisation areas (section 4). For each smart specialisation area the roadmap towards detailed action plan is designed – it presents necessary activities to be taken for introducing the demand-side instruments (section 5). Finally principles of measuring the impact of implementation of the demand-side innovation policy are recommended (section 6).

1. Methodology

The aim of the developed methodology was to analyse reasonability of introducing demand-side innovation policy measures and to integrate them into other (supply-side) policies in Estonia. The key issue was understanding why and which types of demand side approaches to apply for specific policy contexts.

The study was provided in three main stages:

Stage 1: mapping worldwide trends in demand-side innovation policy in medium and long-term perspective and existing policy gaps in Estonia;

Stage 2: Characteristics and market potential for introducing demand-side innovation policy in Estonia;

Stage 3: Creating a policy mix for Estonian smart specialisation areas, developing policy recommendations and action plans.

Stages 1 and 2 are covered in the final report part 1 and stage 3 is discussed in the current report. The process of the study is presented on Figure 1. In the first stage of the study mainly **desk research** was used. For international mapping of demand-side instruments recently provided studies were reviewed and analysed. The most interesting examples relevant for Estonia were presented. Estonian innovation policy mix was described on the basis of existing studies on innovation, smart specialisation strategy and sectoral strategies. For mapping of existing support measures related to the smart specialization areas as well as number of public procurements in those areas Structural Funds Information System as well e-procurement registry were used.

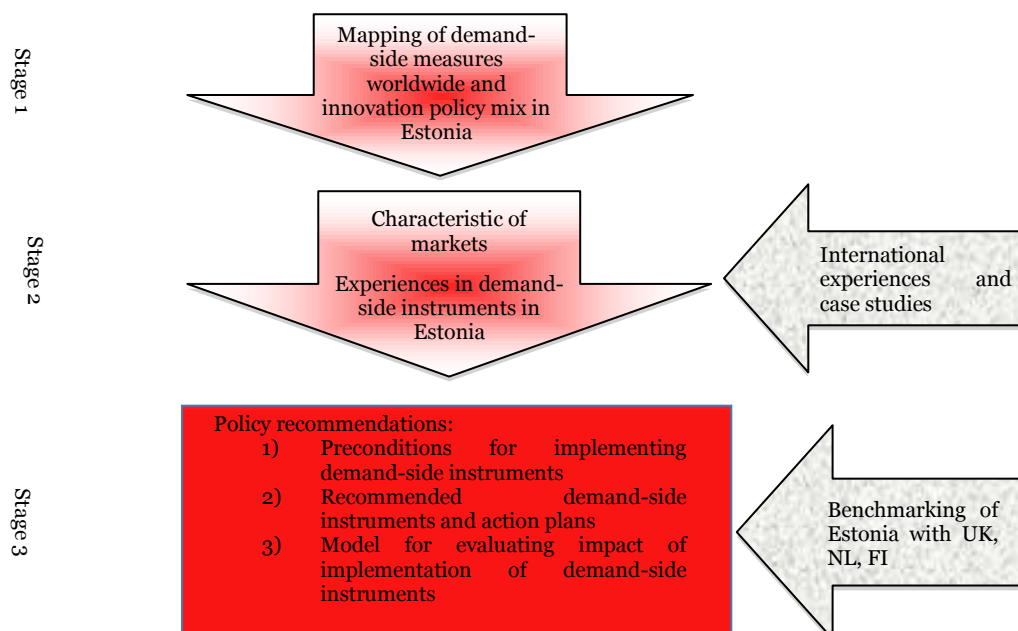


Figure 1. *Process diagram of the feasibility study*

Second stage (field-work) of the study focused on data and qualitative information collection about stakeholders as well as their competence, awareness and readiness in order to characterize market potential in all three smart specialization areas. Stakeholders were identified on the basis of their role in the market: first, public sector as market regulator and demand creator and secondly, private sector as innovation supplier. For collection of qualitative information three **focus groups** were provided in ICT (18 participants), health (31 participants) and resources (17 participants). In addition 11 **in-depth interviews** were conducted with representatives of public authorities as well as sectoral umbrella organisations. To collect experiences abroad three **case studies** were provided in the areas of ICT (test platforms in the UK), health (pre-commercial procurements in the UK) and construction (smart regulation in Denmark). Also, looking for existing demand-side experiences in Estonia, three short case studies were provided.

This part 2 of the final report represents the *final stage* of the study started with **benchmarking** of Estonia against selected countries – the UK, the Netherlands and Finland. The UK was chosen because of its long history in using demand-side instruments, the Netherlands and Finland because of their similar size compared to Estonia as well as existing demand-side experiences. Benchmarking focused on qualitative aspects rather than quantitative, as no demand-side instruments have been used in Estonia so far.

In next step, overcoming barriers to introduce demand-side instruments in smart specialisation areas identified in the second stage, were addressed with potential demand-side policy instruments. To increase impact of demand-side innovation policy, the focus of smart specialisation areas were narrowed to e-governance (ICT), e-health (health) and smart construction (more effective use of resources) as the most promising areas for further growth in Estonia. Final policy recommendations were **validated** with stakeholders in order to get their feedback and understand how feasible is introducing of the proposed instruments.

The current report aims to give qualitative input into the development of supportive measures in all smart specialisation areas led by the Estonian Development Fund. As the process is on-going and no specific sectorial measures are yet defined, the level of detail of this report remains on the level of strategic advice. Furthermore, before implementing demand-side instruments a number of basic policy preconditions need to be addressed – ignoring fulfilling these preconditions will result in limited impact from introducing demand-side instruments.

2. Benchmarking Estonia's position

Policy benchmarking is an important step in the selection, improvement and development of the activities of government. It is generally considered to be good practice for governments to investigate new policies before implementation them and to do this through some form of comparative exercise such as benchmarking, as well as to conduct an impact assessment of the policy to identify what is likely to happen as a result of the introduction of the policy. In order to be successful, a benchmarking exercise must choose the right targets, and compare similar items and or their contexts, otherwise the conclusions reached will be unrealistic. As the report by Lember *et al* has noted, Estonia does not have at present a generic demand side policy². Therefore it is not possible to make a comparison on the basis of usual benchmarking criteria of such countries as the Netherlands, the UK and Finland, where there are such policies, with Estonia, where such policies are not implemented although they are now under discussion. However, **comparison between UK, Netherlands, Finland and Estonia is possible at the level of contexts for policy** and this has been the approach we have taken here. Our stance in this analysis is qualitative and borrows from realist evaluation, which emphasizes the contexts of policy as well as the policies themselves. The importance of qualitative benchmarking is to understand in which innovation and sectoral policy contexts the demand-side instruments in benchmarking countries are implemented and what can Estonia learn from other countries' experiences. Also, what are the most important preconditions to be in place before introducing any demand-side instruments and what are the preconditions requiring improvement in Estonia. However the benchmarking is based on qualitative interpretation (having no figures to proof the opinion) of policy contexts', it gives us understanding that **no demand-side innovation policy can be successfully implemented without addressing necessary policy preconditions**.

An examination of the preceding benchmarking exercise enables the following broad conclusions to be drawn (see Appendix A). These are presented according the headings used in the benchmarking exercise (see also Table 1) and grouped under three main topics: governance culture, awareness and recognition of the potential of demand side policies and competence and experience in demand side policies and policy mixes.

Governance culture

Government attitudes towards markets (incl. self-regulation): All four economies tend to follow liberal or laissez-faire³ market policies, although business regulation is applied rigorously, particularly in certain sectors, albeit in a way that is intended not to constrain business development. Regulations have been used to stimulate demand in certain areas, such as green technologies (in the UK and Netherlands) while fiscal policies have also been used to stimulate private R&D activity (UK, Netherlands and Finland). Neither regulation nor fiscal policy is used as yet as an innovation policy instrument in Estonia, which thus offers a policy opportunity.

² Lember, V, Kattel, R, Kalevt, T, Public procurement, Innovation and Policy: International Perspectives, Springer, 2014, available at: <http://www.springer.com/business+%26+management/technology+management/book/978-3-642-40257-9>

³ The laissez-faire leadership style is where the leader delegates the tasks to their followers while providing little or no direction to the followers.

Balance between government roles as market actor: In Estonia, the government is a major owner or stakeholder in several more strategic private sector companies (e.g. in energy) and also in the education and health sectors. A similar situation occurs in the Netherlands; here the government controls a number of infrastructure and financial actors. In Finland, state control has been replaced through a process of privatisation and regulatory control, although it retains control of the health and education sector. In the UK, successive governments have followed a long-term strategy of privatisation. The Netherlands and the UK are very active with regard to public procurement and also, increasingly, its use as a policy instrument. In Estonia, no long-term public procurement plans exist, although the government has introduced a number of e-governance services – thus, the development of public procurement practices also offer a potential opportunity for Estonia.

Balance between political and expertise based drivers in policy design: While Estonia has no strong traditions of policy studies, analyses and evaluations, in contrast, the UK, Netherlands and Finland (although, perhaps less so in the latter) have policy making systems that are strongly grounded in evidence based approaches, including evaluation and monitoring. Clearly, the development of an effective evidence-based view of policy making is essential to the design and implementation of successful policies in Estonia.

Balance between economic - social - environment policy objectives interaction between different policies and cross-departmental characteristics of policy design: ‘Estonia 2020’ has set in place a consistent set of strategic objectives, although weak cooperation between sectoral ministries has negated some of this consistency. The comparator countries have also set out strategic innovation plans which include economic, social and environmental policy objectives and which require close inter-departmental cooperation: this is achieved only to varying degrees but the presence of a ‘lead’ department seems to enhance this process.

Organised strategic intelligence: Estonian foresight activities have been reduced since 2012, the main driver now being EU funding. In contrast, the UK has an extensive track record in the conduct of strategic reviews, evaluations, foresight exercises and horizon-scanning activities. Likewise, the Netherlands has a culture of evidence-based policy design with a structured policy monitoring and evaluation system in place and has undertaken a number of foresight exercises. In Finland, strategic intelligence activities are less widely undertaken (foresight exercises are carried out) but the strong evaluation and monitoring practice is generally sufficient to provide the necessary supporting evidence for policy making. Stakeholder engagement is also strongly present in the UK, Netherlands and Finland. Such strategic intelligence activities would be a significant enabler in the identification and formulation of policies to stimulate demand in Estonia.

Role of mission oriented policy design: Estonian experience in this area is relatively limited to the planning of the use of EU funds. It is clear from the experience of the other countries examined that cross-governmental coordination, possibly through a lead agency or ministry, is a critical factor in the governance of mission-oriented activities.

Balance between management by objective and management by resources: There is a clear distinction between Estonia, where a management by resources approach dominates and the other countries, where a management by objectives approach is more prevalent, albeit one tempered by the constraints imposed by available budgetary resources. Overall, an objectives-based approach must be accompanied by clear mechanisms for prioritisation and selectivity.

Stakeholders (market actors, end-users) participation in policy design: Overall, the involvement of stakeholders in policy design is far less developed than in the UK, Netherlands and Finland where such dialogue forms a prevalent and important input.

Cross-departmental governance (incl. leadership): Both the UK and the Netherlands utilise lead departments or ministries in research and innovation policy governance,

assisted through extensive cooperation with other relevant departments, ministries, agencies and stakeholders. The Finnish system also makes use of cooperation across government although 'leadership' roles for agencies are a newer development. Such practices are absent in Estonia, but would form an essential prerequisite for the development of a government wide demand driven policy initiative.

Horizontal policy implementation: Overall, joint strategic action between ministries and departments, when it occurs, is well coordinated in the three comparator countries. However, this appears to be a problematic area for Estonia. This is an issue since demand-side policies typically require a horizontal and strategic approach.

Public sector risk management culture: There is a relatively positive attitude to the acceptance of risk in the UK, Netherlands and Finland, which is recognised as a feature of innovation. The occurrence of risk is mitigated by the presence of dialogue, consensus building and appropriate mechanisms for policy design, monitoring and assessment, all of which seek to minimise the consequences of risk. Such attitudes and the associated approaches to the amelioration of risk are absent in the Estonian system.

Awareness and recognition of the potential of demand side policies

Role of demand side in innovation policy: The UK, Netherlands and Finland all recognise the potential of demand instruments as a component of innovation policy. Both the Netherlands and Finland have been leaders in the introduction of such instruments, and the UK has also introduced some measures, although they have yet to be integrated into broader strategic policy mixes. Direct demand-side policy in Estonia is yet to be developed.

Innovativeness of potential buyers: Estonia has no long-term public procurement plans and there is poor awareness of innovative potential and opportunities offered by Estonian firms, a mismatch exacerbated by a lack of communication between both sets of actors. Despite a high demand for public procurement in the UK, the procurement of innovation remains challenging. Recent evidence suggests that Dutch experience with demand side instruments is positive although there seem to be some issues concerning the entry of the outputs into the public sector market. Finland demonstrates some risk aversion concerning the uptake of innovation by the public sector. It appears that, generally, more effort is needed in increasing the acceptance of innovation by public sector clients.

Innovativeness of end-users: There is a spectrum of openness of end users to innovation, from Finland, where it is quite high, through the Netherlands, to the UK where openness depends on sectoral characteristics, to Estonia, where there is more reticence to the uptake of innovative products and services, often for reasons of higher cost. A shift from price-based procurement towards an innovation-oriented approach would be required for the introduction of this type of demand-led instrument.

Competence and experience in demand side policies and policy mixes

Experiences with demand side instruments and policy mix: All three comparator countries have some experience of demand side policies: the UK and Finland have focused on innovation procurement and pre-competitive procurement, to which the Dutch add regulation. All three countries, however, have less experience with the design of strategic policy mixes. Estonia lacks any experience with the implementation of demand side policies.

Competences (in identifying, designing, implementing and governing policy mixes and potential of demand side instruments) Although all three comparator countries have some experience of the design and implementation of demand-side instruments, experience is relatively lacking with regard to identifying, designing, implementing and governing policy mixes. However, several studies indicate that policy mixes are organic constructs that arise over time through the sequential evolution of their component instruments and policies. This process can be informed by policy learning processes (i.e. review and evaluation) but an example of the design, *ab initio*, of an

entire policy mix is, as yet, unknown. Since the concept of demand-side innovation policy is new in Estonia, an essential first step would be training and awareness raising within the public sector, coupled with improved competences in evaluation and review practice.

On the basis of benchmarking results the preconditions for implementing demand-side innovation policy instruments can be developed. Table 1 summarises all necessary preconditions for introducing demand-side instruments as well as gives qualitative opinion about status of the precondition in Estonia. When there have been taken some actions already or the precondition has already been addressed on certain level, the current level of implementation is assessed as 'slight' (meaning meeting the precondition is on half-way, but still needs to be addressed). When there are no activities taken yet or the level of addressing this precondition is low, the current level of implementation of the precondition is assessed as 'low' (meaning strong efforts to meet the precondition should be taken).

The column of importance of change in Table 1 shows the impact of addressing certain precondition – how much impact a precondition has for implementing demand-side instruments. High scores preconditions have high impact for implementing demand-side instruments, meaning these should be addressed in first hand. Medium and low scored preconditions have less impact on implementation of demand-side instruments, meaning they can be addressed in a second or third hand (respectively), but in any cases cannot be ignored or forgotten.

Table 1. *Representation of necessary preconditions for successful demand side policy implementation.*

Precondition	Current level of implementation	Importance of change
Unified cross governmental-level, longer term, ambitious visions and strategies	Slight	high
Strong strategic intelligence capacity	Slight	medium
Truly horizontal and holistic R&D and innovation policy	Low	medium
Partnerships between government and market actors	Slight	high
Active role of end-user communities in the design and implementation of policies	Slight	Low
Identification and active work with market actors to influence EU-level decisions relevant for enhancing the demand for innovation in selected markets	Low	Low
Systematic innovation risk management practices of the public sector	Low	high
Regulation and fiscal policy as an innovation policy instrument	Low	medium
Development of smart public procurement practices	Low	medium
Development of effective evidence-based view of policy making	Low	Low
Close inter-departmental cooperation (with possible 'lead' department)	Slight	Medium
Objectives-based policy making accompanied by clear mechanisms for prioritisation and selectivity	Low	medium
Role of demand side in innovation policy	Low	Medium
Innovativeness of potential buyers	Slight	Medium
Innovativeness of end-users	Slight	Low
Experiences with demand side instruments	Low	N/A
Innovation related training and awareness within the public sector, coupled with competences in evaluation and review practice	Low	medium

3. Preconditions for introducing demand side policies and for designing coherent policy mixes

There are a number of barriers that need to be addressed at the overall level of policy and governance in Estonia in order to foster demand side innovation policies and allow for more systematic design of policy mixes. Furthermore, there are a number of barriers related to specific types of demand side instruments that can be addressed at the more general policy level. Both of these are discussed here. Since many of the recommendations related to addressing these barriers are interlinked, all recommendations are presented at the end of this chapter.

Systematic R&D&I are long-term activities, which aim to provide solutions to future market needs. There are markets, in which most future needs have already been recognised. However, fast technological developments and continuous restructuring of global value chains and businesses increases uncertainty. Although **all R&D and innovation include risks**, the more predictable the future market needs are, the higher the incentive for companies to engage in systematic R&D&I activities.

If the public sector wishes to be a significant driver for innovation, it must be as transparent as possible with its future needs.

This is important for two reasons. *First*, it will make companies interested in focusing their R&D&I efforts to provide new and better solutions for the public sector, thereby allowing them to plan their long-term R&D activities strategically. *Secondly*, it will allow long-term development of public sector activities and, especially, lead to the improvement of the effectiveness, efficiency and quality of public services with the help of innovation.

As the public sector aims to be a driver for innovation, it must take care that the demand it creates is consistent with future demand in international markets. This further highlights the need for strategic intelligence in defining future public sector needs. Proprietary national solutions should be carefully avoided, since they may encourage companies to waste resources to develop solutions that have minimal or no export potential.

The main barrier for innovation in the public sector is too much focus on short-term activities and resources. While there are longer term plans (such as for the structural funds period 2014-2020), these tend to be divided into activities at the level of individual ministries and their activities without any overall government level strategic direction. This leads to fragmentation, which may be overcome with additional coordination efforts. However, more often coordination remains unaddressed or is ineffective. The result is a fragmented set of policies and policy initiatives, which is both confusing for companies and is subject to unexpected changes. Again, this lack of longer-term vision poses a challenge to companies with regards to their strategic investment planning. Short term focus and fragmented policy implementation makes public sector future demand rather unpredictable and therefore less interesting for companies to invest any R&D and innovation efforts.

To overcome this and to enhance the role of public sector demand as a driver for innovation, **governance must place greater emphasis on defining and communicating longer term needs**. This requires changes at all levels of the policy cycle, i.e. strategic intelligence, policy design and policy implementation.

The main driver for public sector innovation is the need to address societal challenges. These are often referred also as ‘wicked problems’, since they are difficult to address by the traditional hierarchical government structures and governance models. These include social challenges related to, for example, ageing of the population and social inequalities, and environmental challenges related to, for

example, climate change, waste management, sustainability issues and environmental impact.

In order to address societal challenges, there is **a need to improve governance models and/or structures** accordingly. A more unified governance approach is needed, which may be achieved through enhanced coordination and collaboration between existing structures or through restructuring. In the innovation policy domain this raises two issues. *First*, innovation policy must become more horizontal and holistic, i.e. not a sectoral policy under one ministry, but a policy objective shared (and understood) across the whole government. *Secondly*, innovation policy should shift towards a challenge driven approach, i.e. shifting the focus from supporting R&D&I activities as such towards supporting the creation of innovative products, services and solutions to address societal challenges. This also emphasises the increasing role of demand side policies.

An additional driver for demand side policies is the need **to increase the leverage of public policy and especially public funding**. As public resources become more and more limited, policies and policy initiatives must become more effective, i.e. achieve a higher impact with less resources. This also means that rather than focusing only on dedicated R&D&I policy resources, all appropriate public resources should be utilised to enhance R&D and innovation. This implies a greater alignment of policies outside the narrowly defined R&D and innovation policy sphere, such as those relating to, for example, energy, transport, health and environmental policies, particularly where R&D and innovation activities may also play a significant role.

Shifting the focus on demand side innovation policies means adopting a more market driven approach to innovation.

demand for innovation.

Estonia is a relatively market driven economy, so the overall political and economic context would seem to favour this kind of shift. However, in the R&D&I policy domain and in the public sector activities, market driven approaches do not currently appear very strong. In fact, they are relatively weak, as the policy seems to favour supporting public research and support for companies' innovation activities rather than enhancing the market

Demand side policies are driven by market needs and, more specifically, future market demand. Whereas the 'future' might refer to next year or 10 years from now, the main issue is that the driver for R&D and innovation is the market and its needs. If the government intends to utilise demand side policies to drive innovation, it must focus on how to change market behaviour and specifically how to enhance the market demand for innovation. This inevitably means that government needs to actively seek real partnerships with market actors and end-users.

On one hand, this may change the perception of the role of government. This does not mean that government should become more active in the markets or seek to influence the markets. It means that the government must identify and introduce very targeted and time limited actions to enhance market development towards a direction which favours higher market dynamics, lowers or removes market entry barriers, increases quality and performance based competition and increases the awareness and interest of buyers and end-users to buy innovative products, services and solutions.

On the other hand, this means that government must establish continuous dialogue and strategic longer-term partnerships with market actors. These may take many different forms. However, the main purpose of these partnerships is to make future public sector demand more predictable and ensure that it is consistent with international market demand, and thereby make companies interested in developing and providing solutions that meet these future needs. Partnerships will also enhance public sector strategic intelligence capacity, since public agencies will benefit from the companies' knowledge of global market trends, public research organisations' knowledge of global research trends, and changes in consumer/citizen attitudes and needs. Furthermore, partnerships can be very effective in building trust and enhancing

networking, which can support the creation and development of stronger clusters and knowledge concentrations, which in turn are important in attracting R&D&I related FDI into Estonia.

Estonia is a small open economy within the EU. This means that many decisions and limitations related to markets and policies originate and must be adopted from the EU level. In order to be able to influence these decisions, a **small member state must be able to build a stronger negotiation position in selected areas of importance to it.** While there may be several ways to achieve this (including alliances with other member states), being among one of the most advanced Member states in the design and implementation of modern R&D and innovation policies is one of the most effective. Practical experience and showcases of novel policy approaches and initiatives will inevitably raise the visibility of a member state and its influence in future decisions related to innovation policy at the EU level.

This is one of the reasons Estonia should be active in the EU platforms, especially those related to the design and implementation of demand side policies and policy mixes addressing societal challenges. This will also allow Estonian companies and research organisations to identify and network with relevant partners within the EU and thereby enhance their possibility to influence and access future markets based on the new platform technologies, standards and regulatory environments developed to address societal challenges in Europe. This again emphasises the need for partnership between government and companies (and public research organisations), since participation and the ability to enhance the influence of Estonia at EU platforms should be a joint effort.

Based on the above discussion of key overall policy level barriers and the ways in which they may be overcome, we present the following recommendations. These recommendations are given here at a general level. Each recommendation is labelled as **important** (priority no. 1), **desirable** (priority no. 2) or **optional** (priority no. 3) depending on how essential it is for introducing demand side measures and designing policy mixes (see Appendix B). Some of them will be further detailed later in the context of describing the policy mixes and action plans.

Table 2. Recommendations for implementation of innovation policy-mix in Estonia.

Recommendation	Policy mix	Demand-side instruments
Governance		
1. The Estonian Government should establish unified cross governmental-level, longer term, ambitious visions and strategies.	Important	Desirable
2. The Estonian Government should strengthen its strategic intelligence capacity.	Desirable	Optional
3. R&D and innovation policy should shift towards a truly horizontal and holistic policy.	Desirable	Optional
4. The Estonian Government should actively build partnerships with market actors.	Desirable	Important
5. The Estonian Government should encourage end-user communities to take a more active role in the design and implementation of policies related to markets and innovation.	Optional	Optional
6. The Estonian Government should identify and actively work together with market actors to influence EU-level decisions relevant for enhancing the demand for innovation in selected markets.	Optional	Optional
7. The Estonian Government should establish systematic risk management practices for the public sector.	Optional	Important
Public procurement of innovation and pre-commercial procurement		
8. The Estonian Government should establish a small unit to specialise in the public procurement of innovation and pre-commercial	Optional	Important

procurement.		
9. The Estonian Government should make use of public-private partnerships to identify the potential of innovation in addressing the longer-term needs of the public sector.	Optional	Desirable
10. The Estonian Government should make use of end-user communities in understanding the needs of citizens with regard to potential demand-led innovation solutions.	Optional	Optional
11. The Estonian Government should establish appropriate incentives and governance practices that support innovative procurement.	Desirable	Important
Smart regulation, standards and norms		
12. The Estonian Government should adopt a government-wide policy to reform the regulatory regime to better enhance innovation.	Desirable	Desirable
13. The Estonian Government should make use of partnerships to identify and reduce or remove any regulatory barriers for innovation.	Desirable	Important
14. The Estonian Government should encourage innovative companies to participate in EU-level and other international standardisation activities.	Optional	Desirable
15. The Estonian Government should establish time limited buyer incentives with a clearly communicated exit plan and impact monitoring system.	Desirable	Important
16. The Estonian Government should establish experimental platforms aimed at private markets	Optional	Optional
17. The Estonian Government should establish experimental platforms aimed at public sector solutions to help develop and test applications for the public sector in a safe environment before adopting them more widely.	Desirable	Important

How these recommendations may work in practice and in which smart specialisation areas specifically will become evident in the next chapters, where we discuss in more detail how to proceed in designing policy mixes that include demand side instruments.

4. Creation and evaluation of a set of sustainable policy mix for stimulating Estonian smart specialisation areas

Lessons learned from other countries show clearly that the best results of innovation policy are gained from combining supply as well as demand-side innovation policy measures. As both instruments target different aims they perfectly complement each other. For full picture of implementing innovation policy three main aspects have to be in place:

Horizontal preconditions	
to create a scene (framework) for implementing supply and demand-side instruments	
Supply-side instruments	Demand-side instruments
to improve economy's productive potential and its ability to produce (to supply products/services)	to improve domestic demand and innovation potential

The discussion in this chapter focuses on developing of innovation policy mix in the smart specialisation areas that were identified as the most promising ones to introduce demand side measures (See Table 11 in final report part 1). An innovation policy mix is developed for each of these areas. First a rationale behind of suggested policy mix is presented, which is summarised in table format at the end of each smart specialisation area.

