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Public Procurement for Innovation in Baltic Metropolises

Veiko Lember
Tarmo Kalvet
Rainer Kattel
Caetano Penna
Margit Suurna

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Executive summary

Until recent years, public procurement in the European Union has been perceived as being a rigid process aiming narrowly at non-discrimination, cost efficiency and transparency goals. However, recently public procurement has recognized as powerful tool to influence innovation processes. By definition, procurement for innovation means the purchase of goods or services that do not yet exist or require new features, and hence require research and innovation to realize the requirements.

There exists evidence that local and regional governments are becoming more involved every day in procuring innovative solutions in order to solve existing as well as emerging social challenges. The overall knowledge of how they do it and what the effects of doing that are, has, however, remained limited. It is the main task of the current report to fill in these gaps by taking a closer look at the current state-of-the-art in public procurement for innovation in some Baltic Metropolises (Berlin, Copenhagen, Helsinki, Malmö, Riga, Stockholm, and Tallinn).

The study consists of thorough literature analysis and in-depth empirical data gathering. Web-based questionnaire represented the first step designed to gain the overall knowledge of procurement for innovation in the participating cities. It was followed by collection of information regarding the key cases (8 case studies were identified) and structured interviews with different stakeholders of public procurement for innovation in the partner cities. Altogether 18 persons from 6 cities were interviewed. The research was supported with secondary sources where available.

The theoretical framework of the report is built around the popular technology life cycle model according to which in the early days of a new technology – the fluid phase – the application potential of a technology is imagined, but the market risks are very high. Research and development costs for an entrepreneur are high and it takes a good deal of experimenting around the technology and its applications, but the sales volume is low, and customers have to be prompted to try the product. It has been even argued that the end-user innovation is, by far, the most important and critical and users and producers of innovations are mutually interdependent in a complex way.

Particularly in technology driven products, the fluid phase is often characterized by competing technology trajectories. Such technological competitions create what is called “winner-takes-all” markets where a winning technology often captures the entire (potential) market, thereby creating huge scale economies for the producer(s). So, once an entrepreneur manages to overcome risks associated with a fluid phase, and once the technology enters the transitional phase, the entrepreneur benefits from economies of scale that possibly include exports to other countries, increases in companies’ employment levels and real wages, etc. This all brings positive spillovers or external economies to the whole region (e.g. development of supplier networks).

Employing public procurement for the sake of innovation is not a new idea. Especially the United States, but also Japan, China and other Asian countries have been using public procurement for promoting innovation since WW II. And the success has been staggering: the Internet, GPS technology, semi-conductor industry and passenger

jets are perhaps the most prominent examples resulting from government innovation-oriented procurement. However, besides creating the above-mentioned radical innovations, the fact that procurement for innovation has made it possible to change the logic of public policy intervention from trade barriers to competitive competence-building process through procurement is just as important. In addition, there are studies available comparing R&D subsidies and state procurement contracts without direct R&D procurement concluding that over longer time periods, state procurement triggered greater innovation impulses in more areas than R&D subsidies did.

There are several ways how public agencies can support innovations, namely via the creation of new markets for products and systems that go behind the state-of-the-art; the creation of demand “pull” by expressing its needs to the industry in functional or performance terms; providing a testing ground for innovative products; providing the potential of using public procurement to encourage innovation by providing a ‘lead market’ for new technologies. The public sector can act as a technologically demanding first buyer by socializing risks for socially/ecologically demanded products where significant financial development risks prevail as well as by promoting learning as procurement introduces strong elements of learning and upgrading into public intervention processes.

There are three main procurement forms through which innovation can be promoted. Direct procurement is a situation where a public authority purchases a product for its own use. Cooperative procurement happens when public authorities or agencies buy jointly with private purchasers. Catalytic procurement refers to a situation where a public sector actor is involved in the procurement, or even initiates it, but the purchased innovations are in the last instance used exclusively by private end users.

However, the EU member states have not generally taken advantage of such options and the size of public procurement in support of research and innovation is marginal in total public procurement. For example, in 2004, the EU-wide tendered R&D procurement formed less than 1% of the total EU-wide tendered procurement budget. The US equivalent was 15%. To cope with the criticism towards the traditional procurement, the EU decided to reform its public procurement regulation. In 2004, a new package of regulation was adopted by the EU, including several new tools and principles for supporting procurement for innovation.

The experience of the BaltMet cities regarding public procurements for innovation is mixed, but mostly innovation does not play any role in the current public procurement guidelines in the cities. Stockholm can be considered perhaps the most advanced (see table).

Public Proc. System		Berlin	Copenhagen	Helsinki	Malmö	Riga	Stockholm	Tallinn
Organizational structure		Decentralized	Decentralized/ Mixed	Mixed	Mixed	Decentralized	Mixed	Decentralized
	PP Budget	N/A	€ 160 million	€ 2.0 billion	€ 160 million	N/A	≈ € 1.1 billion	N/A
	% of total budget	N/A	26%	40%	15%	N/A	30%	N/A
	Strategy for Public Procurement in city/region	N/A	Yes (being created)	Yes	Yes	No	Yes	No
	Procurement guidelines (manuals)	N/A	Yes	Yes	Yes	No	Yes	Yes
	"Innovation" emphasized in guidelines	N/A	No	Yes (very modestly)	No	No	No	No
	Link between procurement and strategy for econ. develop. (or innovation)?	N/A	No	Yes	No	No	Yes	No
	Incorporation of the new EU legislation	N/A	Yes	No (a draft exists)	No (delayed legislation in Sweden)	No	No (delayed legislation in Sweden)	Yes
	Policies for participation of SMEs in tendering processes	N/A	No	Yes	No	Yes	Yes	No
	Framework for unsolicited innovations proposals	N/A	No	No	No	No	Yes	No
	Training procedure	N/A	No	Envisioned in strategy	Varies	No	Voluntary schemes	Occasional

Based on the feedback from questionnaires, interviews and case study analysis, the following conclusions can be drawn describing the current situation of public procurement for innovation in the Baltic Metropolises:

- As of today, public procurement is not seen as an inherent part of the cities' innovation policy;
- There is a lack of awareness among city officials about the connection between procurement and innovation;
- There is no common practice regarding transfer of intellectual property rights (IPR) in the cities/region;
- The main triggers for procurement for innovation have been specific public needs or policies such as environmental policy;
- As of today, local authorities do not act like risk-taking sides when promoting innovation through public procurement;
- Local governments can act as market creators;
- Public procurement for innovative solutions has had positive impact on the providers;
- The roles of regional and central government remain important when local authorities start procurement projects to support innovation;
- Supportive measures are needed to promote diffusion of innovative solutions, as procurement itself may not be sufficient;
- Political support is crucial;

- The cities face the challenge to change the prevailing procurement culture and motivate their officials to use the new tools available.

Consequently, in order to build a coherent policy capable of capturing innovation through public procurement, the cities should:

- Adopt its own strategy and guidelines for public procurement for innovation;
- Bind together innovation policies, R&D policies (where applicable) and public procurement policies;
- Introduce the demand for innovation already in legislation regulating a certain policy field;
- Build up capacities to routinely collect information from the market on emerging (technological) solutions for social needs;
- Establish a unit or appoint a person responsible for the procurement and innovation issues;
- Allocate a share of public procurement to innovation;
- Inform public (procurement) officials about the aims and nature of procurement for innovation;
- Systematically deal with barriers and governance issues related to procurement for innovation.

These are supported with procedural recommendations also prepared within the research project. There is also a room for co-operation and a joint action between the Baltic Metropolises – “BaltMet Procure” – has been proposed. The latter should focus on the exchange of experiences and awareness building, introduction of the new EU procurement processes and innovation-friendly philosophy, communication and integration with businesses and initiation of hands-on pilot projects.

The study was conducted by Tallinn University of Technology between August and December 2007 with the help and input of all partner cities, BaltMet Inno project, Culminatum Ltd and all interviewees.

1 Introduction

1.1 Background

Until recent years, public procurement in the European Union has been perceived as being a rigid process aiming narrowly at non-discrimination, cost efficiency and transparency goals. However, the new global challenges as well as the growing global competition have forced the EU to change the traditional course of action towards using the public procurement tool also for wider social goals. Green procurement, sustainable procurement and socially responsible procurement are the fields where the EU and its member countries have been more or less active for more than a decade now.[1] Somewhat less attention has been given to using public procurement to promote innovation and therefore the economic growth of the region.

By definition, procurement for innovation means the purchase of goods or services that do not yet exist or require new features, and hence require research and innovation to realize the requirements (European Commission Expert Group, 2005). Although procurement for innovation is most often associated with the field of technology, this report considers both product as well as process innovation to be equally important.

From the government perspective, it is about purchasing new solutions for emerging social needs. From the provider organization perspective, it is about increasing their internal capacity and export potential by using public funds for the development process. And from the public point of view, it is about promoting economic growth and overall well-being. Therefore, if implemented correctly, public procurement for innovation can create a win-win-win situation.

There exists evidence that local and regional governments are becoming more involved every day in procuring innovative solutions in order to solve existing as well as emerging social challenges. The overall knowledge of how they do it and what the effects of doing that are, has, however, remained somewhat unclear. It is the main task of the current report to fill in these gaps by taking a closer look at the current state-of-the-art in public procurement for innovation in the Baltic Metropolises. The following cities were included in the study: Berlin, Copenhagen, Helsinki, Malmö, Stockholm, Riga and Tallinn. As a result of the study, it is expected to:

- find out the best practices and case studies on procurement for innovation in Baltic Metropolises, and
- prepare recommendations for improvement of strategies and processes of public procurement for innovation in Baltic Metropolises

It is hoped that the current report serves as a basis for further discussion and actions in the field of procurement and innovation.

[1] See for example different European initiatives on responsible procurement at http://www.respiro-project.eu; www.carpe-net.org and http://www.build-for-all.net/en/reference/; environmental procurement at http://www.grip.no/hamar2006/ and http://europa.eu.int/comm/environment/gpp/; sustainable procurement http://www.procuraplus.org/.

The study was conducted by Tallinn University of Technology between August and December 2007. The help and input of all partner cities, BaltMet Inno project, Culminatum Ltd and all interviewees is greatly acknowledged.

1.2 Method

To our knowledge, this study represents the first attempt to comparatively assess the public procurement (PP) for innovation in the Baltic region. There have been case studies, some even published earlier (e.g. Pohl and Sandberg, 2005; Edler et al., 2005), but these have not aimed to develop a comparative analysis allowing generalizations about the Baltic (Nordic?) region on this issue. For that reason, a two-step approach was designed to gather the empirical data.[2] First, a questionnaire was delivered to the partner cities. Second, structured interviews were conducted with different stakeholders of PP for innovation in the partner cities. See Annex I for the list of interviewees.

The web-based questionnaire represented the first step of the research study that was designed to gain the overall knowledge of procurement for innovation in the participating cities. An equally important goal was to collect information regarding the key cases and contacts of persons who have been involved in the procurement for innovation processes. The questionnaire was sent to the following cities: Berlin, Copenhagen, Helsinki, Malmö, Riga, Stockholm, and Tallinn. Six cities out of seven responded. The questionnaire can be found in Annex II.

As a second step, structured interviews were carried out with representatives of the cities and the provider organizations as well as field experts. The interview aimed at gaining the specific knowledge of procurement for innovation cases in the participating cities. The contact persons from the partner cities made the initial selection of possible cases, and then the persons responsible were contacted. We tried to find out how the innovative solutions are procured by the cities and what the general effect of these procurement cases has been on the cities, producers and the overall economic well-being of the region.

The questions were divided into three parts. The first part concerns the institutional set-up of public procurement in a region. The second part deals with the general nature of the cases of the procured goods/services. The third part is about procurement and the contracting process. Questions for representatives of provider organizations and field experts were slightly modified. See Annex III for the employed interview structure.

Altogether, 8 cases were identified and 18 persons from 6 cities were interviewed. Information obtained through written questionnaires by Culminatum Ltd in 2006 was also used in this report. Table 1 summarizes the methods employed and cities studied.

[2] The employed questionnaire and interview structures are based on the framework used in the Fraunhofer Institute report for the European Commission. See Edler et al. (2005).

Table 1. Employed methods for the study

City	Web-based questionnaire	Oral interviews	Written interviews	Case-studies
Berlin	-	-	1	1
Copenhagen	1	2	1	1
Helsinki	1	1	1	2
Malmö	1	1	1	1
Stockholm	1	2	2	2
Riga	1	-	-	-
Tallinn	1	5	3	1

1.3 Structure of the report

The introductory chapter explains the overall background of the study and the method employed. The second chapter of the report gives an overview of the relationship between public procurement and innovation. It will be argued how public procurement fits into the innovation policy framework and what the potential is of using the public procurement tool for innovation.

The third chapter outlines recent developments in legal regulation as well as theoretical thinking on what can actually be done by public authorities to promote innovation through public procurement.

The fourth chapter outlines the results of empirical study of the current status of procurement for innovation in Baltic Metropolises. Also, case studies from Baltic Metropolises about public procurement for innovation are presented.

The final chapter presents recommendations and suggestions for further actions to be undertaken by the partner cities of the BaltMet Inno network in order to promote innovation in the region through public procurement.

2 Innovation and public procurement for innovation

2.1 Innovation

It is generally accepted today that throughout the history of mankind, the generation, exploitation and diffusion of knowledge has been fundamental to the economic development and the well being of nations (see Reinert, 2007 for a detailed treatment). In 1613, for example, Antonio Serra analyzed why his home town of Naples remained so poor, while Venice, which had no natural resources, was at the very center of the world's economy. The conclusion was that the Venetians had to build up an industry that was making great use of knowledge in various ways. He also concluded that "…*effective government, when it occurs to perfection in any kingdom, will undoubtedly be the most powerful cause of all of making it abound in gold and silver*" (Serra, 1613, translation forthcoming in 2008). Serra's work was greatly appreciated by Joseph Alois Schumpeter who was the first to produce a detailed approach to innovation and entrepreneurship. His main argument was that ***economic development is driven by innovation through a dynamic process in which new technologies, skills, industries etc. replace the old ones, a process he labeled "creative destruction".***

All currently popular innovation theories are heavily built on the Schumpeterian approach, including the Oslo Manual, the foremost international source of guidelines for the collection and use of data on innovation activities in the industry. According to the Manual, a firm can make many types of changes in its work methods, its use of factors of production and the types of output that improve its productivity and/or commercial performance.

> *An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations* (OECD and Eurostat, 2005, 46).

The current paper is looking at both product and process innovations. The former consists of the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. A process innovation is the implementation of a new or significantly improved production or delivery method; this includes significant changes in techniques, equipment and/or software.

2.2 Technology life cycle

There are some generally agreed regularities regarding how innovation takes place and develops. According to the technology life cycle model (Abernathy and Utterback, 1978), both process and product innovations develop through three main phases (Figure 1).

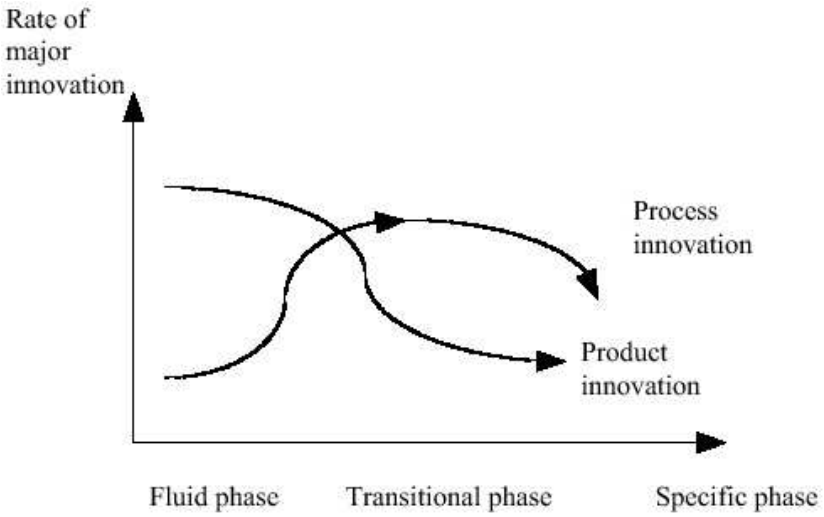

Figure 1. Different phases in the technology life cycle (Source: Abernathy and Utterback, 1978).

In the early days of a new technology – the fluid phase – the application potential is imagined, but the market risks are very high. Research and development costs for an entrepreneur are high, but the sales volume is low, and customers have to be prompted to try the product. This phase is characterized by a good deal of experimenting around the technology and its applications.

The transitional phase starts with the emergence of a dominant design. As product and market uncertainty lessens and research and development efforts are focused on improving the dominant technology, design cycles shrink. As a result, costs are reduced due to economies of scale, the sales volume is increased significantly, and activities are profitable for an entrepreneur. Once a product is well established, the emphasis moves towards the process innovation. The once highly profitable market becomes commoditized, a direct result of cost reduction and excess capacity.

