THE ECHORD++ PROJECT. ROBOTICS IN A PUBLIC ECONOMY

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ABSTRACT
The idea of the ECHORD project was born before the economic crisis had its maximum impact on the robotics industry. Therefore, the concept of a project with the clear goal to strengthen the collaboration between academia and industry was a good opportunity to support the industry by offering funding opportunities and fostering already existing networks and creating new partnerships with the academic world taking into account the circular economy in the productive cycle of the intelligent robotics solutions to solve the challenges of the modern cities. One of the most innovative part of this project is to foster the participation of public investment in new robotic projects mainly in urban robotics. At this moment, more than 40 european cities have been participating in the challenge that ECHORD++ proposed.

Keywords: *Academia-Industry Transference, Public Investment, Urban Robotics*

1 INTRODUCTION

Focus on application-oriented research and development, ECHORD++ (E++) is been funded by the 7th Framework Programme (7FP) at the EU for five years to improve and increase the innovation in robotic technology through small-scale projects and a "structured dialogue" incorporating public entities and citizens to the conventional platforms of industry and academia. Three instruments and processes are being developed under the ECHORD++ project: experiments (EXP), research innovation facilities (RIF) and public end-users driving technological innovation (PDTI), all of them improving and increasing the innovation in robotic technology of SMEs companies and addressing answers to societal and industrial needs in different scenarios. E++ will elaborate four Annual White Papers describing the outcomes and results of the project, the tasks of communication and dissemination and the structured dialogue between all the involved stake-holders.

This paper is focused on the PDTI process and the lessons learned during the first 24 months of E++. The aim of this paper is to introduce the novel PDTI process with the intention to boost the innovative research in technologies and specifically in robotic technology and to contribute and join efforts to improve public services. After an overview of the innovative public procurement instruments, the PDTI process is described with emphasis in its relationships with one of these instruments, the precommercial procurement (PCP), looking to check the 4 phases proposed in this instrument. The case study of Echord++ PDTI in Urban scenarios brought us the opportunity to develop deeper the phase 0 of a common PCP through a group of Activities for Public Demand Knowledge with the active participation of the end users. Finally this first research describes the outcomes and findings in robotic technology in urban scenarios and the future proposals in innovative public precommercial procurements.

2 OBJECTIVES AND SCOPE

Different policies from the European Commission have looked to take advantage of public procurement, creating an innovative Europe and solving the lack of an innovation-friendly market (1). The Europe 2020 strategy includes innovative public procurement as one of the key market-based policy instruments for smart, sustainable and inclusive growth. Having reached the 19.4% of the Gross Domestic Product, Public Procurement has an immense potential to fully exploit research and technology for innovation and also to deliver more cost effective and better quality of public services. In some cases the technologies needed to make these breakthroughs exist or are closed to the market; in other situations, investment in R&D is needed to assure the progress of technological solutions that meet the societal needs detected. In this last case, the instrument used by public entities is a Pre-Commercial Procurement (PCP), located into the procedures of Innovative Public Procurement. During the last years very few PCP have been initiated in Europe and in some cases the calls have been declared void. The possible reasons of this lack of success could be a range of deficiencies in the PCP process including information asymmetries, lack of interaction between buyers and potential suppliers, perceived exclusion of small companies, risk aversion on both the public and private sides (2) and the lack of knowledge of public entities about what technology is and could solve.

However the good results of the Innovative Public Procurement at the United States of America public sector, that spend in research, development and innovation 20 times compare to Europe, give us a clear goal to reach. It is in this scenario where the ECHORD++ project proposes the process "Public end users Driven Technological Innovation" (PDTI) to increase and improve the innovation in robotic technology developing deeper the phase 0 of a common PCP. Situated in the demand-side innovation policy, the PDTI develops a group of tasks and activities addressed to a deeper knowledge of public demand and could be defined as a public measure to induce innovations and/or speed up diffusion of innovations through increasing the demand, by specifying and defining new functional requirements for public products and services. An intensive dialogue between all the stakeholders involved will be essential to narrow the wide field for innovative public procurement: public entities as procurers; technological consortiums as suppliers; users as surveyors and the research team as coordinator of all the process.