4.1 E-governance

The Government's role in creating market demand is very strong together with that of local governments. So far the focus in developing e-governance has been on the national level introducing e-governance solutions. Due to the strong track record (electronic ID and several public e-services based on it) as well as potential in e-governance solutions, the smart specialisation area of ICT through other sectors can be **focused on developing e-governance solutions**. E-governance enhances all government related and initiated activities enabling more effective functioning of the public sector as well as offering better public services.

The key stakeholders in the area of e-governance are:

- Government, i.e. politicians and ministries
- Local governments, cities, municipalities
- Public sector organisations providing public services
- Private organisations selected to provide public services (incl. infrastructure, etc.)
- Public sector employees
- End-users, citizens
- Companies developing and supplying e-government solutions
- Research organisations (including competence centres and the NATO Cooperative Cyber Defence Centre of Excellence)

Government (both national and local) **motivation** is to enhance effectiveness and cost efficiency of public services, and the visibility and positive image of Estonia internationally as a leading adopter of e-government solutions. As ICT is a sector with fast development cycles, even short-to-mid term strategies may be relatively effective.

Hence, the overall governance culture has not been acting as a similarly severe barrier for adopting e-government solutions as it has in other areas. Naturally, the relatively strong political commitment to developing e-government solutions has been essential.

The market for e-government solutions is driven by the public sector as the leading customer.

This means that the market is dominated by public procurement carried out by the government or other public sector organisations. Since e-government solutions are still quite rare internationally, many of the solutions have had to be developed for Estonian needs without the possibility to buy existing solutions from international markets. This has facilitated innovation at the level of these solutions, although the underlying ICT technologies applied have been already in existence. The benefits to end-users (citizens as well as companies) have been visible, although their participation in the actual development of e-government solutions has remained limited (mostly expert driven definition of the need and how to address it). The development has been implemented in the form of government level projects utilizing special expertise. While this has allowed fast implementation, it has not addressed the wider lack of ICT competences and skills within the government and public sector.

So far, e-government solutions developed and adopted in Estonia have focused on areas where these solutions have been relatively easy to adopt without dramatic changes to the public sector role, culture or practices. While there is still ample potential to develop further e-government solutions in similar areas, there will come a time when future e-government solutions will eventually have to challenge the public sector role, culture and practices in a more profound way. There is already evidence of this in the slower than expected adoption of electronic health records. The implementation of the decision to allow open access to public sector data from the beginning of 2015 may face similar challenges.

Potential policy measures for enhancing the incentive for defining and procuring further and more innovative e-government solutions include:

- Governance based on longer term national (and local) strategy and vision, and management-by-objectives instead of management-by-resources
- Funding based more primarily on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost)

Main drivers of research organisations are financial and scientific. Incentives for research organisations to steer their activities more towards addressing societal challenges and related public sector needs should therefore be mostly financial. This should be integrated with the scientific ambition, focusing more towards stronger international collaboration to ensure longer-term development and sustainability of sufficient scientific competences. Incentives for research organisations to engage more **in innovation and multidisciplinary research** (often a key prerequisite for innovation) in collaboration with the public sector organisations, companies and end-users include (see Table 3):

- Funding and assistance to participate in international collaboration and networking addressing societal challenges
- Incentives for establishing multidisciplinary research groups to address public sector needs with specific emphasis on future changes in public sector role, culture and practices, future public services for citizens and companies, and societal challenges
- Funding for collaboration and networking with public sector organisations, companies and end-users
- Incentives based on utilisation of research results (rewards, income from spin-offs and licenses, etc.)
- Incentives based on graduates employed in industry
- Pre-commercial procurement based on longer-term strategies and public sector needs

The main driver for companies developing and supplying e-government solutions as well as companies selected to provide public services is the eventual **business potential**. Companies focusing on e-government solutions may view Estonia as their key market and a demonstration environment that may help them launch their business internationally. Incentives for these companies should therefore be related to a sufficiently high and predictably growing market potential. Incentives may include (see Table 3):

- Awareness of international market developments, public sector needs and innovation potential
- Funding and services to help develop innovation to and access international markets (incl. R&D, market validation, etc.)
- Funding and assistance for hiring skilled professionals (for R&D, international business development, etc.)
- Continuous dialogue with public sector to ensure shared understanding of future challenges and needs (including future smart regulations, standards and norms)
- Funding for collaborative research, development and innovation activities (including Clusters and Competence centres)
- Pre-commercial procurement based on longer term strategies and needs
- Procurement of innovation based on longer term strategies and needs
- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, other companies, research organisations and end-users
- Access to open data (to the extent data security and protection of personal data can be ensured)
- Incentives for locating business activities in Estonia (foreign direct investments (FDI))

As the awareness, education level and innovativeness of citizens increase, they may also be able to contribute to the development of public services. **End-users are motivated** both by money and their personal value systems, which may lean more towards the individual (demanding sophisticated customer) or towards the society (social awareness, helping others). Incentives may therefore include (see Table 3).

- Access to experimental platforms where innovative products, services and solutions are developed and tested in collaboration with e-government solution providers, other companies, public sector and research organisations
- Financial incentives and assistance for establishing social enterprises
- Access to policy design (e.g. via social media, crowd sourcing and other virtual tools)
- Support for establishing active end-user communities

The **motivation of public sector organisations** responsible for producing public services to participate in innovation is mainly limited by existing traditions and practices. To effectively motivate civil servants to engage in innovation, these activities must be supported by the organisational culture and practices. Innovation should be rewarded and valued, and failures should be tolerated. Incentives for civil servants are therefore largely dependent on the organisational context (see Table 3):

- Financial and other rewards for innovation
- Incentives (time and money) for participating in research and innovation
- Access to experimental platforms where innovative products, services and solutions are developed and tested in collaboration with companies, research organisations and end-users
- Access to policy design (e.g. via social media, crowd sourcing and other virtual tools)

The **cultural and organisational context of the public sector organisations** is typically highly path dependent (i.e. depend strongly on existing traditions and practices) and it may be further limited by regulation. As long as the government lacks a longer-term

strategy and vision, and the funding is allocated short term and based on low price/cost, the incentive for innovation remains relatively low. To ensure sufficient incentive for innovation among the public sector organisations responsible for producing public services, the incentive should originate from the way funding is allocated to the production of these services, preferably based on a longer-term strategy and vision. The potential incentives include (see Table 3):

- Access to policy design (e.g. via social media, crowd sourcing and other virtual tools)
- Governance based on longer term national strategy and vision, and management-by-objectives instead of management-by-resources
- Funding based more primarily on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost)
- Establishment of a transparent ranking of service providers based on quality and performance (productivity, end-user and employee feedback)
- Continuous dialogue with the government, end-users and companies to ensure shared understanding of future challenges and needs (including future smart regulations, standards and norms)
- Recognition of innovation such as rewards, visibility, additional resources, etc.
- Funding for collaborative research, development and innovation activities with research organisations and companies
- Incentives for (or mandatory participation in) pre-commercial procurement
- Incentives for (or mandatory participation in) procurement of innovation
- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with companies, research organisations and end-users

Table 3. *Relevant policy measures for developing a policy mix in the smart specialisation area of e-government in Estonia.*

Policy measure	Barriers for innovation addressed	Value
Governance related measures		
Governance based on longer term national strategy and vision, and management-by-objectives instead of management-by-resources, reform of the governance model accordingly	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Lack of longer term ambition • Low capacity how to define the public sector need and how to address it • Funding models do not encourage or support innovation 	Important
Allocation of money based more primarily on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost)	<ul style="list-style-type: none"> • Low awareness of the potential of innovation • Low capacity how to define the public sector need and how to address it • Low cooperation between different ministries and field-specific experts • Funding models do not encourage or support innovation 	Important
Establish systematic innovation risk management practices for the public sector with special considerations relevant to e-governance (e.g. data security)	<ul style="list-style-type: none"> • Attitudes towards innovation • Perceived high (financial) risks related to innovation • No (or low) tolerance for failure • No (government guarantee) system to manage risks 	Important
Continuous dialogue between the government, providers of e-governance solutions, end-users (citizens, companies) to ensure shared understanding of future e-governance challenges and needs and the potential for innovation	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Lack of longer term ambition • Low capacity how to define the public sector need and how to address it • Low cooperation between different ministries and field-specific experts • Perceived high (financial) risks related to innovation • Lack of knowledge and competences • Intellectual rights are sold with the e-governance solutions • Complicated relationships between companies (Estonia is small) • The government buys large solutions and small 	Important

	companies are not able to undertake such big projects	
Active participation of end-users and public sector employees to policy design (e.g. via social media, crowd sourcing and other virtual participation tools)	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Low capacity how to define the public sector need and how to address it • Low cooperation between different ministries and field-specific experts 	Desirable
Increasing transparency of public sector productivity (productivity, end-user and employee feedback)	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation 	Optional
Funding for R&D and innovation (supply side)		
Funding and assistance to participate in international collaboration and networking addressing societal challenges (and more specifically developing e-governance solutions)	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Lack of longer term ambition • Low capacity how to define the public sector need and how to address it • Low cooperation between different ministries and field-specific experts • Perceived high (financial) risks related to innovation • Funding models do not encourage or support innovation • Lack of knowledge and competences • Lack of skilled specialists (e.g. ICT, international business) 	Important
Funding and services to help develop innovation to and access international markets (incl. R&D, market validation, branding, etc.)	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Lack of longer term ambition • Low capacity how to define the public sector need and how to address it • Perceived high (financial) risks related to innovation • Funding models do not encourage or support innovation • Complicated relationships between companies (Estonia is small) • The government buys large solutions and small companies are not able to undertake such big projects 	Important
Incentives for research organisations based on <ul style="list-style-type: none"> • establishing multidisciplinary research groups to address public sector needs with specific emphasis on future changes in public sector role, culture and practices, future public services for citizens and companies, and societal challenges • graduates employed in industry • utilisation of research results (rewards, income from spin-offs and licenses, etc.) 	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Low capacity how to define the public sector need and how to address it • Lack of knowledge and competences • Lack of skilled specialists (e.g. ICT, international business) 	Desirable
Funding for participation in research and innovation	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Lack of longer term ambition • Funding models do not encourage or support innovation • Lack of knowledge and competences • Lack of skilled specialists (e.g. ICT, international business) 	Desirable
Funding for collaboration and networking with public sector organisations, companies and end-users	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Lack of longer term ambition • Low capacity how to define the public sector need and how to address it • Low cooperation between different ministries and field-specific experts • Perceived high (financial) risks related to innovation • Funding models do not encourage or support 	Optional

	<ul style="list-style-type: none"> innovation Lack of knowledge and competences Lack of skilled specialists (e.g. ICT, international business) 	
Funding and assistance for hiring skilled professionals (for R&D, international business development, etc.)	<ul style="list-style-type: none"> Attitudes towards innovation Low awareness of the potential of innovation Perceived high (financial) risks related to innovation Lack of knowledge and competences Lack of skilled specialists (e.g. ICT, international business) 	Optional
Other measures facilitating innovation and economic activities		
Awareness of international market developments, public sector needs and innovation potential	<ul style="list-style-type: none"> Attitudes towards innovation Low awareness of the potential of innovation Lack of longer term ambition Low capacity how to define the public sector need and how to address it Perceived high (financial) risks related to innovation Complicated relationships between companies (Estonia is small) The government buys large solutions and small companies are not able to undertake such big projects 	Important
Access to open data (to the extent data security and protection of personal data can be ensured)	<ul style="list-style-type: none"> Attitudes towards innovation Low awareness of the potential of innovation The government buys large solutions and small companies are not able to undertake such big projects 	Desirable
Incentives for locating business activities in Estonia (attracting FDIs)	<ul style="list-style-type: none"> Attitudes towards innovation Low awareness of the potential of innovation Lack of longer term ambition Low capacity how to define the public sector need and how to address it Lack of knowledge and competences Lack of skilled specialists (e.g. ICT, international business) Complicated relationships between companies (Estonia is small) The government buys large solutions and small companies are not able to undertake such big projects 	Optional
Enhancing the market demand for innovation (demand side)		
(Voluntary or mandatory) allocation of (existing or competitive additional) resources for pre-commercial procurement and procurement of innovation based on longer term strategies and public sector needs	<ul style="list-style-type: none"> Attitudes towards innovation Low awareness of the potential of innovation Low capacity how to define the public sector need and how to address it Low cooperation between different ministries and field-specific experts Perceived high (financial) risks related to innovation Funding models do not encourage or support innovation Intellectual rights are sold with the e-governance solutions The government buys large solutions and small companies are not able to undertake such big projects 	Important
Smart regulation (demand side)		
Establish quality and performance based standards and norms	<ul style="list-style-type: none"> Attitudes towards innovation Low capacity how to define the public sector need and how to address it Low cooperation between different ministries and field-specific experts 	Desirable
Establish quality and performance based smart regulations	<ul style="list-style-type: none"> Attitudes towards innovation Low capacity how to define the public sector need and how to address it Low cooperation between different ministries and field-specific experts 	Optional
Support for user driven innovation and experimentation (demand side)		
Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, companies,	<ul style="list-style-type: none"> Attitudes towards innovation Low awareness of the potential of innovation Low capacity how to define the public sector need and how to address it Low cooperation between different ministries and field-specific experts 	Important

research organisations and end-users.	<ul style="list-style-type: none"> • Perceived high (financial) risks related to innovation • No (or low) tolerance for failure • No (government guarantee) system to manage risks • Lack of knowledge and competences • Complicated relationships between companies (Estonia is small) 	
Recognition of innovation such as rewards, visibility, additional resources, etc.	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation 	Optional
Support for establishing active end-user communities and social enterprises	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Lack of longer term ambition • Low capacity how to define the public sector need and how to address it • No (or low) tolerance for failure 	Optional

Special attention in designing demand-side innovation policies should be focused on the following:

- Full adoption of e-governance solutions (how to overcome slow or only partial application of the full benefits of e-governance solutions);
- Data security;
- Use of modern virtual participation tools (social media, crowd sourcing), but also beware of preventing social divide, i.e. avoid over reliance on virtual tools, i.e. how to reach those end-users that are not active users of virtual tools;
- Experimental platforms are not the same as environments built only for demonstration purposes, experimental platforms should be sufficiently large scale to ensure verification in real life context;
- Procurement conditions should be changed to facilitate companies providing e-governance solutions in Estonia to develop international business activities (this is mainly related to the use of IPR developed for procured e-governance solutions in Estonia).

4.2 Healthcare

Particular innovation potential in the healthcare area seems to be in **e-health solutions**, healthcare processes and services, preventive healthcare and health tourism. Potential for innovation and relevant background are the main reasons behind focusing on e-health solutions.

Government role on the healthcare sector is strong.

In healthcare services and processes as well as in e-health sector the government policies and decisions guide what and how services are provided. This is done through regulation, standards and norms and through public procurement. The end-user (patient/all citizens) has little direct influence on the services and to what extent e-health solutions are used. Government, through its organisations analyses and interprets end-user needs and organises healthcare services accordingly and under politically defined budgetary limitations. Governance is based on mandatory health insurance and procurement from healthcare providers (hospitals).

In the areas of health tourism and preventive healthcare, the government role is much more indirect. Government may act as a facilitator and raise awareness of various stakeholders, but the actual markets are defined by direct interaction between service providers and end-users. Government typically regulates issues such as requirements related to occupational health, which may allow it some direct ways to influence the market development.

The key stakeholders in the area of healthcare are:

- Government, i.e. politicians and ministries

- Estonian Health Insurance Fund
- Agencies, such as Health Board, Pharmaceutical committee, National Institute of Health Development and State Agency of Medicines
- Healthcare providers, such as hospitals (including management and owners)
- Healthcare professionals, such as doctors, nurses, etc.
- End-users, i.e. patients, employees, citizens
- Wellbeing service providers, such as spas
- Employers, i.e. all organisations in the case of occupational health and preventive healthcare
- Companies producing products and services for the healthcare sector, such as software, e-health solutions, pharmaceuticals, medical equipment, real estate, etc.
- Research organisations (including competence centres)

As discussed in Chapter 2.1.2 and more specifically in Table 9 of the final report part 1, there are several barriers for innovation in the area of healthcare. Policies in this area have not featured long term strategies or visions that would have supported innovation. Biotechnology has been identified as an area with high research and innovation potential in longer term, but most biotechnology research is fragmented and poorly integrated to the needs of the market actors, especially healthcare service providers.

While there is a valid rationale for public funding for basic research, it is not primarily based on economic value stemming from scientific break-throughs in Estonia. The main rationale for a small open economy to invest in basic research lies in developing and maintaining sufficient competences to monitor, understand, adopt and utilise results of global scientific research. This means that academic research in Estonia should especially focus on international collaboration. Access to and collaboration with leading international scientific groups requires that Estonian basic research is able to foster talented scientists and international level research in selected niche areas.

The mismatch between public research and healthcare needs is not problematic in the area of basic research. The **key challenge is in applied research**, i.e. translating research results into innovation. This barrier for innovation is currently addressed mainly by the Competence centre programme and partly also by the Cluster programme. The Competence centre programme is mainly research driven and aims at international markets. Its links to the Estonian healthcare system are still relatively weak. The Cluster programme is more market actor driven and therefore may address the short- to mid-term needs of the healthcare sector.

Main drivers of research organisations are financial and scientific. Incentives for research organisations to steer their activities more towards the needs of the Estonian healthcare system and innovation should therefore be mostly financial. The scientific ambition should be used more as a driver towards stronger international collaboration to ensure longer-term development and sustainability of sufficient scientific competences. Incentives for research organisations to engage more in innovation and multidisciplinary research (often a key prerequisite for innovation) in collaboration with the healthcare organisations include (see Table 4):

- Funding for collaboration and networking (Competence centres, Clusters)
- Incentives based on utilisation of research results (rewards, income from spin-offs and licenses, etc.)
- Incentives based on graduates employed (healthcare providers, industry)
- Incentives for establishing multidisciplinary research groups to address healthcare sector needs
- Pre-commercial procurement based on defined healthcare strategies and needs

The main driver for companies producing products and services for the healthcare sector is the eventual business potential. Depending on the companies, this may materialise in different ways. For example, large multinational corporations do not necessarily view Estonia as an interesting market as such because of its small size. They may see it more as a part of their market expansion strategy in a wider geographical area, or they may see it as a cost effective location for clinical studies. Smaller software companies focusing on healthcare software solutions may view Estonia as their key market and a demonstration environment that may help them launch their business internationally. To some companies, the healthcare sector is just one of their market segments and, especially if other market segments offer more potential, they are less inclined to engage in innovation in healthcare.

Incentives for these companies should therefore be related to a sufficiently high and predictably growing market potential. Incentives may include (see Table 4):

- Awareness of international market developments, healthcare needs and innovation potential
- Funding and services to help develop innovation to and access international markets (incl. R&D, market validation, etc.)
- Funding and assistance for hiring skilled professionals (for R&D, international business development, etc.)
- Continuous dialogue with healthcare providers to ensure shared understanding of future healthcare challenges and needs (including future smart regulations, standards and norms)
- Funding for collaborative research, development and innovation activities (including Clusters and Competence centres)
- Pre-commercial procurement based on defined healthcare strategies and needs
- Procurement of innovation based on defined healthcare strategies and needs
- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with healthcare providers, other companies, research organisations and end-users
- Access to patient and healthcare data (to the extent data security and protection of personal data can be ensured)
- Incentives for locating business activities in Estonia (FDI)
- Buyer incentives for adopting personalised e-health services and products

All organisations need skilled labour and one of the incentives to attract it is **additional benefits the employer** can offer to increase job satisfaction. As people become increasingly health conscious, these additional benefits may include occupational health services organised and paid by the employer or even services to help maintain the mental and physical ability to work and other preventive healthcare services (such as, for example partly or totally paid participation in sports activities or spa, physiotherapy, massage and other similar treatments). While there may be a shortage of skilled labour and therefore the before mentioned may occur naturally in some areas, without incentives it will eventually reach only a very limited section of the workforce. Incentives for employers should therefore focus on (see Table 4):

- Financial incentives for employers to maintain and enhance employees' work ability by encouraging financially (organising or offering partial or total funding) employees to engage in activities supporting preventive healthcare (such as sports, active leisure, and the use of spas and other related health tourism services)

Wellbeing service providers in collaboration with healthcare service providers are the key actors in developing the health tourism business. So far these two organisations meet mostly only on the level of healthcare professionals, who may be employed by both. The organisational level collaboration remains limited. The main driver is the business potential, which means that incentives for innovation in this stakeholder group should focus on (see Table 4):

- Awareness of international market developments and innovation potential
- Funding and services to help develop innovation to and access international markets (incl. R&D, market validation, branding, etc.)
- Funding and assistance for hiring skilled professionals (for R&D, international business development, etc.)
- Funding for collaborative research, development and innovation activities, especially between wellbeing and healthcare service providers (including Clusters)
- Access to patient and healthcare data (to the extent data security and protection of personal data can be ensured)
- Buyer incentives for adopting personalised e-health services and products
- Financial incentives for employers to maintain and enhance employees' work ability by encouraging financially (organising or offering partial or total funding) employees to engage in activities supporting preventive healthcare (such as sports, active leisure, and the use of spas and other related health tourism services)

End-users are gradually becoming increasingly health conscious. As the education level increases, patients are also increasingly aware of their condition and better able to evaluate the quality of healthcare services. The most aware, educated and innovative people may also be able to contribute to the development of healthcare innovation. End-users are motivated both by money and their personal value systems, which may lean more towards the individual (demanding sophisticated customer) or towards the society (social awareness, helping others). Incentives may therefore include (see Table 4):

- Buyer incentives for adopting personalised e-health services and products
- Vouchers allowing the selection of healthcare service providers
- Financial incentives from employers to maintain and enhance one's work ability
- Vouchers for participating in preventive healthcare activities (such as sports, active leisure, and the use of spas and other related health tourism services)
- Access to experimental platforms where innovative products, services and solutions are developed and tested in collaboration with healthcare providers, companies and research organisations
- Financial incentives and assistance for establishing social enterprises
- Access to healthcare and innovation policy design
- Support for establishing active end-user communities

Direct contact with the healthcare system for the end-users is through **healthcare professionals**. Their motivation to participate in innovation is mainly limited by existing traditions and practices. While innovative individuals often find an outlet for their innovativeness even in a rigid organisational setting, most of the innovation potential of healthcare professionals often remains untapped. To effectively motivate healthcare professionals to engage in innovation, these activities must be supported by the organisational culture and practices. Innovation should be rewarded and valued, and failures (naturally only within limits and especially ensuring patient safety and quality of healthcare) should be tolerated. Incentives for healthcare professionals are therefore largely dependent on the organisational context (see Table 4):

- Financial and other rewards for innovation
- Incentives (time and money) for participating in research and innovation
- Access to patient and healthcare data (to the extent data security and protection of personal data can be ensured)
- Access to experimental platforms where innovative products, services and solutions are developed and tested in collaboration with companies, research organisations and end-users
- Access to healthcare and innovation policy design

The cultural and organisational context of the healthcare professionals is defined by the healthcare service providers that employ them. The decisions are taken by the

management together with the owners. These decisions are highly path dependent (i.e. depend strongly on existing traditions and practices) and limited by the national healthcare governance practices and government regulation. As long as the government lacks a longer-term strategy and vision, and the funding to provide healthcare services is allocated short term and based on low price/cost, the incentive for innovation remains relatively low. While lack of resources may often be a strong driver for innovation, the indirect governance arrangement typical for the healthcare system can effectively stifle it. To ensure sufficient incentive for innovation among the healthcare service providers and their owners, the incentive should originate from reform of the overall healthcare governance system based on a longer term strategy and vision. The potential incentives include (see Table 4):

- Access to healthcare and innovation policy design
- Healthcare governance based on longer term national strategy and vision, and management-by-objectives instead of management-by-resources
- Funding based more primarily on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost)
- Establishment of a transparent ranking of healthcare service providers based on quality and performance (monitoring and evaluation of impact, feedback from patients and employees)
- Continuous dialogue with the government, end-users and companies to ensure shared understanding of future healthcare challenges and needs (including future smart regulations, standards and norms)
- (Voluntary or mandatory) allocation of (existing or competitive additional) resources for R&D and innovation
- Recognition of innovation such as rewards, visibility, additional resources, etc.
- Funding for collaborative research, development and innovation activities with research organisations and companies (including Clusters and Competence centres)
- Funding for collaborative research, development and innovation activities, between wellbeing and healthcare service providers (including Clusters)
- Incentives for (or mandatory participation in) pre-commercial procurement based on defined healthcare strategies and needs
- Incentives for (or mandatory participation in) procurement of innovation based on defined healthcare strategies and needs
- Vouchers allowing the selection of healthcare service providers
- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with companies, research organisations and end-users
- Access to patient and healthcare data (to the extent data security and protection of personal data can be ensured)

The Estonian Health Insurance Fund is the organisation that channels the funds from health insurance to the healthcare providers. The Fund operates under specific regulations and political supervision. While some changes to the Fund practices could be initiated by the Fund itself, the more significant changes must be made at the government level.

Currently, money from the Fund to healthcare service providers is channelled through contracts (based on a number of insured people in a service region), where competition is somewhat limited (regional availability of healthcare service providers). This does not facilitate or encourage innovation. The available budget is politically defined and allows the Fund only limited room to manoeuvre. **The incentive to innovate and support innovation among healthcare providers and companies** should therefore originate mainly from the government and be based on longer-term strategy and vision. Potential measures include (see Table 4):

- Access to healthcare and innovation policy design

- Healthcare governance based on longer term national strategy and vision, and management-by-objectives instead of management-by-resources
- Continuous dialogue with the government, healthcare providers, companies and end-users to ensure shared understanding of future healthcare challenges and needs (including future smart regulations, standards and norms)
- Allocation of money based more primarily on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost)
- (Voluntary or mandatory) allocation of (existing or competitive additional) resources for R&D&I
- (Voluntary or mandatory) allocation of (existing or competitive additional) resources for pre-commercial procurement based on defined healthcare strategies and needs
- (Voluntary or mandatory) allocation of (existing or competitive additional) resources for procurement of innovation based on defined healthcare strategies and needs
- Establishment of a transparent ranking of healthcare service providers based on quality and performance (monitoring and evaluation of impact, feedback from patients and employees)
- Recognition of innovation such as rewards, visibility, additional resources, etc.
- Vouchers allowing the selection of healthcare service providers

Government has relatively high impact on innovation in healthcare sector.

Since the government has such a strong role in the healthcare sector, it also has a relatively high impact on innovation. Without the recognition of and support to innovation in the healthcare sector at the government level, the level of innovation in healthcare in Estonia is expected to remain low. An on-going work to define a Health R&D&I

Strategy for Estonia represents a step into the right direction.