Particularly in technology driven products, the fluid phase is often characterized by competing technology trajectories, famous examples include VHS vs. BETA video technologies, or Windows vs. OS II operating systems. Such technological competitions create what is called “winner-takes-all” markets where a winning technology often captures the entire (potential) market, thereby creating huge scale economies for the producer(s) (see Arthur, 1994 as a classic reference). According to Schumpeter, such market imperfections are precisely the reason why entrepreneurs innovate. It is important to note here that, depending on specific policy aims and environment, with procurement processes, it is possible to create both this initial fluid phase as well as the phase where technological trajectories are already defined.

In a final phase, the sales volume declines or stabilizes, prices as well as profitability diminish. The existing technology can be rendered obsolete by the introduction of next-generation technology, a more advanced technology or converging markets.

So, once an entrepreneur manages to overcome risks associated with a fluid phase, and once the technology enters the transitional phase, the entrepreneur benefits from

economies of scale that possibly include exports to other countries, increases in companies' employment levels and real wages, etc. This all brings positive spillovers or external economies to the whole region (e.g. development of supplier networks).

2.3 National Innovation Systems and Regional Innovation Systems

What has been presented regarding the innovation processes implies that innovation does not happen in a vacuum, but there is an interplay of various actors. Some of the innovation researchers have been working on the concept of national innovation systems defined as

> *The network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies (Freeman, 1987, p. 1).*
>
> *Elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge and that a national system encompasses elements and relationships, either located within or rooted inside the borders of a nation state (Lundvall 1995, p. 2).*

Recently, various approaches to regional development have increasingly started to emphasize different aspects of skills development, technological advancement and industrial competitiveness. In his 1990 analysis of the economic and regional development of the United States, Porter introduced the term of *industrial clusters* which was inspired by Marshall's works about a century earlier. Porter argues that geographic concentration stimulates growth because of local advantages, such as concentration of highly specialized skills and knowledge, organizations, rivals, related businesses and sophisticated consumers. In 1992, Cooke et al. coined the term of *Regional Innovation Systems* based on Freeman's and Lundvall's earlier works about national innovation systems. Both of these directions of research, clusters and innovations systems, have, in turn, given rise to various approaches to *regional clusters* in recent years (see OECD, 2007).

2.4 End-user innovation

Based on the technology life cycle model we can argue that entrepreneurs in all countries encounter barriers to innovation in the fluid phase. However, these barriers can widely vary in developed and in developing countries. While much of national innovation systems literature deals with developed countries and thus often assumes relatively high levels of education, R&D and governmental administrative capacity, developing countries lack or have serious deficiencies in all of these aspects. Yet, central to innovation processes are users and their needs, and often, changes are carried out in the product (Table 2).

Table 2. Stages in the innovation life cycle

Characteristic	*Fluid pattern*	*Transitional phase*	*Specific phase*
Competitive emphasis placed on …	Functional product performance	Product variation	Cost reduction
Innovation stimulated by	Information on user needs, technical inputs	Opportunities created by expanding internal technical capability	Pressure to reduce cost, improve quality, etc.
Predominant type of innovation	Frequent major changes in products	Major process innovations required by rising volume	Incremental product and process innovation
Product line	Diverse, often including custom designs	Includes at least one stable or dominant design	Mostly undifferentiated standard products
Production processes	Flexible and inefficient - aim is to experiment and make frequent changes	Becoming more rigid and defined	Efficient, often capital intensive and relatively rigid.

Source: Utterback, 1994.

This is confirmed by a variety of empirical research and has led Eric von Hippel (1976) to identify the ***end-user innovation as, by far, the most important and critical.*** Lundvall has also written seminal works on how users and producers of innovations are mutually interdependent in a complex way (see, for example, Lundvall, 1988). The end user here signifies the fundamental idea of market economy first articulated by Adam Smith that the division of labor or productivity is limited or enhanced by the size of the market. The more end users there are (e.g. willing customers, interested contractors and/or suppliers etc.), the larger the production potential and thus also the larger the economies of scale are. In the context of procurement, it is important to note that governments can precisely become important end users via the procurement process. Next to direct technological or product innovations, also quality and other (e.g. ecological) standards set by public agencies play a key role here.

2.5 Public procurement for innovation

As argued by Edler and Georghiou (2007), innovation support has been mainly given to enterprises through the highly differentiated supply-side innovation policy measures (Figure 2), while demand-side innovation policies – defined as all public measures to induce innovations and/or speed up the diffusion of innovations by increasing the demand for innovations, defining new functional requirements for products and services or better articulating demand – have been less prominent. Rothwell (1984) argued similarily that supply-oriented instruments tackle only some aspects of the problem. However, it is important to note that while most economic theories agree that in the initial stages of technology development, government intervention in one form or other is justified (usually in the form of infant industry protection or developing defence capabilities), developing countries often face quite different challenges. Developing countries rarely operate at the technological frontier, rather they seek opportunities to catch up. This has widespread implications also for how to justifiy and conceptualize government intervention and policies generally. Developing countries might need both strong supply- and demand-side policies to

enhance markets and innovation. Public procurement for innovation can be a powerful tool for demand-oriented policies, essentially creating or enhancing markets.

The public procurement for innovation is defined in the following report as

> *Public procurement, which occurs when a public agency acts to purchase, or place an order for, a product – service, good, or system – that does not yet exist, but which could probably be developed within a reasonable period of time, based on additional or new innovative work by the organisation(s) undertaking to produce, supply, and sell the product being purchased (Edquist, Hommen and Tsipouri, 2000).*

Indeed, procurement offers much more refined options for government intervention and market enhancement than simple protectionism and/or subsidies (see further below). In fact, within the procurement process, it is often possible to enhance competition between different suppliers and thus avoid the usual traps of protectionism (e.g. rent-seeking) (see Wade, 1990 as an excellent discussion on Taiwan).

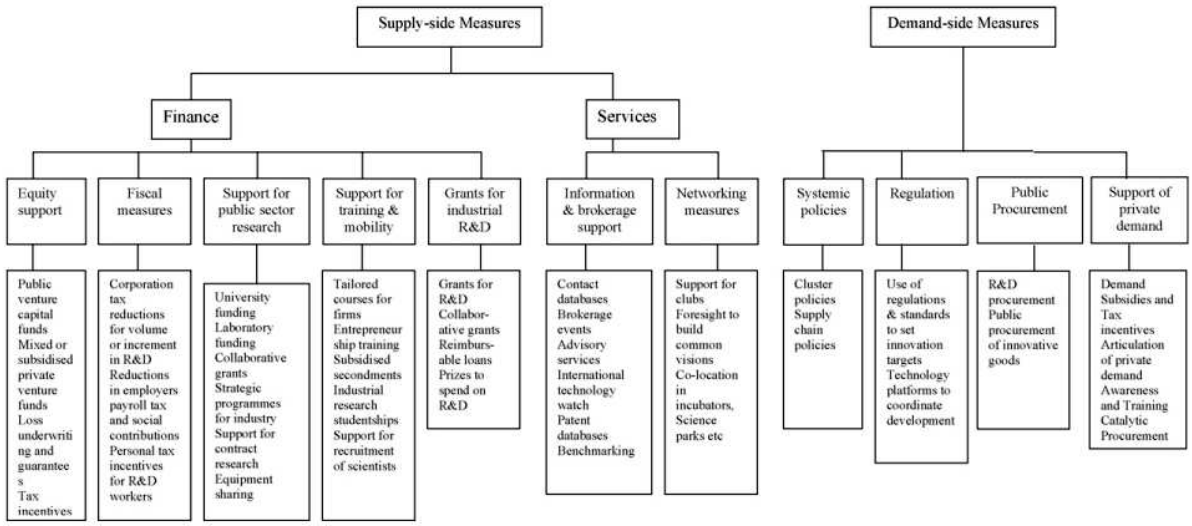

Figure 2. Supply-side and demand-side innovation policy measures (Source: Edler and Georghiou, 2007).

Employing public procurement for the sake of innovation is not a new idea. Especially the United States, but also Japan, China and other Asian countries have been using public procurement for promoting innovation since WW II. And the success has been staggering: the Internet, GPS technology, semi-conductor industry and passenger jets are perhaps the most prominent examples resulting from government innovation-oriented procurement (Cabral et al., 2006). However, besides creating the above-mentioned radical innovations, the fact that procurement for innovation has made it possible to change the logic of public policy intervention from trade barriers to competitive competence-building process through procurement is just as important.

Both the US and various Asian economies offer excellent examples of how procurement coupled with other extensive policy measures can significantly improve

both developed and developing economies (see, e.g. Wade, 1990; European Commission Working Group, 2006). It is important to note that procurement is not a stand-alone policy measure but rather an additional instrument in the policy mix. Although such tools have been used also in Europe, they seem to be generally less studied; however, recently several studies have emerged. The first one was a thorough study by Edquist et al. (2000) on various technologies applied in Sweden (e.g. X2000 High Speed Train, Electrotechnolgy, School Computers), Italy, France, Greece and Austria (all about Digital Switching Systems). Palmberg (2002) convincingly shows how the important role of the public telecom operator, as a competent technology procurer, has contributed to the success and growth of Nokia prior to the mid-1980s. Jakob Edler and his colleagues have also come up with case studies on Germany (e.g. new lighting systems in Hamburg), Austria, Norway, the Netherlands, the United Kingdom and Italy (see Edler et al, 2005).

The public sector procurement in the current context can be seen here as a special case of user-producer interaction: “In capitalist economic systems, where markets are effective mechanisms for articulating and satisfying most economic needs or demands, the point of departure in the application of public technology procurement must be the satisfaction of genuine social needs – in other words, specific societal needs unlikely to be met by the market” (Edquist and Hommen in Edquist et al , 2000, p. 5). But not only that, as ***the role of the central government as well as local governments can be seen also as a facilitator of innovation processes in fluid phases as both social and economic benefits for the region and/or nation state might follow.***

In more concrete terms, there are several ways how public agencies can support innovations, namely via

- the creation of new markets for products and systems that go behind the state-of-the-art;
- the creation of demand “pull” by expressing its needs to the industry in functional or performance terms;
- providing a testing ground for innovative products (Rothwell, 1984, p. 166);

but also,

- providing the potential of **using public procurement to encourage innovation by providing a ‘lead market’ for new technologies** (European Commission Working Group, 2006).

The public sector can act as a technologically demanding first buyer by **socializing risks** for socially/ecologically demanded products where significant financial development risks prevail as well as by **promoting learning** as procurement introduces strong elements of learning and upgrading into public intervention processes.

> *… we propose to distinguish three fundamentally different roles that public technology procurement can play in relation to processes of market development. The first of these roles, and the one most closely associated with developmental technology procurement, is that of market initiation. The second, most commonly associated with adaptive or diffusion oriented public technology procurement, is that of accelerating or expanding markets that have come into existence, and may be referred to as market escalation. A*

third role that can be identified is that of "bundling" demand through harmonisation or standardisation across what would otherwise remain a series of fragmented "niche" markets. This role of public technology procurement in relation to market development can be referred to as market consolidation (Edler et al., 2005, p. 18).

Edler argues (based on Geroski, 1990; Dalpé et al., 1992; Dalpé, 2003, Edquist, 1998) that the state:

- *is frequently a very "demanding" demander, necessitating innovative solutions to fulfil its tasks in society. This applies in the military and non-military area. New societal needs and thus state priorities inevitably offer leeway also for innovative solutions.*
- can bear higher entry costs. *In connection with political tasks or even "missions", the state is also frequently more willing or able to pay the higher price at the beginning of the life cycle of innovations.*
- can help in creating critical mass. *State demand may lead rapidly to a critical mass, in particular by bundling the needs of various government bodies. Such public demand creates clear incentives for manufacturers and reduces their market risk. This critical mass also structures the manufacturing branches connected with the innovation in question. This effect is especially strong for young technologies, i.e. when industry is able to react to strong impulses on the part of the state.*
- *demand for innovative products additionally sends strong signals to the private users, the diffusion impulses are sometimes much stronger than those triggered by purely private demand.*
- can help in linking innovation to production (and not just increasing R&D capacities of the companies). (Edler, 2006, p. 8).

Regarding the latter: there are several studies available (e.g. Rothwell and Zegveld, 1981) comparing R&D subsidies and state procurement contracts without direct R&D procurement concluding that ***over longer time periods, state procurement triggered greater innovation impulses in more areas than R&D subsidies did.*** Geroski (1990, p. 189) highlights the direct links between innovation and production showing that (in contrast to supply-side measures such as R&D subsidies,) public procurement for innovations leads not only to technological capacities, but at the same time to increased production capacities for innovations.

2.6 Challenges for small states and regions

Due to their small size, there are several advantages and disadvantages associated with small states, cities and regions in procurement for innovation. Size matters in procurement for innovation in the following way: large and wealthy countries have both the means and capacities to carry out complicated procurement processes. Equally, such units have usually many competitors for contracts, and prospective markets are considerable. Contrarily, small states and even more so cities and regions have clear disadvantages as cities and regions[3]

[3] As our focus is on cities and regions, we leave small states out of further discussion.

- are often dependent on nation-state level legal regulations and financing
- lack administrative and financial capacities to manage and implement large-scale and long-term procurement processes
- lack large potential markets
- are exposed to heightened rent-seeking and other corruptive pressures due to smallness.

On the other hand, cities and regions have clear advantages in procurement for innovation: size constraints also mean that cities and regions are often at an advantage in

- building and creating competencies and networks (key system elements in innovation systems) essential to successful procurement of innovation where cooperation, networking and learning by doing are cornerstones of success
- concrete and usually short-term demand: e.g. procurement for a new m-parking system is relatively easier to handle (in terms of management capacities, finance, accountability and transparency) than long-term R&D ventures.

3 From traditional public procurement to public procurement for innovation

3.1 Introduction

The EU is the largest public procurement market in the world, worth € 1.4 trillion annually (Trybus, 2007). Up until recent years, the EU procurement policy did not favor using procurement as a tool for wider social goals. But taking into account that EU spending on public procurement accounts for 16% of the EU GDP, the public purchasing has a huge potential for influencing wider social goals, including innovation and industrial policy. The traditional public procurement in the EU can be characterized by four main principles:

- Competitiveness
- Non-discrimination
- Transparency
- Cost efficiency

It has been tradition for the EU not to impose exceptions permitted by the WTO Government Procurement Agreement on restricting open competition in public procurement on the areas where the EU suppliers are world market leaders. These exceptions are, however, used by other countries such as India, China or Japan (European Commission Working Group, 2006). In order to enforce the main principles of public procurement, the traditional public procurement in Europe is designed to be as automatic as possible allowing minimum discretion for public authorities. Once the decision has been made on purchasing a certain good or service by public authorities, the process is expected to be automatic, so that abuses and corruptive behavior could be avoided and the potential providers are secured with the level playing ground. Therefore, the traditional public procurement is thoroughly about avoiding risks.

The general approach to traditional public procurement policy has faced increasing criticism, however. It has been claimed that although the procurement process has become very complex, the regulation falls short in fighting against corruption and the whole process has become very time and resource consuming (Kelman, 2002; Trybus, 2007). At the same time, the traditional model forces public authorities to acquire the cheapest products, not those with the best value.

The EU has taken a very limited advantage of procurement for innovation demanding R&D work. A report of the European Commission Expert Group states clearly that:

> *Interviewed national experts unanimously consider the **size of public procurement in support of research and innovation** as **marginal** in total public procurement (*European Commission Working Group, 2006*).*

The same report outlines that:

- In 2004, the EU-wide tendered R&D procurement formed less than ***1%*** of the total EU-wide tendered procurement budget. The US equivalent was ***15%***.
- The EU spends ***4 times*** less on civilian R&D procurement and ***20 times*** less on defense R&D procurement than the US

- Low procurement of R&D by public authorities is ***the main reason for the existing R&D investment cap*** between the US and the EU, not the financial assistance.

To cope with the criticism towards the traditional procurement on the one hand and the growing competition in the global market on the other, the EU decided to reform its public procurement regulation. In 2004, a new package of regulation was adopted by the EU, including several new tools and principles for supporting procurement for innovation (see European Parliament and Council of Europe, 2004a and 2004b).[4] As of today, not all the member states have adopted the new regulation into their national legislation, so the member countries are still somewhat in the middle of a transformation phase.

Public authorities have had the possibilities to use procurement as a tool for innovation policy already during past decades, but the new avenues that emerged recently provide the option to enhance the potential of that tool. Using public procurement for innovation more profoundly means that some of the main principles characterizing the traditional procurement have to be altered. For instance, procurement for innovation always embraces the risk to fail, and therefore, a shift from a risk-avoiding public sector towards a risk-accepting public sector needs to take place (Rothwell, 1984).