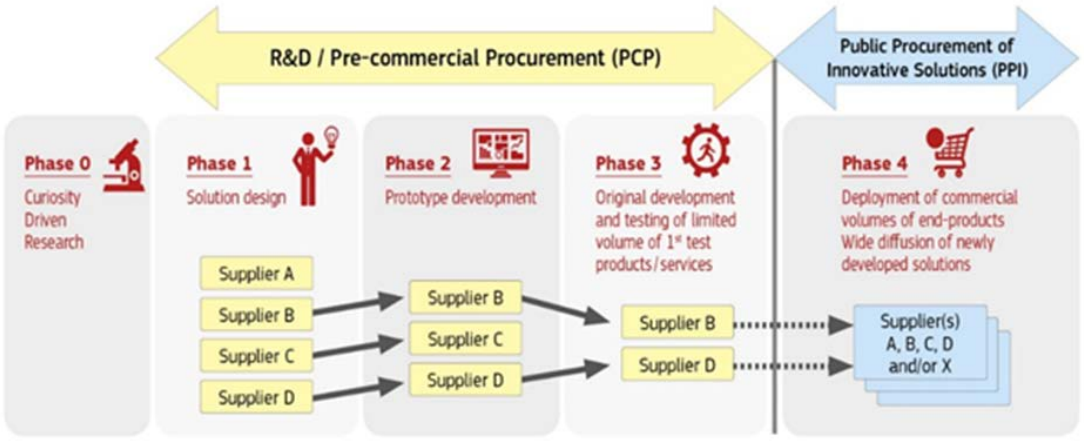

Figure 1: Innovation Procurement Instruments

3 OVERVIEW OF THE INNOVATIVE PUBLIC PROCUREMENT INSTRUMENTS

Policy may act where the demand for innovations is insufficient, or non-existent, but where a technological product has a high potential benefit. Innovation life cycles are concerned with the life cycles of generation of technology from the perspective of the economy and society as a

whole as opposed to the life cycle of a specific product (3). Two main public procurement instruments' have been developed into the product innovation life cycle:
Pre Commercial Procurement (PCP) and Public Procurement for Innovation (PPI). Public Procurement for Innovation (PPI) is procurement where contracting authorities act as a launch customer for innovative goods or services which are not yet available on a large-scale commercial basis, and may include conformance testing. Pre-commercial procurement (PCP) means procurement of research and development services involving risk-benefit sharing under market conditions, and competitive development in phases, where there is a separation of the research and development phase from the deployment of commercial volumes of end-products (European Comission, 2014) (Figure 1).
Despite the perception of innovative procurement as something of a policy panacea and repeated efforts to put procurement budgets to work to drive innovation, efforts have been met with limited success. Numerous barriers exist from demand and supply side: there are market failures (information problems) and system failure (poor interaction); suppliers of potential new products and services often lack the knowledge on what customers might in the future; user-producer interaction and communication doesn't help to produce synergies results and innovative firms in the side of the suppliers perceived a lack of expertise on the procurers and see it as a strong barrier to supplying innovative goods or services (4).
On the other hand, public call for RTD tenders or proposals, may not consider as a common call. Its complexity requires much more comprehensible development of the preliminary phases of public demand knowledge, as well as the specifications and features of the new technology. It is necessary to develop the initial phase, the phase 0, of the Pre Commercial public procurement procedures, through activities aimed to know in depth the demand of both of the authorities and the users. Moreover it has to be analyzed the innovative technology that can give a response to these needs, while it allows to improve the quality of the public service or to reduce its economic cost. The aim is that the joint consortia of industry and academia could offer innovative pre commercial products linked to real demand.
The analysis presented in the document Quantifying public procurement of R&D of ICT solutions in Europe (Digital Agenda for Europe, SMART 2011/0036, European Union, 2014) highlights the poor initiatives developed by the 29 European Countries in favor of the innovative public procurement. Only one country of all Europe was working aligned with the innovative public procurement strategy in 2014: Spain. A series of policy measures supporting innovative public procurement in this country was the formal origin of the stimulus: the agreement of the Council of Ministers from 2/7/2010, where the State's Innovation Strategy was adopted; the Science, Technology and Innovation Act (Law 14/2011, June 1st) explicitly mentions innovative public procurement, while an agreement of the Council of Ministers from 8/7/2011 sets out the procedure for the implementation of innovative public procurement in all ministerial departments and public bodies. Despite this, 13 innovative public procurement contracts were awarded in Spain from October 2012 until the April 2013, with a combined total value of about EUR 18 million. In Urban policies, the article Urban Competiveness and Public Procurements for Innovation presents the case study of six Nordic-Baltic Sea cities that have developed six specific Innovative Public procurements from 1998 to 2007. The authors defend that the main triggers for procurement for innovation is based in the necessity of the cities to answer social needs. The experience of the Nordic-Baltic Sea cities reveals that in general terms there is a small number of cases relates to the fact that public procurement for innovation at the urban level is not very common. Public procurement for innovation is not seen till now as an inherent part of the cities' innovation policy and mostly the cities tend to implement supply-side policy measures.