Healthcare policies should be based on a government level longer-term national strategy and vision. The strategy should be defined and regularly updated in an interactive dialogue with all key stakeholders. The strategy process should focus on finding solutions to national challenges and capture the importance of innovation in continuously improving the quality and performance of the healthcare sector and thereby improving the health and quality of life of the population.

The rationale for government policy action in supporting innovation in healthcare originates from the improved health of the population and therefore lower long term cost of healthcare, and the economic potential of exporting innovative healthcare services, products and solutions, as well as the economic value created by attracting health related FDI and tourists.

While the longer term strategy and vision capturing the value of innovation creates an essential foundation, the practical implementation is based on an appropriate governance model. It should ensure that all relevant stakeholders have sufficient incentives for innovation to overcome existing barriers and obstacles. Furthermore, a governance model should ensure that both healthcare and innovation as well as other relevant policies are designed and implemented in the form of a coherent policy mix.

Agencies, such as the Health Board, Pharmaceutical committee, National Institute for Health Development and State Agency of Medicines all work under the supervision and guidance from the Ministry of Social Affairs. Their role is to support policymaking and/or support in the implementation of policy. Their respective roles should be evaluated in the context of establishing a longer-term strategy and the appropriate governance model to implement it. This may lead to changes in the roles, mandates and/or organisational arrangements of these agencies.

The following Table 4 collects the potential policy measures related to the policy recommendations presented in the previous chapter, as identified above specifically for the healthcare sector and refers to the barriers to innovation they address as well as their relevance to the specific sub-areas of healthcare.

Table 4. *Relevant policy measures for developing a policy mix in the healthcare smart specialisation area in Estonia.*

Policy measure	Barriers for innovation addressed	Relevant sub-areas of healthcare	Value
Governance related measures			
Healthcare governance based on longer term national strategy and vision, and management-by-objectives instead of management-by-resources, reform of the governance model accordingly	<ul style="list-style-type: none"> • Attitudes towards innovation • Low awareness of the potential of innovation • Low motivation for innovation • Low capacity for problem definition for innovations • Risk aversion in the public sector 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Preventive healthcare • Health tourism 	Important
Allocation of money based more primarily on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost)	<ul style="list-style-type: none"> • Low capacity for problem definition for innovations • Low motivation for innovation • Low exploitation of R&D&I • Attitudes towards innovation • High risks barriers in the market • Low level of patients' participation in decision-making • Current financing mechanism not supporting R&D&I • The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Preventive healthcare • Health tourism 	Important
Continuous dialogue between the government, healthcare providers, companies and end-users to ensure shared understanding of future healthcare challenges and needs and the potential for innovation	<ul style="list-style-type: none"> • Low awareness of the potential of innovation • Low capacity for problem definition for innovations • Low motivation for innovation • Risk aversion in the public sector • Attitudes towards innovation • Lack of complementary knowledge and competences (e.g. ICT) • Low level of patients' participation in decision-making • The nature of healthcare service (how to offer) is regulated instead of setting expected final goals • Low cooperation between different ministries and field-specific experts • Availability of systematic health data 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Preventive healthcare • Health tourism 	Important
Establish systematic innovation risk management practices for the public sector with special considerations relevant to healthcare	<ul style="list-style-type: none"> • Low capacity for problem definition for innovations • Low motivation for innovation • Risk aversion in the public sector • Low exploitation of R&D&I • Attitudes towards innovation • Low cooperation between different ministries and field-specific experts 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health 	Important
Active stakeholder participation to healthcare and innovation policy design	<ul style="list-style-type: none"> • Low awareness of the potential of innovation • Low capacity for problem definition for innovations • Attitudes towards innovation • Low level of patients' participation in decision-making • Availability of systematic health data 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Preventive healthcare • Health tourism 	Desirable
Establishment of a transparent ranking of	<ul style="list-style-type: none"> • Low awareness of the potential of 	<ul style="list-style-type: none"> • Healthcare services 	Optional

healthcare service providers based on quality and performance (monitoring and evaluation of impact, feedback from patients and employees)	<ul style="list-style-type: none"> • innovation • Low motivation for innovation • Low exploitation of R&D&I • Lack of resources to adopt innovation (two years to reach eligibility) • Attitudes towards innovation • The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> • and processes • e-health 	
Funding for R&D and innovation (supply side)			
Funding for participation in research and innovation	<ul style="list-style-type: none"> • Low motivation for innovation • Low exploitation of R&D&I • Attitudes towards innovation • Limited financing 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Health tourism 	Important
Funding for collaborative research, development and innovation activities (including Clusters and Competence centres)	<ul style="list-style-type: none"> • Low motivation for innovation • Low exploitation of R&D&I • Attitudes towards innovation • Limited financing • Limited opportunities for research collaboration • Lack of complementary knowledge and competences (e.g. ICT) • Current financing mechanism not supporting R&D&I 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Preventive healthcare • Health tourism 	Important
Incentives for research organisations based on <ul style="list-style-type: none"> • graduates employed (healthcare providers, industry) • utilisation of research results (rewards, income from spin-offs and licenses, etc.) • establishing multidisciplinary research groups to address healthcare sector needs 	<ul style="list-style-type: none"> • Low capacity for problem definition for innovations • Low motivation for innovation • Attitudes towards innovation • Limited financing • Limited opportunities for research collaboration • Lack of complementary knowledge and competences (e.g. ICT) 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Preventive healthcare • Health tourism 	Important
(Voluntary or mandatory) allocation of (existing or competitive additional) resources for R&D&I	<ul style="list-style-type: none"> • Low motivation for innovation • Low exploitation of R&D&I • Lack of resources to adopt innovation (two years to reach eligibility) • Attitudes towards innovation • Limited financing • Current financing mechanism not supporting R&D&I 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Health tourism 	Desirable
Funding and assistance for hiring skilled professionals (for R&D, international business development, etc.)	<ul style="list-style-type: none"> • Low capacity for problem definition for innovations • Low exploitation of R&D&I • Lack of complementary knowledge and competences (e.g. ICT) 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Preventive healthcare • Health tourism 	Optional
Funding and services to help develop innovation to and access international markets (incl. R&D, market validation, branding, etc.)	<ul style="list-style-type: none"> • Low motivation for innovation • Low exploitation of R&D&I • Attitudes towards innovation • High risks barriers in the market • Small size companies in the health sector • Limited financing • Lack of complementary knowledge and competences (e.g. ICT) • Current financing mechanism not supporting R&D&I 	<ul style="list-style-type: none"> • e-health • Health tourism 	Desirable
Other measures facilitating innovation and economic activities			
Awareness of international market	<ul style="list-style-type: none"> • Low awareness of the potential of innovation 	<ul style="list-style-type: none"> • Healthcare services and processes 	Desirable

developments, healthcare needs and innovation potential	<ul style="list-style-type: none"> • Low motivation for innovation • Low exploitation of R&D&I • Attitudes towards innovation • High risks barriers in the market • Small size companies in the health sector • Limited financing 	<ul style="list-style-type: none"> • e-health • Preventive healthcare • Health tourism 	
Access to patient and healthcare data (to the extent data security and protection of personal data can be ensured)	<ul style="list-style-type: none"> • Lack of resources to adopt innovation (two years to reach eligibility) • Small size companies in the health sector • Availability of systematic health data 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health 	Optional
Incentives for locating business activities in Estonia (attractive FDIs)	<ul style="list-style-type: none"> • Attitudes towards innovation • Small size companies in the health sector • Limited financing • Lack of complementary knowledge and competences (e.g. ICT) 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health • Health tourism 	Optional
Enhancing the market demand for innovation (demand side)			
(Voluntary or mandatory) allocation of (existing or competitive additional) resources for pre-commercial procurement and procurement of innovation based on defined healthcare strategies and needs	<ul style="list-style-type: none"> • Low awareness of the potential of innovation • Low capacity for problem definition for innovations • Low motivation for innovation • Risk aversion in the public sector • Low exploitation of R&D&I • Attitudes towards innovation • High risks barriers in the market • Limited financing • Current financing mechanism not supporting R&D&I 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health 	Important
Buyer incentives for adopting personalised e-health services and products	<ul style="list-style-type: none"> • Attitudes towards innovation • High risks barriers in the market • Small size companies in the health sector • Limited financing • Low level of patients' participation in decision-making • Current financing mechanism not supporting R&D&I • The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> • e-health • Preventive healthcare 	Important
Vouchers allowing the selection of healthcare service providers	<ul style="list-style-type: none"> • Attitudes towards innovation • Low level of patients' participation in decision-making • Current financing mechanism not supporting R&D&I • The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> • Healthcare services and processes • e-health 	Optional
Vouchers for participating in preventive healthcare activities (such as sports, active leisure, and the use of spas and other related health tourism services)	<ul style="list-style-type: none"> • Attitudes towards innovation • High risks barriers in the market • Small size companies in the health sector • Limited financing • Low level of patients' participation in decision-making • Current financing mechanism not supporting R&D&I • The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> • Preventive healthcare • Health tourism 	Optional
Financial incentives for employers to maintain and enhance employees' work ability by	<ul style="list-style-type: none"> • Attitudes towards innovation • High risks barriers in the market • Small size companies in the health sector 	<ul style="list-style-type: none"> • Preventive healthcare • Health tourism 	Optional

encouraging financially (organising or offering partial or total funding) employees to engage in activities supporting preventive healthcare (such as sports, active leisure, and the use of spas and other related health tourism services)	<ul style="list-style-type: none"> Limited financing Low level of patients' participation in decision-making Current financing mechanism not supporting R&D&I The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 		
Smart regulation (demand side)			
Establish quality and performance based standards and norms	<ul style="list-style-type: none"> Low capacity for problem definition for innovations Attitudes towards innovation The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> Healthcare services and processes e-health Preventive healthcare Health tourism 	Important
Establish quality and performance based smart regulations	<ul style="list-style-type: none"> Low capacity for problem definition for innovations Attitudes towards innovation The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> Healthcare services and processes e-health 	Desirable
Support for user driven innovation and experimentation (demand side)			
Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with healthcare providers, companies, research organisations and end-users	<ul style="list-style-type: none"> Low awareness of the potential of innovation Low motivation for innovation Risk aversion in the public sector Low exploitation of R&D&I Attitudes towards innovation High risks barriers in the market Small size companies in the health sector Limited opportunities for research collaboration Lack of complementary knowledge and competences (e.g. ICT) Low level of patients' participation in decision-making Current financing mechanism not supporting R&D&I 	<ul style="list-style-type: none"> Healthcare services and processes e-health 	Important
Recognition of innovation such as rewards, visibility, additional resources, etc.	<ul style="list-style-type: none"> Low awareness of the potential of innovation Low motivation for innovation Attitudes towards innovation 	<ul style="list-style-type: none"> Healthcare services and processes e-health Preventive healthcare Health tourism 	Optional
Support for establishing active end-user communities	<ul style="list-style-type: none"> Low awareness of the potential of innovation Low capacity for problem definition for innovations Low motivation for innovation Attitudes towards innovation Low level of patients' participation in decision-making 	<ul style="list-style-type: none"> Healthcare services and processes e-health Preventive healthcare 	Optional
Financial incentives and assistance for establishing social enterprises	<ul style="list-style-type: none"> Limited financing Low level of patients' participation in decision-making The nature of healthcare service (how to offer) is regulated instead of setting expected final goals 	<ul style="list-style-type: none"> Healthcare services and processes Preventive healthcare 	Optional

4.3 Smart construction

Under the smart specialisation area relating to the more effective use of resources the biggest potential for innovation is foreseen through focusing on smart construction. Smart construction is not just a construction process, but a whole smart living environment including conceptual developments such as smart cities, energy

solutions, environment friendly materials, ICT solutions (but not only) – all physical environment solutions aimed at better serving the needs of end-users..

Government has a dual role in the construction sector.

On one hand it controls the markets using regulations, standards and norms.; for instance where one may build, what and how is based on permits applied from and issued by the local government, city or municipality. This effectively defines boundaries for innovation in the construction sector. Relevant regulations, standards and norms for the construction sector include use of construction materials, safety during construction, safety of buildings/houses, land use, energy and other utilities, waste management, etc. An increasing number of these are now defined at the EU-level.

The other role the government has in the construction sector is related to public buildings and infrastructures. The role of Riigi Kinnisvara is critical in this respect, as it is responsible for developing and maintaining the main body of public buildings. Riigi Kinnisvara in collaboration with local governments, represents a significant market. Construction and renovation of public buildings may represent an opportunity to enhance the demand for innovation in the construction area.

Increasing political pressures originating from climate change, use of energy, recycling and reducing waste and increasing resource efficiency have been visible also in the construction sector. Especially energy efficiency (e.g. passive and zero energy) has become one of the leading trends in construction.

The Estonian construction sector has been growing and internationalising during the last decade. The sector has been able to develop a niche in international markets by focusing on industrial construction processes, and modular and wooden houses. More recently, the idea of combining ICT within construction and houses (smart construction) has further enhanced the interest towards innovation within the sector.

The key stakeholders in the area of smart construction are:

- Local governments (cities, municipalities) and national government (incl. ministries and politicians) as regulators (construction, but also environmental) and owners of public buildings
- Public sector organisations responsible for the procurement and maintenance of public buildings
- Real estate companies (property owners of buildings and houses rented to end-users)
- Real estate service companies (maintenance of buildings/houses)
- Riigi Kinnisvara (procurer, property owner and real estate service provider)
- End-users (home owners, lease holders)
- Utilities companies (electricity, water, waste, etc.)
- Construction companies
- Construction material companies
- ICT companies
- Manufacturers of appliances, equipment and electronics used in buildings/houses
- Architects and designers
- Research organisations

The **main barriers for driving and utilizing innovation in the public sector** are related to awareness, incentive structures and existing traditions and practices. Awareness of the potential of innovation is relatively low and decisions are driven by existing

practices and traditions. Incentives are mainly short term and linked to available budgets and risk aversion. To overcome these barriers the following measures could be considered (see Table 5):

- Continuous dialogue (partnership) between the government and industries to ensure shared understanding of future challenges and needs and the potential for innovation
- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, companies, research organisations and end-users
- Governance based on longer term horizontal national (and local) strategy and vision featuring the potential of research and innovation, and management-by-objectives instead of management-by-resources (incl. quantifiable objectives)
- Public procurement based on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost) featuring issues related to e.g. energy efficiency, land use, community planning, cost effective provision of utilities, traffic and transport, etc.
- Smart regulations, standards and norms designed in collaboration with companies and other key stakeholders to remove barriers and facilitate innovation
- Recognition of innovation such as rewards, visibility, additional resources, etc.

Owners of buildings/houses typically focus on the cost-benefit since buildings/houses represents a major long-term capital investment. Appreciation and recognition of innovation is based on existing and new products and services. While the initial investment is still the main criterion, awareness and appreciation of longer-term maintenance costs is increasing. The higher end market is also increasingly interested in personalisation and design. Leaseholders tend to focus mainly on maintenance costs (rent, etc.) and location as well as on quality of the living environment. Owners and leaseholders may be incentivised by using the following measures (see Table 5):

- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, companies, research organisations and end-users
- Access to policy making and definition of regulations, standards and norms, as well as community planning, land use, and other relevant policy processes
- Incentives (grants, attractive loans, guarantees, etc.) and assistance for procuring innovation
- Buyer incentives for private home owners (e.g. heating/cooling systems)
- Crowd-sourcing and other virtual methods to monitor end-user values and needs
- Fiscal incentives and disincentives (e.g. energy tax, property tax)

Companies are motivated by profit and growth opportunities. Since the construction sector features many types of companies representing different industries, collaboration and networking is a necessary precondition for most innovation. Natural incentive structures follow value-chains, i.e. if end-users require innovation, property owners must provide them, which creates a demand for innovation for construction companies. These in turn pass on the requirement to innovate to their subcontractors and construction material manufacturers. Similarly a demand for innovation is passed on to architects, designers, appliance and equipment manufacturers, etc. While there are measures that can be used to enhance innovation among actors further from end-users in the value chain, measures targeting end-users or those close to end-users are typically more effective. Potential measures include (see Table 5):

- Awareness of international market developments, public sector needs and innovation potential (incl. EU and other Smart cities initiatives)
- Funding and services to help develop innovation to and access international markets (incl. R&D, market validation, etc.)
- Funding and assistance for hiring skilled professionals (for R&D, international business development, etc.)

- Continuous dialogue (partnership) with public sector to ensure shared understanding of future challenges and needs (including future smart regulations, standards and norms)
- Funding for collaborative research, development and innovation activities (mainly in the form of Clusters)
- Pre-commercial procurement based on long term quality and performance
- Procurement of innovation based on long term quality and performance
- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, other companies, research organisations and end-users
- Recognition of innovation such as rewards, visibility, additional resources, etc.

Research that may serve the needs of smart construction is relatively wide ranging from ICT, materials and other technological research to more business-oriented disciplines and social sciences. The main focus in incentivising research should be driven by industry needs and opportunities. Therefore research should be mainly facilitated in collaborative forms between universities, research institutes and companies. A specific dimension of research that should receive sufficient attention and be done mainly in or integrated to international research is related to developing new platforms for smart construction, especially those related to the EU and other Smart cities initiatives. Incentives for research would therefore include (see Table 5):

- Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, other companies, research organisations and end-users
- Funding for collaboration and networking (industry leadership such as Cluster-type approaches)
- Incentives based on utilisation of research results (rewards, income from spin-offs and licenses, etc.)
- Incentives based on graduates employed by industries
- Incentives for establishing multidisciplinary research groups to address opportunities related smart construction
- Pre-commercial procurement based on future industry needs

Table 5. *Relevant policy measures for developing a policy mix in the smart construction smart specialisation area in Estonia.*

Policy measure	Barriers for innovation addressed	Value
Governance related measures		
Governance based on longer term horizontal national (and local) strategy and vision featuring the potential of research and innovation, and management-by-objectives instead of management-by-resources (incl. quantifiable objectives)	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • inability to define longer term needs • lack of collaboration between policy makers and organisations responsible for implementing policies • no or inefficient policy coordination 	Important
Public procurement and allocation of resources in public real estate based on quality and performance, i.e. longer term cost-effectiveness (rather than short term price/cost) featuring issues related to e.g. energy efficiency, land use, community planning, cost effective provision of utilities, traffic and transport, etc.	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • inability to define longer term needs • lack of collaboration between policy makers and organisations responsible for implementing policies • no or inefficient policy coordination • perception of risks related to innovation are high • perception of benefits related to innovation are low 	Important
Continuous dialogue	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures 	Important

(partnership) between the government and industries to ensure shared understanding of future challenges and needs and the potential for innovation	<ul style="list-style-type: none"> enhancing the demand for innovation in the Estonian markets both among policy makers and market actors international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential mismatch between research competences and industrial needs inability to define longer term needs lack of collaboration between policy makers and organisations responsible for implementing policies no or inefficient policy coordination perception of risks related to innovation are high perception of benefits related to innovation are low 	
Establish systematic risk management practices for the public sector, possibly including a guarantee system	<ul style="list-style-type: none"> low tolerance of risks especially in the public sector perception of risks related to innovation are high lack of risk identification and management competences and methods 	Important
Funding for R&D and innovation (supply side)		
Funding for collaborative research, development and innovation activities (mainly in the form of industry lead Cluster-type arrangements)	<ul style="list-style-type: none"> mismatch between research competences and industrial needs shortage of skilled labour lack of absorptive capability for new technologies and innovation among many companies inability to define longer term needs perception of risks related to innovation are high perception of benefits related to innovation are low 	Important
Funding and services to help develop innovation to and access international markets (incl. R&D, market validation, etc.)	<ul style="list-style-type: none"> lack of absorptive capability for new technologies and innovation among many companies inability to define longer term needs perception of risks related to innovation are high perception of benefits related to innovation are low 	Important
Funding and assistance for hiring skilled professionals (for R&D, international business development, etc.)	<ul style="list-style-type: none"> mismatch between research competences and industrial needs shortage of skilled labour lack of absorptive capability for new technologies and innovation among many companies inability to define longer term needs perception of risks related to innovation are high perception of benefits related to innovation are low 	Desirable
Incentives for research organisations based on <ul style="list-style-type: none"> establishing multidisciplinary research groups to address the needs and opportunities related to smart construction graduates employed in industry utilisation of research results (rewards, income from spin-offs and licenses, etc.) 	<ul style="list-style-type: none"> mismatch between research competences and industrial needs shortage of skilled labour lack of absorptive capability for new technologies and innovation among many companies 	Desirable
Other measures facilitating innovation and economic activities		
Awareness of international market developments, public sector needs and innovation potential (incl. EU and other Smart cities initiatives)	<ul style="list-style-type: none"> shortage of skilled labour lack of absorptive capability for new technologies and innovation among many companies inability to define longer term needs perception of risks related to innovation are high perception of benefits related to innovation are low 	Important
Enhancing the market demand for innovation (demand side)		
(Voluntary or mandatory) allocation of (existing or competitive additional) resources for pre-commercial procurement and procurement of innovation based on longer term strategies and public sector needs	<ul style="list-style-type: none"> lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors low tolerance of risks especially in the public sector international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential lack of competences in demand side innovation policy and initiatives among policy makers lack of absorptive capability for new technologies and innovation among many companies inability to define longer term needs 	Important

	<ul style="list-style-type: none"> • perception of risks related to innovation are high • perception of benefits related to innovation are low 	
Incentives (grants, attractive loans, guarantees, etc.) and assistance for procuring innovation	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • inability to define longer term needs • perception of risks related to innovation are high • perception of benefits related to innovation are low 	Desirable
Buyer incentives for private home owners (e.g. heating/cooling systems)	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • lack of absorptive capability for new technologies and innovation among many companies • inability to define longer term needs • perception of risks related to innovation are high • perception of benefits related to innovation are low 	Desirable
Fiscal incentives and disincentives (e.g. energy tax, property tax)	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • lack of competences in demand side innovation policy and initiatives among policy makers 	Optional
Smart regulation (demand side)		
Establish quality and performance based smart regulations	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • lack of competences in demand side innovation policy and initiatives among policy makers • inability to define longer term needs • lack of collaboration between policy makers and organisations responsible for implementing policies 	Important
Establish quality and performance based standards and norms	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • lack of competences in demand side innovation policy and initiatives among policy makers • inability to define longer term needs • lack of collaboration between policy makers and organisations responsible for implementing policies 	Important
Support for user driven innovation and experimentation (demand side)		
Experimental platforms (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, companies, research organisations and end-users	<ul style="list-style-type: none"> • lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors • low tolerance of risks especially in the public sector • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • lack of competences in demand side innovation policy and initiatives among policy makers • mismatch between research competences and industrial needs • shortage of skilled labour • perception of risks related to innovation are high • perception of benefits related to innovation are low • lack of risk identification and management competences and methods 	Important

	<ul style="list-style-type: none"> • lack of opportunities for end-users to participate in defining the longer term needs 	
Recognition of innovation such as rewards, visibility, additional resources, etc.	<ul style="list-style-type: none"> • international markets far more interesting than Estonian markets, especially for innovative companies with high growth potential • perception of benefits related to innovation are low 	Optional
Crowd-sourcing and other virtual methods to monitor end-user values and needs	<ul style="list-style-type: none"> • lack of competences in demand side innovation policy and initiatives among policy makers • perception of risks related to innovation are high • perception of benefits related to innovation are low • lack of opportunities for end-users to participate in defining the longer term needs 	Optional

5. Developing an action plan to implement demand-side instruments in smart-specialisation areas

Implementing demand-side instruments requires commitment from several ministries responsible for different policy areas. In more simple words demand-side innovation policy can be implemented only if there is awareness about trends on specific markets as well as knowledge about behaviour and needs of final beneficiaries. This is something where bodies responsible for policy areas (sectoral ministries) can give their input into demand-side innovation policy.

Due to the division of policy areas between ministries, the Ministry of Economic Affairs and Communications plays dual role in implementing innovation policy:

- It has the role of facilitator defining innovation policy objectives and developing strategy, launching support measures for R&D and innovation as well as awareness rising and
- It has the role of sectoral policy making in ICT and construction areas enhancing activities like defining sectoral policy objectives, changing regulations, providing trainings.

The tentative action plans in this chapter include some examples of activities the ministries responsible for certain areas have to initiate in order to introduce demand-side instruments. It has to be noted that before launching any activity the government organisations have to have common understanding about the aims and benefits of the demand-side innovation policy. All ministries have to work in parallel in order to maximise the impact of demand-side innovation policy – implementing demand-side innovation policy is teamwork.

5.1 Action plan for improving policy preconditions for implementing demand-side instruments

It is important to recognise that the preconditions for introducing and implementing demand side innovation policy measures differ from those required for supply side policies.

Benchmarking and other evidence presented in this report clearly show that certain preconditions are essential for successful demand side policies. Attempts to introduce demand side instruments without these preconditions are more than likely to fail or produce less than desired impact.

Some essential preconditions may be addressed simultaneously with the launch of specific demand side policy instruments. However, many of the preconditions require changes in policy culture, practices and traditions, which are typically difficult and take time.

The following Table 6 illustrates the characteristics of the **most important preconditions** and their relevance for all three smart specialisation areas and different types of demand side policy measures in Estonia. There are a number of activities the ministries responsible should consider launching immediately. The list of activities is not complete, but gives an idea of potential first steps to start addressing the preconditions. As the preconditions are horizontal, all relevant ministries should be involved in the process. Some examples of activities the **Ministry of Finance** should initiate:

Policy governance

- Improve Structural Funds management system with more horizontal management (monitoring committees as a management tool to ensure successful implementation of cross-sectoral strategies, such as innovation)

- Within the framework of strategic planning to train deputy secretary generals, directors of agencies and heads of departments about market demand oriented policy making
- Include innovation risk in strategic planning cycle

Public procurement of innovation and pre-commercial procurement

- Create a unit within the Public Procurement Department (it can be one-two persons initially) to support introducing pre-commercial procurements and procurement of innovation
- Provide training to educate the unit with relevant competence (incl. study tours, international internships). Consider involving external knowledge or mentoring.
- Define mandatory allocation of a percentage of budget for innovation (or procurement budget or define a certain number of projects/purchases to be innovative)

Regulations, standards and norms

- Improve ex-ante assessment of regulations, standards and norms with regard to their potential impact on innovation (in collaboration with the Ministry of Justice)
- Strengthen consultations with stakeholders before enforcing the regulations, standards and norms

Some examples of activities the **Ministry of Economic Affairs and Communications** (MoEC) should initiate:

Policy governance

- Create more close contacts with sectoral umbrella associations, provide monthly/quarterly meetings, test ideas/legislation, get feedback
- Add innovation risk management into general risk management practice (incl. to what extent the innovation risk can be accepted and how to cover cost of failure)
- Provide training and tools on innovation risk management in the MoEC and sectoral ministries

Public procurement of innovation and pre-commercial procurement

- Provide training on procurement of innovation and PCP to support the specialised unit and other ministries (one person in the MoEC could be trained first). Consider involving external knowledge or mentoring.
- Provide additional resources (like competitive funding based on the best ideas) for public procurements (to cover costs of innovation)
- Create system of rewards based on success for public sector institution or guarantees against possible failure

Regulations, standards and norms

- Launch a process for analysing the opportunities to improve the regulatory regime as well as standards, norms and practices to support the transition from detailed technical towards quality and performance (and safety) based in construction sector.