3.2 Main elements favoring public procurement for innovation

As indicated earlier, the recent changes in public procurement policy underline the need to employ public procurement as a demand-side tool for innovation policy. There are three main procurement forms through which innovation can be promoted (Edquist et al., 2000).[5] Public authorities can employ either:

- Direct procurement, or
- Cooperative procurement, or
- Catalytic procurement

Direct procurement is a situation where a public authority purchases a product for its own use. Cooperative procurement happens when public authorities or agencies buy jointly with private purchasers. Catalytic procurement refers to a situation where a public sector actor is involved in the procurement, or even initiates it, but the purchased innovations are in the last instance used exclusively by private end users. The scarce empirical evidence claims that ***public procurement is most effective***

[4] Already at the beginning of the 1990s, the procurement reform took place in the US, when a clear direction away from strict regulations was taken. The idea was to facilitate value capturing and achievement of social and economic goals such as involvement of minority groups, women-owned businesses and SMEs (Kelman, 2002).

[5] In the framework of procurement for innovation, one should distinguish between procurement for innovation and procurement for knowledge. Although the result can be the same for both methods, and both methods can be used simultaneously, the former should be regarded as materialized goods and services, whereas the latter is about knowledge in its own right. Examples of procurement for knowledge include posting ex-ante or ex-post prizes for rewarding discoveries, performance-based contracts with public laboratories, research contests etc. See also e.g. Cabral et al. (2006) for further discussion on procurement for knowledge. To find additional information on the procurement for knowledge in this report, consult the sections covering pre-commercial procurement.

when public authority acts as the end user of purchased products (Rothwell, 1984).

The following three sections outline the main principles as well as new methods that deserve attention if supporting innovation through procurement is considered to be important. First, an overview of the new methods stemming from the new EU public procurement legislation is given. Secondly, a selection of principles favorable for innovation is outlined. And thirdly, possible barriers and governance issues are briefly discussed.

3.2.1 New legal methods favorable for innovation

Public procurement for innovation should consider the ***Most Economically Advantageous Tender (MEAT) as the first choice for selection and awarding criteria*** and hence it should be preferred over lowest cost criteria. In the framework of MEAT, the awarding criteria should take into account not the current but the whole life-cycle costs (see Annex IV for more detailed overview).

> *Taking … long-term effects into account is possible within the legal framework through, for example, long-term cost calculations or life-cycle cost approaches. Costs and benefits do not have to be limited to only the moment of purchase. (European Commission Expert Group, 2005, p. 16)*

According to EU legislation, MEAT could include a combination of the following criteria:

- Price
- Quality
- Technical merit
- Aesthetic and functional characteristics
- Environmental characteristics
- Running costs
- Cost effectiveness
- After-sales service
- Technical assistance
- Delivery date
- Delivery period
- Period of completion

As this is not a complete list, the other suitable criteria could include partnering/team work, innovation, organizational culture and risk management (European Commission Expert Group, 2005). Empirical evidence suggests that although 50% of public procurers claim to use life-time costing, the actual statistics shows that only 1% of contracts include life-time costing principles (Nyiri et al., 2007).

Further, selection criteria should take into account the ***bidder's capacity to carry out needed research and development work if this is required*****.** For example, aspects like the bidder's annual spending on R&D, the educational level of personnel and the provider expertise level can be used (European Commission Expert Group,

2005, p. 16). In case innovation as such (e.g. technology development) is procured, the innovative quality can be one of the awarding criteria.

To promote innovation when deciding upon technical specifications (description what is purchased for and basis for selection procedure), ***the performance-based or functional specification should be preferred to input-based detailed technical specifications.*** Technical specifications should be formed in a way allowing bidders to come up with alternative solutions. In order to provide equivalent evidence, it is legally permitted to search for alternative solutions which meet the minimum technical specifications.

> *Example:*
> *(Public authorities) should indicate in the specifications that the functional requirement for all offices in a building is to be at 20 degrees during office hours, instead of formulating extensive technical specifications for an oil or gas heating installation. This way companies can also make use of incoming sunlight, natural ventilation or other ways of heating and cooling buildings, which have the same effect but are cheaper and/or more environmentally friendly. (European Commission Expert Group, 2005, p. 16)*

In a similar vein, ***accepted standards should be referred to as much as possible*** instead of outlining specific technical requirements and details in case performance-based specifications are not sufficient.

Still, the public authorities should not rely on any possible standards. There exists empirical evidence indicating that standards should be selected carefully, as inappropriate standards can limit an innovation-friendly approach. The evidence also suggests that there is a confusion among public authorities what the performance-based specification really means, as they claim to use it more often than they actually do (Nyiri et al., 2007).

In addition to open, restricted and negotiated procedures, ***the competitive dialogue became a formal part of the EU public procurement regulation in 2004***. This procedure is aimed at facilitating public authorities to carry out purchases of very complex solutions. From a legal viewpoint, it can be used if it is impossible for the contracting authority to objectively specify what is needed or if it is seen that the offers cannot be objectively assessed due to technical, legal or financial reasons. According to the EC Expert Group (2005, p 18) the competitive dialogue consists of three steps:

> *• The setting up of requirements by the public authority and prequalification of bidders, based on their technical expertise and the way they intend to satisfy the customer's needs;*
> *• A dialogue with at least three shortlisted potential tenderers aimed at setting up the solution. The public authority can pay tenderers for the dialogue;*
> *• Limiting the final tendering to at least three participants, with the possibility of clarification but without further negotiations, and basing the final tendering on the requirements issued at the start of the tendering procedure.*

And last but not least, within the new regulation, the public authorities are reserved with the option to use ***framework agreements***. Nyiri et al. (2007, p. 17) stated that:

> *Relevant to innovation, these agreements enhance the use of multiple sourcing techniques, the use of functional specifications and allow contracting authorities to request technological developments without restarting the tendering procedure.*

3.2.2 Principles favorable for innovation

Using different foresight methods before starting the procurement process. Public organizations should build up capacities to routinely collect information from the market on emerging (technological) solutions for social needs. ***Market survey*** is a method aimed at searching for information on alternative solutions to pre-established needs. Using methods like ***technology foresights*** can increase awareness of opportunities to support innovation through public procurement.[6] At the same time, ***technical dialogue*** with market stakeholders enables authorities to gather needed information on the more specific aspects of solutions offered by the market.

> *Example:*
> *A contracting authority issues a market survey in case it wants to know what the market can offer regarding open source and/or proprietary software for internet portals. If, for example, the choice has been made for open source software, a technical dialogue could be launched in order to help specify the exact requirements regarding open source software for internet portals. (European Commission Expert Group, 2005, p. 16)*

Further, ***public technology platforms should be developed and used*** by the public authorities when appropriate. It is about

> *a mechanism to bring together all interested stakeholders to develop a long-term vision to address a specific challenge, create a coherent, dynamic strategy to achieve that vision and steer the implementation of an action plan to deliver agreed programmes of activities and optimise the benefits for all parties.*[7]

Additional methods for creating continuous dialogue with the market involve:

- organizing “industry days”, where cities invite industries to share the latest information on what they have to offer for solving pre-defined social needs.
- developing procedures for technical dialogues
- creating strategies for handling unsolicited proposals

[6] In recent years, the EU has introduced many initiatives for Europe-wide technology foresights, see http://cordis.europa.eu/foresight/home.html. The EC Expert Group has even proposed that a special information service should be developed exclusively advising procurement authorities on new technologies and solutions emerging on the market (2005, p. 7).

[7] Source: Europa Research (http://europa.eu.int/comm/research/energy/nn/nn_rt/nn_rt_hlg/article_1262_en.htm) , quoted in EC Expert Group, 2005, p. 29).

- creating a market-intelligence capacity; the cities need to acquire or have access to appropriate technical know-how.

Involving SMEs in public procurement for innovation is an important task to be fulfilled for at least two reasons. First, a large part of the creative ideas for new technologies comes from SMEs. Second, SMEs compete mostly in their local markets; therefore, empowering them would increase the possibility that the positive spill-overs stemming from procurement for innovation remain with a local region. At the same time, SMEs have a *'less extensive network and less experience of dealing with the public sector and its procedures'* (European Commission Expert Group, 2005, p. 28). One way to promote the participation of SMEs is to reserve subcontracting opportunities for them in large scale procurement for innovation projects.

Public authorities need to pool the resources in order to aggregate demand. As R&D work of new solutions involves high costs, the economies of scale plays a crucial role here. Fragmented demand is considered the most important limit for procurement for innovation in the EU (European Commission Working Group, 2006).[8] Also, in this way, market and technical expertise can be enhanced and risks reduced between multiple buyers.[9] In order not to exclude SMEs from large procurement projects, it is suggested:

- to implement ***coordinated unbundling*****,** *'whereby the larger market is preserved at the system level but where component technologies are separately sourced'*, or
- to use **multiple lots**, or
- to use **combinatorial tenders**, *'where each firm is allowed to bid on one, several and/or all the lots simultaneously'*. (Ibid.)

Demand aggregation can take place in many different forms:

- Inside the public sector – local authorities together with other local as well as regional and national authorities
- Across sectors – public authorities together with private organizations
- Across borders – public authorities with or without private organizations from different countries

However, it has to be noticed here that cooperative procurements *'require extensive mapping of needs and actors of public procurement'* and are considered to be a serious future challenge for public authorities (Nyiri et al., 2007, p. 30). Such procurement processes presuppose the presence of high-level capacities in the public sector. This, however, is not always the case, particularly less developed countries/cities often have serious disadvantages in this respect. Thus, building administrative and governance capacities might be the first important task for public authorities in such cases. Cave and Frinking (2007) have listed several potential challenges in cross-border procurement pooling:

[8] Cross-border joint purchases are very seldom carried out, and then mainly within EU-level initiatives such as Galileo and GEANT.

[9] This is especially important in the case of pre-commercial procurement. Later sections deal with the phenomenon in more detail.

- the potential for expensive coordination failure
- the fact that such a scheme would (at least initially) favor suppliers in some countries and undercut the (potential) market of suppliers in others
- systematic national differences in the nature of demand
- the potential for conflict with other policy domains (e.g. competition policy).

Public authorities need to introduce proper risk-management methods to cope with risks stemming from procurement for innovation. Innovation and R&D always involve risks, and the public sector needs to learn not how to avoid them but how to deal with them.[10] Interestingly enough, the usual risk-management tools in procurement like screening for abnormally low offers, screening suppliers through insurance schemes and different scoring rules (e.g. closest to the arithmetic average of all submitted offers) may outplay the most innovative offers (Cabral et al., 2006). Some of the main aspects of risk management are (European Commission Expert Group, 2005, p. 36):

- *Risk identification – determining which risks are likely to affect the project over its life cycle and documenting their characteristics.*
- *Risk analysis – evaluating risks and risk interactions to assess the range of possible outcomes so that they may be prioritized and the need for responses identified.*
- *Risk mitigation and contingency planning – assigning responsibility for risk actions, developing mitigation (where feasible) and/or contingency plans, developing measurements and developing action plans to respond to the risks.*
- *Risk allocation – determining which party is best placed to bear and mitigate risks, and assigning responsibility accordingly.*

Cabral et al. stated that

> *When innovation is a priority both multi-sourcing and surety bonds paid by the procurer may be useful tools to increase the likelihood of awarding the contract to innovative contractors or projects, while achieving some protection from risk (2006, p. 526).*

Intellectual property rights (IPR) should be transferred to provider organizations. If the public sector wants to promote innovation via procurement, it is vital that the new technologies are given the possibility to diffuse into the market. Transferring the ownership of IPR to provider organizations is one of the best ways to do so (e.g. European Commission Working Group, 2006; Edler et al., 2005; Nyiri et al., 2007; European Commission Expert Group, 2005). Still, the contractor's interest should also be protected by arranging extra agreements. In addition, often the experiences gained by the contractor might outweigh the lack of IPR. Such positive experiences constitute learning-by-doing in the production processes that provide strong competitive advantage over competitors. See Annex V for a good practice example for innovation in the respect of IPR.

The information acquired from the procurement for innovation processes should be made available for the public and for the market as much as possible. This also includes the technology-related information. It has to be kept in

[10] See for example Neely and Neufville (2001); van Putten and MacMillan, (2004).

mind, though, that strict confidentiality clauses apply to public procurement. However, where possible and appropriate, the public authority should set conditions for or agree upon licensing and other mechanisms to make the developed application available for the whole market.

If possible, public authorities should not require unlimited liability from the providers. As explained by the European Commission Expert Group (2005, p. 40):

> *Unlimited liability clauses in the context of R&D may reduce competition between bidders as certain, otherwise acceptable, bidders will automatically exclude themselves ex-ante, either because they consider the cost of the risk would make their bid price prohibitive or because they are not willing to risk their livelihood on a government contract.*

Evaluation should be treated as an inherent part of the procurement for innovation process. Although it is obvious that the public authorities have to see that through the evaluation, the administrative as well as the political accountability is secured, in this case this is not the only reason. As already explained in Chapter 1, learning through evaluation and learning-by-doing in production is the main factor making the procurement for innovation an effective tool to use compared to e.g. R&D subsidies. Learning should take place directly between user and provider, without mediators. An overview of methods to use for evaluating procurement for innovation is given in Annex VI.

There should be public procurement policies developed and mixed together with other demand-side innovation policies. Promoting innovation through procurement cannot just happen. A coherent strategy and internal regulations need to take into account at least the aspects described in the current chapter. The procurement for innovation strategy can be targeted towards radical as well as incremental innovation and towards pre-commercial as well as commercially ready technologies. Developing specific strategies for procurement for innovation challenges the cities' strategic planning capacity, as the effective procurement for innovation policy assumes long-range communication between a market and public authorities. Concrete measures involve setting budgetary targets for public procurement spending on innovation. For instance, in the UK, there exists a goal to allocate 25% of the public procurement budget to innovation.

One thing is to have a general strategy of procurement for innovation. Another thing is to see procurement as a demand-side tool of innovation policy. An empirical study concluded that:

> *Procurement has an enhanced probability of influencing technological change when it is used in conjunction with other policy instruments such as regulation (Rothwell, 1984, p. 168)*

Therefore, in order to effectively use the public resources for innovation, public procurement should be concentrated on ***sectors and clusters relevant to the region or the country*** (e.g. social and health services, e-governance, environmentally friendly public transportation, biotechnology etc.). This is so because public procurement for innovation has the biggest effect when public authorities can

act as first and quality lead-users in sectors capable of coming up with radical innovations. Another question here is whether to concentrate on national champions or start-ups.[11] A third aspect would be to stimulate private demand for new products in order to create network externalities. This is the general context of market failure where there are unmet needs in society. And last but not least, R&D grants and other innovation supporting tools should be concentrated on areas where cities are about to begin large procurement projects.

Cabral et al. (2007, p. 520) list six aspects that should be taken into account when establishing a policy for procurement for innovation:

- To stimulate R&D and innovation in financially constrained sectors, the government should increase the current cash flows of innovative firms by buying more at higher prices.
- To stimulate R&D and innovation in sectors that easily raise external capital, the government should commit to a policy that increases innovative firms' future expected profits, for example by promising to buy future innovative goods more and at higher prices.
- Government expenditure should increase expected profits in sectors in which the supply of the R&D inputs is more elastic and reduce them where they are less elastic.
- Public procurement should increase expected profits in innovative sectors during recessions or, more generally, when there is excess capacity of R&D inputs (e.g. human capital).
- Government procurement should make prices and quantities demanded responsive to quality ranking modifications: top quality products should be guaranteed immediate profits whereas for obsolete goods, the public buyer should bargain for very competitive (zero profit) prices.
- Government expenditure should reduce expected profits in sectors in which the future innovative prospects are low and re-direct R&D towards the more technologically underexploited sectors.

An inherent part of the procurement for innovation policy is ***a sound communication strategy*** for public procurement officials. Traditional public procurement involves some fundamentally different logic compared to procurement for innovation. The procurement officials need to be offered proper training schemes and political support indicating that innovation is truly a goal of procurement policy. Also, a special unit should be created or a person appointed, responsible for coordinating the procurement and innovation issues.

The city governments should introduce the demand for innovation already in legislation regulating different policy fields. Fulfilling strategic goals of different public policies (environmental, social etc.) should become an essential part of public procurement practices. For example, in social policy, instead of just demanding ICT solutions to be economically most advantageous, a public authority should demand ICT exploited in their jurisdiction to be usable by handicapped people.[12]

[11] This question will not be discussed in details here. See, e.g. Cabral et al. 2007; Ades and Di Tella, 1997 for further discussion.

[12] In the US, the Americans with Disabilities Act states that ICT used by government agencies must be useable by handicapped people. It has been a major social re-engineering effort leading to innovation, forcing the market to change earlier than it would have done otherwise and has led to great ICT innovations that are used worldwide

Performance contracts should be introduced. Special agreements with implementors/consultants responsible for the concrete case of public procurement as well as providers should be used. To guarantee a successful outcome and to motivate the responsible persons or organizations, extra bonuses should be paid when the agreed outputs or outcomes of the procurement process are met. Similarly, extra rewards for providers ought to be offered if cost savings occur due to innovation.

3.2.3 Pre-commercial procurement

As can be seen from Figure 3, the typical research and innovation cycle consists of 4 phases.