4 THE PDTI PROCESS

In this scenario it is where the lessons learned in the case study of the ECHORD++ project bring us the possibility to introduce the novel PDTI processes and generalize it to other domains. Located into the product innovation life cycle, and based in Pre Commercial Procurements, the PDTI proposes a process that develops two main phases (Figure 2):

- Activities for public demand knowledge
- Activities for research and technological development of pre-commercial products.

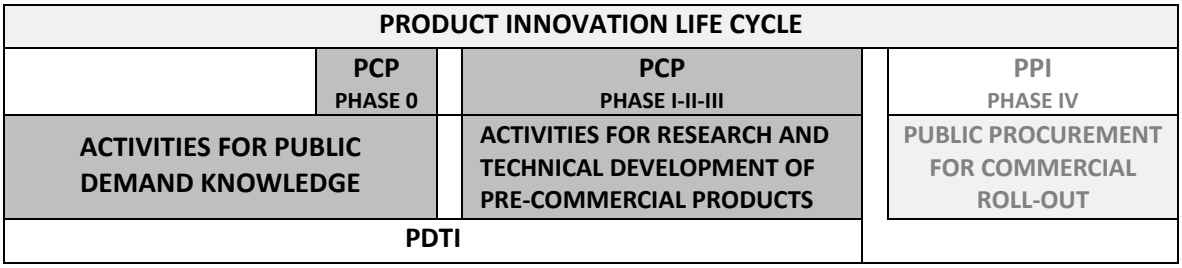

Figure 2. Relation between PCP and PDTI processes

The "Activities for public demand knowledge" increase and structure the tasks developed in the phase 0 of a common PCP. The "Activities for research and technological development of pre-commercial products", match the phases I, II and III of the PCP, ending in a pre-commercial product and making possible a Call for Commercial Tendering (PPI).

Policy instruments mainly address the act of procurement itself and does not engage with the whole cycle from identification of needs and forget to involve a wider set of actors and stakeholders (5). To the importance of this identification of needs and looking to bring future needs and future supply together at an early stage the first part of the PDTI process, the Activities for public demand knowledge, develops four qualitative phases inspired in Delphi methodology (6): Brainstorming, Narrowing Down, Ranking and Challenge Description. This group of activities ends in a Call for Proposals /Tenders, initiating the Activities for research and technical development of pre-commercial products structured as a Pre-Commercial Procurement: Solution Design, Prototype Development and Small Scale Test Series (Figure 3).

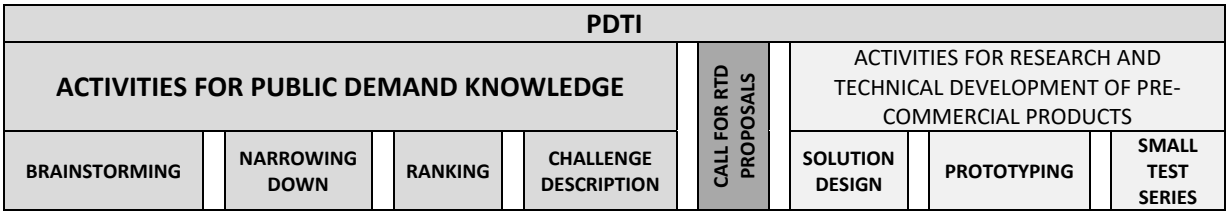

Figure 3. PDTI process and activities

5 THE PDTI PROCESS: ACTIVITIES FOR PUBLIC DEMAND KNOWLEDGE

The novelty of the PDTI is to develop the phase 0 of a common PCP putting more emphasis in the preliminaries tasks and proposing a previous and indispensable phase of knowledge and interactivity between the stakeholders. The public entities, demand side, and the technological consortiums, suppliers, under the coordination of a research team and the supervision of the users constitute the stakeholders. More-over, the innovation procurement requires a shared vision of the future needs between purchasers and suppliers, and a systematic way of identifying and characterizing those possible needs (2).