Some examples of activities the **Ministry of Social Affairs** should initiate:

Policy governance

- Recognise and introduce R&D&I into the longer-term strategies and action plans. Use this process as a framework to establish a more permanent

partnership between all key stakeholders (including companies and end-users).

- Allocate funding based on quality and performance to enhance the adoption of innovation. Consider adjusting the funding structures towards a more balanced approach between preventive healthcare, treatment of illnesses and aftercare.
- Add innovation risk management into general risk management practice (incl. to what extent the innovation risk can be accepted and how to cover cost of failure).

Regulations, standards and norms

- Launch a process for analysing the opportunities to improve the regulatory regime as well as standards, norms and practices to support the transition from detailed technical towards quality and performance (and safety) based.

In addition, to support long-term strategic planning in Estonia the **Development Fund** should consider re-launching policy foresights in all smart specialisation areas as well as monitor systematically behaviour and market dynamics of smart specialisation areas.

Actions to establish these preconditions have to be taken without any delay. In principle, demand side measures are not to be launched before these preconditions have been addressed sufficiently. However, some measures may be possible to launch simultaneously. The current situation with respect to these preconditions varies, which has an impact on the relevant policy options for introducing demand side measures. Sector-based ‘must-be’ preconditions for implementation demand-side instruments are given in Table 7.

Table 6. *Most important preconditions for introducing demand side innovation policy measures in Estonia.*

Precondition	Main characteristics	Relevance
<i>Policy governance</i>		
The Estonian Government should establish horizontal government-level, longer term, ambitious visions and strategies that feature research and innovation.	<ul style="list-style-type: none"> Requires a change in policy culture and practices Requires horizontal cross-ministry collaboration Typically takes a long time May be developed faster in areas where ministries identify common challenges and interests 	<ul style="list-style-type: none"> Important especially for healthcare and e-governance areas Specifically important for procurement of innovation and PCP, desirable for all other demand side measures
The Estonian Government should actively build partnerships with market actors.	<ul style="list-style-type: none"> Can be established relatively quickly Building common understanding and trust takes longer time Transparency and consistency are essential 	<ul style="list-style-type: none"> Important for all smart specialisation areas Important for introducing all demand side measures
The Estonian Government should establish systematic risk management practices for the public sector.	<ul style="list-style-type: none"> Risk identification and management methods exist and are relatively quick to introduce Behavioural changes take longer time and must be supported with appropriate incentives 	<ul style="list-style-type: none"> Important for all smart specialisation areas Specifically important for procurement of innovation and PCP
<i>Public procurement of innovation and pre-commercial procurement</i>		
The Estonian Government should establish a specialised unit to support public procurement of innovation and pre-commercial procurement.	<ul style="list-style-type: none"> Relatively quick to establish Competence grows quickly through experience May be supported by using external expertise This unit should facilitate and assist in defining the need (on which the procurement attempts to identify and find solutions to) and implementing the procurement on behalf of the public sector organisations. In longer term as the competences for PCP and procurement of innovation increase, the unit may transform into an advisory and training capacity. 	<ul style="list-style-type: none"> Important for all smart specialisation areas Specifically important for procurement of innovation and PCP
The Estonian Government should establish appropriate incentives and governance practices that support innovative procurement.	<ul style="list-style-type: none"> Requires changes in policy culture and practices May take a long time if based on voluntary action Can be significantly faster by using mandatory allocations May be challenging under restrictive budget conditions 	<ul style="list-style-type: none"> Important for all smart specialisation areas, especially healthcare and e-government Specifically important for procurement of innovation and PCP
<i>Smart regulation, standards and norms</i>		
The Estonian Government should adopt a government-wide policy to reform the regulatory regime to better enhance innovation.	<ul style="list-style-type: none"> Requires changes in policy culture and practices Requires political support Should be started in areas which are heavily regulated by detailed and technical legislation 	<ul style="list-style-type: none"> Important for healthcare and smart construction Important for introducing smart regulations

Table 7. *Most important preconditions for introducing demand side innovation policy measures in smart specialisation areas*

Precondition	E-governance	Healthcare	Smart construction
The Estonian Government should establish horizontal government-level, longer term, ambitious visions and strategies that feature research and innovation.	While there does not seem to be an overall government level longer-term strategy for e-governance, there are several national high-profile projects, which are based on a longer-term vision. These should provide for a reasonable basis to build on and may therefore fulfil the necessary precondition.	There is an overall longer-term vision and strategy as well as several sub-strategies for developing the healthcare sector in Estonia complemented with longer-term action plans and monitoring. Although these recognise the role of medical science, the role of research and innovation in a wider sense as a tool to enhance the quality and performance of the healthcare sector is missing.	There is no national strategy in the area of smart construction. While there are discussions between stakeholders in clusters and competence centres, these don't feature the government or public sector, as the main focus in this area is to enhance research and innovation among companies targeting international markets.
The Estonian Government should actively build partnerships with market actors.	No systematic partnerships seem to exist, although interactions between key stakeholders have taken place the previous and on-going procurement as well as cluster and competence centres. However, this does not seem to foster innovation to the extent it potentially could.	There are not any systematically organised partnerships in the area of healthcare. Interaction does take place to some extent in the context of clusters and competence centres, but is limited to the actors active in those. The government does not actively participate in this interaction.	No systematic partnerships seem to exist, although interactions between key stakeholders have taken place the previous policy making process. Interaction between market actors and research community has been increasing recently within and between Clusters. There is a lack of awareness of the potential of possible measures enhancing the demand for innovation in the Estonian markets both among policy makers and market actors.
The Estonian Government should establish systematic risk management practices for the public sector.	While systematic government level risk management seems to be missing, there should be ample experience from previous and on-going national projects to build on.	Risk management in the healthcare area focuses on patient safety. While this is a highly relevant issues also related to research and innovation, it does not sufficiently address all risks related to innovation in the area of healthcare.	There is no systematic risk management featuring innovation, since there is no innovative procurement, neither is there any incentives or support for it. However, there is one organisation responsible for significant share of public real estate (Riigi Kinnisvara). Reorienting the activities of this organisation could form a basis to build on. Furthermore, there is a requirement to use a percentage of public procurement budgets to buy arts and craft from local designers and manufacturers. This represents an existing feature of policy culture that could be extended to innovation.
The Estonian Government should establish appropriate incentives and governance practices that support innovative procurement.	The government has experience from public procurement in the context of national high-profile projects in the area of e-governance. Although these projects have not necessarily been highly innovative (rather based on application of known technologies), this experience may be built on.	There are no incentives or support for procurement of innovation in healthcare. However, major part of all resources in healthcare are allocated via the national health insurance organisation through contracts. Reorienting the activities of this organisation may form a basis to build on.	There are no incentives or support for procurement of innovation in the area of construction. Low tolerance of risk limits innovation procurements. Also, there is lack of absorptive capability for new technologies and innovation among many companies.
The Estonian Government should adopt a government-wide policy to reform the regulatory regime to better enhance innovation.	The regulatory regime is relatively flexible and the decision to open public data further emphasises this. While regulations, standards and norms may not specifically enhance innovation, they don't represent a barrier in any way.	There is no indication of attempts to assess and reform the regulatory regime (including standards and norms) to support innovation.	The construction sector is typically heavily regulated by detailed technical standards and norms. While some of these are defined at the EU-level and may therefore not be changed nationally, there are many standards and norms that does not need to be as technical and detailed as they currently are. Furthermore, there very little regulation, standards or norms in the area of smart construction, especially for introducing ICT to buildings and houses. This may offer a first mover advantage to those that are actively developing innovation in the area of smart construction.

5.2 Policy options for introducing demand side innovation policy measures in Estonia

There are basically three basic options for introducing demand side policy measures. The **first option** is to establish a solid foundation for innovation policies. Here one needs to start by addressing the relevant preconditions first. After they have been sufficiently established, then appropriate demand side measures may be designed and launched. This is the most time consuming, but the most effective option.

The **second option** is to launch experimental demand side measures simultaneously with activities targeted to address the preconditions. This is a more risky option, but could be attempted, especially if the experimental policy measures can be designed to be flexible and sufficient learning processes are put in place.

The **third option** is the most risky one, since it would mean launching demand side policy measures without addressing the preconditions. This would not be advisable, since the failure to reach the desired impact may cause resistance against any future attempts to benefit from demand side policies.

Since the third option is not a real option and can't therefore be recommended, the following discussion is based on the first two options.

Policy option 1

Since the main national strategies seem to be highly integrated into the national plans for using EU structural funds, it would seem appropriate that these plans would be revisited in terms of introducing innovation horizontally in all smart specialisation areas. Another possibility would be to draft national strategies to complement the EU structural fund plans. However, since both should be consistent and coherent to act as a solid basis for longer term policies, it may not be possible to only focus on national strategies without addressing the EU structural fund plans as well.

This may be challenging, because structural fund plans have been negotiated and agreed between the government and EU Commission quite recently. However, if this is not possible immediately, it may be possible at a later date. It is quite natural that national as well as structural fund plans would need to be updated over a 7-year period.

Potential disadvantage

This policy option would mean that no demand side policy measures would be launched during the next 1-2 years, since the preconditions are currently not met to a sufficient degree. Even after this period, launching demand side measures would depend highly on the ability to establish the preconditions.

Advantage

The positive point in selecting this option would be that demand side policies could be launched more widely. All types of demand side measures could be designed and launched in all smart specialisation areas. This would also allow a more evidence-based design of policy mixes. Furthermore, establishing the preconditions would increase awareness, allowing the building of shared understanding and commitment, and thereby ensure the successful design and implementation of demand side policies and policy measures.

Policy option 2

This option would build on a simultaneous launch of activities addressing the preconditions and design an implementation of selected experimental demand side measures. Many member states have selected to launch experimental demand side measures without addressing the preconditions first. However, this includes risks (which often result in low or no impact) and requires that those preconditions that are highly relevant for the selected demand side measures are addressed sufficiently.

Procurement is the fastest demand side measure to introduce in most countries and Estonia is not an exception. The quick introduction of pre-commercial procurement and procurement of innovation requires a mandatory allocation of procurement budgets for these purposes. This should be supported by establishing a specific unit of procurement experts to support the definition and implementation of PCP and procurement of innovation.

It would be advisable to launch these first as experimental initiatives in selected areas and extend them after sufficient experience has been gained. The most promising areas for PCP would be in most sub-areas of healthcare and smart construction, whereas procurement of innovation should be considered in the areas of e-governance and smart construction, as well as in e-health.

Smart regulation, standards and norms would most probably have the biggest impact in the area of smart construction. Since the technological platforms for smart construction are eventually going to be international, any attempts to use smart regulations, standards and norms should be complemented with measures to enhance strategic intelligence and access to platforms where international regulations, standards and norms are defined. Example of these are EU-level initiatives in the areas of smart cities and smart traffic as well as any standardisation in related areas. Smart standards and norms may also offer an opportunity in the area of healthcare, especially in cases where these may currently be too detailed and technical and thereby hinder or prevent innovation. However, care should be taken, since these may in some cases be politically sensitive.

Any policy measures targeting smart regulations, standards and norms or innovation procurement should feature strong partnerships between all stakeholders, including the government and public sector. Partnerships may be built making use of the processes needed in the detailed design of these policy measures.

Buyer incentives would seem most appropriate in areas of smart construction and most sub-areas healthcare (e-health, preventive healthcare and health tourism). More detailed design of these measures should be based on a more in-depth analysis of the quality and volume of necessary end-user incentives.

Experimental platforms may be established in all smart specialisation areas. A logical context for establishing these would be policy measures targeting strong networks, i.e. clusters and competence centres. These already attempt to bring together most of the relevant stakeholders with the aim to support research and innovation. However, current networks should be extended to enhance the participation of public sector actors and end-users at least at the level of projects and other activities implemented by networks.

Potential disadvantage

Introducing demand-side instruments without fully meeting the preconditions increases risk/probability of failure. The level of risk accepted has to be commonly agreed before launching any demand-side instruments.

Advantage

Meeting pre-conditions and launching demand-side instruments in parallel, allows some impact in shorter period. Procurement of innovation and PCP as well as introducing smart regulation in construction through Riigi Kinisvara are the instruments that potentially have the most immediate and highest impact.

5.3 Tentative road maps towards an action plan

While we would recommend policy option 1, we have a distinct feeling that the option 2 will eventually be selected. Budget has already been allocated to demand side measures, which most probably means that there is also a pressure to launch them. That is why the tentative road maps presented here are mostly based on option 2. There are several ways where to start introducing demand-side instruments – either from big national projects like ‘Green Estonia’ or ‘Estonia in the cloud’ or from smaller, easily implementable activities like introducing procurement of innovation by Riigi Kinnisvara as the owner of the majority of public buildings in Estonia. The advantage from starting with big national projects is that many government organisations need to act for one national objective, strengthening cross-ministerial cooperation as one precondition for introducing demand-side instruments. On the other hand starting with small and easily understandable activities, it will give first experiences, success will motivate other public organisations to follow as well as increase awareness. Both approaches can be implemented in parallel.

E-governance

The steps should be taken in the order presented in Table 8, although steps 1 to 5 could also be launched simultaneously, followed by steps 6 and 7. Steps 1a and 1b as well as 6a and 6b can be seen as alternatives – if step *a* cannot be taken, then step *b* has definitely to be taken. Steps 1, 4 and 6 are the most important measures to support e-governance innovation by demand side policies. Other steps are highly desirable, but not mandatory. Steps 6 and 7 should be complemented with establishing a unit to support innovation procurement. The bodies responsible to initiate the activities are added as well as examples of activities to be launched immediately. Close cooperation with other ministries and public agencies related to the area is essential.

Table 8. *A road map towards action plan for introducing demand-side instruments in e-governance*

	Ministry of Economic Affairs and Communication (MoEC)	Ministry of Finance (MoF)	Estonian Development Fund (EDF)
<i>Step 1a</i>	Establish a long-term national strategy for e-governance featuring research and innovation. Consider using this process as a framework to establish a more permanent partnership between all key stakeholders (including end-users). The process should be supported with appropriate strategic intelligence of the potential role of research and innovation (studies, analyses, foresight, evaluations, etc.).		Consider re-launching policy foresights at least in smart specialisation areas.
<i>Step 1b</i>	Introduce support for research and innovation to high-profile national e-governance projects (e.g. e-residence). This can be considered as easy and quick start. Use these as a framework to establish a more permanent partnership between all key stakeholders (including end-users). This should be supported with appropriate strategic intelligence of the potential role of research and innovation (studies, analyses, foresight, evaluations, etc.).		Consider re-launching policy foresights at least in smart specialisation areas.
<i>Step 2</i>		Support the transition towards management-by-objectives in public sector. Consult the partnership during the selection of final metrics and indicators. Establish benchmarking for public service providers focusing on performance and quality (use the metrics and indicators defined).	
<i>Step 3</i>	Allocate funding based on quality and performance to enhance the adoption of innovation.		
<i>Step 4</i>	Establish open (safe) experimentation platforms, which are integrated into the real life context and include both physical and virtual elements. Consider building these in collaborative leadership between companies and public sector service providers, e.g. under the umbrella of cluster-type arrangements.		
<i>Step 5</i>	Consider establishing a programme for SMEs to pilot their innovative e-governance solutions in the public sector. Funding may be allocated also for developing the solution, but mainly for testing it together with a public sector service provider. The programme should provide both funding and matching services (help in finding the public sector service provider willing to pilot/test the solution).		
<i>Step 6a</i>		Make a political level decision to allocate a percentage of all public procurement to PCP and later also procurement of innovation or designate a certain number of innovative projects/ procurements per ministry/public agency. This may begin from a more limited number of organisations (selection may also be voluntary, in which case it may need to be complemented with an incentive), and extend gradually.	
<i>Step 6b</i>	Establish a high profile certificate/label/association of both public and private organisations pledging that they are committed to voluntarily allocate a percentage of their (procurement, collaboration, etc.) budgets for buying innovative products, services and solutions from innovative SMEs.		
<i>Step 7</i>	Launch a programme for procurement of innovation where e-governance is one of the focus areas. Programme is important in the beginning to offer platforms for all relevant stakeholders to support interaction, learning, collaboration and networking. Platforms are also a vehicle to integrate national activities into EU-level initiatives and networks.		

Healthcare

The steps should be taken in the order presented in Table 9, although steps 1, 2, 4, 5, 6 and 8 could also be launched simultaneously, followed by steps 3 and 7, and finally 9 and 10. Steps 4, 5, 6 and 7, as well as steps 9 and 10 are naturally optional and valid only if the respective demand side measures are selected to the policy mix. Steps 9 and 10 should be complemented with establishing a unit to support innovation procurement. Steps 9a and 9b can be seen as alternatives – if step *a* cannot be taken, then step *b* has definitely to be taken.

The bodies responsible to initiate the activities are added as well as examples of activities to be launched immediately. Close cooperation with other ministries and public agencies related to the area is essential

It has to be noted, that introducing demand-side instruments in healthcare sector takes more time than in other smart specialisation areas as changes in healthcare are implemented carefully as well as mind shift in healthcare needs time to be adopted.

Table 9. A road map towards action plan for introducing demand-side instruments in healthcare

	Ministry of Social Affairs	Ministry of Economic Affairs and Communications (MoEC)	Ministry of Finance (MoF)	Estonian Development Fund (EDF)
Step 1.	<p>Recognise and introduce R&D&I into the longer-term strategies and action plans. Use this process as a framework to establish a more permanent partnership between all key stakeholders (including companies and end-users).</p> <p>The process should be supported with appropriate strategic intelligence of the potential role of research and innovation (studies, analyses, foresight, evaluations, etc.).</p> <p>Instead of establishing a scientific committee, establish a research and innovation committee focusing more widely on the role and potential benefits of research and innovation in the area of healthcare.</p>			Consider re-launching policy foresights at least in smart specialisation areas.
Step 2	<p>Continue and strengthen the already launched process of establishing the transition towards management-by-objectives and towards quality and performance based regulations, standards and norms.</p> <p>Consult the partnership during the selection of final metrics and indicators.</p> <p>Establish benchmarking between healthcare service providers (domestically and later also internationally) focusing on performance and quality (use the metrics and indicators defined).</p>			
Step 3	Allocate funding based on quality and performance to enhance the adoption of innovation. Consider adjusting the funding structures towards a more balanced approach between preventive healthcare, treatment of illnesses and aftercare. More balanced approach would allow more emphasis and resources on preventive healthcare and aftercare, allowing the development of markets (supply of services).	Consider establishing end-user incentives (e.g. vouchers) to use preventive healthcare (employers and social security), aftercare (health insurance) and e-health services (end-users) to enhance the demand for these services. Consider eliminating the tax for fringe benefits related to these services (requires changes in value added tax law).		
Step 4	<p>Launch a process for analysing the opportunities to improve the regulatory regime as well as standards, norms and practices to support the transition from detailed technical towards quality and performance (and safety) based. This can be considered as easy and quick start.</p> <p>Bring the results of the analysis to an open discussion with the partnership in order to define which regulations, standards, norms and practices could and should be changed and how.</p> <p>Initiate the necessary administrative processes to reform the regulatory regime.</p>			
Step 5	Strong collaboration with the MoEC	Establish incentives for participating in research and innovation for the healthcare organisations and professionals. This is important to raise the awareness of healthcare organisations and professionals of the potential benefits of research and innovation. Incentives may be		

		based on quality and performance, they may be established in the form of competitive funding or allowing the organisations and professionals to use part of their resources and/or time for R&D&I activities.		
Step 6	Strong collaboration with the MoEC	Redesign the networking initiatives so that cluster-type measures are built with the leadership of (business) organisations active in the identified healthcare sub-sector markets. These could be built around care of specific illnesses ranging from preventive to treatment and aftercare including e-health, or around specific types of services/offerings. Competence centre type measures should focus on longer-term development of competences, medical treatments, pharmaceuticals, etc., i.e. research driven innovation.		
Step 7	Establish open experimentation platforms, which are integrated into the real life healthcare context and include both physical and virtual elements. Consider building these with the leadership of healthcare organisations and companies, e.g. under the umbrella of cluster-type arrangements.			
Step 8	Emphasise economic and societal impact throughout public research funding. This may be done in the form of funding criteria (e.g. utilisation of research results, employment of graduates, etc.), additional competitive funding or rewards. Close collaboration with the Ministry of Education and Research is required.			
Step 9a	Strong collaboration with the MoEC	Consider establishing a guarantee mechanism (e.g. insurance for health tourism clients) to cover the additional costs of innovation or failure (make a political decision whose responsibility the guarantee fund is – whether managed by MoF or sectoral ministries).	Make a political level decision to allocate a percentage of all public procurement to PCP and later also procurement of innovation or designate a certain number of innovative projects/ procurements per ministry/public agency.. This may begin from a more limited number of organisations (selection may also be voluntary, in which case it may need to be complemented with an incentive), and extend gradually.	
Step 9b	Strong collaboration with the MoEC	Establish a high profile certificate/label/association of both public and private organisations pledging that they are committed to voluntarily allocate a percentage of their (procurement, collaboration, etc.) budgets for buying innovative products, services and solutions from innovative SMEs.		
Step 10	Strong collaboration with the MoEC	Launch a programme for PCP where healthcare is one of the focus areas. It would be important in the beginning to offer platforms for all relevant stakeholders to support interaction, learning, collaboration and networking. Platforms are also a vehicle to integrate national activities into EU-level PCP initiatives and networks.		

Smart construction

The steps should be taken in the order presented Table 10, although steps 1 to 6 could also be launched simultaneously, followed by 7 and 8. Steps 3 to 5, as well as steps 7 and 8 are naturally optional and valid only if the respective demand side measures are selected to the policy mix. Steps 7a and 7b can be seen as alternatives – if step *a* cannot be taken, then step *b* has definitely to be taken. Steps 7 and 8 should be complemented with establishing a unit to support innovation procurement.

The bodies responsible to initiate the activities are added as well as examples of activities to be launched immediately. Close cooperation with other ministries and public agencies related to the area is essential.

Table 10. *A road map towards action plan for introducing demand-side instruments in smart construction*

	Ministry of Economic Affairs and Communications (MoEC)	Ministry of Finance (MoF)	Estonian Development Fund (EDF)
Step 1	<p>Establish a longer-term strategy and action plan featuring research and innovation. Use this process as a framework to establish a more permanent partnership between all key stakeholders (including end-users).</p> <p>The process should be supported with appropriate strategic intelligence of the potential role of research and innovation (studies, analyses, foresight, evaluations, etc.).</p>		Consider re-launching policy foresights at least in smart specialisation areas.
Step 2	Allocate funding based on quality and performance to enhance the adoption of innovation.		
Step 3	Consider establishing property owner and/or end-user incentives (e.g. vouchers) to enhance the demand for innovation (e.g. heating/cooling, ICT, real estate services).		
Step 4	<p>Launch a process for analysing the opportunities to improve the regulatory regime as well as standards, norms and practices to support the transition from detailed technical towards quality and performance (and safety) based. This can be considered as easy and quick start.</p> <p>Bring the results of the analysis to an open discussion with the partnership in order to define which regulations, standards, norms and practices could and should be changed and how.</p> <p>Initiate the necessary administrative processes to reform the regulatory regime.</p>		
Step 5	Establish open experimentation platforms, which are integrated into the real life construction context and include both physical and virtual elements. Consider building these with the leadership of construction organisations and companies, e.g. under the umbrella of cluster-type arrangements.		
Step 6	Emphasise economic and societal impact throughout public research funding. This may be done in the form of funding criteria (e.g. utilisation of research results, employment of graduates, etc.), additional competitive funding or rewards.		
Step 7a		<p>Make a political level decision to allocate a percentage of all public procurement to PCP and later also procurement of innovation or designate a certain number of innovative projects/ procurements per ministry/public agency. This may begin from a more limited number of organisations (selection may also be voluntary, in which case it may need to be complemented with an incentive), and extend gradually.</p> <p>Consider establishing a guarantee mechanism to cover the additional costs of innovation or failure. Start with Riigi Kinnisvara. This can be considered as easy and quick start.</p>	
Step 7b	Establish a high profile certificate/label/association of both public and private organisations pledging that they are committed to voluntarily allocate a percentage of their (procurement, collaboration, etc.) budgets for buying innovative products, services and solutions from innovative SMEs.		
Step 8	Launch a programme for procurement of innovation where smart construction is one of the focus areas. Programme is important in the beginning to offer platforms for all relevant stakeholders to support interaction, learning, collaboration and networking. Platforms are also a vehicle to integrate national activities into EU-level procurement of innovation initiatives and networks.		

6. Principles of measuring the impact of implementation of the demand-side innovation policy

6.1 Orientation: what are the programme aims?

Prior to specifying the methodological considerations, which will be required to guide the evaluation, it is first necessary to decide on the precise objectives that the prospective programme is intended to address. In very broad terms, these objectives may be oriented as follows:

- To support the development of Estonian industry in terms of
 - Its capacity for the production of innovative products, processes and services
 - Its market position (as a public sector supplier), domestically and/or abroad
 - Its market position (in the private market), domestically and/or abroad
- To provide directed support to sectors of the Estonian economy which exhibit growth potential (healthcare, e-Governance, Smart Construction, etc.). To ensure the supply of innovative goods and services to the Estonian public sector for the benefit of Estonian society
- A combination of some or all aspects of the above.

In addition, and as recommended elsewhere in this report, the requirements of adopting a horizontal policy approach to demand-led policies will further necessitate the programme objectives to address a range of relevant sectoral objectives that will be set according to the responsibilities and portfolios of other stakeholder departments.