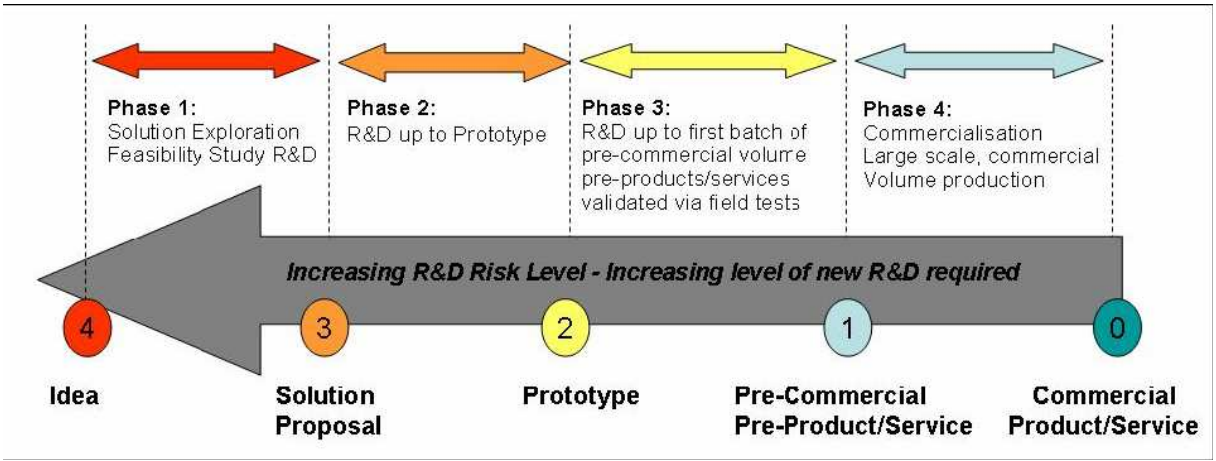

Figure 3: Typical Research and Innovation life-cycle transforming an idea into a product/service (Source: European Commission Working Group, 2006).

The evidence suggests that public authorities, especially local governments, seldom engage with pre-commercial innovation (Nyiri et al., 2007).[13] Also, the current legal framework specifically covers the procuring of commercially ready products. In terms of innovation, it means that solution exploration, prototyping and production of pre-commercial products are not separately targeted as being part of the public procurement process. However, if the radical innovation is aimed at, the public procurement policies should engage also with pre-commercial procurement of innovation.

> *Pre-commercial Procurement of Innovation refers to the procurement of Technological Innovation up to and including a first pre-commercial volume batch of products and/or services validated via field tests. (European Commission Working Group, 2006, p.17)*

(Edler et al., 2005, p. 188). Similarly, in Stockholm, residential waste collection companies are forced to use environmentally friendly lorries in order to get contracts with the city.

[13] Exception includes cellular networks in the Nordic countries (Edquist et al., 2000).

It is about procuring 'yet-to-be-designed' technology research. Public contracts for R&D services do not fall under the Public Procurement Directives. Nevertheless, the public authorities need to tackle this process with care as some state aid rules and Treaty principles still apply here.[14] It is also a more complex issue in terms of technological risks involved.

In order to cope with the problems, a three-stage process has been proposed, which enables the stakeholders to get involved with the most important one – the learning process. Figure 4 presents the case.

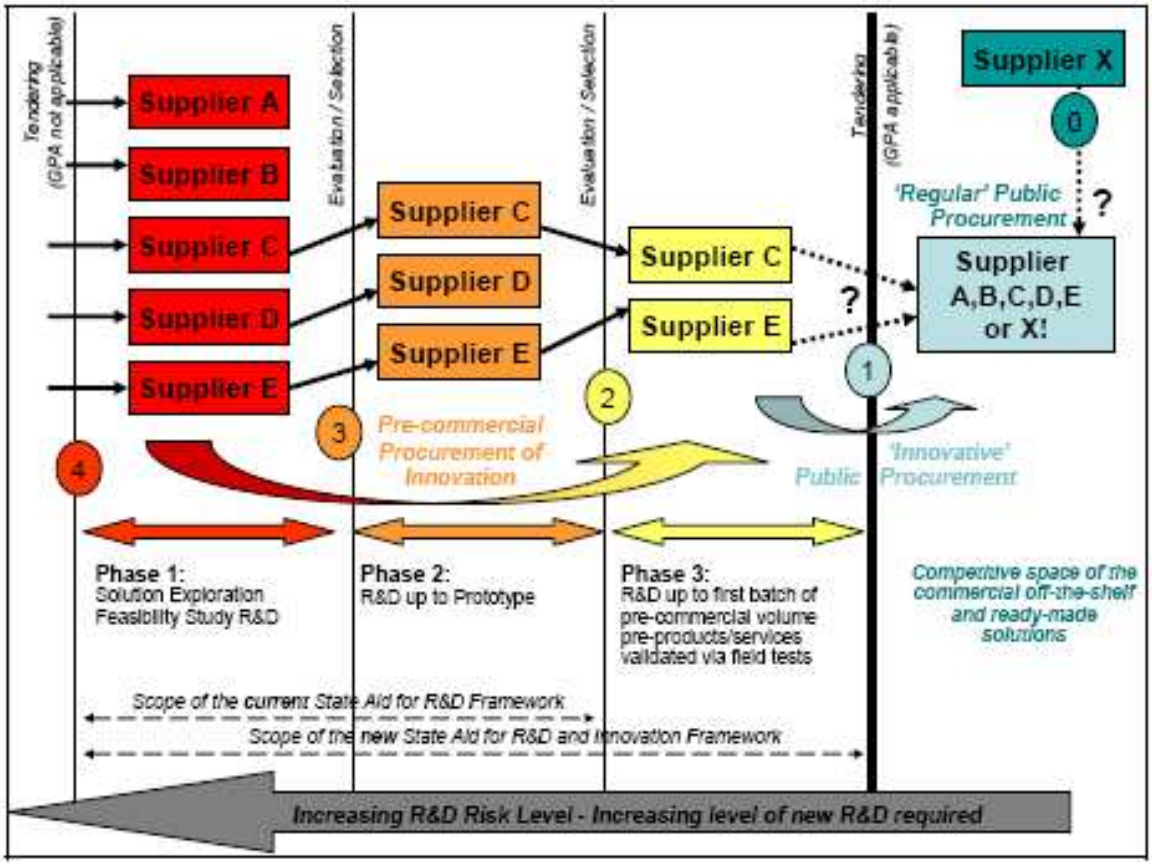

Figure 4. Pre-commercial Procurement of Innovation: A phased shared risk/shared benefit approach (European Commission Working Group, 2006).

The three-stage pre-commercial procurement process is implemented as a single public procurement procedure – of the type 'Public service contract for R&D services' – with two intermediate evaluation points (European Commission Working Group, 2006).

Phase 1: Solution Exploration / Research (min 3-5 competing suppliers)
Phase 2: R&D up to Prototype (min 2-3 competing suppliers)
Phase 3: R&D up to first pre-commercial volume batch of pre-products/services validated in a field test series (min 2 competing suppliers)

[14] Non-discrimination may be complicated to secure when, for example, evaluating results of prototypes. See also EC (2006) for a more detailed overview of applying state aid rules.

Procuring of pre-commercialized products helps the providers to reduce investment risks and gain capital for R&D. For the government, it helps to reduce technological risks making it possible to control and learn all the details involved in the complex product. After every step, the process can be reorganized according to emerging information.

3.2.4 Summarizing the existing elements for procurement for innovation

The previous sections show that there is actually quite a large amount of options available that can be used to promote innovation through public procurement.

Table 3 summarizes the above-described main methods and principles favoring innovation in the public procurement framework.

Table 3. Elements favorable for public procurement for innovation.

Legally available methods favorable for innovation in the EU	Most Economically Advantageous Tender – to be preferred over lowest cost criteria
	Providers capacity to carry out R&D work can and should be weighed
	Performance-based specification to be preferred over input-based technical specification
	Standards can and should be referred to
	Competitive dialogue as a new option for complex procurement for innovation
	Framework agreements should be used where appropriate
Principles favorable for innovation	Public authorities should use different foresight methods such as market survey, technical dialogue and public technology platforms
	Involvement of SMEs is crucial
	Aggregation of demand and cooperation is strongly needed
	Proper risk-management techniques and methods should be introduced
	Intellectual property rights should be transferred to providers
	Unlimited liability should not be required
	Evaluation to be taken as inherent part of procurement for innovation cycle
	Procurement for innovation policy to be bound together wit other demand-side innovation policies
	Regulation should be viewed as a tool of procurement for innovation policy
	Performance contracts should be used
	Authorities should engage with pre-commercial procurement

The features described above can be implemented as single steps or as a unified strategy. Annex VII presents an example of a coherent strategy for capturing innovation through public procurement. See Annex VIII for a complex example of how to embed innovation in a tendering process.

3.3 Barriers to procurement for innovation and issues of governance

Public procurement in general is a complex process itself full of contradictions, and including innovation as an additional goal makes it even more complicated. Therefore, it is essential that the main challenges of governing the environment of complex relationship between buyer and providers were approached here.[15] The main issues of barriers to procurement for innovation and governance include, *inter alia*, the following aspects.

Lack of innovation orientation, budget and skills are considered to be the main barriers for local governments (Nyiri et al., 2007). The shortage of proper know-how among procurement professionals about suitable procurement methods for fulfilling wider social goals seems to be a global phenomenon (Brammer and Walker, 2007). In addition, there seems to be a shortage of special curricula for public procurement as an independent discipline.[16] The introduction of public procurement for innovation assumes a change in organizational culture (Cox, Chicksand and Ireland, 2005). A recent global study on sustainable procurement found out that the practitioners see leadership, supportive legislation and proper strategies as the way to change the traditional course of action (Brammer and Walker, 2007). A method to employ for altering risk-aversive behavior of public procurers would be to allocate specific grants, which would signal that risk taking is allowed and indeed encouraged by the political leadership. The grants can include resources for launching the procurement for innovation process and also extra bonuses for the responsible unit if the procurement is successfully implemented.

Complexity. There tend to be too many goals to follow in modern public procurement for the public administrators – cost savings, transparency, sectoral policies (e.g. environmental, energy, industrial etc.) – which often contradict each other (Cave and Frinking, 2007; Nyiri et al., 2007). This may lead to misallocation of resources, where agency goals conflict with wider policy goals (New Zealand, 2005). Figure 5 illustrates the possible conflict triangle that may arise between different in-house stakeholders.

[15] In spite of the importance of the issue, it can be claimed here that this is a somehow neglected issue in the literature.

[16] In order to introduce the sustainable PP policy, the government of Canada has created a special policy unit for green procurement and has made it mandatory for the governmental bodies to have green procurement targets and properly trained procurement personnel in green procurement. In addition, a special toolkit and website have been provided by the policy unit of green procurement. In Japan, examples of similar initiatives can be found on the municipal level involving clear goals in monetary terms. (Brammer and Walker, 2007).

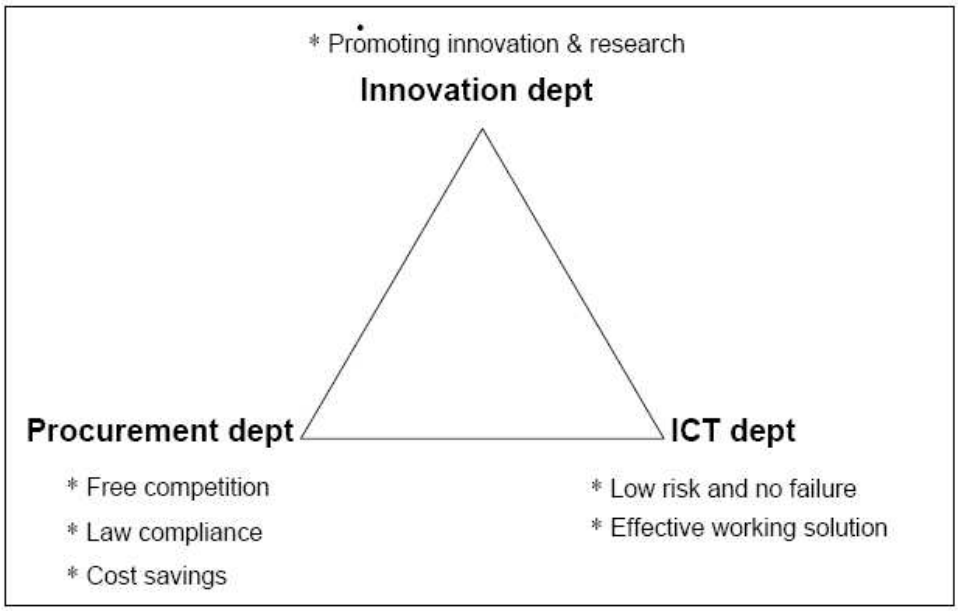

Figure 5. The public actors of PTP and their goals (Source: New Zealand, 2005).

There is a dilemma between the micro cost effectiveness of a contract and the higher costs of R&D-based product/services in order to boost innovation (Cabral et al., 2006). Especially when the payoff is unclear, the innovative solution can be perceived as the more expensive solution (Brammer and Walker, 2007). The process itself – procurement for innovation – is a costly effort.[17] Therefore, at the end of the day, under the current culture of public procurement, cost savings may still be perceived as the most important goal.

Coordination is a challenge yet to be solved by public authorities. This is especially the case with centrally organized procurement, cross-border procurement, cooperative procurement and catalytic procurement. Coordination always involves transaction costs, which have to be taken into account when implementing the process.

Procurement for innovation is a time-consuming effort, which has to be taken into account when time matters. Public authorities have to realize that more time is needed to prepare for a tender for innovative solutions.

How to measure or evaluate the effect of a concrete procurement transaction for innovation (whether the spill-over effect ever materializes). What is needed is constant evaluation and that the lessons learnt are reflected in the procurement policy.

Lack of awareness and readiness by public authorities to understand markets and technologies. The will to constantly learn about market solutions is needed. This is something one does not need so much when purchasing off-the-shelter products. Identification of possible solutions is a demanding task that needs special routines and skills.

[17] It has been found that already without innovation goals, public procurement is twice as expensive as procurement in the private sector (New Zealand, 2005).

4 Public procurement in BaltMet Inno cities

4.1 Public procurement practices in the cities

4.1.1 Public procurement set-up

The main characteristics illustrating public procurement and innovation in the partner cities can be found in Table 4. The organizational set-up of public procurement in studied cities can be divided into two broad groups. The first group of cities employs a mixed system, meaning that although the city departments have been delegated the right to carry out procurement independently, part of the procurement is done centrally. Examples include Helsinki, Malmö and Stockholm.

> *Example of a mixed public procurement system – Helsinki*
> *In Helsinki part of the public procurement is implemented centrally and the rest is carried out by individual departments. Centralized procurements are done by the Supplies Department and the Public Works Department's Technical Division. The share of the procurements done by the Supplies Department was 14.5% in 2005. In addition, the Social Services Department, Health Centre, Education Department and all the municipally-owned enterprises have their own central procurement units. (Ruoppila et al., 2007)*

In other cities, a decentralized model is applied, where the departments and agencies (Copenhagen, Riga and Tallinn) or boroughs (Berlin) are made responsible for public procurement.

> *Example of a decentralized system – Tallinn*
> *In Tallinn all the procurement is done by individual departments or agencies of the city. There is also a central unit created – Public Procurement Bureau – responsible for internal procurement policy making, monitoring and counseling. The bureau itself is not involved in actual procurement. The policy making includes development of internal procedures and documentations for carrying out public purchases.*

In Copenhagen, an administrative unit is being created which would take over the responsibility of all procurement. As of today, no city has introduced a fully centralized procurement system.

As can be seen from Table 4, the size of public procurement budgets is relatively important in the cities' overall budgets, which indicates the potential of using the procurement instrument as a vehicle for promoting innovation. In some cities, however, no relevant statistics are available.

Most of the cities use at least some sort of procurement manuals or guidelines (exceptions include Riga). Specific public procurement policy has been developed in cities employing a mixed procurement system, i.e. Copenhagen, Helsinki, Malmö and Stockholm.

Table 4. Overview of public procurement in Baltic Metropolises.