This part of the PDTI process, Activities for Public Demand Knowledge, is a qualitative procedure inspired in Delphi methodology and allows a group of stakeholders to systematically approach a particular task or problem (7). In our case, the objective will be the reliable and creative exploration of social needs related to public services that could be solved through technology and the production of sustainable information for decision making in the area of Innovative Public Procurement. The methodology will employ iterations of questionnaires and feedback through series of rounds to develop a consensus of opinion from the participants. There is not a limit of time, but is necessary to consider a minimum and a maximum number of rounds. After each step, specific documentation will be generated as the conclusion of the developed activities as well as the starting point of the next phase.
Figure 4 shows the methodology to develop the Activities for public demand knowledge, the stakeholders involved, the tasks to develop and the documents elaborated in each one of the four phases. First of all, a Collaboration Agreement should be signed between all the stakeholders as an official requirement to start the process. This document will describe the roles of the different agents, the process and the proposed methodology.

	ACTIVITIES FOR PUBLIC DEMAND KNOWLEDGE				
USERS **SURVEYORS**		USERS **SURVEYORS**			**CALL FOR RTD PROPOSALS /TENDERS**
RESEARCH TEAM **COORDINATOR**	RESEARCH TEAM **COORDINATOR**	RESEARCH TEAM **COORDINATOR**	**EXPERT PANEL**	RESEARCH TEAM **COORDINATOR**	
PUBLIC ENTITIES **PROCURERS**	PUBLIC ENTITIES **PROCURERS**	PUBLIC ENTITIES **PROCURERS**		PUBLIC ENTITIES **PROCURERS**	
TECH CONSORTIA **SUPPLIERS**			TECH CONSORTIA **SUPPLIERS**		
PROCESS	**BRAINSTORMING**	**NARROWING DOWN**	**RANKING**	**CHALLENGE DESCRIPTION**	
	1-3 ROUNDS	**WORKSHOP**	**OPEN MARKET**	**1-6 ROUNDS**	
METHODOLOGY TASKS AND ACTIVITIES	**TASK 1**.STATE OF THE ART IN TECHNOLOGY APPLIED TO SOCIAL NEEDS AND CHALLENGES. **TASK 2**. TECHNOLOGICAL NEEDS IN EXISTING PUBLIC SERVICES	**TASK 3.** EVALUATION CRITERIA / IMPACT INDICATORS **TASK 4.** MANAGEMENT OF THE FEEDBACK OF ALL STAKEHOLDERS	**TASK 5**. CHALLENGE EVALUATION THROUG IMPACT CRITERIA **TASK 6**. SELECTION OF CHALLENGES	**TASK 7.** ELABORATION OF THE CHALLENGE BRIEF AND PREPARATION OF THE DOCUMENTATION FOR THE CALL FOR TENDERS / PROPOSALS	
COLLABORATION AGREEMENT	**QUESTIONNAIRE**	**CLASSIFIED CHALLENGE LIST**	**CHALLENGE SELECTED**	**PRODUCT IDEA CHALLENGE BRIEF**	

Figure 4. PDTI Activities for Public Demand Knowledge: process, methodology, tasks and activities

The involved stakeholders will be the Public Entities and their specific departments, the Users, the Users' Associations, the Industry, the Technology Manufacturers, the Research and

Academy Institutions and Organizations. They have different roles to play in PDTI. The procurers are the Public Entities; the suppliers are the technological consortiums; the surveyors are the users; and finally, the coordinator is the research team, which will give the technological support to the public sector for developing and implementing the innovation-oriented procurement. The role of the coordinator is needed to drive and lead the complete process based on innovation. Due to the complexity of this process, it is valuable that the coordinator has a team of people coming mainly from technological areas but also from other areas as economics, psychology or political science fields (8).
The participation of users will take place all along the development of the PDTI to survey the process and participate in it, through different activities. The contact and participation of users can be done through local associations as Living Labs. These living labs offer us a real-life test and experimentation environment where users and producers co-create innovation in a trusted and open ecosystem.