6.1.1 How to deliver the selected objectives

As discussed in the earlier sections of this report, there are a number of routes by which these objectives may be addressed. Summarising from Tables 3, 4 and 5, these include:

- Allocation of resources for pre-commercial procurement and procurement of innovation based on longer term strategies and public sector needs
- Establish quality and performance based smart regulations
- Establish quality and performance based standards and norms
- Establish buyer incentives

However, if it is assumed that the primary goal of the prospective instrument will be the provision of support for user driven innovation and experimentation then the available instruments/policies include:

- Experimental platforms to test and develop innovative products, services and solutions in collaboration with public sector organisations, companies, research organisations and end-users
- Recognition of innovation such as rewards, visibility, additional resources, etc.
- Support for establishing active end-user communities and social enterprises.

On the basis of the above, we will set out a number of issues that need to be considered in the evaluation context of the first option (experimental platforms) and, more specifically on the assumption that measure to be implemented will be similar to examples found in other countries such as the SBRI-type of scheme, i.e. it is valid primarily for procurement type schemes. However, this basic model could be

elaborated so that it might be applied to other forms of demand side policy such as smart regulation, standards and norms, since the main stakeholders are principally the same although their respective roles may vary according to the instrument employed.

In addition, we will elaborate on the issues that will require consideration in the monitoring and evaluation of the broader policy mix in support of fostering demand side support.

6.2 Monitoring and measurement of specific demand-side instruments

Demand-side innovation policy measures are primarily intended to create a change of behavior, in both the way in which public sector departments and agencies address their requirements for new services and products and in the attitude and capacity of the firms that fulfill these requirements.

The approach to evaluating such measures may be sub-divided into the two principal target groups: a) firms and b) Government departments and agencies procuring specific products and services.

6.2.1 Issues for target firms

The key questions here are:

- To assess the extent to which the instrument has generated new business opportunities for companies, provided a route to market for SMEs' ideas and bridged the seed funding gap experienced by many early stage companies, and;
- To assess the extent to which the instrument has been successful in supporting economic growth and in enabling the development of innovative products and services through the public procurement of R&D.

Information requirements

Broadly speaking, to answer these questions will require gathering information on the following issues:

- Awareness: How firms found out about the scheme;
- Customer journey: Experience of the application and award process;
- Project profiles, enablers and barriers: factors that contributed to or hindered the development of the specific project;
- Impacts of the scheme on innovation outputs, collaboration and performance;
- Subjective estimates of additionality: What did participation in the scheme contribute to the firm and the project?;
- Behavioural additionality effects;
- Effects on business growth, profitability and employment;
- Spill-over, displacement, multiplier and substitution effects.

The data/information gathering process may be divided into (at least) two phases: that which may be collected during the application process ('monitoring data'), such as baseline characteristics against which potential scheme effects may be benchmarked and data/information to be collected through specifically designed evaluation instruments during the evaluation phase(s). An overall suggested set of information and data requirements are set out below (see Table 11).

Table 11. Suggested set of information data and sources for measuring demand-side instruments

Information/data	Examples/issue	Source(s) of information
Baseline and comparative data on firm characteristics	Company size	M + E (survey)
	Recent (2yr) size trajectory	M + E (survey)
	Company turnover	M + E (survey)
	Recent (2yr) turnover trajectory	M + E (survey)
	Age of business	M + E (survey)
	Business Activity (SIC)	M + E (survey)
	Business structure (subsidiary, parent, etc)	M + E (survey)
Data on market conditions	Intensity of competition faced	M + E (survey)
	Market penetration (domestic vs EU & international)	M + E (survey)
Attitude to innovation	Recent introduction of new/improved products, services, process	M + E (survey)
	Likelihood of future introduction of above	M + E (survey)
	Cooperation activities (e.g with Government)	M + E (survey)
	Likelihood of future cooperation	M + E (survey)
	Use of other government support schemes	M + E (survey)
Experience of scheme	Prior experience as public sector supplier	M + E (survey)
	Awareness of scheme	E (survey)
	Rationale & expectations from participation	E (survey)
	Experience with application process	E (survey)
	Extent to which objectives were met	E (survey)
	Barriers to success (if applicable)	E (survey)
Impact of scheme	Potential effects of no support	E (survey)
	Direct benefits of scheme participation	E (survey)
	Effects on attitude to innovation	E (survey)
	Outcomes of participation (new products/services etc)	E (survey)
	Effects of non-participation (on turnover, duration of effect)	E (survey)
	Reason for positive effects	E (survey)
	Effect on market (esp. with public sector/international)	E (survey)
	Further outcomes (spin-outs, etc)	E (survey)

Key: M = Monitoring data (gathered during application phase)

E = Evaluation data (plus evaluation instrument used)

During the evaluation, we would also suggest the selection of a comparable sample of firms against which further benchmarking of the effects of the scheme may be benchmarked. A possible source of such firms would be non-successful applicants (for which initial monitoring data would already be available).

Suggested methodologies

Much, if not all, of the required information and data could be captured through a combination of the application process (as an early stage monitoring exercise) and a survey of firms once sufficient time has elapsed through the lifetime of the programme for appropriate outcomes to have resulted: i.e. an interim evaluation. If feedback on the administration and management of the programme were required, an earlier, more limited survey could be applied in order to address this narrower range of issues. The precise timing of the outcomes/impact evaluation would depend on the duration of a project, which typically could be between two-to four years, according to the stage of deliverable required (i.e. fully developed concept or advanced prototype).

The interim evaluation survey would target participating firms, with a control group of unsuccessful applicants (for which baseline data would already be available via the application process monitoring). An additional control group could be added, through a targeted selection of firms which did not apply, but which exhibit similar characteristics to the applicants and participants.

6.2.2 Issues for government organisations

The **main question** here is to assess the extent to which the instrument has been successful as a mechanism to enhance the provision of innovative solutions to challenges faced by the public sector, leading to better public services and improved efficiency and effectiveness.

The **main target** will be all government organisations/ministries engaged with the use of the demand-side instruments.

Information requirements:

Broadly speaking, to answer these questions will require information to be gathered on the following issues:

- Issues concerning procurement
 - How are strategic procurement requirements identified?
 - Is there dialogue with other departments regarding procurement needs (particularly with regard to horizontal or enabling technologies)?
- Issues relating to department engagement and operation of the scheme
 - Level of participation (i.e. number of applications/projects)
 - Do the requirements of the scheme complement the normal strategic identification of priorities and requirements?
- Outcomes achieved
 - Operational or policy-supporting
 - How were procurement priorities identified?
 - Impact on exposure/access to range of potential supplier companies or to range of potential products/processes/services
- Risks of lock-in
 - Has the scheme led to improved dialogue with suppliers during any stage of the procurement process?
 - Has the scheme led to any improvements in the way that public sector services are delivered?
- Relative importance of the scheme in regard to the typical procurement portfolio
 - Impact on/comparison to ‘normal’ procurement routes (hinder or assist)

- Effect on procurement specification and post-award dialogue with supplier
- Has there been an increase in the ‘risk’ of procurement and have the benefits outweighed this?
- How effective is the engagement between the agency/department operating the scheme and the procuring department?
- How does the organisation identify and select appropriate applicant projects? What criteria are applied?
 - Does the organisation assist companies in the identification/scoping of future potential markets?

An overall suggested set of information requirements is set out in Table 12, below:

Table 12 Suggested set of information data and sources for measuring demand-side instruments – government organisation perspective

Information	Examples	Sources of Information
Identification and Publication of Strategic Requirements	Presence of a process for identification of strategic priorities Cross-departmental/ministerial dialogue	M + E (Departmental interviews) M + E (Departmental interviews, Documentary analysis) E (Departmental interviews)
Departmental Engagement with Policy	How many departments engaged Number of procurements undertaken Size of procurements undertaken	M + E (Documentary analysis) M M
Comparison of Innovative Procurement Approaches with other Traditional Alternatives	Have innovative procurements been undertaken? What procedures have been used (e.g. Competitive Dialogue, Pre-commercial procurement, performance based specifications)	M + E (Departmental interviews, end-user interviews) M = E (Departmental interviews)
Outcomes Achieved	Results of procurements compared with traditional procurements on the basis of the following: technical sophistication, effectiveness for the organisation, cost-savings,	E (Departmental interviews, End-user interviews, Case studies, Workshops)
Lock-in Risks	Have procurements become more open – greater number of suppliers coming forward to enter procurements including procurement competitions	M (Firm data) + E (Departmental interviews)
Comparison with other approaches	Comparison with traditional procurements done under existing procedures [Note: there may not be sufficient comparative data in the case of Estonia]	E (Departmental interviews, Case studies)
Agency and Procuring Department Relationship	Nature of contacts between funding agency and procuring department: contacts between agency and industrial provider [depends on nature of programme and if single responsible funding/administrative body is used]	E (Departmental and agency interviews)
Identification and Selection of Appropriate Projects	Selection criteria applied (balance between cost, novelty and risk) Level of assistance to applicants during proposal stage	M + E (Departmental interviews, Documentary analysis) M + E (Departmental interviews)

		interviews, analysis)	Documentary
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Key: M = Monitoring data (gathered during programme administration)

E = Evaluation data (plus suggested evaluation instrument)

Suggested methodologies

As the required information is largely of a qualitative nature, the most appropriate methodology would be the use of structured interviews with relevant officials from the client departments/ministries. In addition, in order to develop cross-departmental issues and to promote additional synergies as an output of the evaluation process, the use of a workshop with all representatives of these organisations/ministries, together with representatives of participating companies and the scheme administrators is also suggested.

6.3 Behavioural additionality

The concept of behavioural additionality has been emerging as an issue in evaluation studies for a number of years since its identification by early workers such as Buisseret, et al.⁴ and its development by others (e.g. OECD, 2006⁵, Gök, 2010⁶). The measurement of other forms of additionality (notably input and output additionality) are well established in the evaluation of publicly supported innovation policy instruments particularly since they can be used to justify such support on the basis of notions such as return-on-investment and cost-benefit ratios. However, behavioural additionality refers to the effects of policy instruments in bringing about a sustainable change in the ways that the beneficiaries of such instruments undertake innovation-related activities as a direct consequence of their participation. It thus attempts to identify a range of more subtle and sophisticated programme effects beyond simple, potentially one-off, economic concerns. In fact, the presence of behavioural additionality is seen as a highly desirable policy outcome since it implies a lasting (ideally, positive) change in the target audience's attitude towards and relationship with innovation activities in the future.

Essentially, behavioural additionality refers to the ways in which target organisations, or the individuals within such organisations, alter their activities (typically referred to as 'routines' or 'organisational routines') as a consequence of participating in innovation support activities. In the case of demand-side instruments, these participants will comprise the beneficiary firms and the client government organisations or ministries who undertake the (supported) procurement activities.

A number of the evaluation issues identified above can be seen to be closely associated with behavioural additionality concerns. The most significant of these, from the perspective of both firms and government organisations/ministries, are set out as specific elements for the investigation of behavioural additionality effects below (Table 13). It should be noted that, from the perspective of demand-side instruments, which rely strongly on the concept of pre-commercial procurement as well as procurement of innovation (i.e. the assumed potential measure for introduction in Estonia), the principal targets for behavioural additionality effects are the government organisations that have a high requirement for innovative procurement. This is because these are likely to be 'repeat customers' for innovative products and services:

⁴ Buisseret, T., Cameron, H., Georghiou, L., (1995), What difference does it make? Additionality in the Public Support of R&D in Large Firms, Int. J. of Technology Management, Vol. 10, 587 - 600.

⁵ OECD, (2006), Government R&D Funding and Company Behaviour, Measuring Behavioural Additionality, OECD Publishing, France.

⁶ Gök, A., (2010), An Evolutionary Approach to Innovation Policy Evaluation: Behavioural Additionality and Organisational Routines, Faculty of Humanities. Manchester Business School, UK.

the firms that supply such solutions are less likely to engage repeatedly with government clients, largely due to the lack of opportunities.

It should also be noted that the development of evaluation methodologies for the measurement of behavioural additionality effects is still in its infancy. Whilst ‘traditional’ approaches, such as interviews and case studies can be used, these present certain problems (such as pre-suggestions of the possibility that behavioural additionality has occurred, rather than a ‘neutral’ approach to identifying its occurrence). However, more exploratory approaches (such as advanced text-mining) are still awaiting development.

Table 13: Suggested set of information data and sources for measuring behavioural additionality effects and outcomes: Firms and government organisations/ministries.

Information	Examples	Potential sources of Information
Participant firms		
Attitude to innovation	<p>Likelihood of future introduction of new/improved products, services, processes</p> <p>Likelihood of future cooperation activities with Government</p> <p>Intended use of other government support schemes</p>	<p>E (survey, followed up by interview, case study)</p> <p>E (survey, followed up by interview, case study)</p> <p>E (survey, followed up by interview, case study)</p>
Impact of scheme	<p>Effects on attitude to innovation</p> <p>Effects on future products, services, etc. outputs</p> <p>Effects on future market development (i.e. with regard to public sector clients, international actors/partners, etc.)</p> <p>[Effects of non-participation (optional control group counter-factual to examine behavioural additionality outcomes)]</p>	<p>E (survey, followed up by interview, case study)</p> <p>E (survey, followed up by interview, case study)</p> <p>E (survey, followed up by interview, case study)</p> <p>E (survey, followed up by interview, case study)</p>
Government organisations		
Identification and Publication of Strategic Requirements	<p>(Change in) attitudes/presence of process for identification of strategic priorities – future likelihood of use of strategic approach</p> <p>(Change in) cross-ministerial dialogue – future plans/intentions</p>	<p>E (Ministerial interviews)</p> <p>E (Ministerial interviews)</p>
Ministerial Engagement with Policy	Change in level of engagement (positive or negative)	E (Ministerial interviews)
Comparison of Innovative Procurement Approaches with other Traditional Alternatives	<p>Change in utilisation of innovative procurements</p> <p>Use of procedures (e.g. Competitive Dialogue, Pre-commercial procurement, performance based specifications) – actual and intended</p>	<p>E (Ministerial interviews)</p> <p>E (Ministerial interviews)</p>
Ministerial relationship with supplier companies (potential and actual)	<p>Change in relationship with potential suppliers (e.g. contract notification procedures, advance notification, technical specification formulation/negotiations).</p> <p>Dialogue with applicants during proposal stage, Dialogue with successful applicants during project stage.</p>	<p>E (Ministerial interviews, Documentary analysis)</p> <p>E (Ministerial interviews, Documentary analysis)</p>

Key: E = Evaluation data (plus possible evaluation instrument to be used)

7. Executive Summary

Demand-side innovation policy instruments can effectively support supply-side instruments in stimulating economic growth

Over the last decade, and especially during the economic crisis since 2008, governments have been seeking new ways of supporting businesses and communities. Europe 2020 has set challenging targets towards inclusive growth in all EU member states, linking the use of the EU Structural Funds 2014-2020 with smart specialisation. Estonia has defined the following **smart specialisation areas** as the most promising sectors for economic growth:

- ICT horizontally across other sectors;
- Health and healthcare technologies;
- More effective use of resources.

The R&D strategy “Knowledge based Estonia 2014-2020” and the “Entrepreneurship growth strategy 2014-2020” focus explicitly on supporting companies which have growth potential in smart specialisation areas. Since a “business as usual” policy will not bring the country closer to sustainable economic growth, the Ministry of Economic Affairs and Communications has sought new opportunities to implement its innovation policy. While Estonian R&D and innovation policies have hitherto mainly focused on facilitating supply-side innovation policy, attention has now shifted to the possible use of demand-side innovation policy instruments as a key for further growth. **Demand-side policy** refers to an approach where the government stimulates the country’s economy with policies on enhancing the demand for more innovation. An accompanying benefit is that, as a result of innovation, public services may be provided more efficiently and effectively, in the long run saving public money.

For stimulating both market supply and demand with a combination of supply and demand-side innovation policy instruments is considered as a potential. Direct support to companies, competitive grants, government subsidised loans or credit guarantees are seen as typical supply-side innovation policy instruments supporting improving economy’s productive potential. At the same time procurement of innovation, pre-commercial procurements, buyers’ incentives or smart regulation are the most used demand-side instruments supporting improving domestic demand and innovation potential.

The aim of the feasibility study was to analyse how demand-side policies can be integrated into other (supply-side) policies in order to address innovation policy objectives

The key issue was to understand how to introduce and integrate demand-side measures to the specific Estonian innovation policy contexts in order to make them stronger. The study, provided by Technopolis Group and Manchester Institute of Innovation Research, comprised: 1) international benchmarking and case studies, 2) analysis of the Estonian situation and potential for new types of policy measures through individual interviews and focus groups with key stakeholders and potential beneficiaries, 3) development of policy recommendations for introducing demand-side innovation policy measures in Estonia, with a specific focus on smart specialisation areas.

There are several examples of the experience of using demand-side instruments (including those in the UK, Netherlands, Finland, Sweden, Denmark, Austria). A qualitative benchmarking of policy contexts was provided in order to understand the policy context in which successful demand-side innovation policy countries can operate and what Estonia can learn from their experience. This formed an important piece of information, which led to the understanding that **no demand-side innovation policy can be successfully implemented without first addressing necessary policy preconditions**. Ignoring horizontal preconditions will not deliver the expected economic impact from demand-side innovation policy.

A knowledge of the existing situation in Estonia concerning the implementation of innovation policy, together with the overall policy context and the general objective of innovation policy (economic growth), the fourth and missing piece of this policy jigsaw – the formulation and selection of appropriate demand-side innovation policy instruments – can be developed. Towards this end, the market potential of each smart specialisation area as well as the awareness and readiness of relevant stakeholders was analysed and the sub-sectors of smart specialisation areas with most potential were identified. In order to define the appropriate policy mix and thereby the most appropriate demand-side instruments for each of these areas, an analysis of the key barriers and drivers of innovation of the key stakeholder groups was undertaken. Based on this it was possible to identify the potential and appropriate innovation policy measures that could be used to strengthen the incentives of each stakeholder group to engage in, support and demand innovation. These incentive structures were then used as a basis for defining the appropriate policy mix for each of the selected smart specialisation areas, including specific demand side measures that could be introduced to best strengthen the overall policy mix. This allowed the development of tentative action plans with recommended actions to introduce the specific demand-side instruments for each sub-sector of smart specialisation. Introducing demand-side policies is a learning process. Principles of measuring the impact of implementation of the demand-side innovation policy were developed to support this.

Addressing the necessary preconditions is essential for the successful introduction of demand-side innovation policy instruments

There are a number of barriers that need to be addressed at the overall level of policy and governance in Estonia in order to foster demand-side innovation policies. **The main barrier for innovation in the public sector** is too great focus on short-term activities and resources. To overcome this, and to enhance the role of public sector demand as a driver for innovation, government must place greater emphasis on defining and communicating its longer-term needs from the private sector. At the same time, **the main driver for public sector innovation** is the need to address societal challenges: this implies a requirement to improve governance models and/or structures accordingly. An additional driver for demand side policies is the need to increase the leverage of public policy, especially public funding. The introduction of demand-side innovation policy in Estonia will require shifting the focus towards a more market-driven approach of innovation. In advance of the introduction of any demand-side innovation policy instruments in Estonia, **the following most important policy context preconditions** will need to be addressed (these can also be addressed in parallel with the introduction of demand-side instruments):

1. The Estonian Government to establish horizontal government-level, longer term, ambitious visions and strategies that feature research and innovation.
2. The Estonian Government to actively build partnerships with market actors.
3. The Estonian Government to establish systematic innovation risk management practices for the public sector.

Introducing demand side policies in Estonia should start from specific demand-side policy instruments in selected smart specialisation areas integrated either to big national projects or as smaller, easily implementable activities

There are three main policy options to introduce the implementation of demand-side innovation policy instruments:

1. The **first option** is to establish a solid foundation for innovation policies. Here, the relevant preconditions must be addressed first. Once these have been sufficiently established, appropriate demand-side measures may be designed and launched. This is the most time consuming, but most effective option.
2. The **second option** is to launch experimental demand-side measures simultaneously alongside activities aimed at addressing the preconditions. This is a more risky option, but could be attempted, especially if the

experimental policy measures can be designed to be flexible and sufficient learning processes are put in place.

3. The **third option** is the most risky one, since it would mean launching demand-side policy measures without first addressing the preconditions. This would not be advisable, since the failure to reach the desired impact may cause resistance against any subsequent attempts to benefit from demand-side policies

Since the third option is not a real option and cannot therefore be recommended, the first two options remain as the most preferable. A potential disadvantage of the first option is that no demand-side policy measures would be launched during the next 1-2 years, since the preconditions are currently not met to a sufficient degree. As there seems to be a political desire to introduce demand-side policies rather quickly in Estonia, the **second option would seem the most feasible**.

As international experience shows and as policy option 2 clearly emphasises, demand-side measures should be introduced gradually while simultaneously addressing the horizontal preconditions. In order to ensure their successful introduction and to maximise their impact, those with potentially high impact should be introduced in selected smart specialisation areas.

E-governance enhancing all government related and initiated activities enabling more effective functioning of the public sector as well as offering better public services

The market for e-government solutions is driven by the public sector as the lead customer. This means that the market is dominated by public procurement carried out by the government or other public sector organisations, which makes **procurement of innovation** (or pre-commercial procurements) as a major demand-side innovation policy tool to be implemented in this sector. For supporting user-driven innovation, **experimental platforms** (safe environments, where failure is accepted) to test and develop innovative products, services and solutions in collaboration with public sector organisations, companies, research organisations and end-users should also be considered. In e-governance big national projects like 'Estonia in the cloud' can be considered as potential projects for introducing innovation. These demand-side instruments should be supported by supply-side instruments such as continuous funding of R&D and innovation – supporting participation in international collaboration and networking activities addressing societal challenges as well as services to help develop innovation for, and providing access to, international markets (incl. R&D, market validation, branding, etc.). At the same time, awareness rising of both public and private sector stakeholders about international market developments, public sector needs and innovation potential should also be supported.

Healthcare with particular innovation potential in healthcare services and processes, preventive healthcare, e-health solutions and health tourism

The Government's role in the healthcare sector is strong. In healthcare services and processes as well as in e-health sector, government policies and decisions guide what and how services are provided. This is done through regulation, standards and norms and through public procurement. The end-user (patient/all citizens) has little direct influence on the services and to what extent e-health solutions are used. In contrast, the Government, through its organisations, analyses and interprets the needs of end-users and organises healthcare services accordingly and under politically defined budgetary limitations. Governance is based on mandatory health insurance and procurement from healthcare providers (hospitals). This provides government behaviour with a high impact on innovation in the healthcare sector.

The main recommended demand-side instruments in the healthcare sector are **procurement of innovation** and the introduction of **smart regulation**. Although the area is already strongly regulated, the new regulations could focus more on defining the desired results and be performance-based rather than focusing on detailed technical specifications. This will open the possibility to introduce innovative

products or solutions in the healthcare system. Similarly, as in the case of procurement of innovation and pre-commercial procurement, only the final result is specified, leaving the way open for the development of innovative solutions. This demand-based approach will better help to address the needs of end-users as well as raise the quality of healthcare services overall. **Buyer incentives** for adopting personalised health services and products (like arm bracelets for health monitoring or vouchers for preventive healthcare/aftercare) as well as **experimental platforms** to test and develop new products and solutions could also be considered. In parallel, the continued funding of R&D and innovation in the healthcare sector (as supply-side instrument) should also be maintained.

Smart construction as a whole smart living environment including conceptual developments such as smart cities, energy solutions, environment friendly materials, ICT solutions (and others) – all physical environment solutions aimed at better serving the needs of end-users.

The Government plays a dual role in the construction sector. On the one hand it controls the markets using regulations, standards and norms; for instance, control over where, what and how building may be carried out is based on permits issued by the local government, city or municipality. This effectively defines boundaries for innovation in the construction sector. Relevant regulations, standards and norms for the construction sector include the use of construction materials, safety during construction, safety of buildings/houses, land use, energy and other utilities, waste management, etc. An increasing number of these are now defined at the EU-level. The other role of the government in the construction sector is related to public buildings and infrastructures. The construction and renovation of public buildings may represent an opportunity to enhance the demand for innovation in the construction area.

The construction sector is the best area to start the introduction of **pre-commercial procurements** and **procurement of innovation**. Riigi Kinnisvara, as the owner and operator of many public buildings, forms a logical facilitator and leader for the purchase of innovation and smart construction solutions. Riigi Kinnisvara can be considered as quick and easy start for introducing procurement of innovation. The innovative behaviour of a government owned company would give a strong signal to the market about the government's innovative approach. This would also facilitate innovation in other areas. Smart construction also requires **smart regulation** – similar to its use in the healthcare sector, defining the final results and focusing on performance could form the basis of smart regulation in the construction sector. Due to the sector's characteristics, increased **awareness of international market developments** has also to be considered. Construction is strongly related to the use of new materials, ICT solutions and the addressing of environmental challenges, all of which require high awareness of the use of these possibilities. The setting up of **experimental platforms** to develop and test new solutions is also recommended. These demand-side instruments should be supported by supply-side ones such as the funding of R&D – collaborative research, innovation activities (Cluster-type arrangements) – as well as access to international markets.

The introduction of demand side innovation policies in Estonia requires a holistic approach

Ideally, although the introduction of demand-side innovation policy in Estonia would take years to be fully implemented, it is important to start with small and clearly understandable steps. These initial activities to introduce demand-side innovation policy instruments will give a strong signal to the market that the Government is open to innovation and will serve as facilitator to increasing the domestic demand for innovation. The introduction of demand-side instruments is a joint effort of the whole public sector since demand-side innovation policy requires the involvement of innovation as well as sectoral policies. Therefore, the main preliminary tasks for introducing demand-side instruments in smart specialisation areas can be divided between the Ministry of Finance, the Ministry of Economic Affairs and

Communications, the Ministry of Social Affairs and the Estonian Development Fund. The following highlights are the most important actions key policy-makers should take in introducing demand-side innovation policy measures in Estonia.

As a quick start on the policy governance level the **Ministry of Finance** has to consider initiating the improvement of the Structural Funds' management system with more horizontal management activities (e.g. use monitoring committees as a management tool to ensure the successful implementation of cross-sectoral strategies). In cooperation with the Government Office training of deputy secretary generals, directors of agencies and heads of departments about market demand-oriented policy making has to be launched. Also, as innovation always involves risk, managing innovation risk has to be integrated into normal strategic planning cycle. For introducing public procurement of innovation and pre-commercial procurement a dedicated unit within the Public Procurement Department (it can be one-two persons initially) has to be created. The unit has to be supported by necessary trainings to educate the staff with relevant competence (incl. study tours, international internships, etc.). Involving external knowledge or mentoring is highly recommended. Defining mandatory allocation of a percentage of budget for innovation (or procurement budget) or define a certain number of projects/purchases to be innovative in all or some public organisations will serve as a clear signal towards supporting innovation.