Public Proc. System		Berlin	Copenhagen	Helsinki	Malmö	Riga	Stockholm	Tallinn
Organizational structure		Decentralized	Decentralized/ Mixed	Mixed	Mixed	Decentralized	Mixed	Decentralized
	PP Budget	N/A	€ 160 million	€ 2.0 billion	€ 160 million	N/A	≈ € 1.1 billion	N/A
	% of total budget	N/A	26%	40%	15%	N/A	30%	N/A
	Strategy for Public Procurement in city/region	N/A	Yes (being created)	Yes	Yes	No	Yes	No
	Procurement guidelines (manuals)	N/A	Yes	Yes	Yes	No	Yes	Yes
	"Innovation" emphasized in guidelines	N/A	No	Yes (very modestly)	No	No	No	No
	Link between procurement and strategy for econ. develop. (or innovation)?	N/A	No	Yes	No	No	Yes	No
	Incorporation of the new EU legislation	N/A	Yes	No (a draft exists)	No (delayed legislation in Sweden)	No	No (delayed legislation in Sweden)	Yes
	Policies for participation of SMEs in tendering processes	N/A	No	Yes	No	Yes	Yes	No
	Framework for unsolicited innovations proposals	N/A	No	No	No	No	Yes	No
	Training procedure	N/A	No	Envisioned in strategy	Varies	No	Voluntary schemes	Occasional

4.1.2 Public procurement and innovation

Innovation does not play any role in the current public procurement guidelines in the cities. Malmö has claimed that some departments emphasize innovation in their everyday practices, others put more emphasis on off-the-shelf products to reduce risks. Copenhagen has participated in innovative development projects, but not as a part of public procurement. When it comes to the strategic level of public procurement and innovation, only Helsinki and Stockholm have developed a policy vision on linking procurement and innovation in their region.[18] If for Helsinki, this is a relatively new issue and no major actions have been carried out so far, then Stockholm can be considered a rather experienced city regarding the issue. According to an interviewee, Stockholm's goal is to:

> *Promote economic development, both in Stockholm and in the region, through procurement and competition where a larger number of small companies are welcome as partners.*

[18] This is not to say that the other cities do not engage in procuring innovative solutions at all. On the contrary, as revealed by the case studies, it has been done, but only as single efforts and not as a coordinated activity.

Stockholm's activity can be explained through the fact that Sweden is one of the few countries in Europe to have dealt with the issue since the 1990s (Edquist et al., 2000).

As not all the member states of the EU have incorporated the new procurement legislation into national laws, the cities are still in a transformation phase of introducing the new methods favorable for innovation into their practices.[19] As can also be seen in Table 4, most of the cities have still not incorporated the latest legislation changes into their practices. This implies that currently, the report is not able to analyze the effectiveness of the new EU legislation on PP for innovation in the cities.

The cities have a different approach to training in procurement. There are examples of voluntary as well as strategy based training, but no systematic training programs or courses could be identified targeting procurement and innovation.

The majority of the cities do not have procedures carrying out a continuous market watch on what kind of new solutions private companies or universities can offer for meeting public needs. As stated by an official, Stockholm has:

> *a constant dialogue carried out with different branches from The Executive Office and other departments. There is also a possibility for companies or organizations from outside to (so called) challenge existing activities throughout the City, where the responsible committee has to try the challenge.*

Tallinn has its own "ideas portal" (www.ideepank.ee), but it is not associated with procurement by the stakeholders.

4.2 Case studies

4.2.3 Overview of case studies

In the current sub-chapter, we are analyzing the activities of various cities related to public procurements for innovation through case studies. Suggestions for case studies were provided by the cities, although due to the focus of the study – the implementation **of a new or significantly improved technology** – not all of them were suitable for further analysis as the innovation aspect was missing and rather the regular procurement was carried out.

The case studies analyzed included those related to market creation (radical innovations not available on the (local) market), market escalation (market has been established, but technologies required further development) or market consolidation (establishment of critical mass) and include examples of direct, co-operative and catalytic procurement (Table 5).

[19] E.g. the city of Helsinki is active in organizing seminars for the procurement personnel to cope with the changed legal environment.

Table 5. A typology of innovative public technology procurement

	Role in Relation to Market		
	Initiation (Development)	**Escalation** (Adaptation)	**Consolidation** (Standardization)
Direct Procurement Based on needs *intrinsic* to the procuring organization.	**Journey Planner for Public Transportation**	**ID-ticket for the Public Transportation System** **Mobile ticketing for public transport**	**Education Software**
Cooperative Procurement Based on shared needs, *congeneric* to public and private sector users.	**Ethanol-fueled Pick-up Cars** **SAPOS**		**Photovoltaic System for Municipality-owned Premises**
Catalytic Procurement Based on needs of other end users, *extrinsic* to the procuring organization	**Development of the Environmental City District Hammarby Sjöstad**		

Source: authors, based on interviews, methodology adapted from Edler et al., 2005.

All the cases analyzed in depth are summarized in Table 6, followed by a short presentation of individual cases.

Table 6. Summary of cases of public procurements for innovation in Baltic Metropolises.

	Journey Planner for Public Transportation, Helsinki	Ethanol-fuelled Pick-up Cars, Stockholm	Development of the Environmental City District Hammarby Sjöstad, Stockholm	ID-ticket for the Public Transportation System, Tallinn
Year	2001	2007	1998-2012	2004
Type of procurement	Direct	Cooperative	Mixed (200 projects), incl. technology competitions, market creation	Direct
Nature of Innovation	Radical	Radical	Mixed	Adaptive
Level of risk for procurer	Medium	Low	Low	Low
Trigger for procurement	More efficient and effective public transport	Environmental policy goals	Environmental policy goals	Simplify collection of payments, attract people to register as local residents
Initiator	Helsinki Metropolitan Area Council	City of Stockholm (identification of demand; specification of common necessities).	City District Hammarby Sjöstad, Stockholm	City of Tallinn (Transport Department)
Procurer	Helsinki Metropolitan Area Council	Mostly private sector (Stockholm City itself might be buying 5-10 cars)	City District Hammarby Sjöstad, Stockholm	City of Tallinn
Supplier	WM-data – a LogicaCMG	Volkswagen	Different	Consortia: Certification Center Ltd, Eesti Ühispank and EMT
Price of good or service	€ 160 000	SEK 150,000/van (Volkswagen Caddy) [≈ € 22.3 million (no guarantee of volume; supply of 1,500 vehicles)]	-	Initial costs EUR 700 000 Aggregate over EUR 2 million
Number of competing bids	10 acceptable bids, then 6 were selected out for the first qualification, then 3 were chosen for demonstration implementation	1 (Volkswagen – bid just for the smallest category; other processes postponed)	-	6
IPR to	Core product – the company; adoptions – the city	Volkswagen	-	Supplier
Successful Innovation? How?	Increased export and competitiveness of company. Cost benefit of € 5 million. 90,000/day users of the service.	Creation of new market (new transport service market using ethanol-based cars)	Some suppliers have scaled up production processes and implemented process innovations	Effective solution in place, popularized national ID cards, similar system implemented also in other cities

	Mobile ticketing for public transport	Education Software	Photovoltaic System for Municipality-owned Premises	SAPOS
Year of procurement	2001	2007	2005	
Type of procurement	Direct	Cooperative	Direct/Cooperative	Cooperative
Nature of Innovation	Radical (unique validation method) and Adaptive (SMS)	Market escalation	Market escalation	Radical/escalation
Level of risk for procurer	Low	Low	Low	-
Trigger for procurement	Easier and more comfortable access to the service resulting with increase usage of public transport rather than individual cars	Motivate students through a new education system using IT.	Environmental issue	
Initiator	Plusdial Ltd	The Municipality of Copenhagen's Children and Youth Administration	City of Malmö (Civil servants within the city administration)	Cooperation
Procurer	HKL Enterprise	Municipality of Copenhagen'	City of Malmö, Real Estate Department	Joint-agency
Supplier	Plusdial Ltd with Add2Phone Ltd	Crossroads Copenhagen		
Price of good or service	-	< € 65,000 project (Copenhagen entered with c. € 15,000)	The price for the PV-part was € 8 million. Fixed price: 30% was paid my Malmö, and 70% by Sweden.	
Number of competing bids	-	Not applicable – negotiated procedure, not open due to the size.	Four bids for the PV installation, and one bid for the steel construction. Open procurement procedure. No search for local suppliers.	
IPR to	Provider	Alinea has the IPR, public schools of Copenhagen have free access		
Successful Innovation? How?	Creation of new market, fostering mCommerce. Increased customer satisfaction, improved image of Helsinki City Transport and public transportation. Increase in efficiency and effectiveness for the operator.	A successful process, it attended the necessities: children were motivated and teachers were satisfied	Energy being produced. Inspiration for other cities. Positive economical externalities. Greater social welfare. Marketing for the city.	Real-time position fixing and for postprocessing meet all needs. Allows development of new applications

4.2.4 *Journey Planner for Public Transportation in the Helsinki Metropolitan Area, Helsinki*

Journey Planner for the Helsinki metropolitan area gives advice on the best public transport connection door-to-door within the Helsinki Metropolitan Area. The fastest route can be found by entering the street addresses of the departure and arrival places into the Web browser. Besides timetables, commuters also have access to means of transportation, travel instructions and a route map to help follow the route. The service covers bus, tram, metro, commuter train and ferry routes. The search features of Journey Planner can be tailored, e.g. by giving one's own walking speed or favorite means of transportation. Language versions are in Finnish, Swedish, English and even in the Finnish slang spoken in Helsinki.

Figure 6. Journey planner (Source: http://aikataulut.ytv.fi/reittiopas/en).

The Finnish version of Journey Planner also includes Helsinki City Transport's 'Own Departures' service www.omatlahdot.fi, which offers on-demand online timetables regularly used by commuters. Own Departures timetables are available for bus and tram stops, commuter train and metro stations as well as for ferry harbors. Commuters can sign in to the service and edit their preferences both by browsers and mobile phones.

The procurement was initiated in 2000, after the first attempt had been failed 4 years before. It was carried out by the Helsinki Metropolitan Area Council (YTV) and the service has been delivered by the company WM-data – a LogicaCMG. The development of the product began in the start-up company. The company has became part of the bigger companies (sold 6 times) and new also the new product line based on the original product has been developed.

There was a three stage competition organized. Altogether 10 bids were accepted, then 6 were selected out for the first qualification, and then 3 were chosen for demonstration implementation. The unique aspect in this particular procurement process for innovation is that 3 basic bidders were asked to realize

the demonstration service using the real data before the final selection. The price of the product was EUR 160 000.

The main criterion for selection was to fulfil the functional requirements. The final evaluation between the three companies was based on complete economical advantage, only 20% of weight for the price. Functional requirements included: maintenance, data structure etc. Five main criteria group were elaborated: user and use ability, output of the plans, managing and configuration (regarding maintenance), actual trip planning and algorithm (quality of results so to say), ability to configure the trip planning, update process for the data (the company had to update the database of the service continuously).

Duration of the procurement process was ten months. It started in August 2000 and was finalized in April 2001. The original contract was for 5 years (since 2001). The Metropolitan Council has extended of the service with a new negotiated contract.

The service is very popular today: the average number of daily visits to Journey Planner is 90,000, during busiest days there are 100,000 visits.

Cost-benefit analysis of the Journey Planner based on the calculation of time savings accrued through more effective itineraries and personal trip planning as well as growth in the use of public transportation has showed benefits worth of 5 MEUR in 2002.

4.2.5 Ethanol-fueled Pick-up Cars, Stockholm

The current case is an additional phase of an ongoing procurement project of environmentally friendly cars started already in 1992.[20] Environmental issues are considered an important concern in Stockholm and ethanol-based Ford Focus is, largely due to the previous public procurement projects, very popular in Sweden (9 out of 10 of them are fueled by ethanol). There is also an infrastructure existing in the form of 1,000 filling stations. However, as there are no ethanol-based light-duty vehicles available, but at the same time, there is much company interest in such technology, the city of Stockholm organized a co-operative procurement to show to the car producers the existence of the respective market. In a way, it is also an example of catalytic procurement, as buying those cars for the city of Stockholm was a minor goal. The main goal was to create a market for such cars.

The request to express interest in using ethanol-fueled pick-up cars, vans carrying 3-5 m^3 and vans carrying 6-18 m^3 was sent to 5,000 local companies that had light-duty vehicles in use. It was known from previous experience that aggregate demand for 3,000 cars could be enough to motivate car manufacturers to start producing them. As 2,500 companies, both private and municipal ones, expressed their interest in purchasing such vehicles, the procurement process was initiated. The City of Stockholm strongly co-operated with the Procurement Bureau and also had an expert for technical evaluation.

[20] See also Pohl and Sandberg (2005).

After consulting car manufacturers and following the announcement of the procurement, there was a bid submitted by Volkswagen based on Volkswagen Caddy. Procurement for the other two categories was postponed, as the companies did not believe it possible to deliver the trucks before 2010. It is important to notice that Volkswagen –Europe's largest car manufacturer – did not have any ethanol-based cars in production by then, but it promised for them to be available by January 2008 (price 150,000 SEK).[21]

From the perspective of the public procurement for innovation, this is an example of aggregating demand and lowering the price per unit sold. One of the problems was related to the lack of standards and uncertainties relating to them. Namely, there are no standards regarding the E85 fuel and neither were there certification rules for E85 cars. This can be overcome on the EU level on the initiative of the European Commission. At this stage, the cars, their emissions, etc. were tested relying on standards for petrol and petrol cars.

The Intellectual Property Rights belong to Volkswagen. It is planned that the cars be paid for on delivery.

For the City, there were no real risks associated, because it is not specified that buyers should really buy vans – there is just a reference that at least 2,000 customers are there. The only direct cost the city has had is associated with pooling the demand and carrying out the procurement process.

4.2.6 The Environmental City District Hammarby Sjöstad, Stockholm

Hammarby Sjöstad is a project to build up a new part of the city. The amount of the apartments to be built was 15,000 and offices 10,000. The area was an old industrial area, very near to the city of Stockholm. The development of this environmentally friendly city district started in 1998 and included a unique method for integrated and sustainable planning of infrastructure as well as for the implementation of innovative technology for energy, water and waste management. A related slogan was "Everything should be twice as good as the best or as the state of art at that time". The project was initially expected to be finished by 2012.

[21] The representatives of Volkswagen refused to be interviewed on the procurement process. The probable reason is that the information is still too sensitive to be published.

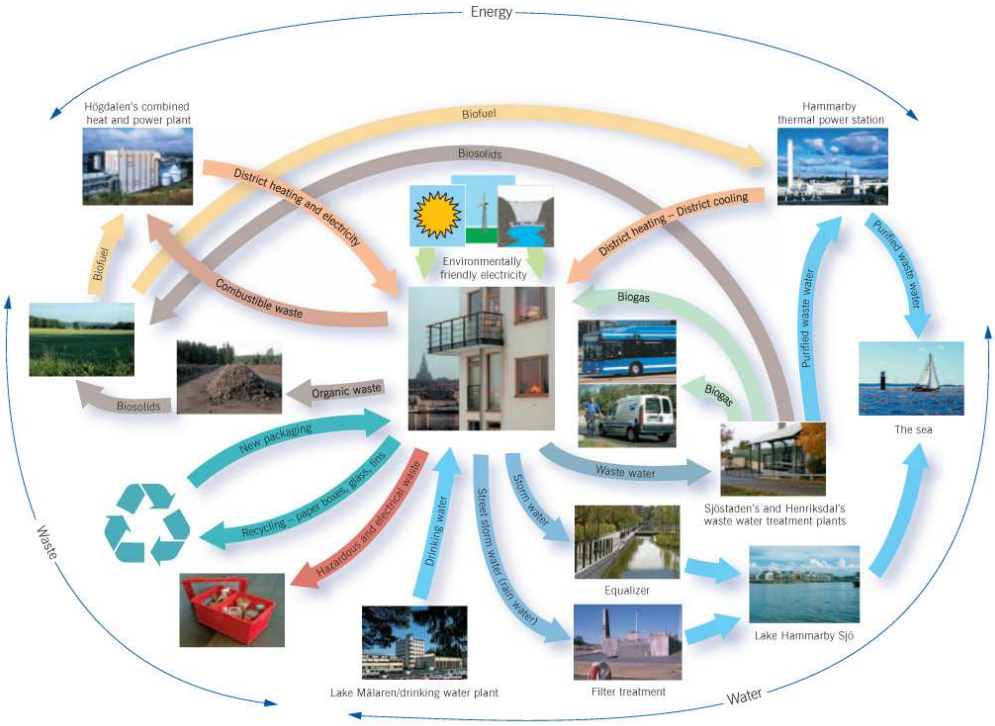

Figure 7. Hammarby model (Source: http://www.hammarbysjostad.se/)

More than 200 projects were conducted with the help of the following tools:

- technology competitions (to speed up development and market introduction of innovative technologies, such as solar cells, smart windows, fuel cells etc.)
- integrated public procurement (to press down prices of existing technology or material by integrating orders from various buyers, e.g. 4-glass windows and other construction details)
- investment grant for environmental projects (in new constructed and old houses) of both small and large development companies
- information and education activities (such as seminars, fact finding visits and specialized reports) in order to encourage environmental investments, change attitudes and stimulate new thinking

One example of the procurement for innovation is the procurement for a technology for **individual metering**. It was aimed at developing a new technology for cost allocation of energy and water consumption in family houses. The idea was to create a program or system monitoring the energy consumed and the distribution of the costs respectively for each apartment. The project was carried out in 1999-2000, and such a technology was missing in the Swedish market. There were 10 different housing companies in the buyers' group, and using external experts, they put together the technical requirements. The company that was selected as the technology provider installed those in 500 apartments in Hammarby Sjöstad. IPR was left to the supplier. However, the firms which worked out the product, were not able to enlarge the market and did not get enough orders from other parts of the country nor internationally.