5.1. Brainstorming

The process starts with an identification of the real needs in hands of the users and budget holders rather than procurement officials. Two tasks are developed at least: Task 1. Analyze the state of the art in technology applied to social needs and technological challenges; Task 2. Analyze the technological needs in existing or new public services. Sometimes the identification of the needs is constrained by lack of knowledge of the innovation potential (2). The objective of this step is the elaboration of a Questionnaire of Public Needs and its associated Innovative Technology, based in the improvement of existing public services, their cost reduction or the creation of new ones. At the same time the knowledge about innovative technology could be introduced in public environments. Interactive collaboration between organizations is extremely important for innovations to emerge, in the demand/pull side as in the supply/push side (8). The success will come by interacting with the stakeholders in several rounds. A questionnaire of the public needs and the associated innovative technological solutions will be the tool used during the rounds. The information elaborated in each round will be collected, edited and returned by the coordinator to prepare the next round. Finally, a consensus final Questionnaire will be elaborated.

5.2. Narrowing Down

This phase has the objective to focus the needs proposed at the Questionnaire through specific criteria. It consists of two tasks. The objective of Task 3 is to obtain a group of impact indicators. Clear narrowing down instructions should be provided emphasizing the clarity and simplicity of them (9). These impact indicators sometimes exist in the Public Entities, and in this case they can be used as starting point. In any case, a list of impacts indicators must be created and they will be used in the evaluation and selection of the Innovative Challenge List.
Task 4 consists in the management of the stakeholder feedback. One way to develop this phase is by organizing a workshop with the different stakeholders involved, discussing and receiving the feedback through the impact indicators and elaborating the Innovative Challenges List. Users, Industry and Academia Consortiums can be invited to participate in order to know their opinion. Also the use of social media allows to reach a large number of people with a wide spectrum, however not always is easy to obtain the expected result. To raise users' opinion is very convenient to organize activities with them all along the process. As we have said, the elaborated document at the end of this phase is the List of Innovative Challenges and each one of these selected challenges should be described and evaluated through the proposed impact indicators.

5.3. Ranking

The third phase of the Activities for public demand knowledge will be done by an expert panel composed by designed people from the Public Entity and the Research Team. Task 6 consists in evaluating the List of innovative challenges and task 7 is where the selection of the public challenges will be done. The expert panel has to use the impact indicators; however other criteria can be used at the same time. In this process, the number of selected Public Challenges will depend on the budget of the Public Entity and at the same time of the potential market offered by the procurer weighting if is relatively big or small to the costs involved in the development of the Innovation.

5.4. Challenge Brief

The aim of this phase is to create the Challenge Brief. It consists of task 8 which have to elaborate the challenge description. The Challenge Brief is a document with a clear explanation of the public service and with enough information about the functions to be developed by the new technology. It is important to address that this Challenge Brief is not a common procurement document, but an innovative one, and has to be written taking in mind its functionalities (to do or required by the public service) instead of the specific requirements that could narrow the innovation field.

New rounds between the public entity and the research team should be done. The functionalities must be defined by the end user of the public entity and not by its general services which are not directly involved in their implementation, especially if they do not possess the relevant information (10). At least, 2-6 meetings are necessary in order to get the Challenge Brief. This document has to specify the functionalities of the new technology, which must be chosen from the present functions, those that can be applied but are not standard and the new ones that will optimize the public service.

The translation of needs/problems/challenges into functionalities requires highly developed competences in technological level on the part of the procuring organization (8) and the role of the researchers is essential. The Challenge Brief will be the main document for the Call for Proposals/Tenders and the starting point of the second part of the PDTI process, the “Activities for research and technical development of pre-commercial products”.