The **Ministry of Economic Affairs and Communications** plays dual role in implementing innovation policy:

- It has the role of facilitator defining innovation policy objectives and developing strategy, launching support measures for R&D and innovation as well as awareness rising;
- It has the role of sectoral policy making in ICT and construction areas enhancing activities like defining sectoral policy objectives, changing regulations, providing trainings.

For performing the task of facilitator, the Ministry, among other activities, has to initiate support measures or programmes for supporting procurements of innovation and pre-commercial procurements as well as open (experimental) platforms to test and develop new products and services. For managing innovation risks a guarantee mechanism (e.g. insurance for health tourism clients) to cover the additional costs of innovation or failure has to be initiated as soon as possible. To introduce demand-side instruments in e-governance and construction sector the Ministry has to launch a process for analysing the opportunities to improve the regulatory regime as well as standards, norms and practices to support the transition from detailed technical approaches towards quality and performance (and safety) based approaches. In addition, considering launching a programme for SMEs to pilot their innovative e-governance solutions in the public sector, would be a possible start to encouraging innovation in e-governance.

Introducing demand-side instruments in the healthcare sector the **Ministry of Social Affairs** in first hand has to recognise and introduce R&D and innovation into the longer-term strategies and action plans. For getting maximum effect from demand-side innovation policy in healthcare sector funding allocations has to be based on quality and performance to enhance the adoption of innovation. As the sector is heavily regulated a process for analysing the opportunities to improve the regulatory regime as well as standards, norms and practices has to be launched as soon as possible. It is necessary to support the transition from detailed technical approaches towards quality and performance (and safety) based approaches and processes.

In order to support long-term strategic planning in Estonia the **Development Fund** has to consider re-launching policy foresight exercises and monitoring in all smart specialisation areas. This would allow the Fund to give regular strategic and operative input for decision-makers in the key ministries to support long-term evidence-based policy making.

Introducing demand-side innovation policy is a great challenge for Estonia. It requires strengthening cross-ministerial cooperation, setting up field-specific long-term R&D and innovation strategies, developing practices for identifying and understanding market trends as well as raising awareness about innovation. It also gives opportunities to learn and improve governance traditions. Demand-side innovation policy is a step ahead in implementing innovation policy in Estonia - it stimulates domestic demand – a driver to boost economic growth.

8. Kokkuvõte

Turunõudluse ja pakkumise toetamine täiendavad teineteist innovatsioonipoliitika elluviimisel efektiivselt

Riigid on viimasel kümnendil, eelkõige majanduskriisi algusest alates 2008. aastast, proovinud leida uusi viise ettevõtluse ja innovatsiooni toetamiseks. Tagamaks ühtlast majanduskasvu liikmesriikides on Euroopa Liidu (EL) strateegia „Euroopa 2020“ sidunud EL struktuurivahendite 2014-2020 kasutamise majanduse nutika spetsialiseerumise põhimõttega. **Nutika spetsialiseerumise valdkonnad** Eestis on:

- IKT horisontaalselt läbi teiste valdkondade;
- tervis ja tervisetehnoloogiad;
- ressursside efektiivsem kasutamine.

Nii teadus- ja arendustegevuse (T&A) ning innovatsiooni strateegia „Teadmistepõhine Eesti 2014–2020“ kui ka „Eesti ettevõtluse kasvustrateegia 2014–2020“ keskenduvad suure kasvupotentsiaaliga ettevõtete toetamisele eelkõige nimetatud kolmes nutika spetsialiseerumise valdkonnas. Riigi jätkusuutliku majanduskasvu kindlustamiseks ei piisa jätkates tavapärase majanduspoliitika elluviimist, mistõttu on Majandus- ja Kommunikatsiooniministeerium otsimas uusi viise innovatsioonipoliitika teostamiseks. Kuna senine poliitika on keskendunud pigem pakkumispoolsete meetmete rakendamisele (st olemasoleva T&A ja innovatsiooni toetamisele), siis nüüd peetakse nõudlus- ja pakkumispoolse poliitika meetmeid, kui teineteist täiendavaid, edasise kasvu võtmeteguriteks. Riigi poliitika, mille fookuses on innovatsiooni järele nõudluse tekitamine turul, on tuntud kui **nõudluspoole innovatsioonipoliitika**. Innovatsiooni tulemusena muutuvad üldiselt avaliku sektori teenused tõhusamaks ja efektiivsemaks, mis pikemas perspektiivis aitab riigil muuhulgas raha säästa. Otsetoetused ettevõtetele, konkursipõhised toetused, riigi poolt subsideeritud laenu või garantiid on tüüpilised pakkumispoolse innovatsioonipoliitika instrumentid, mis toetavad majanduse tootlikkuse arendamist. Teisest küljest on innovaatilised riigihanked, toetused lõpptarbijatele või targad regulatsioonid need vahendid, millega toetatakse kodumaise nõudluse ja innovatsiooni potentsiaali kasvu.

Käesoleva uuringu eesmärgiks oli analüüsida kuidas loomida nõudluspoole innovatsioonipoliitika meetmed tänase pakkumispoolse innovatsioonipoliitikaga Eestis

Uuringu viisid läbi Technopolis Group ja Manchester Institute of Innovation Policy mitmes etapis: 1) rahvusvaheline võrdlus, 2) tänase innovatsioonipoliitika elluviimise olukorra ja potentsiaalsete uute meetmete rakendamise vajaduse analüüs Eestis (sh intervjuud ja fookusgrupid), 3) poliitikasoovituste väljatöötamine spetsiifiliste nõudluspoole innovatsioonipoliitika instrumentide rakendamiseks nutika spetsialiseerumise valdkondades.

Mõistmaks, kuidas saaks Eesti teiste riikide kogemusest õppida, alustati rahvusvaheliste nõudluspoolsete instrumentide elluviimise kogemuste kogumisest ning nende omavahelisest võrdlemisest. Kuigi kõik võrdlusriigid Ühendkuningriik, Holland ja Soome (aga ka nt Rootsi, Taani, Austria) rakendavad nõudluspoole instrumente veidi erinevalt, on neil kõigil üks ühine omadus – neil on suuremal või vähemal määral täidetud nõudluspoole innovatsioonipoliitika rakendamiseks vajalikud valitsemisalaselised eeltingimused. Kuna Eestil puuduvad seni nõudluspoole poliitika alased kogemused, teostati valitud riikidega kvalitatiivne innovatsioonipoliitika konteksti võrdlusanalüüs. See oli oluline mõistmaks, kuidas sellel alal edukad riigid oma nõudluspoole innovatsioonipoliitikat rakendavad ning mida oleks Eestil neilt õppida. See analüüs viis arusaamisele, et **mitte ükski nõudluspoolne innovatsioonipoliitika ei saa edukalt toimida olukorras, kus olulised horisontaalsed eeltingimused ei ole täidetud**. Eeltingimuste täitmise vältimine nõudluspoole poliitika ellukutsumisel vähendab loodetud positiivset majanduskasvu.

Teades innovatsioonipoliitika rakendamise hetkeolukorda Eestis, teiste riikide õppetunde ja innovatsioonipoliitika peamist eesmärki (majanduskasv), saab välja töötada puuduva elemendi - nõudluspoolsed vahendid. Selleks analüüsiti nii iga nutika spetsialiseerumise valdkonna turupotentsiaali kui ka sidusrühmade teadlikkust ja valmisolekut. Tulemusena kitsendati nutika spetsialiseerumise valdkondi suurimast potentsiaalst lähtudes alamvaldkondadeks. Selleks, et iga alamvaldkonna jaoks defineerida sobivaimad nõudluspoolsed innovatsioonipoliitika vahendid, selgitati vastavate alade ekspertidest koosnenud huvirühmades välja peamised piiravad ja soodustavad tegurid nõudluspoolsel innovatsioonipoliitika kasutamiseks. Kogutud informatsioon oli aluseks iga nutika spetsialiseerumise valdkonna jaoks eraldi nii nõudluspoole instrumentide kui ka nende elluviimiseks pakutud tegevuskava väljatöötamiseks.

Eeltingimuste täitmine on edukaks nõudluspoolsel innovatsioonipoliitika rakendamiseks hädavajalik

Eduka nõudluspoolsel innovatsioonipoliitika rakendamine Eestis vajab head eeltööd mitmete poliitika- ja valitsemisüleside eelduste täitmiseks. **Peamine barjäär innovatsiooni rakendamiseks** on avalikus sektoris valdav lühiajaline strateegiline planeerimine ja ressursside kasutamine. Innovatsiooni soodustamiseks peab riik keskenduma pikemaajalisematele strateegiatele (enam kui neli aastat). Samas on peamiseks **innovatsiooni soodustavaks teguriks** vajadus lahendada riigi es seisvaid suuri ühiskondlikke probleeme. Teine soodustav tegur on võimalus tõsta riigi finantsvõimekust, eelkõige optimeerides riigi raha kasutamist. Enne nõudluspoolsel innovatsioonipoliitika instrumentide tutvustamist Eestis **peavad olema täidetud järgnevad valitsemisülesed eeltingimused** (muutused võivad toimuda ka paralleelselt nõudluspoolsel innovatsioonipoliitika rakendamisega):

1. T&A ning innovatsioon peavad olema integreeritud riigi pikaajalistesse strateegiatesse;
2. Eesti valitsus peab aktiivselt arendama koostööd turu osapooltega mõistmaks turunõudlust ning lõpptarbija vajadusi;
3. innovatsiooniga seotud riskide maandamine tuleb süsteemselt integreerida tavapärasesse riskide maandamise strateegiatesse.

Konkreetsete nõudluspoolsel innovatsioonipoliitika instrumentide elluviimist nutika spetsialiseerumise valdkonnas võib alustada nii läbi suurte riiklike projektide kui ka väiksemate üksiktegevuste

Nõudluspoolsel innovatsioonipoliitika tutvustamiseks on kolm strateegilist lähenemist:

1. **Esimene valik** eeldab innovatsioonipoliitikale tugeva vundamendi loomist eeltingimuste näol enne poliitika rakendamist. Kõigepealt täidetakse vajalikud eeltingimused ja alles siis, kui need on vajalikul tasemel, hakatakse nõudluspoolsed innovatsioonipoliitikad kujundama ja rakendama. See on kõige aeganõudvaim, kuid kõige efektiivsem valik.
2. **Teine valik** on nõudluspoolsel instrumentide elluviimine samaaegselt eeltingimuste loomiseks vajalike tingimuste täitmisega. See valik on riskantsem, aga seda on mõistlik katsetada, kui meetmed on piisavalt paindlikud ning sellest tegevusest on võimalik edaspidiseks õppida.
3. **Kolmas valik** on kõige riskantsem, kuna see seisneb nõudluspoolsel innovatsioonipoliitika tutvustamises ilma eeltingimustega tegelemata. See valik ei ole soovitatav, kuna võib suure tõenäosusega lõppeda nõudluspoole innovatsioonipoliitika läbikukkumisega.

Uuringu autoritepoolne soovitus on keskenduda kahele esimesele valikule. Esimese võimaluse peamiseks puuduseks on kaasnev oht, et esimese paari aasta jooksul ei võeta kasutusse mitte ühtegi nõudluspoolsel poliitika instrumenti, kuna eeltingimuste tase ei ole piisav. Poliitiline surve võtta nõudluspoolsed innovatsioonipoliitikad Eestis kasutusele võimalikult kiiresti teeb **teisest võimalusest sobivaima valiku**.

Tuginedes rahvusvahelistele kogemustele, on nõudluspoolseid instrumente soovitatav tutvustada järk-järgult paralleelselt horisontaalsete eeltingimuste tagamisega. Nõudluspoole innovatsioonipoliitikast maksimaalse efekti saavutamiseks tuleb keskenduda valitud nutika spetsialiseerumise kitsamatele valdkondadele.

E-valitsemine, mis toetab avaliku sektori efektiivsemat funktsioneerimist ja teenuste pakkumist

E-valitsemise lahenduste väljatöötamisel on avalik sektor liidrirollis ning dikteerib turunõudlust. Seetõttu on turgu domineerivad **riigihanked** selles valdkonnas võtmetööriistaks nõudluspoolse innovatsioonipoliitika rakendamisel. Kasutajakeskse innovatsiooni toetamiseks tuleb koostöös avaliku sektori organisatsioonidega, ettevõtete, teadusasutuste ja lõpptarbijatega lisaks luua **eksperimentaalsed platvormid** (ehk turvalised riskivabad testkeskkonnad), võimaldamaks testida ja arendada innovaatilisi tooteid, teenuseid ja lahendusi. E-valitsemine on see valdkond, kus riigil on hea võimalus kasutada nõudluspoolseid vahendeid suuremate riiklike projektide nagu 'Eesti riik pilves' elluviimiseks. Nimetatud nõudluspoolseid instrumente tuleb jätkuvalt toetada pakumispoolsete meetmete nagu pidev T&A rahastamine, ühiskondlike probleemide alase rahvusvahelise koostöö ja suhtlusvõrgustiku toetamine kui ka innovaatilise toote (rahvusvahelistele) turule toomise kaasaitamine. Samal ajal tuleb nii avalikus kui ka erasektoris tegeleda teadlikkuse tõstmisega rahvusvaheliste turgude trendide, avaliku sektori vajaduste ja innovatsiooni potentsiaali tuvastamiseks.

Tervishoid, kus avaldub innovatsiooni potentsiaal eelkõige tervishoiuteenustes ja protsessides, ennetavas tervishoius, e-tervise lahendustes ja terviseturismis

Riigi roll tervishoiu sektoris on tugev. Nii tervishoiu teenuste ja protsesside kui ka e-tervise vallas suunavad riigipoolsed poliitikad ja otsused seda, kuidas ja milliseid teenuseid pakutakse. Riik juhib seda sektorit peamiselt läbi regulatsioonide, standardite, normide ja riigihangete. Lõpptarbija (patsiendid/kodanikud) omab vähe otsest mõju selle üle, millised e-tervise teenused ja millises ulatuses on talle kättesaadavad. Valitsus seevastu analüüsib ja interpreteerib läbi erinevate organisatsioonide lõpptarbija vajadusi ning korraldab tervishoiuteenuseid poliitiliselt paika pandud eelarvest lähtuvalt. Sektori valitsemine põhineb kohustuslikul tervisekindlustusel ja tervishoiuteenuste (haiglatelt) sisseostul.

Peamine soovitus nõudluspoolse innovatsioonipoliitika rakendamiseks tervishoiu sektoris on **innovaatiliste hangete** kasutamine ja **targa regulatsiooni** elluviimine. Kuigi sektor on juba tugevalt reguleeritud, peavad uuendatud regulatsioonid keskenduma vajadus- ja tulemuspõhisusele, mitte detailsetele tehnilistele kirjeldustele. Sarnaselt peaks riigihangete ja kommertskasutusele eelnevate hangete puhul olema defineeritud eelkõige lõpptulemus, mis jätab ettevõtetele vabad käed toote või teenuse arendamisel. See nõudluspoolne lähenemine aitab paremini lahendada lõpptarbija vajadusi ning tõsta tervishoiuasutuste teenuste üldist kvaliteeti. Samuti on nii **ostja stiimulite** personaalsete tervishoiuteenuste ja toodete (nt käel kantavad nutiseadmed tervisega seotud parameetrite järgimiseks või nn vautšerid terviseennetuseks või taastusraviks) ostmiseks kui ka **eksperimentaalsete testplatvormide** loomine soovitatav. Samal ajal peab kindlasti säilima paralleelselt T&A jätkuv toetamine tervishoiusektoris.

Nutikas ehitus kui terviklik nutika elukeskkonna kontseptsioon nagu näiteks smart city, nutikad energialahendused, loodussõbralikud materjalid, IKT lahendused – kõik füüsilise keskkonna lahendused, mille eesmärk on lõpptarbija vajaduste parem rahuldamine

Riigil on ehitussektoris kahene roll. Ühelt poolt kontrollib ta turgu kasutades regulatsioone, standardeid, norme, millega piiritletakse innovatsioonitegevus. Olulised regulatsioonid, standardid ja normid hõlmavad ehitusmaterjale, tööohutust, hoonete ohutust, maa-, energiakasutust, jäätmekäitlust jne. Üha suurem osa eelpool nimetatutest on defineeritud EL tasemel. Teiselt poolt on riik ehitussektoris klient talle kuuluva kinnisvara ja infrastruktuuri ehitamisel ning haldamisel. Nende hoonete

ehitus ja renoveerimine pakub hea võimaluse innovatsiooni järele nõudluse tekitamises.

Ehitussektor on parim koht **kommertskasutusele eelnevate hangete** ja **innovaatiliste riigihangete tutvustamiseks**. Riigi Kinnisvara, paljude riigile kuuluvate hoonete omanik ja haldaja, on nutikate ehituslahenduste ostmisel loomulik nõustaja ja juht. Riigile kuuluva ettevõtte innovaatiline käitumine annaks turule tugeva positiivse signaali riigi innovaatilisest suhtumisest ning aitaks omakorda kaasa innovatsioonile ka teistes sektorites. Tutvustades innovaatilisi riigihankeid läbi Riigi Kinnisvara oleks lihtne ja kiire viis nõudluspoolse meetmete kasutamise praktika tekitamiseks. Nutikas ehitus vajab tarka regulatsiooni – sarnaselt tervishoiusektorile peaksid lõpptulemuse defineerimine ja tulemusele keskendumine looma ehitussektori regulatsioonile aluse. Ehitussektori iseloomust lähtudes on oluline teadlikkuse tõstmine **rahvusvahelistel turgudel toimuva** kohta, sest ehitamine on tugevalt seotud uute materjalide, IKT lahenduste ja keskkonnamõjude vähendamisega. **Eksperimentaalsete platvormide** loomine uute teenuste ja lahenduste testimiseks on samuti soovitatav. Nõudluspoolne innovatsioonipoliitika peab olema jätkuvalt toetatud pakkumispoolsete meetmetega nagu teadus- ja arendustegevuste rahastamine, klatri-tüüpi tegevused kui ka juurdepääs rahvusvahelistele turgudele.

Nõudluspoolse innovatsioonipoliitika tutvustamine Eestis vajab terviklikku lähenemist

Riigi huvi turunõudluse suurendamisel annab turule selge signaali, et riik on innovatsioonile avatud ja käitub koduturul innovatsiooni vahendajana. Nõudluspoolse innovatsioonipoliitika instrumentide tutvustamine on avaliku sektori ühine jõupingutus, kuna see nõuab valdkondlike ja innovatsioonipoliitika koostööd. Esialgsed ülesanded nõudluspoolse innovatsioonipoliitika tutvustamiseks saab jagada Rahandusministeeriumi, Majandus- ja Kommunikatsiooniministeeriumi, Sotsiaalministeeriumi ning Arengufondi vahel. Järgnevalt on toodud peamised tegevused, mida erinevad poliitikate elluviimise eest vastutajad ja avaliku sektori organisatsioonid peavad eeskätt ellu viima.

Üheks kiireimaks vahendiks, kuidas **Rahandusministeerium** saab valitsemisülest koostööd parendada on muuta EL struktuurivahendite juhtkomisjoni töö valdkondadeüleseks juhtimisvahendiks. Koostöös Riigikantsleiga tuleb välja töötada spetsiaalne koolitus- ja nõustamisprogramm, mis aitaks poliitikategijatel (ministeeriumide asekanterid, osakonnajuhatajaid, riigiametite direktorid jt) paremini mõista nõudluspoolse poliitika võimalusi ning teha vastavasisulisi otsuseid uute toodete ja teenuste tellimiseks. Kuna innovatsioon on alati seotud riskiga, siis on väga oluline luua innovatsiooniriskide maandamise meetmed (nt. garantiifond innovatsiooni ebaõnnestumisel kulude katmiseks) üldisesse strateegilisse planeerimisse. Rahandusministeerium, kui riigihankepoliitika eestvedaja, saab innovaatiliste riigihangete elluviimiseks luua vastava ettevalmistusega üksuse riigihangete osakonnas, kelle ülesanne on nii aidata haruministeeriumidel defineerida vajadus innovatsiooni järele kui ka nõustada neid innovaatiliste riigihangete läbiviimisel. Lisaks, on Rahandusministeeriumi pädevuses juurutada tava eraldada teatud osa iga ministeeriumi või asutuse riigihangete eelarvest innovaatilistele hangetele või leppida kokku, et teatud arv sisseostetavatest toodetest või teenustest peavad olema innovaatilised.

Majandus- ja Kommunikatsiooniministeeriumil on innovatsioonipoliitika elluviimisel kahene roll:

- Esiteks, innovatsioonipoliitika elluviimise eestvedaja defineerides poliitika eesmärgid, algatades ja läbi viies toetusmeetmeid ning tõstes teadlikkust;
- Teiseks, valdkondlike poliitikate - IKT ja ehitus - eestvedaja omades spetsiifilist valdkonnapõhist ekspertiisi, algatades ja läbi viies valdkonnapõhiseid poliitikaid, muutes regulatsioone ning tõstes valdkonnaspetsiifilisi teadmisi.

Majandus- ja kommunikatsiooniministeerium peab algatama meetmed toetamaks innovaatiliste riigihangete elluviimist, eksperimentaalsete platvormide asutamist välja töötamiseks ja katsetamiseks uusi tooteid ja teenuseid. Innovatsiooniriskide juhtimiseks tuleb luua nt. tagatis(garantii)mehhanism katmaks võimalikke riskide realiseerumisega seotud kulusid innovatsiooni sisseostmisel. Targa regulatsiooni rakendamiseks ehitusvaldkonnas tuleb koostöös turu osapooltega analüüsida milliseid regulatsioone on võimalik ja mõistlik muuta, et need soodustaksid parima lõpptulemuse ja kvaliteedi saavutamist. Väike ja keskmise suurusega ettevõtete innovaatilisuse suurendamiseks tuleb luua toetusmeede, kus nad saaksid riskivabalt katsetada oma innovaatilisi tooteid või teenuseid avalikus sektoris.

Juurutades nõudluspõhise innovatsioonipoliitika põhimõtteid tervise valdkonnas peab **Sotsiaalministeerium** siduma T&A ja innovatsiooni tihedamalt oma pikaajaliste strateegiate ja tegevuskavadega. See on oluline tekitamaks mõttemaailma muutust traditsioonides kinniolevas tervishoiu valdkonnas. Saavutamaks tervise valdkonnas nõudluspõhistest instrumentidest maksimaalset efekti, tuleb tervise valdkonna raha eraldada pigem kvaliteedi ja efektiivsuse kriteeriumist lähtudes. Samal ajal tuleb muuta rahastust tasakaalustatumaks ennetustegevuse, ravi ja taastusravi vahel. Kuna tervishoiu sektor on tugevalt reguleeritud, siis tuleb nutikate regulatsioonide väljatöötamiseks algatada analüüs, milliseid regulatsioone on võimalik ja mõistlik muuta. Viimased peavad soodustama parima lõpptulemuse ja kvaliteedi saavutamist mitte keskendumata tehniliste üksikasjade defineerimisele.

Toetamaks T&A ning innovatsiooni kaasavate pikaajaliste strateegiate koostamist Eestis on hädavajalik teada pikaajalisi valdkondlikke kasvutrende. Selleks peab **Arengufond** taaskäivitama arenguseire kõigis nutika spetsialiseerumise valdkondades ning süstemaatiliselt jälgima ja analüüsima turu käitumist ja dünaamikat. Regulaarne seire annab väärtusliku sisendi võtmeministeeriumide poliitika planeerimisse. Teadmata pikemaajalisi trende ja sellega seonduvalt Eesti võimalusi, ei saa poliitikas teha pika-ajalisi otsuseid.

Nõudluspoole innovatsioonipoliitika elluviimine Eestis on suureks väljakutseks ja võimaluseks. See nõuab hästi toimivat ministeeriumidevahelist koostööd, pikaajalisi valdkondlike T&A ja innovatsioonistrateegiaid, samuti kõrget teadlikkust innovatsioonist ja turgude dünaamikast. Samal ajal loob see võimalusi luua uued valitsemise traditsioonid avalikus sektoris. Igal juhul on nõudluspõhine innovatsioonipoliitika samm edasi kindlustamaks Eestile sihipärast majanduskasvu.

Appendix A Benchmarking Estonia with other countries

A.1 Governance culture

Country	Government attitudes towards markets (incl. self-regulation)
Estonia	Estonian economic policy follows principles of liberal economic policy intervening market as less as possible. However, in the areas of health or construction, as an example, market regulations are well developed and monitored strictly. Economic and fiscal policy has rather been entrepreneurship friendly enabling launching new companies easy and quickly, modernizing business law, release companies from corporate income tax of reinvested profit (motivating companies rather invest than to take dividends out). At the same time no tax incentives for R&D or innovation activities either on highly educated employees have been introduced. The main goal of fiscal policy is to tax everything/everyone as equally as possible and as less as possible tax exemptions. Incentives on corporate income tax in one main driver for business units to operate today. Business sector has expressed an urgent need to set a ceiling for social security taxes in order to balance costs on highly educated specialists, the innovative companies need the most.
UK	<p>Economic policy in the UK is managed in accordance with the principles of market liberalisation and low taxation and regulation. Regulation is strictly enforced; however, the Government has embarked on a process of ensuring that regulation does not impose an unnecessary burden of the growth of firms and innovation, particularly with regard to SMEs. UK innovation policy aims to address market failures and to provide innovating businesses with easy access to the knowledge infrastructure, to enter new export markets and to strengthen innovation at the local level through local leadership and engagement. The UK Government employs a range of instruments to encourage higher levels of innovation activity, which include competitive grant funding and fiscal measures such as R&D tax credits.</p> <p>Despite its general laissez-faire approach to market development, the Government nevertheless sees a role in stimulating the creation of new market opportunities for UK companies (such as grapheme technology applications) through strategic approaches which may include investment in public R&D, infrastructures, promotion of collaboration and the development of lead markets through public procurement.</p>
Netherlands	<p>The Netherlands follows a rather laissez-faire economic policy. Although over the past years also as a reaction to the crisis of 2008 many reforms happened in the area of trade, reviewing administrative rules for businesses and strengthening labour market rules.</p> <p>Interventions in markets have been minimalist, but for instance the Dutch Government intervened in certain areas such as in green electricity. A regulatory energy tax was introduced in the 1990s, which led to a substantial increase in demand. An issue was that this demand was served by imports rather than domestic producers and this led to a change in policy approach shifting towards a more balanced approach of demand and supply side.</p> <p>Fiscal incentives are important policy measures in the Netherlands. Companies can obtain a tax relief for R&D wage costs and R&D investments via the WBSO (Research and Development Tax Credit) and the new RDA (R&D deductions) schemes. A new RDA+ scheme promotes private public partnership.⁷</p>
Finland	The overall economic policy in Finland is based on free market principles, although there are still a number of sectors, which are either highly regulated (e.g. taxis, pharmacies) or where the public sector is a major market actor (e.g. healthcare, education). Economic policy is horizontal in principle, although from time to time there is a tendency to make political decisions that favour specific sectors (e.g. mining, data centres, rail transport vehicles, electric car batteries). There is a clear objective to develop Finland into a more enterprise friendly environment by lowering the administrative burden, simplifying the granting of various permits, offering innovation and other incentives and developing important infrastructures. While the main principle in developing the fiscal system is neutrality, there are still some sector specific tax incentives, especially in the area of energy and transport. Innovation policy is still mainly horizontal, even though there is an increasing political interest to focus resources to specific areas recognised to have high future growth potential.