Another example of the co-operative procurement is the procurement of **energy efficient windows.** Such windows were produced in Sweden before the procurement, but with a higher price (30-40%). For the current procurement, a rather

substantial production volume was created – the buyers' group included all the big construction and housing companies in Hammarby Sjöstad. Bids with the price expected were received from several window producing companies. There were not any technical improvements, but due to the increased production volume, the producer was initiating process innovations.

4.2.7 ID-ticket for the Public Transportation System, Tallinn

The ID-ticket is an electronic ticket in the public transport system (bus-tram-trolley) which is sold to the user via the electronic payment collection system and which the user proves with his or her personal identification document (national ID-card). Thus, it will be sufficient to carry one's ID-card along when using public transportation that needs to be presented to the controller, who has a special machine for controlling the validity. ID-tickets can be purchased via the Internet bank, a mobile phone or from sales points.

Figure 8. Estonian electronic ID-card (Source: www.pilet.ee).

Estonia started issuing national ID-cards in January 2002. Without the existence of this infrastructure, several innovative public services in Estonia (e.g. eVoting) would not be possible. In addition to being a physical identification document, the card has advanced electronic functions facilitating secure authentication and a legally binding digital signature for public and private online services. An electronic processor chip (a respective smart card reader is needed for operation) contains a personal data file as well as a certificate for authentication. Certification Center Ltd, is the key organization, which was established as a 100% privately owned company in 2001, and as of 2007 is the only certification authority, providing certificates for authentication and digital signing for Estonian ID-cards.

Since September 2002, the Tallinn City Government has a working group that included representatives from the Tallinn Transport Department as well as Registrikeskus (register center) and was looking for ways of how to increase the number of people officially registered as residents of Tallinn. Discounted public transport tickets were seen as one way. Also alternatives to the ID-card were considered (e.g. a separate magnetic card to be used only in Tallinn).

The procurement process generated bids from six applicants; one was a joint tender AS Certification Center, AS EMT (mobile telephone operator) and AS Eesti Ühispank (bank), and this one was selected. The service was introduced successfully in 2004.

There was no fixed price agreed upon. The price was to be formed on the turnover of tickets sold: 4.49% of returns in favor for the procuring company. As a result, the company was interested in the application to work as efficiently as possible.[22]

Next to the small financial risks, the technological risk was small as well as the technologies developed relied on already existing ID-card-based infrastructure. The main concern was how the new service would be welcomed by the users.

The ID-ticket was not planned to replace the old channels of distribution, but to create additional ones. Also, it has turned out to be a very efficient service, especially from the standpoint of controlling the usage of tickets: (1) the ticket is personalized, so it is not possible to diffuse tickets among users, as was the case with paper-based tickets; (2) mechanisms to control the validity of tickets in public transport is quick. The ID-ticket was one of the services that generated interest towards obtaining a national ID-card. Today, a similar service has also been launched in Tartu, Estonia. The Intellectual property remained with the Certification Center.

In sum, the ID-ticket is an example of successful innovation where product, process and organizational innovations are combined.

4.2.8 Mobile ticketing for public transport, Helsinki

The mobile ticketing service works on all mobile phones that can send and receive SMS (Small Message System). All major mobile network operators in Finland have provided access for the SMS ticket service.

The service uses standard SMS text messages and a unique validation method to provide mobile tickets. The ticket arrives in real-time showing the validity time and area, identification number and consigner number. The price of the ticket is charged automatically to the customer's phone bill.

The service was procured by HKL Enterprise, a unit of the Helsinki City Transport, and the technology was developed by Plusdial Ltd in co-operation with Add2Phone Ltd.

A joint development project was started in 2001, and the first mobile tickets were sold and tested in Helsinki City Transport's trams, metros and ferries on the International Car Free Day in August 2001. This was the first mobile ticketing service for transportation in the world accessible to the wide public. The actual mobile ticketing pilot started in trams and metros in 2002. The production contract was signed with Plusdial Ltd and the Helsinki City Transport in 2003.

Currently, the mobile ticket sales can be considered to be excellent given that for the time being, the service is only available inside the Helsinki city area, but in the tram traffic, the share of mobile tickets exceeds 55 percent of all single tickets sold (2006). The mobile ticketing application won the Prime minister's Best Practises Grand Prix in 2004.

[22] In the case of a turnover below EEK 53 mln (in sum 150 EEK mln for the whole period), the Tallinn City Government was obliged to compensate unrealized returns to some extent and based on the percentage agreed upon before. E.g. if returns had been 0, the Tallinn City Government would had been obliged to pay about EEK 7 mln in 3 years, which in turn was equal to 4.49% of planned returns.

By October 2006, already 9 million mobile tickets had been delivered to passengers' mobile phones in the Helsinki City Transport's vehicles. The sales still show a steady annual growth, and passengers have frequently expressed the wish for the service to be expanded into the wider Helsinki Metropolitan area.

The mobile ticketing application won the Prime minister's Best Practises Grand Prix in 2004.

The company Plusdial Ltd has already introduced its mobile ticketing service to Germany, Italy, Great Britain and Sweden. The mobile ticketing service has also raised much international interest, and similar services by other companies are nowadays widely applied in several countries not only for transportation but also for other mCommerce (mobile commerce) purposes.

4.2.9 Education Software, Copenhagen

The digital teaching concept "Sat ud" (The Evicted Tenants) was developed in 2007 by Crossroads Copenhagen in co-operation with the Municipality of Copenhagen, the publishing house Alinea, the private company Congin and Østrigsgade School. The software used in teaching introduced students to the era of industrialization by completing assignments, writing essays, and communicating with each other. It is particularly useful for bilingual students. Copenhagen's public schools have been given free access to the content.

The initiation of the project was encouraged by the fact that students were found to be more willing to study the use of new engaging technologies during their studies.

4.2.10 Photovoltaic System for Municipality-owned Premises, Malmö

The rationale for implementing energy-saving solar power photovoltaic system stems from environmental concerns. With the implementation of this initiative, the City of Malmö is now the number one city in Sweden in this field, and other cities are following suit.

During the project, photovoltaic systems were installed in the municipality-owned premises. The procurement was carried out by the City of Malmö (external consultants were involved in the preparation of the tender) and its was also financially supported by the central government.

Technologies were supplied by Exoheat AB and NAPS Sweden AB.

The procurement is an example of direct procurement with a potential of also affecting the market. For the successful delivery, next to delivering existing technologies, the suppliers had to carry out some incremental innovations. The project serves as an example of testing – showing that such systems can be effectively and efficiently used in the public sector in this country.

The procurement case is regarded as successful by the city of Malmö. Malmö is, for example, 'The Best Practice City' – Best sustainable City Development practice in the

North Sea and Baltic Region (SCD Award 07). The system implemented is applicable in other environments. An additional impact is the attraction of additional tourists.

4.2.11 SAPOS – German National Survey Satellite Service Positioning, Berlin

The basis of the SA*POS*® services is a network of global-positioning system reference stations.[23] This network records the satellites' signals and provides correction data to its customers to allow for position fixing and navigation to an accuracy level of a few centimeters or less.

SA*POS*® services is a joint project of the Surveying Authorities of the States of the Federal Republic of Germany. This is an example of cooperative procurement.

The Global Positioning System (GPS) enables its users to calculate their position (Latitude, Longitude and Height) anywhere in the world with an estimated accuracy of 10 meters. A higher level of accuracy can be obtained by relative observations with two simultaneously operated GPS receivers.

SA*POS*® represents a major advance in the technical evolution of land surveying. Whether for terrestrial or aerial surveys, for centimeter or millimeter accuracy, the SA*POS*® services for real-time position fixing and for postprocessing meet all needs. The connection to the future official spatial reference system, ETRS 89, is simply, quickly and efficiently achieved, independent of monumented local control points. With the Berlin State software products for the transformation of plane coordinates and heights, the results can be precisely transformed into the still-valid Soldner-Berlin plane coordinate system and into the uniform nationwide DHHN 92 height reference system.

SA*POS*® will not be able to entirely replace the terrestrial measurement procedures for detail surveys. However, the economic and technical advantages will lead to ever wider use of this modern technique.

4.3 Future cooperation between the cities on procurement and innovation

Cooperative procurement is especially important when procurement policy is to influence innovation, as the effect on innovation tends to be correlated with the size of demand. One of the few examples involves Copenhagen and Stockholm, which have purchased alternative-fueled cars together. Nevertheless, based on the current study as well as on other surveys, the cities are not very confident how and whether to proceed with cooperative procurement as there are still too many untested issues.[24]

No respondent, however, denied the need for cooperation between Baltic Metropolises in procuring for innovation. As a respondent put it:

> *Cooperation should be enhanced, especially between small countries.*

When the representatives of the cities and the field experts were asked about possible candidates for future cooperation between the cities, the respondents came

[23] The origin of the text can be found at http://www.stadtentwicklung.berlin.de/geoinformation/sapos/index_en.shtml.
[24] See for example a report by Ruoppila et al. (2007), where this question is dealt with.

up with different suggestions. As seen in Table 7, the most often mentioned areas were environmental protection and transport, but also the areas of e-health care (e.g. online consultation and asking for a second opinion, cross-border access to databases) and elderly care were considered as important. The specific products and services suggested include:

- Mobile e-government solutions[25]
- Clean vehicles and fuels
- Diagnostics (biomedicine)
- m-parking

Table 7. Future cooperation between Baltic Metropolises in procuring for innovation

Future cooperation between Baltic metropolises in procuring for innovation		Berlin	Copenhagen	Helsinki	Malmö	Riga	Stockholm	Tallinn
1	*Most relevant sectors for procurement of innovation in the city/ region*							
	Elderly care and info-communication technology	N/A	X	X	-	-	X	-
	Health care	N/A	X	X	-	-	X	-
	Transport	N/A	X	-	X	X	X	-
	Education	N/A	X	-	-	-	-	-
	Environmental protection	N/A	X	X	X	-	X	-
	E-government	N/A	X	X	-	-	X	-
	Other	N/A	-	-	-	-	-	-
2	*Experience in cross-border procurement*	N/A	Yes	No	No	No	Yes	No
	If yes, example	N/A	Ethanol-based buses	-	-	-	Ethanol-based buses	-

The respondents raised several issues that have to be taken into account when organizing cross-border procurement:

- cities have different financing systems in the case of different services (e.g. health care)
- the initiative should come from the bottom, compulsory projects are more likely to fail
- the cities should act as moderators between stakeholders
- projects initiated by providers may bring along better results
- language may bring along high transaction costs, especially when taking into account the necessary expertise
- the regions/cities have different cultures
- there are diverse stakeholder expectations and needs

4.4 Conclusions from the empirical work

Based on the feedback from questionnaires, interviews and case study analysis, several conclusions can be drawn describing the current situation of public procurement for innovation in the Baltic Metropolises.

[25] According to a study, e-government is a field where *'local governments still lag behind national governments'* (Nyiri et al., 2007).

As of today, public procurement is not seen as an inherent part of the cities' innovation policy. Mostly, cities implement supply-side policy measures. On the one hand, this phenomenon is comprehensible for until recent years, it was the official policy of the EU that procurement should not be used for wider social goals. On the other hand, it is a surprising fact because procurement for innovation has been, at least theoretically, regarded as the most powerful demand-side tool the public authorities have for promoting innovation.

There is a lack of awareness among city officials about the connection between procurement and innovation. Based on the selected case studies and also the opinions of the interviewees, the cities so far have not initiated public procurement aiming at supporting economic development.[26] When asked about the possible challenges and problems of public procurement for innovation, a respondent acknowledged the main obstacle to be that:

> *The national public procurement act does not define separately the purchase of innovative products or services.*

The field experts claimed that sometimes, the public sector treats the procured solutions as something belonging only to public organizations and do not favor using the developed applications (i.e. IPR) for providers' business interests. In doing so, the public sector actually prevents diffusion of new technologies into the market.

As demonstrated in chapter 3 of the current report, the public procurement regulation actually has many different tools specifically designed for promoting innovation through procurement. The existence of these avenues has simply not been realized.

Civil servants in some cities seem to be better informed about the opportunities offered by public procurement for innovation and have first-hand experience, both with and without success. However, this experience is neither disseminated nor discussed widely. The same applies to companies. Those that have positive experience consider it an important tool that should be applied more widely.

There is no common practice regarding transfer of intellectual property rights (IPR) in the cities/region. There are already cases indicating that the cities transfer the IPR to the providers, e.g. Tallinn ID-ticket. Nonetheless, this is not yet a common practice in the Baltic region. As was stated by a CEO of a prominent ICT company in the region:

> *The issue of IPR transfer is the single most eminent shortcoming of the current public procurement practice for innovation. It is vital for the overall economic development that the IPR stay with the providers so that the results of procurement (i.e. innovative solutions) can be diffused into the market.*

[26] When the representatives of the cities were approached in order to sort out possible candidates for procurement for innovation cases, the majority of cities stated that they had never had such cases. As the report demonstrates, all the cities actually do influence the innovation through their procurement, although in most cases, it is done indirectly or without this particular goal in mind.

The main triggers for procurement for innovation have been specific public needs or policies such as environmental policy. Generally speaking, there can be two points of origin for promoting innovation via public procurement – innovation for innovation's sake (i.e., private sector economic gains that bring about spill-over/external economies) or innovation to meet social needs. The experience of the BaltMet cities reveals that the latter cause prevails. For example, Tallinn faced the challenge to introduce a universal ticket system for public transportation, which eventually led to the creation of electronic ID-card tickets. Copenhagen's case was initiated because of the emerging need in the educational policy. Malmö's photovoltaic energy supply purchase was a direct result of its environmental policy, but it was also exploited as a marketing tool for the city. In Stockholm, public procurement for innovation is strongly driven by environmental goals as well.[27] The initiatives in Helsinki were launched to meet the emerging problems in their public transportation sector. That is, BaltMet cities have not used procurement as a genuinely innovation policy measure but rather as an additional if key tool in achieving other (social and environmental) policy aims.

Therefore, the source for future success depends partially on the ability of the cities to make the innovation aspect part of field policies. Procurement offers much wider options for promoting innovation than BaltMet cities have realized so far. However, there are noticeable barriers to further development.

As of today, local authorities do not act like risk-taking sides when promoting innovation through public procurement. The cities do not procure and therefore influence the innovation of pre-commercial technologies. This also goes with the radical innovation examples included in the study. An outstanding exception includes the City of Helsinki - in the journey planner procurement case the city reduced some of the financial risks of the bidders by awarding the three finalists monetary prizes. This is not to say that the procurement examples reviewed did not embrace any risks. Indeed, for instance Stockholm's alternative-fueled cars procurement did not actually produce the expected results after the first attempt. But as of today, the cities are not ready to take any steps reducing the risks of providers associating with investments for R&D, production or field-testing.

Local governments can act as market creators**.** Market creation can usually happen in two ways. First, market creation can be a so-called "by-product" of a procurement process, where the main goal was to satisfy some sort of a social need. Tallinn's ID-card case demonstrated that incremental procurement for innovation may lead to new solutions not foreseen by the stakeholders before starting the process. Second, market creation is the main purpose of a purchasing activity. As demonstrated by Stockholm, market creation by using cooperative procurement can successfully be the goal of a local authority.

[27] In order to influence the situation of environment in the Stockholm region, the city demands innovative solutions whenever possible to help protect the environment. Main initiatives include energy savings, transportation and housing. For instance in transportation, the waste collection contractors, public transportation providers and taxi companies are demanded to use clean vehicles in Stockholm. Contracts are made with and licenses are given only to the providers that guarantee to use a certain number of clean vehicles. Further, when politicians or employees of the City of Stockholm call a taxi from a shift board (the number of the City of Stockholm is recognized there), the shift board operator will send a clean taxi if one is available in the neighborhood.

Public procurement for innovative solutions has had positive impact on the providers. The mobile ticket case from Helsinki demonstrates the positive influence a public sector can give to markets through innovation-friendly procurement. The solution for journey planner in Helsinki was exported to US and elsewhere. A similar effect is likely to emerge in the case of Tallinn's ID-ticket procurement. The positive impact of public procurement on companies is evidenced by the increased exports and, most importantly, changes in companies' routines regarding how innovation is approached. The latter, immediate behavioral change, is considered the most important impact as some economic impacts (exports, increases in value-addedness) might be revealed only in the future.

Procurements for innovative solutions do fail. The successful examples of Stockholm alternative fuelled cars, Helsinki journey planner and Tallinn electronic ticket system have all a common denominator – the first attempts to purchase the new solutions had all failed. The gained experience was, however, turned into successful results in the later attempts.