6 THE OUTCOMES OF E++ URBAN PDTI AND THE INNOVATION IN URBAN ROBOTICS

As we have said before, 14 urban robotic challenges were received from different European City Councils. The wide scenario of urban challenges was structured and analyzed looking to stablish synergies between the urban needs proposed and under a new technological-urbanistic point of view. We structured them in three groups: city infrastructures, information and communication technologies related to different urban areas and technologic challenges for pedestrian areas at the city (Figure 5).

We also organized two workshops with local living labs and we started the recruitment of E++ citizens’ collaborators, looking to receive their feedback through the different phases of the project. We used the E++ web site to publish this activity. 103 citizens were involved to survey the activities programed in E++ Urban PDTI and their first task was to evaluate the Robotic Urban Challenge List (Figure 6) at the Science and Technical Party celebrated in June 2014 in Barcelona. We arranged the survey following ludic criteria, in order to motivate their feedback as a qualitative procedure. We received comments and suggestions that we collected and joined to the challenges’ evaluation.

INFRAESTRUCTURES	**HELSINKI Finland**	**Traffic infrastructure inspection and maintenance.** Decreasing the cost of maintenance and increasing the area livability through robotisation of the city's maintenance traffic at the Smart Kalasatama designated smart city area, including both vehicles and installed infrastructure in the area.
INFRAESTRUCTURES	**BARCELONA Spain**	**Automatic detection and road surface damage warnings.** To find a solution that can gather data and analyze the 11Mm2 of asphalt paving surfaces, road, cycle and pedestrian across the whole city.
INFRAESTRUCTURES	**CORNELLA Spain**	**Improving waste management and street cleaning.** Perform tasks with less cost for the maintenance of parks and gardens.
INFRAESTRUCTURES	**BARCELONA Spain**	**Utilities infrastructures condition monitoring.** To mechanize sewer inspections in order to reduce the labor risks, objectify sewer inspections and optimize sewer cleaning expenses of the city.
ICT AND ENVIRONMENT	**MALAGA Spain**	**Environmental monitoring and control.** This challenge aims at the deployment of a robotic collaborative network for monitoring and mitigating the presence of air pollutants (including pollen), as well as odors that may be unpleasant to citizens.
ICT AND TOURISM	**GREENWICH United Kingdom**	**Improving tourist services at the city.** To provide a cost effective way of interacting with visitors to provide accurate information based on real time management data as well as information on attractions and related services.
ICT AND PLANNING	**SEVILLA Spain**	**Improving the management, planning and urban city observations.** The use of aero robots in the management, planning and urban city knowledge
ICT AND MOBILITY	**SEVILLA Spain**	**Planning and information of urban accessible routes**. The robotic challenge we propose is the realization of a LAND ROBOT prototype, as the basis for a battery of them deployed around the city taking mobility accessibility data with references that are inherent in the development of the Planner.
ICT AND SURVEILLANCE	**PADOVA Italy**	**Providing safe and secure environments for citizens.** The new technology should improve the limits of traditional surveillance cameras and should have more features (i.e. proactive action, movement ...) compared with the actual passive video surveillance/acquisition.
ICT AND MOBILITY	**VALENCIA Spain**	**Improving the management, planning and urban city observations.** An innovative monitoring system applied to urban bus lines to monitor Origin and Destination and sustainable mobility modes.
PEDESTRIAN AREAS	**BARCELONA Spain**	**Personalized mobility support for pedestrian areas**. To create a system or service that will guide the transport or mobility impaired through the neighborhood. The system must be integrated into the pedestrian area of the new city model raised.
PEDESTRIAN AREAS	**SITGES Spain**	**Providing safe and secure environments for citizens.** New robotic infrastructure where now there is a human intensive service. Objectives: noise reduction, surveillance and management of public spaces, especially in crowded events and support to disabled people in pedestrian areas
PEDESTRIAN AREAS	**BARCELONA Spain**	**Goods distribution technology to improve local retail.** To create a sustainable system to make the distribution from the neighborhood Warehouse to each commerce. This robotic system must to be integrated in the pedestrian areas of new neighborhoods.
PEDESTRIAN AREAS	**COIMBRA Portugal**	**Personalized mobility support.** To contribute to the downtown urban life revitalization, improving the existing personalized transport as a key issue to connect activities and people. To select and apply the best mobility solution that can assure an effective transportation role in the downtown.