⁷ Netherlands Enterprise Agency, <http://english.rvo.nl>

Country	Balance between government roles as market actor
Estonia	<p>Estonian government owns a number of companies in strategically important infrastructure areas in energy production and supply as well as in transport (Tallinn harbour, Tallinn airport, Estonian railways) and real estate (Riigi Kinnisvara holds state real estate – buildings of ministries, public agencies, schools aso). In these areas the government participates actively on the market. In the area of education in addition to private service providers, government owns also a number of schools, vocational education schools as well as universities. Public healthcare services are offered by a number of hospitals (in the form of foundations) as well as private hospitals and clinics. Government policy is to regulate the market as less as possible and as much as needed as well as tax everything equally – to use as less tax incentives as possible. There are no long-term public procurement plans in place. Government has been the most important market facilitator in ICT introducing several e-services (e-government, e-health, e-voting, e-business register, e-tax and customs board, e-ID aso). Still, several studies underline that government support and industry needs have been developing in different directions as well as dialogue between government and industry has not been very strong and sustainable.</p>
UK	<p>Following a continuing ‘neo-liberal approach to economic policy, and particularly championed by a succession of Conservative governments, but also espoused by subsequent Labour administrations, the UK has embraced a policy of privatisation of many former state controlled enterprises, ranging from energy production, transport, manufacturing, utilities companies, telecommunications and, recently, postal services. These have combined outright ‘sell-offs’ of state owned concerns and so-called private finance initiatives (PFIs) which sought to introduce market conditions into a range of public sector organisations such as the Post Office and the National Health Service, ostensibly to promote a higher degree of entrepreneurship. Current policy continues to follow a general desire to ‘roll back’ the boundaries of the state.</p> <p>The government retains control of the state-school sector, although there are numerous private educational establishments. Universities, which obtain a large proportion of their support from state funds are nevertheless autonomous entities (only one is privately owned) and have charitable status although some have trading businesses with limited company status for more commercial activities. Finally, a large number of government laboratories have been privatised to varying degrees and operate under a range of contractual and business models.</p>
Netherlands	<p>The Dutch government is a major shareholder in a number of Dutch companies that serve the public interest, but it is cautious about investing in new government holdings. It holds shares in the following kinds of company: monopolies such as the Dutch Railways, Schiphol Airport and the electricity grid operator TenneT; and companies that provide services for the government such as the Bank for Netherlands Municipalities. At the end of 2008 the Dutch government bought the Dutch parts of the Belgian Fortis group in order to safeguard the stability of the financial markets.</p> <p>It has been active in fostering public procurement of innovation and pre-commercial public procurement through various schemes.</p>
Finland	<p>Many of the previously government owned companies have been privatised, although the government still retains ownership in companies operating in strategic sectors. Government has continued to reduce its ownership in companies and thereby its direct role in the market. The previous ownership role in the markets is being replaced with regulatory control, fiscal incentives and indirect ownership in the form of strategic investments via Industry Investment Ltd (a government venture capital fund operating on market principles). The overall tendency is to reduce government role in the markets, although the political pressures especially during the current economic situation have slowed this development.</p> <p>Education sector is either government owned or heavily dependent on and therefore controlled by government funding. All hospitals are government owned and only a small fraction of basic locally organised healthcare services are procured from the private sector. The private healthcare service sector is growing mainly because of healthcare benefits offered by organisations to their employees. Universities are autonomous, but heavily dependent on government funding (university education is free for all students). There are practically no private research institutes.</p>

Country	Balance between political and expertise based drivers in policy design
Estonia	Estonian policy making in general is rather politically driven – there are no strong traditions of policy studies, analyses and evaluations. In some areas and in some cases the policy planning relies on thorough analyses, but this is rather rare. The use of EU Structural Funds imported also a culture of policy analyses and evaluations into Estonia.
UK	The UK has a very strong and internationally recognised track record in the evaluation of R&D and innovation policies, at a range of levels from the programme, institutional, sectoral and national perspective. Few major policy changes are implemented in the absence of some form of review or specific evaluation and all government-funded programmes are subject to periodic evaluation as a requirement of HM Treasury. The use of ‘evidence-based policy making’ is therefore widespread through all sectors of government. The government publishes and requires the use of various evaluation methodologies to assess programmes ex ante and ex post (see later note below), the design and assessment of programmes is therefore more technical than political.
Netherlands	The Netherlands has a culture of policy design where scientific expertise, analyses and data play an important role in shaping policies. For instance the Dutch policy-makers rely on the studies and reports of the independent Central Bureau of Statistics. Policy analysis, evaluation and monitoring are common practice and each policy measure is monitored and evaluated. Most recently the Dutch government established the Commission Theeuwes with the aim to develop a series of activities to achieve an adequate monitoring and impact analysis of the financial budget. The Commission Theeuwes is composed of a panel of experts on policy evaluation such as scientists, the Central Planning Bureau, the General Court (as observers), the Central Bureau of Statistics etc (Erawatch, 2012).
Finland	R&D and innovation policies in Finland have been evidence based since 1980's. While especially in time of difficult economic situations the pressure to make politically motivated decisions might have lead into isolated decisions that may not be that strongly supported by evidence, the main policy design is very much evidence based. There is a strong tradition for transparency in monitoring and evaluation, which has been further emphasised by the increased visibility of the State Audit office. Accountability and transparency as well as evidence based policy making in general have become stronger in all policy areas, although the tradition and especially the quality of monitoring and evaluation still varies across sectors. Lately the tendency to launch a large number of studies and analyses to support political decision making has increased. Unfortunately this has not (yet) resulted in faster or more systemic political decisions or policies.

Country	Balance between economic - social - environment policy objectives interaction between different policies and cross-departmental characteristics of policy design
Estonia	Joining the EU has forced Estonian politicians to agree on strategic objectives - strategy ‘Estonia 2020’ sets up the most challenging objectives Estonia has ever had. On the strategic level there is a consistency of objectives – the strategic planning process is managed centrally by the Ministry of Finance (who also manages the State Budget Strategy), but on the policy implementation level the consistency is lost as it needs strong cooperation between sectoral ministries, which is weak.
UK	Whilst there is no central, overarching government strategy, mechanisms are in place to ensure that policy coordination is undertaken at the highest level. However, in terms of innovation policy, the Department for Business, Innovation and Skills (BIS) takes the lead executive role in the formulation of innovation strategies and forms the major conduit for the bulk of civil public sector R&D funding. Policy formulation is conducted in a coordinated fashion through discussions at a range of levels with other concerned departments and ministries. Thus, for example, BIS was responsible for the recent Industrial Strategy which sets out investment plans and policies in eleven key sectors of the economy.
Netherlands	Cross-departmental cooperation appears in many support measures. The Netherlands pursues a strategy of green growth, with regard for space and security as well.
Finland	As a Nordic welfare state Finland has featured social and environmental objectives relatively high on the political agenda. This has ensured a balanced match of economic, social and environmental policy objectives. However, in some cases this has resulted in some coordination inefficiencies, such as in the administrative burden for companies in getting environmental permits or rather rigid labour markets (e.g. low mobility, high income tax). The main policy focus is set in the government programme, which is based on and subsequently has an impact on national sectoral strategies. While the policy design is typically driven by a single ministry, other ministries as well as all relevant stakeholders are consulted interactively. However, the implementation of policies remains the responsibility of single ministries and coordination between ministries is typically weak. The coordination in the area of R&D and innovation policies is somewhat stronger, but mainly at the level of agencies or between agencies and

	ministries.
Country	Organised strategic intelligence (isolated, coordinated, joint strategic)
Estonia	<p>Since 2006 Estonian Development Fund carried out foresight studies on different socio-economic areas –the foresight studies were a bit ahead of its time and always created a lot of discussions. Since 2012 the foresights were stopped as new CEO focused on development of start-ups, green economy and entrepreneurship culture. Development Fund was the only one carrying out cross-sectoral foresights – there is no systematic process of collecting and analyzing global trends, carrying out evaluations or policy studies/policy needs today. The only systemic centrally coordinated long-term strategic planning process is planning of EU funds, which takes place after five years, before next EU financing period. The main and only driver for that exercise and commitment is EU funding.</p>
UK	<p>The UK Government conducts a wide range of strategic intelligence gathering activities through a number of processes. These include strategic reviews, evaluations, foresight exercises and horizon-scanning activities.</p> <p>The UK is recognised internationally as having a well-developed culture of evaluation, which forms an integrated part of the cycle of policy formulation. Of particular relevance to the broader context within which evaluation takes place is the underlying performance monitoring system of Public Service Agreements (PSAs) put in place by the Treasury. This serves as a broader mechanism for performance measurement and for monitoring progress against targets. Failure to meet PSAs can affect future budgetary allocations (allocated through three-year Spending Reviews); hence it is in the clear interest of ministry officials to ensure that their policies are designed to effectively and efficiently meet these targets.</p> <p>In terms of the evaluation of innovation support programmes (including R&D funding programmes) the development of evaluation practice is undertaken by BIS, with supporting interest from HM Treasury and the National Audit Office, while other executive and funding agencies also play major roles. Evaluations are conducted either by dedicated bodies within the funding agencies or by external consultancies. A range of stakeholders may be consulted on the technical and operational details of policy measures, depending on the type of measure being designed. Since BIS has oversight of the core range of innovation support policies implemented (at least in England), responsibility for oversight of the evaluation of these innovation support instruments now also resides with BIS.</p> <p>In the definition of research priorities, the Government ensures that it takes the views of a large range of stakeholders (including the private sector) into account. This may be done through foresight exercises (which are now more specific than the broad Foresight exercises of the 1990s), through 'horizon scanning' activities or through invited consultations on a range of documents, such as draft strategies. The Government also consults extensively with a range of stakeholders in the preparation of its STI policies - an example being the recent consultation in advance of the publication of a new science and innovation strategy foreseen in Autumn 2014.</p> <p>HM Treasury produces guidelines on evaluation and assessment practice across Government, for example in its Green Book and Magenta Book.</p>
Netherlands	<p>As noted earlier, the Netherlands has a culture of evidence-based policy design with a structured policy monitoring and evaluation system in place.</p> <p>In terms of foresight exercises, the Netherlands carried out a study to identify 9 top sectors that now constitutes the core of its enterprise policy. The top sector approach covers all relevant policy domains, for which stakeholders developed a targeted agenda and implementation plan.</p> <p>Regarding the top sector approach, the Central Bureau of Statistics (CBS) in consultation with the Ministry of Economic Affairs, Agriculture and Innovation (EL&I) and the Centre of Policy Statistics (EB) has elaborated the first monitoring report of the policy based on a consistent statistical overview of the economic position of the top sectors: "Monitor topsectoren: Uitkomsten eerste meting". The aim of the report was to obtain a picture of the top sectors in the form of (macro)economic indicators, that can be followed over time and thus contribute to the monitoring analysis of the evolution and development of the selected leading sectors.</p> <p>Other foresight exercises include:</p> <ul style="list-style-type: none"> • The state of the Netherlands as innovative country, TNO 2012 <p>Knowledge and Innovation Agenda 2011-2020.</p>
Finland	<p>Strategic intelligence at the level of the government relies mostly on a number of isolated studies and analyses launched by politicians and the systematic intelligence resulting from the work done at the agencies and sometimes at the ministries. Since there is a strong evaluation and monitoring practice, these are usually enough to provide the necessary supporting evidence for policy making. The problem is not so much in the lack of strategic intelligence as it is in the ability to make difficult political decisions in a consensus seeking political culture.</p> <p>Evaluation and monitoring activities are widespread and mostly transparent. The strengthening visibility State Audit office and requirements from the EU in relation to</p>

	<p>structural funds have further enhanced accountability.</p> <p>There is a long tradition of strategic interaction between government, industry and labour unions. During the last years the government as well as ministries and agencies have increasingly started to open possibilities for citizens to participate in policy design using internet based platforms.</p> <p>Some government agencies as well as the parliament and government have established systematic foresight activities. Efforts to coordinate these are gradually improving, but no national level single process is foreseen.</p> <p>A joint process for gathering strategic intelligence and interactive sense making with industry regarding future market trends is currently being developed in collaboration between public R&D and innovation agencies under the Team Finland umbrella.</p>
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<i>Country</i>	Role of mission oriented policy design (i.e. designing cross-departmental policies to address societal challenges, existence of government level strategic initiatives governed from the top level)
Estonia	There is one national agenda where all the ministries are involved into implementation – planning the use of EU funds. Also, an outstanding well-coordinated process, where all government organisations were committed, was joining the Eurozone. These cases prove that Estonian government organisations can cooperate, if there is a national agenda to fulfill.
UK	<p>While UK government departments deal with specific policy areas, the approach to ‘mission-oriented’ policy is carried out in a coordinated, joined up fashion across government. However, where such policies are explicitly or implicitly concerned with innovation or R&D issues more specifically, BIS will generally take a lead or strong supporting role. For example, in delivering the Industrial Strategy, several government departments are cooperating to set out a long-term approach to give businesses confidence to invest and grow. The Industrial Strategy has five strands: sectors; technologies; access to finance; procurement; and skills. While this is intended to offer flexible support to all sectors; however, BIS has developed sector-specific strategies in eleven sectors where Government intervention can have the most impact. These are: Aerospace; Agri-tech; Automotive; Construction; Education; Information Economy; Life Sciences; Nuclear; Offshore Wind; Oil and Gas; Professional Business Services.</p> <p>In addition, in the area of R&D policies, the UK Research Councils, under the umbrella coordination of Research Councils UK, run a number of programmes relating to grand societal challenges.</p>
Netherlands	In 2011, the Dutch government allocated 1,5b euros for financing research related to the selected top 9 sectors: Agro-Food; Horticulture and Propagating Stock; High Tech Materials and Systems; Energy; Logistics; Creative Industry; Life Sciences; Chemicals and Water.
Finland	Government typically defines a number of strategic initiatives in the government programme. These are in principle policy areas where activities of several ministries are needed. However, the leadership is assigned to one ministry which is only asked to coordinate the activities across ministries. Without earmarked allocation of resources or sufficiently strong governance, these strategic initiatives remain loosely coordinated activities. While missions may appear in political rhetoric, there are very few real ambitious mission oriented systematic initiatives governed at the top level, and none in the area of innovation policy.

<i>Country</i>	Balance between management by objective and management by resources
Estonia	Management by resources strongly dominates. There have been attempts to introduce management by objectives (or by results) in the Ministry of Finance and some other public agency/local municipality, but no real implementation or any sustainability can be seen.
UK	UK policy is clearly driven by a process of management by objective. The specific objectives are defined through a strategic process of review, evaluation, consultation with stakeholders and dialogue across government. Nevertheless, this management process is fully cognisant of the need to adhere to public spending targets (set by HM Treasury) and is subject to a process of prioritisation and selectivity.
Netherlands	Management by objectives applies in terms of selecting top sectors to target RDI policy at and to monitor and evaluate policy measures on a regular basis.
Finland	Finnish public sector is formally driven by a process of management by objective. However, as politician often find it hard to make difficult political decisions - especially those related to budget - this often leads to reducing budgets across the public sector, which turns the focus back on management by resources. Also the Ministry of Finance has an unfortunate tendency to micro manage resource allocations, which may in some cases further emphasise management by resources.

Country	Stakeholders (market actors, end-users) participation in policy design
Estonia	Involvement of stakeholders is enliven after introducing EU structural funds in Estonia – strong involvement of stakeholders was one requirement for getting EU funds. Normally sectoral umbrella associations, universities or Chamber of Commerce are consulted. Final beneficiaries, customers/patients are rarely included into policy-making process. However, involvement/consultation traditions vary a lot between sectors and organisations, no strong continuous dialogue or systematic consultation really take place. Still, consultation with stakeholders in many cases is seen as something additional and time consuming and no impact is often seen. Ministries attempt to involve them, but often they do not understand themselves the real impact of that process. In hand, this makes stakeholders skeptical and reduces their willingness to be committed.
UK	As noted above, as part of its policy formulation processes, the UK Government makes extensive use of stakeholder engagement through a large number of consultation exercises. These may be open consultations, to which any stakeholder group or individual may provide an input, to more formal or targeted reviews which invite inputs from selected stakeholder groups and organisations. Industry lobby groups, consumer groups (such as patients or more general, market-based consumers) are frequently invited to provide inputs to aspects of policy debate. With regard to the more specific design of policy instruments, the views of target groups and beneficiaries may be taken into account and the views of selected representatives of such groups sought.
Netherlands	The Dutch policy design follows the so called “polder model” which means that social dialogue plays an important role in getting public support for the introduction of policy initiatives. There is a long tradition of negotiation through frequent contact between trade unions, employers' organisations and government, as well as regular discussions between employers and employees.
Finland	Finnish government consults stakeholders regularly in designing policies. Industry, labour unions and government discuss R&D and innovation policies together with academia and all major funding agencies in the Research and Innovation Council. While it is an advisory body for the government, the wide representation of the government and all stakeholders makes its recommendations relatively strong. End-user participation has been increased over the last years with the use of web-based consultations. The more detailed design of policy initiatives includes consultation with the more specific stakeholder groups either at the level of ministries or at the level of agencies depending on the policy instrument.

Country	Cross-departmental governance (incl. leadership)
Estonia	Real leadership is missing in Estonian governance t the moment. Also, there is no national objective to fulfill. In case of cross-departmental governance, dominating personality (minister) will take the leadership. No clear tradition, no actual leaders seen in the system.
UK	<p>Cross departmental governance, in the area of innovation policy (which broadly encompasses the areas of industrial and science and technology policy) is the responsibility of BIS. In more specific terms, BIS has oversight of further and higher education policy; supporting innovation and development of the UK science and research industry; consumer law; business support; and better regulation. To facilitate this, BIS works in cooperation with around 50 agencies and public bodies and its partner organisations include nine executive agencies. Specific topics of concern are: Business and Enterprise; Consumer rights and issues; Employment; Europe; Financial Services; Further Education and Skills; Higher Education; Regulation Reform; Science and Innovation; Trade and Investment; and the UK Economy.</p> <p>BIS is responsible for formulating strategic policies and plans on all these issues, a process which involves extensive stakeholder dialogue, both within and outside government.</p> <p>The Minister at the head of BIS, the Secretary of State for Business, Innovation and Skills and President of the Board of Trade, is a member of the Prime Minister's Cabinet.</p>
Netherlands	<p>The main actors and institutions in research governance include the Ministry of Education, Culture and Science (OCW) and the Ministry of Economic Affairs (EZ). The latter is responsible for facilitating a competitive business climate and, in addition, developing policy that encourages current and future ‘top sectors’ of the Dutch economy.</p> <p>Cross-departmental cooperation appears in many support measures. The SBIR programme for instance has an interdepartmental nature as an interdepartmental group was established to facilitate and promote the uptake of SBIR.</p>
Finland	The Research and Innovation Council represents the main platform for strategic policy coordination in the area of R&D and innovation policy. In addition, both the Ministry of Employment and the Economy and the Ministry of Education prepare their own strategies related to higher education, research and innovation. At the operational level coordination between ministries is relatively weak and more based on division of labour.

	<p>Coordination of activities at the level of agencies has gained increasing attention. While it previously focused mainly on operational coordination specific activities, attempts are currently made to enhance coordination at the more strategic level.</p> <p>The policy culture is very much sector oriented. The leadership of cross-sector activities is weak and mostly based on coordination.</p>
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<i>Country</i>	Horizontal policy implementation (joint strategic action, coordination, isolated)
Estonia	Horizontal policy implementation is definitely very problematic and difficult as the cooperation between ministries/agencies is weak and everybody is fighting for its organistaion. There is lack of overall strategic 'helicopter view' both among top managers of the public service as well as policy implementing agencies.
UK	<p>The UK Government defines horizontal policy as “those policies which address economy-wide market failures and provide the resources and economic environment in which all businesses and individuals can operate effectively. Policies range from direct investment in human capital and coordination through to legal and regulatory frameworks. In reality, however, few policies are purely horizontal. For example, BIS has a number of policies which support adult skills, some of which are horizontal, whilst others have greater degrees of sector application”.</p> <p>Horizontal policy (and, hence, its governance and implementation) can play a key part in providing a stable policy environment. However, in a constantly changing environment, there is a need for such policy to also be flexible to facilitate industrial change. “Innovation policy is one example in the UK where there has been relative stability in the interventions provided by the Government (for example, Knowledge Transfer Networks, Grant for R&D and Collaborative R&D), whilst at the same time the Technology Strategy Board (TSB) works with stakeholders to identify changing technology priorities to ensure interventions support those areas that will be important in the future”.</p> <p>In the UK, sector and horizontal policy are highly complementary: the latter is essential for providing the foundations for basic capabilities and structures in the economy, but there can be a need for policy to be tailored in terms of its content, application or design to address specific issues caused by sector specific market failures. As noted already, the lead coordinating government department with responsibility for innovation (and, hence, industry) policy is BIS which works with other departments and ministries to ensure that coordination with other relevant policy areas is achieved.</p>
Netherlands	Innovation policy actions are coordinated by the Ministry of Economic Affairs. Ministries have joint strategic actions and coordination mechanisms through interdepartmental working groups for example.
Finland	Horizontal policy implementation is mainly based on joint overall policy and division of labour with the additional layer of coordination. There has been very little joint strategic action across ministries, apart from some policy initiatives. Recently launched Team Finland concept represents a change in this respect. It is the first joint strategic action between several ministries and agencies.

<i>Country</i>	Public sector risk management culture
Estonia	Public sector risk management culture is missing. There is lack of knowledge and negative attitude towards risk – taking risk is not allowed, any failure has to be avoided. There is a risk management plan for EU structural funds implementation system, but this is a separate system and doesn't have any relation with introducing/purchasing innovation. In general there are no mechanisms to manage risks or risk prevention.
UK	<p>The notion of public sector support for R&D and innovation is predicated on the broadly accepted belief that such support is required in order to reduce the perception of risk on the side of business and industry. This concept forms one of the underpinning rationales in UK innovation policy.</p> <p>Innovation, by its very nature, entails a degree of risk, which is also reflected in the implementation of policies to support it. However, the risk of failure of such policies can be minimised through a process of careful preparation in the design of policies, accompanied by close monitoring and periodic evaluation. These all form critical elements of policy learning and, as noted above, the UK has firmly established processes in place in this regard. The UK has also been active in the encouragement of innovation within the public sector itself – thus, the public sector has become more comfortable with the notion of innovation and the benefits it can offer. In turn, one could argue that this makes it a better prepared customer for externally derived innovation.</p> <p>With specific regard to the implementation of demand side instruments, risk may be further minimised by establishing and maintaining a close dialogue between the client and the contractor/supplier of innovation. This is essential in developing a clear understanding of the expectations on both sides. Indeed, the current evaluation of the UK SBRI is examining the development of relationships between contracting departments and the suppliers of innovation (the programme participants) and the role this plays</p>

	<p>as a contributory factor in the success, or otherwise, of the programme.</p> <p>At the centre of Government, the Major Projects Agency has been established to control risk on major projects in which the State is the customer. Ensuring that innovation is achieved as well as tight control of budgets and plans is part of the mission of the MPA.</p>
Netherlands	The Pianoo and SBIR schemes provided a framework to manage risks associated with public procurement of innovative products and services. The Pianoo platform has been instrumental since 2005 in providing a professional network to rely in case of innovation procurement questions and helped to mitigate public sector risk.
Finland	<p>Risks are accepted in the area of R&D and innovation policy because of the specific nature of research and innovation. While the attitudes favour risks, they are also quite sensitive to the impact of public funding.</p> <p>In other policy areas the tradition is avoid risks and failure. This is further emphasised by consensus seeking policy culture. While policy making is mainly evidence based and would therefore offer a good basis for risk identification and management, there is no systematic approach across the government. Risk management is a requirement for all ministries and agencies, but each may follow their own practices.</p>

A.2 Awareness and recognition of the potential of demand side policies

Country	Role of demand side in innovation policy (incl. action plans)
Estonia	There has been no direct demand-side policy in Estonia so far. Demand-side innovation policy aspects can be found in some initiatives/programmes, but they have happened not due to the systemic policy implementation. Mainly supply-side instruments have been used.
UK	<p>In the UK, demand, as a driver of innovation and change, is recognized throughout government policy statements on the economy. Within the BIS ECONOMICS PAPER NO. 18, Industrial Strategy UK Sector Analysis, which underpins the new UK Industrial Strategy, the role of demand is strongly emphasised, as is the role of government on the demand-side in innovation policy. Further changes to reform government procurement will focus on value for money and supporting innovation. The government is planning major changes in this area, but firm proposals have not yet been made⁸.</p> <p>Citing evidence from the World Economic Forum⁹, the 2014 UK Innovation Report (BIS, 2014) notes that “the UK ranks poorly in terms of the impact of government procurement on stimulating innovation, although no country included in the study performed strongly in this area” (see Table below, also).</p>
Netherlands	Although there is no integrated demand-side policy in the Netherlands called as such, demand-side policy tools especially innovation procurement received increasing policy attention in the past decade. Beside being a pioneer in PCP schemes, the Dutch policy aimed at supporting a demand-driven R&D policy, user-driven innovation and open innovation as well.
Finland	<p>Finland has been among the first countries in Europe to develop systemic demand side policies and strategies. These have also been taken to the level of action plans and launch of demand side policy instruments.</p> <p>However, the systemic demand side approach has not included the design of strategic policy mixes. Regulation, standards and norms have not been used much as a driver for innovation. Pre-commercial procurement and procurement of innovation have been launched in the form of funding instruments, but without strategic sector policy support (e.g. voluntary or mandatory allocation of procurement budgets).</p>

⁸ see the Communities and Local Government Committee - Sixth Report, Local government procurement, published 24th February 2014

⁹ World Economic Forum (2014), The Global Competitiveness Report 2013-2014, WEF, Geneva.