The roles of regional and central government remain important when local authorities start procurement projects to support innovation. This becomes clear, for instance, from Tallinn's ID-card ticket example, as this innovative service could not be introduced without the central government, which initiated the development of the electronic ID-card in the first place. The central government can use other demand-side tools for innovation like tax-cuts for certain new products and regulations for changing the business environment. A good example here is Sweden, where the central government assisted the City of Stockholm to create a market for ethanol-fueled cars by demanding that gas-stations also sell alternative fuels and by introducing zero tax for alternative fuels. The case of Malmö's photovoltaic energy systems also indicate the positive role that central government policies can have on local procurement for innovation. In this case, the city of Malmö could use the subsidies allocated from the central government in the framework of energy-efficient technology solutions.

Supportive measures are needed to promote diffusion of innovative solutions, as procurement itself may not be sufficient. In order to guarantee the diffusion of an innovative product, the implementation process should stop after the buying process is completed. For example, when entering the city of Stockholm, you have to pay the congestion charge, but not in case of a clean car, and clean vehicles car park for free in Stockholm.

Political support is crucial. In most of the cases, the procurement for innovation enjoyed the direct support of the highest political level. There have been, however, some occasions in the cities where project leaders have been fired on the grounds of unsatisfactory results of procurement for innovation cases.

The case studies revealed that consultants and experts are involved in the complex procurement processes for innovation. This was the case with all the procurement examples. Using the external know-how increases the transaction costs of public procurement for innovation projects. Thus, different budgetary constraints and attempts to minimize the transaction costs make it problematic to suggest the best solutions for employing external know-how.

The cities face the challenge to change the prevailing procurement culture and motivate their officials to use the new tools available. As was described by a representative of the city of Copenhagen:

> *it is a challenge to motivate employees to spend the necessary time on projects that are not their primary task*.

Procurement officials from Helsinki have admitted that as they are still struggling to get used to the new legal requirements, the question of the links between innovation and procurement are something “for tomorrow”. Other representatives of the cities seem to be in the same position saying that the whole issue is rather new for them.

5 Recommendations and suggestions

There exists already some evidence that the cities try to affect innovation while purchasing different goods and services. Nevertheless, this kind of thinking is not common to all the cities nor to all their departments. What follows are the suggestions for the cities for further actions in organizing innovation-friendly procurement. The recommendations are based on the empirical findings of the current study presented in chapter 4 as well as on recent theoretical thinking and legal changes presented in chapters 2 and 3.

5.1 Policy recommendations

In order to build a coherent policy capable of capturing innovation through public procurement, the cities should:

1. **Adopt its own strategy and guidelines for public procurement for innovation**
    a. **For "usual" commercially ready innovation**
    b. **For early-stage pre-commercial innovation**
2. **Bind together innovation policies, R&D policies (where applicable) and public procurement policies.**
3. **Introduce the demand for innovation already in legislation regulating a certain policy field.**
4. **Build up capacities to routinely collect information from the market on emerging (technological) solutions for social needs.**
    Possibilities include:
    - "industry days"
    - technical dialogues
    - handling unsolicited proposals
    - consultations with technology transfer agents
5. **Establish a unit or appoint a person responsible for the procurement and innovation issues, either within the Business Development Department or the Public Procurement Department**
6. **Allocate ca 25% of public procurement to innovation**[28]
7. **Inform public (procurement) officials about the aims and nature of procurement for innovation.**
8. **Systematically deal with barriers and governance issues related to procurement for innovation.**

Procedural recommendations for procurement managers in the cities

In order to effectively implement public procurement for innovation, the cities should:

1. **Allocate specific grants (EU, national, local) for altering risk-aversive behavior of public procurers signalling that risk taking is permitted by the political leadership**

[28] This figure is proposed to initiate further discussion. As models of governance (and thus tasks of cities) are different between countries, a final figure is difficult to propose.

2. **Introduce a proper training scheme for procurement officials**
3. **Introduce performance contracts for implementors/consultants as well as providers.**
4. **Reserve subcontracting opportunities for SMEs.**
5. **Develop simple but transparent rules for conducting technical dialogue**
6. **Take full advantage of the procurement methods favorable for innovation such as:**
    - Most Economically Advantageous Tender (MEAT) criteria
    - Competitive dialogue
    - Performance-based specification and references to standards
    - Framework agreements
7. **Actively cooperate with public as well as private organizations in order to pool resources and aggregate demand**
8. **Introduce proper risk-management methods and techniques**
9. **Transfer intellectual property rights to providers**
10. **Not require unlimited liability from the providers**
11. **Introduce appropriate evaluation mechanisms into everyday practices**

5.2 A joint action between the Baltic Metropolises – "BaltMet Procure"

It is the view of the current report that the most important tasks the cities face is the need to build general awareness among officials as well as politicians regarding the avenues procurement for innovation offer. The outlined policy-related proposals cannot be implemented immediately and therefore need time and appropriate resource allocation from the cities. The procedural recommendations, on the contrary, should be implemented if not immediately then at least in the nearest future. In order to facilitate the diffusion of the above described suggestions and to take advantage of pooled resources, it is proposed here that a joint action plan should be adopted and implemented between the Baltic Metropolises.

The joint project should be launched already in the first quarter of 2008, so that the opening EU funding can be used. The possible financing opportunities include, *inter alia*, Interreg IVb, FP7 "Region of Knowledge" and the Lead Market Initiative by the EU (launched in December 2007). It is necessary that one of the Baltic Metropolises takes the role as a leading partner. Additionally, universities with the best know-how should be included in the network.

The **BaltMet Procure** project with the following focus areas should be launched:[29]

1. **Exchange of experiences and awareness building**
   As was already indicated earlier, awareness building is the first step to be taken by the cities if public procurement is considered to be an inherent part of innovation policy. As the issue of procurement and innovation is rather new for the cities, a systematic exchange of information should be launched. This may include:

[29] This action plan is partly based on the discussion of the procurement working group session held during the BaltMet Inno conference (Tallinn, 7 November 2007). The input of the participants is greatly acknowledged here.

- joint seminars facilitating discussion on the new avenues for innovation through procurement
- road shows presenting case studies on innovative procurement as well as procurement for innovation from the Baltic Sea region as well as from other areas
- facilitating access to information by creating special internet portals etc.
- other appropriate means

2. **Introduction of the new EU procurement processes and innovation-friendly philosophy**
   In addition to general awareness, building a common training curriculum devoted to procurement for innovation should be launched. Proper training is one of the most frequently mentioned shortages of the modern public procurement supporting innovation (also green procurement etc.). The expertise on innovation-friendly procurement is limited in the region. Joint action should be aimed at building a state-of-the-art curriculum with the best possible quality expertise involved from around the world.

3. **Communication and integration with businesses**
   The cities have to give out a strong signal to the market that innovative solutions are sourced for and that innovative providers are welcome to approach cities. Formal routines are to be developed for consulting businesses on the existing possibilities and emerging solutions that could meet social need. As this is a sophisticated task needing high technical know-how, the cities could benefit from the joint actions. The cities should:
   - create a joint communication strategy for the global market as “innovation-friendly buyers”
   - organize joint industry days
   - develop common market intelligence mechanisms
   - use other appropriate methods.

4. **Hands-on pilot project**
   It was already indicated earlier in the report that the cities should concentrate on specific areas when aiming for radical innovation. It is the main task of the communication and integration strategy to start screening and selecting the most appropriate sectors and clusters. In Europe

   > *Areas like services for **the ageing population, health-care, security, transport & mobility safety and management, new learning opportunities and interoperable networks** have been the most frequently mentioned. These areas are seen as having the greatest potential for growth (Nyiri et al., 2007, p. 12)*

The possible candidates for pilot projects could include:

	Role in Relation to Market		
	Initiation (Development)	**Escalation** (Adaptation)	**Consolidation** (Standardization)
Direct Procurement Based on needs *intrinsic* to the procuring organization.		mobile e-government solutions ICT solutions in transport (e.g. vehicle route information technologies; m-parking) solutions related to traffic safety	mobile e-government solutions education-related solutions elderly care and ICT
Cooperative Procurement Based on shared needs, *congeneric* to public and private sector users.	environmentally friendly sustainable technologies (e.g. Baltic Sea protection, alternative-fueled vehicles)	eHealth care (e.g. online consultation (second opinion), diagnostics)	New materials in building
Catalytic Procurement Based on needs of other end users, *extrinsic* to the procuring organization	Biotechnology (e.g. diagnostics)		

There are three main options for implementing the cooperative projects of procuring innovations between the Baltic Metropolises:

- lead partner approach, where the cities plan, design, finance and evaluate procurement jointly, but delegate the actual implementation to one partner
- creation of a special organization which is made responsible for the whole process
- coordinated separate procurement, where the cities coordinate the whole process but the actual procurement is done separately.

It is strongly suggested here that the lead partner approach be employed. This is due to low experience in cross-border procurement in most of the cities. As it is a tough task for the cities to agree on specifications of to-be-procured products, a lead partner approach makes it more probable that the process will be initiated in the end. This approach also helps to avoid the erosion of motivation and accountability.

The first pilot projects could involve procurement of commercially ready technology, but the cities should also seek to get engaged with pre-commercial innovation procurement.

5. "Procurement watch" network

There is a growing tendency of creating special organizations or networks for supporting cooperation and innovation in public procurement throughout Europe.[30] This is due to the realization of the complexity of the public procurement process when aiming at wider social goals like innovation. The effect of the new EU procurement legislation is still to be discovered.

The tasks of the network could include:

- Utilization of research on public procurement
- Information collection and dissemination
- Consultancy
- Systematic evaluation and impact assessment of cases related to procurement for innovation
- Systematic appraisal of demand-side innovation policy tools in the partner cities.

Again, a lead partner approach is suggested to be employed here. This network could be set up in cooperation with national economic development agencies.

[30] E.g. there are 9 centers of excellence created in the UK supporting innovation and other social goals through public procurement.

6 Conclusion

It is generally accepted that throughout the history of mankind the generation, exploitation and diffusion of knowledge has been fundamental to the economic development and the well being of nations. For innovation to happen, several framework conditions have to exist, including public support. Most economic theories agree that in the initial stages of technology development, government intervention in one form or other is justified. While innovation policies have been receiving increasing attention recently, also on the level of local governments, such measures have so far mainly been focused on supply-side measures (e.g. funding, grants). Only very recently has public procurement been approached as a demand-side policy measure that can provide excellent results, especially when combined with other types of policy measures.

The report demonstrates that there are already initiatives carried out by the Baltic Metropolises supporting innovation through public procurement. However, the report also revealed that public procurement is not seen as an inherent part of the cities' innovation policy: there is a lack of awareness among city officials about the connection between procurement and innovation. It became evident that there is no common practice regarding the transfer of intellectual property rights (IPR) in the cities. Nevertheless, there are some excellent cases of public procurement for innovation, mainly triggered by specific public needs or policies such as environmental policy.

The case-studies analyzed were implemented under the previous EU public procurement regime. Therefore, it is too early to say anything about the effectiveness of the new legal methods or about how the cities use these different methods. Hence, further research is needed for analyzing the effectiveness of the new tools and the diffusion of the new principles into the everyday practice of the cities.

In order to improve the current situation, policy as well as operational suggestions were developed, including a joint action between the Baltic Metropolises – "BaltMet Procure".

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Annex I – List of interviewees

Hackman, Gregor, Director, Environment program, City of Stockholm

Israelsson, Niklas, Department of Internal Services, City of Malmö

Jaaksoo, Ülo, CEO, Cybernetica Ltd

Jakobsen, Jesper Buch, Senior advisor, Finance Department, City of Copenhagen

Juursoo, Leili, Legal Counselor, Public Procurement Bureau of the City of Tallinn

Lamminmäki, Jorma, Procurement Director, Procurement Centre, City of Helsinki

Larsen, Iben, Communication manager, Crossroads Copenhagen

Lincoln Katarina, Executive office, Procurement and Competition, City of Stockholm

Lohse, Steen, Business Link, Greater Copenhagen Region

Månson, Stefan, Strategic Development, City of Malmö

Olev, Väino, Information Technology Service, City Office, City of Tallinn

Paeglite, Baiba, Lawyer, Procurement Specialist, City Delopment Department, Riga City Council

Roots, Mari, Information Technology Service, City Office, City of Tallinn

Sinisalo, Kimmo, PT Inforamtion Systems Manager, YTV Transport, Helsinki Metropolitan Area Council

Sunnerstedt, Eva, Environment and Health Administration, City of Stockholm

Randoja, Märt, Business manager, e-ticketing, Certification Center Ltd

Siimon, Tiit, Deputy Head, Transportation Department, City of Tallinn

Talpsep, Tiit, CEO, Quattromed Ltd

Annex II – Applied questionnaire for the cities

The purpose of the questionnaire was to provide background information for a given organization. Some of the questions are based on Edler et al. (2005).

Background Information

1. Name of Interviewee:
2. Affiliation:
3. Position/ role of Interviewee in the organization:
4. E-mail:
5. Phone:
6. Skype:

General Questions to be asked of Central People in the Procurement Agencies and Authorities

These questions try to establish a general view of a city's 'public procurement system'.

7. How is public procurement in your city generally organized?
   Centralized
      a specific procurement unit in the central administration is in charge of purchase of all goods and services
      other centralized procedure (please specify)
   Decentralized operational units decide on purchase of any goods and services independently
   Mixed operational units and central administration are jointly in charge of purchase procedure
8. What is the share of public procurement in your city annual budget?
   In total monetary value
   As % of total budget
9. What are the thresholds for goods and services subject for regulated public tender procedures in your city?
   Goods
   Services
10. Do you have central procurement guidelines in your city other than national Public Procurement legislation?
    Yes
       Practical manuals for conducting public procurement provided by state government
       Practical manuals for conducting public procurement specifically designed for your city
       Strategic policy document for public procurement specifically designed for your city
       Some other guidelines (please specify)
    Please provide the name(s) of the document(s)
    No
11. Does "innovation" play any role in these guidelines or in your routine practices?
    Yes
    No
    If yes, can you describe its main features?
12. Is there a link between the city's procurement and economic development (or innovation) strategies?
    Yes
    No
    If yes, can you describe its main features?

13. Have there recently been any procedural or structural changes to the procurement guidelines in your city (if any exist) due to the new legislation adopted at the European Union level (in 2004) and later member countries which introduced new methods (e.g. competitive dialogue) and principles into the public procurement?
    Yes
    No
14. Are there policies/strategies in place ensuring participation of small and medium-sized enterprises (SMEs) in public procurement tenders?
    Yes
    No
15. Are there any specific frameworks elaborated for handling initiatives and ideas for procurement (i.e. unsolicited innovative proposals) coming from firms, universities and inventors?
    Yes
    No

Identification of innovative public procurement

The purpose of these questions is to identify cases of innovative public procurement.

16. Please list 3 cases where your organization has been involved in public procurement for innovation.

a) Case 1:

What was the procured good or service?

Could the procurement case be seen as an example of:

"Direct Procurement" (where a public authority purchases a product for its own use), or

"Cooperative Procurement" (when public authorities or agencies buy jointly with private purchasers), or

"Catalytic Procurement" (where a public sector actor is involved in the procurement, or even initiates it, but the purchased innovations are in the last instance used exclusively by private end users).

What was the price of the procured good or service (€)?

What was the number of competing bids in the procurement process?

Who are the persons involved in the cases (representatives of private and public organizations) to be interviewed in detail later on? Please provide the contact information.

Representative of the city responsible for the technical specifications
Name:
Affiliation
Position in the organization:
E-mail:
Phone:

Representative of the city responsible for the public procurement procedures
Name:
Affiliation
Position in the organization:
E-mail:
Phone:

Representative of the supplying organization
Name:
Affiliation
Position in the organization:
E-mail:
Phone:

b) Case 2:

(ibid.)

c) Case 3:
(ibid.)

The future cooperation between Baltic Sea metropolises in procuring for innovation

The size of demand matters in procuring for innovation. If the Baltic Sea cities want to contribute to the overall economic development of the region via procurement for innovation, it is essential to pool the resources whenever possible. The purpose of the questions in this section is to find out the possible fields and projects where the Baltic Sea metropolises could cooperate in procuring innovative goods and services.

17. What would be three goods or services which production/development should be initiated in cooperation with the Baltic Sea metropolises?
18. What sectors are the most relevant for procurement for innovation in your city region?
    Elderly care and info-communication technology
    Health care
    Transport (e.g. traffic control, vehicle route information technologies etc.)
    Education (e.g. e-school etc.)
    Environmental protection (e.g. Baltic Sea protection etc.)
    E-government
    Something else (please specify)
19. Have your city had previous experiences in procuring innovative products together with other municipalities or public agencies?
    Yes
    No
    If yes, can you give any examples?

Annex III – Applied interview structure

The interview structure was based heavily on Edler et al., 2005. When interviewing the representatives of providers and field experts, the questionnaire was slightly modified according to the position of the respondent.

Part I – General Questions to be asked of Central People in the Procurement Agencies and Authorities

What is the institutional set-up of public procurement, in terms of division of labor (horizontally and vertically) in your city?

Do you have any schemes to professionalize procurement in your city (mandatory, voluntary)? And to increase the internal capacity of procurement of innovation?