Figure 5. E++ Urban Robotic Challenges

URBAN AREAS	CITY CHALLENGES	CITIZENS
NFRASTRUCTURE	Traffic infrastructure inspection and maintenance	6,44%
NFRASTRUCTURE	Automatic detection and road surface damage warnings	6,44%
INFRASTRUCTURE	Improving waste management and street cleaning	12,23%
INFRASTRUCTURE	Utilities infrastructure condition monitoring	6,44%
ICT & ENVIRONMENT	Environmental monitoring and control	11,30%
ICT &TOURISM	Improving tourist services at the city	3,92%
ICT & PLANNING	Improving the management, planning and urban city observations 1	5,98%
ICT & MOBILITY	Planning and information of urban accessible routes	5,98%
ICT & SURVEILLANCE	Providing safe and secure environment for citizens	3,64%
ICT & MOBILITY	Improving the management, planning and urban city observations 2	2,52%
PEDESTRIAN	Personalized mobility support for pedestrian areas	8,87%
PEDESTRIAN	Providing safe and secure environment for citizens	13,33%
PEDESTRIAN	Goods distribution technology to improve local retail	4,04%
PEDESTRIAN	Personalized mobility support	8,87%

Figure 6. Citizens' Evaluation

7 COMPARISON AND CONCLUSIONS

Urban competitiveness would drive municipalities to engage in the procurement for innovation, but the innovative public procurement is unknown for most of cities' procurers. Municipalities could boost procurement for innovation in the initiation phase of the technology life cycle, co-creating new solutions with the private sector to sustainability challenges and opportunities in the cities. The development of technology is the key to mastering these challenges and transformations in the European Cities and the PCPs and PDTIs are the right tools to accelerate them.

Few examples of Public Procurement for Innovation have been developed in Europe during the last years. The case study of six Nordic-Baltic Sea cities (12) bring us six specific Innovative Public procurements from 1998 to 2007. Tallinn faced the challenge of introducing a universal ticket system for public transport; Copenhagen's case was initiated because of an emerging need in educational policy; Malmö's photovoltaic energy-supply purchase was a direct result of its environmental policy; Stockholm public procurement for innovation is strongly driven by environmental goals and Helsinki case was launched to meet emerging problems in their public transport sector. In Spain, 83 procedures of innovative public procurement have been developed from 2011 to 2016; 56 are pre-commercial procurements and 6 have been presented by local authorities related to Smart Cities. In general terms there is a small number of cases relates to the fact that public procurement for innovation at the urban level is not very common. Public procurement for innovation is not seen till now as an inherent part of the cities' innovation policy and mostly the cities tend to implement supply-side policy measures.

In spite of this, the European cities are prepared. Their competitiveness makes them strong and at the same time the innovative public procurement makes them more competitive. The lead-user role played by the cities can have spectacular results in innovative public procurement and the case study of Echord++ and the development of the first part of the PDTI, bring us a structured and proactive process to achieve them: 14 urban robotic challenges posed and defended by 10 European City Councils, all of them with robotic technology associated one step below an innovative RTD public call.

Cities and citizens have specific needs, not solved by existing market products, which require innovative solutions. These innovative solutions are based in new technologies that are

unknown for public managers. At the same time the technological consortia of industry and academia unknown the real cities' challenges. In this scenario, the PDTI process sets the connection link to public entities to develop innovative public procurement. It is clear that the Innovative public procurement increases the support to companies and leverage private funding increasing and improving employments opportunities in the cities. The few cases of public procurement for innovation have had a positive impact, not only on the providers but also on the positive influence that public sector can have on innovation-friendly markets. A positive impact on companies is evidenced by the increased exports and changes in companies' routines having an end user driving their RTD development. The social impact is reached improving citizens' accessibility and mobility in most of the cases and better public services.

The results got in the Echord++ PDTI process, during the first months of work, in a continuous learning by doing, bring us fourteen innovative urban challenges proposed by Cities' Councils of all Europe. All of them with innovative technology associated, specifications about functionalities and one step away to achieve a call for RTD tenders. The role of the academia was essential, not only in technological topics but also in the management of all the process.

All of these proposals could be the starting point of a new Innovative Public Pre Commercial Procurement.

8 ACKNOWLEGMENT

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