WEF data: Indicator 12.05: Government procurement of advanced tech products¹⁰.

Country	Value	Rank (out of 148)
Estonia	3.9	34 th
Netherlands	4.1	26 th
UK	3.6	56 th
Finland	4.2	21 st

Country	Innovativeness of potential buyers (adoption of innovative products, services and solutions, ability to identify the potential of innovation in their activities, longer term vision and strategy)
Estonia	There are sectoral strategies until 2020 (or even 2030), but as the real implementation of a strategy is related to the State Budget Strategy made for four years ahead, the real strategic planning is receded on four years. There are no long-term public procurement plans in public organisations set up. Public sector is often not aware about possible innovative solutions the market can offer. At the same time Estonian companies are rather innovative – they are eager to experiment with new products/services/solutions and introduce innovative products. There are many start-ups operating, government support (both financial as well as awareness rising) for start-ups is functioning well, there are many student companies created and entrepreneurship is taught in many schools. Today, it's rather lack of communication between public sector (what are the long-term strategic plans) and private sector (what is the capacity to introduce innovation).
UK	Public sector procurement occurs across a very large range of institutions ranging from large government departments with very large single procurement items (for example in Defence) down to regional and local government. And yet some local government organisations are large, and taken together local government spend around €60b a year on procurement from third parties (see House of Commons Communities and Local Government Committee Report Sixth Report). While there are parts of the public sector where there is pressure and the expectation and capacity to engage in the procurement of innovation, in the majority of areas, there is a strong and increasing focus on value for money purchasing, and less focus on the adoption of new innovations. The government's report (HM Treasury Review of Competitive Dialogue, 2010) highlighted in the area of procurement of innovation the absence of capability in handling complex procurements using this procedure, a fact that may suggest that the procurement of innovation generally is highly challenging in the UK generally, although there are some areas of significant success. This may explain the poor ranking achieved by the UK indicated in the WEF figures provided above.
Netherlands	As mentioned above, the innovativeness of public buyers have been stimulated by the SBIR scheme and supported by the Pianoo professional network. A recent evaluation of the Dutch SBIR scheme by Technopolis Group (2010) found that the cost of implementation of the various SBIR elements are not high and the government departments are satisfied with the programme implementation. While some departments exploited the SBIR well, others were more cautious to embark upon the scheme. It is also seen as a strong positive aspect that the scheme attracts SMEs that were not previously involved in public innovation programmes. The programme is good in getting new products/services developed, in involving SMEs in innovation but it is less straightforward to organise how these new products and technologies will be bought by public procurers.
Finland	Ministries and agencies seldom have longer term vision or strategy. This is mainly due to relatively low strategic capacity of ministries. While foresight activities are quite common in the public sector, the link between foresight and strategies (which may refer to a longer timeframe, but often in reality focus mainly on short term) is typically weak. Risk aversiveness limits the application of innovation in the public sector.

¹⁰ World Economic Forum, <http://www.weforum.org>

	A new programme for innovative buyers emphasises also companies as buyers of innovation.
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Country	Innovativeness of end-users (activity of end-user communities, attitudes towards innovation)
Estonia	Innovativeness of end-users is different among sectors, but in general they are rather passive in demanding/motivating/rising awareness on the market (with exemptions). In general, innovativeness of end-users is rather low as innovative products/services/solutions cost more than normal ones and Estonian consumers are very sensible on price increase. As an example, the market for smart houses can be very narrow in Estonia, but consumers are eager to try new yoghurt, bread or cheese. Regarding innovative healthcare solutions, Estonian people can be very careful – if positive impact on everyday life is easy to recognize, the product/service/solution can be accepted easily, if not, then Estonians are rather sceptic.
UK	End user orientation towards innovation is difficult to measure and any index measure for the whole country is likely to obscure significant variety in practice. Distinctions can be made between private end-users (who are sometimes the target of government procurement of innovation programmes), and public sector end-users, such as doctors and nurses in the health sector or the armed services within the defence sector.
Netherlands	The Global Entrepreneurship Monitor 2012 report for the Netherlands concluded that there is a reduced perception of good opportunities for setting up a business among the Dutch adult population, which trends is more pronounced as compared to similar economies worldwide. However, the Dutch adults remain very positive about entrepreneurship and the intentions to start a business have increased, although lag behind internationally. The innovativeness of end-users are rather positive and encourages innovation. Innovation community initiatives such as Brainport Eindhoven also foster innovative and creative thinking and demand for new solutions.
Finland	Consumers in Finland are mostly oriented towards innovation. Attitudes towards education, research and innovation are favourable. People are generally quite willing to try the newest products and services. Some sectors have active end-user communities, there is a long tradition of third sector organisations (NGOs) and the interest towards social entrepreneurship is increasing.

A.3 Competence and experience in demand side policies and policy mixes

Country	Experiences with demand side instruments and policy mix (intentional demand side initiatives, non-intentional demand side instruments, instruments with demand side characteristics, only with supply side initiatives, policy-mix design, implementation, governance)
Estonia	There is no direct demand-side innovation policy implemented in Estonia so far.
UK	The UK has experience of demand side policies. The NESTA Paper (Innovation policy mix and instrument interaction: a review) gives a number of examples of how this balance is considered generally and in the UK to a very limited degree. These policies in the UK fall into the following four main types: framework conditions; organisational and capability building activities; identification and signalling of needs; incentivizing innovative solutions (NESTA Discussion Paper Review of Measures in Support of Public Procurement of Innovation No. 13). The government's main scheme to support pre-commercial procurement is the Technology Strategy Board's Small Business Research Initiative which works mainly with the larger government departments.
Netherlands	As mentioned above, the Dutch innovation policy relies on demand-side tools such as innovation procurement, PCP or regulations. The PIANOo expertise network was established in 2005 to professionalise public procurement and to stimulate the use of public procurement for innovation or sustainability. The interdepartmental SBIR pre-commercial public procurement programme was established in 2004. Ministries define societal problems and contracts are awarded in a three-phase competition: feasibility, research and commercialisation phase. The SBIR programme was evaluated in 2010, which concluded that it is a well-functioning programme. The key challenge of the scheme is to link the worlds of procurers of new solutions at the national level and the final buyers at regional and local level. It is seen as a critical issue to incentivise regional and local public authorities to be open to new products and services, which at the current time is a challenging task given the public budget constraints and risk-adverse attitudes.

	Regulation such as 'green procurement' has also been used to stimulate innovation: the Dutch government has committed itself to make public procurement 100% sustainable in 2010 (Mostert and Deuten, 2011).
Finland	The experience in Finland with demand side measures is mainly related to pre-commercial procurement and procurement of innovation. Previously isolated demand side measures are being increasingly integrated into supply side measures. While there has been a tradition to define government level and other strategic initiatives, the design of related policy mixes is not very systematic and their governance is based on loose coordination rather than strong leadership.

Country	Competences (to identify policy mixes and potential of demand side instruments, to design policy mix and demand side instruments, to implement policy mix and demand side instruments, to govern policy mix)
Estonia	Competences to implement demand-side innovation policy in Estonia needs improvement. As the whole concept of demand-side innovation policy is new in Estonia, training/awareness rising first of all among public sector would be essential.
UK	In the UK, the practice of identifying policy mixes is relatively limited, and is typically undertaken at a general level in the context of reviews of innovation policy such as the BIS Innovation Report. Some evaluations of programmes have examined the performance of support instruments in the context of similar or related schemes (for example, the provision of finance, or support to SMEs) but have not come to any major conclusion regarding the appropriateness of the overall portfolio of innovation policy support measures... The concept is difficult to operationalize as various authors have claimed. As already mentioned, the lead department here is the Department for Business Innovation and Skills.
Netherlands	The Netherlands is advanced in certain demand-side policy tools such as innovative procurement or PCP schemes and has been able to improve its policy following the results of the evaluations of these initiatives. However, it needs more policy learning in terms of other tools and in policy coordination. More integrated and coordinated demand-supply side policy could be explored in the future.
Finland	There is an understanding of the potential of demand side measures as well as some experience. Both demand and supply side policies are featured in the overall innovation policy. However, the design of strong policy mixes including demand side policy measures still remains weak. Demand side measures remain isolated or integrated only to R&D and innovation funding schemes. Even though there is a long history of R&D policy coordination, the design and governance of innovation policy mixes remains weak, especially in areas where the policy mix should include measures related to changes in regulations, standards and norms, changes in practices of public sector organisations or changes to the fiscal system, or where the governance should be based on strong coordination across several ministries.

Appendix B Policy recommendations

The policy recommendations are given here at a general level. Each recommendation is labelled as **important**, **desirable** or **optional** depending on how essential it is for introducing demand side measures and designing policy mixes.

Governance

Recommendation 1 **demand side: desirable** **policy mix: important**

The Estonian Government should establish unified cross governmental-level, longer term, ambitious visions and strategies.

These should be coherent with the national action plan for using Structural funds and they should preferably focus on the same societal challenges that have been identified at the EU level but with relevance to the Estonian context, particularly with regard to specific requirements and national level capacities for action. This would allow better integration of EU and national activities, and ensure that the eventual innovative solutions would be consistent with European market needs. Specifically in the R&D and innovation policy domain, Estonia should identify and focus on selected niche areas within the wider societal challenges. While allocating resources according to the longer-term ambitious strategies would be preferable, the use of resources for the strategy should also be coordinated across ministries and agencies. The main requirement is that a clear and effective government lead from the top governance level is established to ensure effective and efficient implementation of the strategy. Establishing longer term strategies can also ensure that short term planning and activities are consistent with the longer-term objectives.

Recommendation 2 **demand side: optional** **policy mix: desirable**

The Estonian Government should strengthen its strategic intelligence capacity.

This can be done at the higher governance level or at the level of each ministry, but preferably at both levels. The purpose is to move towards evidence-based policy making, which makes better use of all available relevant knowledge and also includes forward looking analyses (foresight, scenario building, horizon-scanning, etc.). The better the understanding that government and its constituent ministries have about trends and possible futures, the better their position for making longer term decisions, which are essential in increasing the predictability of public sector developments and thereby enhancing public sector innovation. In practice, strengthening strategic intelligence requires both improving competences at the ministries, and allocating more resources for studies, evaluations and analyses which provide the necessary knowledge to support policy making. Furthermore, competence alone is not enough. In order to capture the full benefit from the stronger strategic intelligence knowledge and competences, interactive analytical processes should be introduced to translate the available evidence and information and integrate it into existing policy processes. These should preferably be transparent and include a wider range of stakeholders, including market actors. Establishing the Development Fund and especially its foresight (currently not active) and interactive policy support activities represent steps to the right direction.

Recommendation 3 **demand side: optional** **policy mix: desirable**

R&D and innovation policy should shift towards a truly horizontal and holistic policy.

Rather than focusing on enhancing R&D and innovation competences and activities as such or on economic benefits only, policies should recognise the role of R&D and innovation more widely in addressing all policy objectives. Policies should be better linked to grand challenges at the top government level or, alternatively, each ministry should be required to establish their own strategy describing how R&D and innovation is expected to support their respective policy needs.

However, a combination of these two approaches would be the ideal. This would create a basis for interaction and collaboration between ministries to establish coherent policy mixes which would include both sector policy initiatives and more horizontal policy initiatives such as R&D and innovation and, for example, green policies. Design and implementation of horizontal and holistic policies requires special attention to governance. Governance models and practices need to be renewed to establish sufficiently strong leadership and coordination, especially to overcome traditional barriers for collaboration between ministries.

Recommendation 4

demand side: important

policy mix: desirable

The Estonian Government should actively build partnerships with market actors.

Partnerships form a platform for organising continuous dialogue between government (and its agencies) and market actors. Partnerships should be strategic and longer term, and allow market actors to contribute to strategic intelligence and its interpretation, and to participate in the policy design process (especially with regard to the design of demand side measures). This increases a shared understanding of the

challenges, mutual trust and commitment to policy objectives. Continuous dialogue can ensure that policies and policy changes become increasingly predictable and more understandable to market actors. Since market actors can also contribute to policy design, the ability to for the Government to identify, reduce and remove various regulatory and other barriers related to market dynamics, market access, competition and innovation can also be enhanced.

Recommendation 5

demand side: optional

policy mix: optional

The Estonian Government should encourage end-user communities to take a more active role in the design and implementation of policies related to markets and innovation.

Appropriate policy initiatives may include awareness raising, facilitation of community building, various voucher models, end-user access to experimental platforms and demonstrations and buyer incentives. The main purpose is to encourage and facilitate stronger end-user involvement in defining their needs and increasing their interest to buy and adopt innovative products, services and solutions.

Recommendation 6

demand side: optional

policy mix: optional

The Estonian Government should identify and actively work together with market actors to influence EU-level decisions relevant for enhancing the demand for innovation in selected markets.

Partnerships with market actors should be used to identify relevant regulatory and other barriers limiting access and entry of innovative products, services and solutions to EU markets.

Recommendation 7

demand side: important

policy mix: optional

The Estonian Government should establish systematic innovation risk management practices for the public sector.

Public sector governance culture tends to be risk evasive. Short-term budgetary limitations and low or no tolerance of failure (which is seen as waste or inefficient use of tax payers money) discourage taking any risks. Innovation always includes risks. If risk management capability is weak and failure is not tolerated, the incentive to engage or adopt innovation remains very low. If the government wants to drive innovation, the public sector organisations

need to be able to manage risks, including early detection of risks about to happen and appropriate measures to deal with realised risks.

While the recommendations above address the preconditions for introducing demand side instruments and designing coherent policy mixes in Estonia, selected demand side instruments suffer from a number of specific barriers. Recommendations on how to address these barriers are presented below. Some of these are linked to the overall policy recommendations and, hence, they may not be effective if implemented in their absence.

Public procurement of innovation and pre-commercial procurement

Recommendation 8

demand side: important

policy mix: optional

The Estonian Government should establish a small unit to specialise in the public procurement of innovation and pre-commercial procurement.

The purpose of this unit would be to initially implement these types of procurement processes on behalf of public sector organisations and subsequently provide help and advice if and when these become more frequent. The same unit could also be responsible for green procurement and other special forms of future oriented procurements, where the procurement process is interactive and selection criteria are based mainly on longer term performance and quality rather than immediate price. A separate unit is the most effective way to overcome the barriers related to a

lack of competence and experience.

Recommendation 9

demand side: desirable

policy mix: optional

The Estonian Government should make use of public-private partnerships to identify the potential of innovation in addressing the longer-term needs of the public sector.

This will allow companies to better predict when and what innovations are needed by the public sector, and engage in R&D and innovation activities to develop products, services and solutions accordingly. Through the dialogue, companies can also bring their knowledge of the potential related to new technologies and solutions to the public sector, and thereby raise its awareness of the potential for innovation. Furthermore, partnerships can be used to identify potential regulatory and other barriers for innovation in the sectors concerned. They will also ensure that the conditions in future tenders will not lead to proprietary national solutions, but that solutions are

consistent with international market needs.

Recommendation 10

demand side: optional

policy mix: optional

The Estonian Government should make use of end-user communities in understanding the needs of citizens with regard to potential demand-led innovation solutions.

This may be done by facilitating and encouraging end-user communities and their activities, or via various virtual solutions (social media, crowd sourcing). This will empower end-users and invite them to define future public services. This may also encourage social entrepreneurship, which can further reduce the burden on public resources and alleviate unemployment.

Furthermore, it can improve awareness among end-users and thereby may increase the demand for innovation.

Recommendation 11

demand side: important

policy mix: desirable

The Estonian Government should establish appropriate incentives and governance practices that support innovative procurement.

These include sufficient political commitment, risk management practices, requirement for longer-term ambitious strategies at all levels of governance (including local governments), competence building and assistance, and coordination in the case of applying innovative procurement in the case of grand challenges or other cross-ministry strategies. Incentives may be in the form of additional resources (competitive funding based on the best ideas), mandatory allocation of a percentage of budget (or procurement budget), rewards based on success, or guarantees against possible failure.

Smart regulation, standards and norms

Recommendation 12

demand side: desirable

policy mix: desirable

The Estonian Government should adopt a government-wide policy to reform the regulatory regime to better enhance innovation.

This should require that all new regulations, standards and norms are subject to ex-ante assessment with regard to their potential impact on innovation. Consultation should be held with key stakeholders before enforcing the new regulations, standards or norms. Where appropriate, there should be a shift from detailed technical specifications towards performance and quality based standards and norms.

Recommendation 13

demand side: important

policy mix: desirable

The Estonian Government should make use of partnerships to identify and reduce or remove any regulatory barriers for innovation.

A continuous dialogue should be established between government and market actors to identify existing and potential barriers and recognise how they could be reduced or removed. The same dialogue should be used to monitor the impact of the new regulations, standards and norms, to identify opportunities to utilise self-regulation of market actors and could be used to for the early communication and discussion of any potential future changes in regulations, standards and norms. It would also ensure the right timing and appropriate part of the

value chain to introduce new smart regulations, standards and norms. The involvement of employee organisations, end-user communities or related experts is important to ensure that employee and end-user safety issues are sufficiently covered in any new regulations, standards and norms.

Recommendation 14

demand side: desirable

policy mix: optional

The Estonian Government should encourage innovative companies to participate in EU-level and other international standardisation for a and activities.

In particular, SMEs should be encouraged to participate in the formulation of international standards. This would help them to be better prepared for new standards and offer them the possibility to influence future standards.

Buyer incentives and experimental platforms

Recommendation 15

demand side: important

policy mix: desirable

The Estonian Government should establish time limited buyer incentives with a clearly communicated exit plan and impact monitoring system.

While buyer incentives (such as government subsidies for buyers of electric cars) can be very effective in lowering market access, enhancing the adoption of innovation and speeding up market development and growth, they may very soon become quite costly and unnecessary as the markets start working on their own. To optimise government intervention, the timing must be right and the incentive sufficient to reach the desired impact. After the impact has been reached, government intervention should be gradually removed. The exit (i.e. gradual removal of buyer incentives) should be timed and implemented in a way that does not

slow market development excessively, but at the same time ensures that only a necessary amount of public funds is used. An appropriate impact monitoring system should allow for the design of an appropriate exit.

Recommendation 16

demand side: optional

policy mix: optional

The Estonian Government should establish experimental platforms aimed at private markets

Only if the timing is right, market actors are sufficiently committed, and there is a real potential for establishing an internationally visible showcase effect. These platforms should be established only if there is a real potential for them to become commercially viable business activities in a foreseeable future. Ensuring the

need and commitment of market actors is therefore essential. Identification of appropriate timing and potential for reaching international visibility (if successful) as well as ensuring sufficient commitment requires interactive stakeholder consultation or utilisation of systematic interactive partnerships (ref. recommendation 1.4).

Recommendation 17

demand side: important

policy mix: desirable

The Estonian Government should establish experimental platforms aimed at public sector solutions to help develop and test applications for the public sector in a safe environment before adopting them more widely.

This facilitates better risk management and may therefore significantly increase interest in innovation among public sector actors. While some of these platforms may be virtual and therefore easy to extend to companies, end-users, researchers and other stakeholders, in some areas they may have to be physical or at least include physical facilities. It is important that these platforms represent real life contexts with real end-user participation during experimentation. This means that they should preferably be created inside the public sector as separate environments or selecting existing environments and allowing and facilitating experimentation with innovative solutions in them (e.g. developing and experimenting with innovative services and products for a selected patient group such as e-health for diabetes, ambient assisted living

in a rural municipality, or smart energy grids in a city). Finally, experimental platforms can be very effective in enhancing collaboration and networking as they often require effective collaboration between several companies and public sector organisations (e.g. provision of e-health services or developing smart houses and residential areas).

Appendix C Summary of validation seminar

Validation seminar

Date: 3 June 2014

Participants

Name	Organisation
Kristiina Kaarna	Ministry of Finance
Helena Pärenson	Ministry of Agriculture
Hardo Lilleväli	Ministry of Education and Research
Jüri Truusa	Ministry of Environment
Aivar Roop	Entreprise Estonia
Caroline Rute,	Development Fund
Erkki Karo	Tallinn University of Technology
Kuldar Kuremaa	Health Insurance Fund
Raul Mill	E-Health Foundation
Kitty Kubo	Academy of Sciences
Priit Kruus	PRAXIS
Sigrid Rajalo	Ministry of Economic Affairs and Communications
Kristiina Tuisk	Ministry of Economic Affairs and Communications
Katre Eljas-Taal	Technopolis Group
Katrin Männik	Technopolis Group
Jari Romanainen	Technopolis Group
Kristel Kosk	Technopolis Group
Paul Cunningham	Manchester Institute of Innovation Research
Jakob Edler	Manchester Institute of Innovation Research

1. Benchmarking of Estonia with the countries in terms of implementing demand-side instruments

- What method was used for benchmarking (evaluating) preconditions?
 - Jari, Jakob, Paul: Qualitative methods based on international experience. As there are no quantitative data regarding demand side policies available in Estonia, a qualitative approach was used.
- Should we wait with the demand side policy until all the preconditions are met?
 - Jari: Yes, it is one possibility, but we would suggest starting with addressing the preconditions in parallel with introducing selected demand-side innovation policy instruments.

2. Horizontal activities towards introducing demand-side instruments

- Estonia is a small country. It might happen, that most of the innovative solutions need to be imported. Therefore we will be financially supporting foreign innovation. Should the government support only the local actors?
 - Jari: There should be a balance in supporting private sector. Constant dialogue with companies that have the potential to meet the need of the government and ministries should be established. Pre-commercial procurement would allow to focus the procurement process to local companies, but procurement of innovation should be open also to international companies.
 - Jakob: Opposition to pre-commercial procurements is standing on exactly that argument. However innovation social spill-over will happen anyway, no matter where the innovative solution/product is built. The country will benefit from the spill-over in longer-term.
- A good example from Estonia is Estank- they are doing metal tanks for gas and liquid. Enterprise Estonia supported building a factory where they use specific welding equipment. Now they are market leaders in Estonia and Finland. This is the case of how it was possible to transfer technology that was not available in Estonia before.
 - Jari: Integration of demand-side instruments into existing supply side measures is important.
- Are there any examples of lead departments (ministries) in UK?
 - Jakob: Previous government in UK established a lead department. There is an obvious link with demand side measures. They agreed on cabinet level, that every ministry should have innovative public procurement plan. In the beginning they (especially health) were very reluctant, however “innovation champions” in the ministries were eventually activated due to the innovation plan. This initiative changed the way of thinking in public sector. It is important to understand, that this lead department is not doing all the measures on their own, but has a rather supportive role to the ministries. Innovation ministry should not be the “king” who is leading (this always leads to conflicts).
 - However, lead department should coordinate larger scale horizontal initiatives (e.g. smart cities).
- There was a doubt that in Estonia there is nobody who would take in charge. Development Fund maybe? Smart specialisation is quite narrow. Where to start?
 - Jari: it would be smart to address the same societal challenges that are already defined at the EU level. Big national projects like “Green Estonia” or “Estonia in the cloud” could also be used as a starting point. The problem owners - the government or key ministries in most cases - should take the leadership. However, they may consider assigning the operational management to an agency such as the Development Fund.

3. Procurement of innovation and pre-commercial procurements (A type of procurements to purchase R&D and innovation)

- One option to introduce procurement of innovation and pre-commercial procurements (PCP) is to define a certain percentage of procurement budgets for innovation. There was a doubt that it's risky to define percentage for horizontal project - risk of lock-in for product-to market cycle.
 - Jari: Not the percentage of overall budget, but only the procurement budget. It is important that the ministries use their own money to procure innovation from the very beginning. There is a lock-in

problem in e-governance at the moment. IPR goes to buyer, but it definitely shouldn't. Also the price is lower if company can keep the IPR.

- How exactly would launching a programme for PCP and procurement of innovation takes place?
 - Jari: Launch 1 programme with 3 focus areas. All the key ministries should be involved in the steering committee, but Enterprise Estonia or another agency should do the day-to-day management.
 - Jakob: Pitfalls in the UK. Very often the problem with the PCP (develop until the prototype) is that in the end they can't find a buyer. If additional money is allocated, the public sector is not interested in buying. One needs to be very careful in developing the scheme with a clear commitment to buy in the end. The "need" needs to be defined and addressed. There doesn't need to be a support agency, it can also be done as a competition etc.
 - Jari: Good example is the dike example from the Netherlands where government supported developing a dikes' monitoring methodology and left the decision which solution to buy to the local governments, whose responsibility was to take care of dikes.
 - Jari: Canadian scheme would also be a good example - matching innovation to the real market need. SME with innovative solution not yet in the market approaches an agency, which - if the solution is innovative enough - matches the SME with a public sector organisation that has a need that can be addressed with this innovative solution. The agency supplies them with the additional money for testing.
- What kind of expertise is needed in the recommended innovation procurement unit?
 - Jari: Combination of understanding what is innovation. Sector specific combined with overall procurement skills.
 - Jakob: 1) Expertise to make a business case for innovation, 2) to know about the market and the technology (for example in health sector there is a lot of technology that nobody actually uses), 3) internal analysis what does innovation actually means.
 - Jari: sectoral knowledge comes from the sectoral ministries. Business case comes from the companies. Main competence needed in this unit is therefore how to run innovative procurement processes.
- How would the pre-commercial procurement exactly work?
 - Jari: Example from construction sector - Riigi Kinnisvara would like to have an ICT solution to monitor the maintenance needs of heating and cooling systems in buildings. They define the energy saving criteria they want to reach. Invite the companies and research organisations who would be interested in developing such a system to discussion. These form consortia with other companies and research organisations or come alone to make a proposal. After Riigi Kinnisvara has received all proposals, they select the best ones - typically 2-4 offers that fulfil the criteria representing different potentially viable solutions - they cover the costs of R&D of all selected bidders (this is the risk need to be taken by Riigi Kinnisvara/government). This would eventually lead into 2-4 innovative ICT solutions in the market for all property owners.
- Shouldn't we start with defining the outcome before talking to the companies?
 - Jari: Depends on how innovative the companies are. One example is Motiva from Finland. They ask around in the market in advance to make sure that there is a sufficiently large number of interested potential clients. The potential clients are then invited to make a commitment to buy the innovative product, service or solution provided that it fulfils jointly defined requirements at a reasonable

price . This offers companies a good insight on market needs, a successful early market launch and therefore reduces the risks related to commercialisation. Crowd-funding have been used in a similar fashion, i.e. companies with an idea for an innovative product request crowd-funding with a promise to develop the product if they reach their funding target. Typically those participating in the crowd-funding are promised this innovative product first and possibly at a reduced price.

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