Are there many cases in the experience of your organization where there is an innovation component involved in the procurement process? Have they been carried out under the new 2004 EC Directives on Public Procurement?

How would you judge the possibility for a public agency acting under the procurement laws to procure innovative goods and processes in your country/city?

What are the perceived risks and barriers preventing from doing more procurement for innovation in your city?

Have there been any cases where public procurement for innovation is handled together with allocating research and development subsidies?

What sectors are the most relevant for procurement for innovation in your city region? And why?

In your opinion, what would be the main challenges in organizing cross-border public procurement for innovation?

Part II – Cases of Innovative Public Procurement

What was the procured good or service?

Could the procurement case be seen as an example of:

- "Direct Procurement" (where a public authority purchases a product for its own use), or
- "Cooperative Procurement" (when public authorities or agencies buy jointly with private purchasers), or
- "Catalytic Procurement" (where a public sector actor is involved in the procurement, or even initiates it, but the purchased innovations are in the last instance used exclusively by private end users). If yes:

  Why did the procurement constitute a case of public rather than private procurement, i.e. why had private firms failed to develop the product/ service with-out a public procurement contract?

  Did the project become a case of public procurement because the public authority wants a specific technology developed or a market transformed?

  Would the procurement project have been possible to execute unless public means were involved? How?

Was the need defined rather narrowly (aiming for a certain technology and product) or defined more broadly (i.e., in terms of functionalities and expected results)?

What was the number of competing bids in the procurement process?

What was the duration of the specific procurement process (pre-procurement to decision – decision to delivery, total time)? Was there any deviation of the schedule?

What was the price of the procured good or service? Was there any deviation of the planned budget?

What were the agreements on price (fixed, cost-plus, or other)?

Questions Related to Innovation

Had the procured product or service or similar product or service been used before?

If yes:

What where the differences expected/ required between the previous vintage and the current one?

What was the motivation of the various actors involved in your organization for pursuing an innovation (taking into account risk, higher price, more effort etc.)?

Was there a political mandate for innovation?

What kind of development (if any) did the product or service undergo in the procurement process?

Did the procurement result in a product that was completely new to the market, or was it rather a case of making significant improvements– i.e., non-cosmetic adaptations – to a product that already existed on the market?

To what extent did the procurement process involve expenditures on research and technological development (RTD)?

Did the new product/ service require changes in the organization or the environment in which it is used, e.g. replacing technology/routines or requirement of user training?

Part III – Questions on How the Public Procurement Was Organized, and How it Proceeded

What procurement procedure (open, restricted, negotiated) was used? Why?

Who were the main actors in the procurement process, and what are their significant attributes (for example, their roles and competencies as buyers, suppliers, regulators, etc.)?

What were the patterns of interaction between the different actors?

By whom was the need for the procurement first identified?

- the service-provider or user?
- the procuring agency or administration?
- clients of the procuring agency or administration?
- political decision maker(s)?
- other(s)?

Did you seek any help from external sources (business consultants etc.)?

When was the need for the procurement first identified?

Were the procurement process and the contract set up in a different way for buying innovative products (as compared to what would be the set up for “regular” procurement)?

How was the procurement organized? Has the organization changed over time?

Through what identifiable stages did the process proceed?

How can the most significant features of key be described? (For example, how were needs first translated into functional requirements and then into technical specifications?)

What were the impacts and consequences of the procurement?

Was the procurement of the new product or service successful for the organization?

Questions on Consultation / supplier engagement (Interactive Learning)

What were the (financial, other) risks associated with the procurement process?

How were the risks (if any) addressed?

How did you learn about technological developments?

Did you rely on any systematic or regular processes within your organization to monitor the relevant technological and market developments and define related needs?

Did you engage in any form of market consultation / technical dialogue?

If so, how was this organized, very generally, fully open; or restricted?

Did you also engage with Small and Medium-size Enterprises (SMEs)?

Did you try to provide for some form of local content (i.e. deliberately involving local / regional suppliers)?

Did you consult, bundle with other demanders (aggregation of demand, exchange of experiences etc.)

Tendering / Assessing and Awarding Stage

How did you draft the specification?

- Most Economically Advantageous Tender (MEAT), cost, or mixture?
- What was the relative importance of technology etc.?

How did you formulate the technical specifications?

- Did you adopt standards or specify performance requirements?
- Who was the party responsible for drafting the technical specifications?
- What legal advice / expertise did you have?

Which technological and non-technological parameters did you define and how did you weigh them?

In assessing the bids, how did you weigh the following parameters:

- The quality of the tender according to the selected technological parameters
- The time to market availability
- The price

How hard was it to asses the bids (e.g. assessments of the technological abilities of the tenderers and of their reliability to accomplish their engagements)?

Design and Management of the Contract

How did you manage to balance having a complete contract AND providing flexibility for adjustments that might be needed during the contract's duration?

- How did you translate the innovation requirements in the contract?
- How did you provide incentives for innovation?

How did you monitor the progress made? Did you agree on milestones?

- Did you agree on procedures what would happen in case of failing to meet the milestone?
- Was there any sort of penalty/reward system?

Was it complicated to translate the MEAT and functional criteria into the contract?

How was liability dealt with?

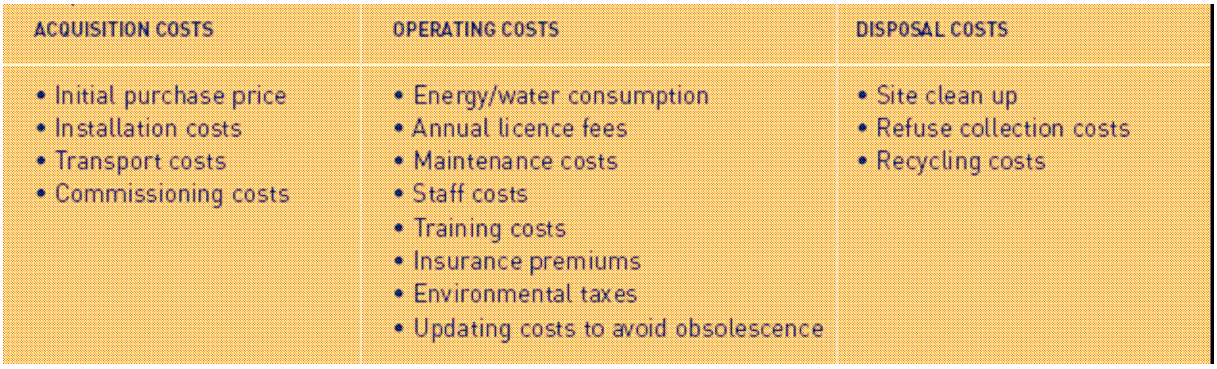
How did you deal with Intellectual Property Rights (IPR)?

What payment scheme did you apply? (e.g. early payment for development / R&D work? Milestone payment?

Was subcontracting possible or mandatory?

Were there any problems with legal expertise inside the administration?

Annex IV – Categories of whole-life costs



ACQUISITION COSTS	OPERATING COSTS	DISPOSAL COSTS
• Initial purchase price • Installation costs • Transport costs • Commissioning costs	• Energy/water consumption • Annual licence fees • Maintenance costs • Staff costs • Training costs • Insurance premiums • Environmental taxes • Updating costs to avoid obsolescence	• Site clean up • Refuse collection costs • Recycling costs

Figure 9. Categories of whole-life costs (Source: European Commission Expert Group, 2005).

Annex V – Good practice for innovation in respect of Intellectual Property Rights

(Source: European Commission Expert Group, 2005)

Key points of good practice for innovation in respect of IPR concern both background (pre-existing proprietary know-how and technologies) and foreground (property rights on new goods and developed technologies). These are:

BACKGROUND

- Require selected firm to declare own rights to background, necessary for the development of the new goods and to declare the licences from third parties that may be necessary.
- Grant the public authorities (and, under certain circumstances, other selected suppliers) rights to use and modify the background brought to the project.
- Collaborate in getting extension of licences from third parties to the public authorities (and under certain circumstances other selected suppliers).

FOREGROUND

- Normally award intellectual property rights to new goods and technologies to the firm that developed them so that it may exploit these in the market.
- In return, expect a lower price to reflect the fact that development expenditures can be written off against higher expected returns.
- Ensure that the purchaser (and, in certain circumstances, its other suppliers) has rights to use and modify the new goods and developed technologies under the most favorable conditions, and that these should be updated to equal the most favorable granted to other customers in the future.
- For rights to modify software, access to the source code should be ensured.

Annex VI – Policy evaluation in public procurement for innovation

OBJECTIVES	INDICATORS	METHODS/DATA SOURCES
Behaviour of actors: change practices and rationales of procurers and suppliers	Changed decision behaviour, knowledge and attitudes (acceptance of risk, life-cycle assessments, functionalities over concrete products, early dialogue, new interaction structures and practices, etc.)	• case studies • interviews • surveys • peer review
Technology: radical innovations, diffusion of innovations	Micro data, input indicators such as R&D budgets, R&D employees, output indicators such as number of patents, number of prototypes, share of innovative products in sales	• patent database surveys • control group approach • longitudinal surveys
Markets: shaping markets (strengthening suppliers of innovative products/services, spill over to value chain suppliers)	Micro and macro data, sales data, changes in market shares of targeted supplier groups, diffusion rates, value chain structures	• analysis of market statistics • sectoral case studies • benchmarking
Administration performance: more effective and efficient service of public administrations (taking advantage of innovative products and services)	Quantified benefits (savings - direct, related areas, effectiveness measures), if appropriate intra and inter-organisational structures	• Cost-benefit analysis[24] (taking into account net present values on the basis of life-cycle), user surveys (e.g. patients in improved health care systems) • interviews • peer review
Sectoral policy aims: e.g. waste reduction, increased public construction, increased public infrastructure, advanced healthcare services, increased security services, etc.	Highly dependent on policy area, e.g. performance indicators such as level of energy savings, level of satisfaction in relevant 'user' or target groups	All methods to be applied in order to assess effects of sectoral policies (inter-temporal comparisons, benchmarking, statistical analyses, surveys, etc.)

Figure 10. Policy evaluation in public procurement for innovation (Source: European Commission Expert Group, 2005).

Annex VII – An example of strategy for capturing innovation

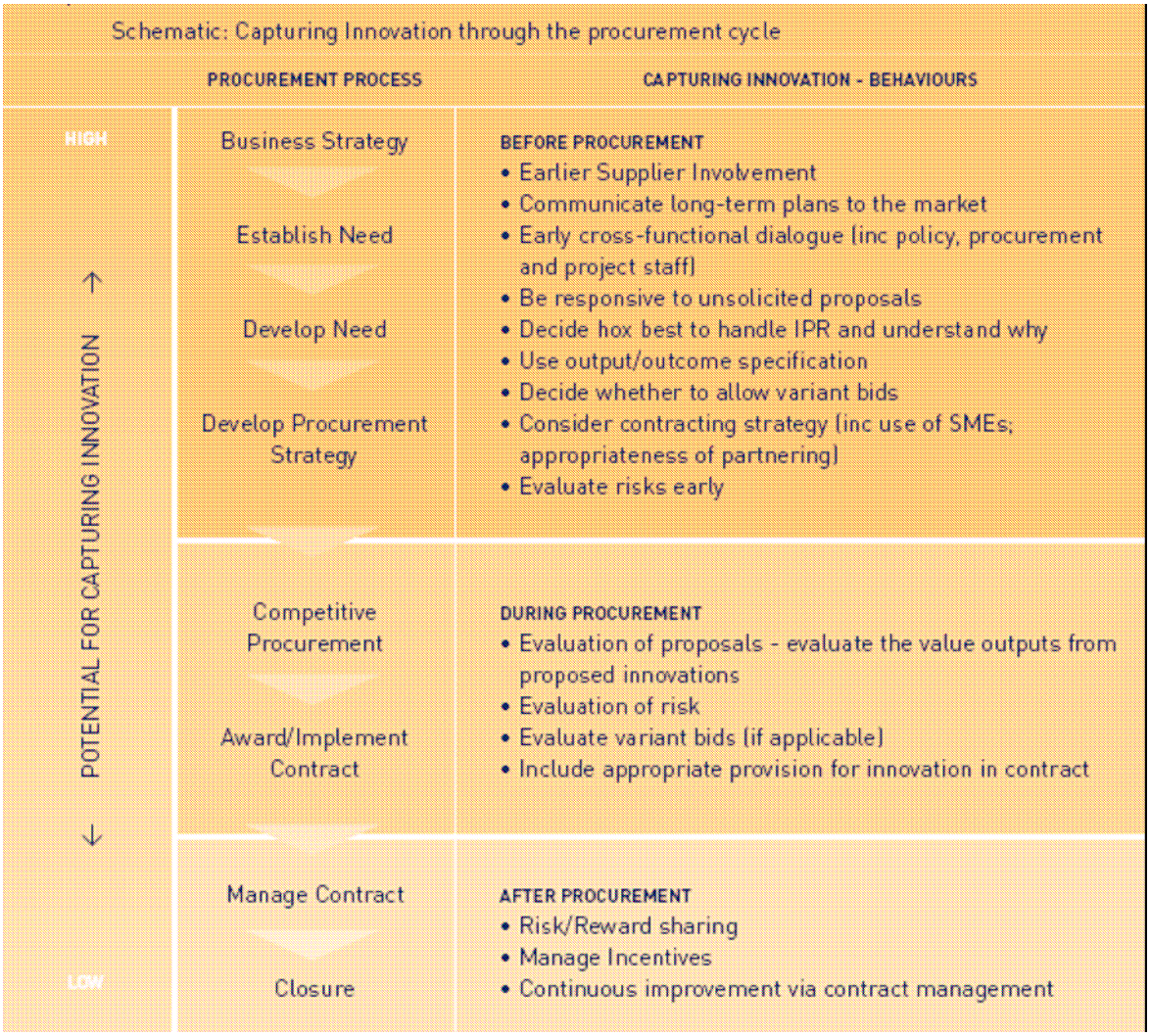


Figure 11. The United Kingdom's Office of Government Commerce (OGC) strategy for capturing innovation (Source: European Commission Expert Group, 2005).

Annex VIII – Embedding innovation in the tendering process

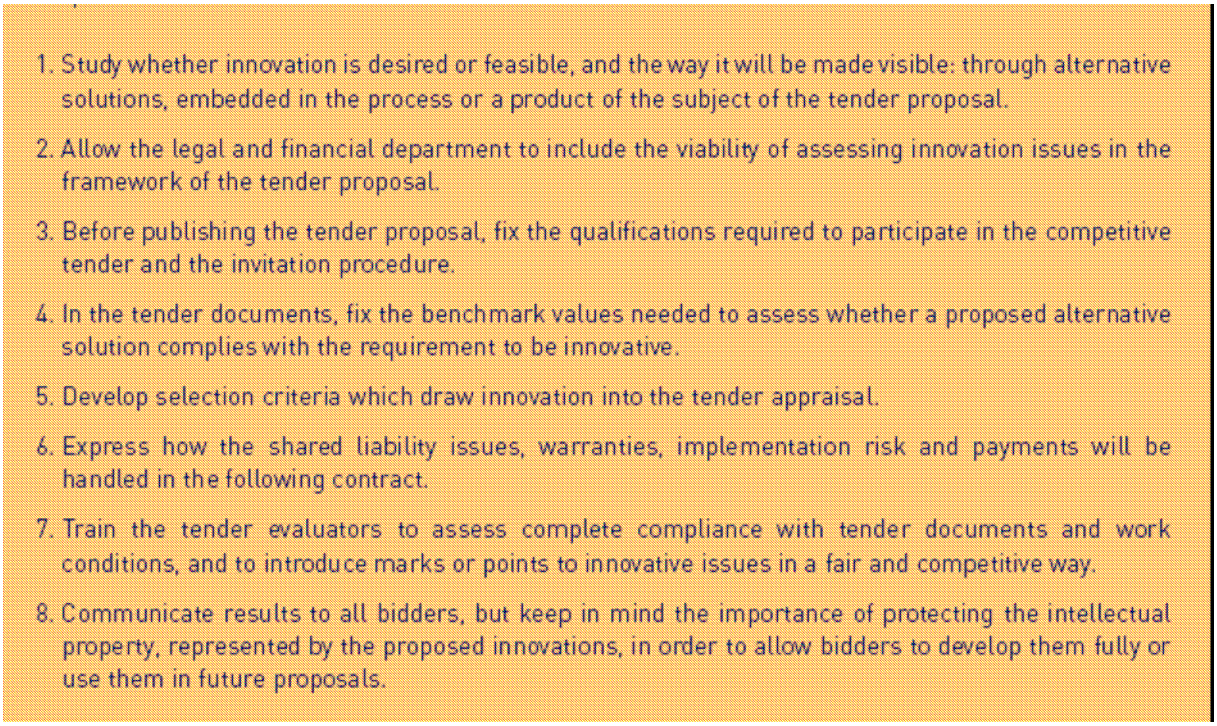


Figure 12. Eight steps to embed innovation in the tendering process (Source: European Commission Expert Group, 2005).