



THE NETWORK  
OF MAJOR  
EUROPEAN  
CITIES

## **Local e-Government Bench-learning Survey**

**Final Report of the  
EUROCITIES Working Group**

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### **EUROCITIES**

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EUROCITIES is the network of major European cities. Founded in 1986, the network brings together the local governments of over 130 large cities in some 34 European countries. EUROCITIES represents the interests of its members and engages in dialogue with the European institutions across a wide range of policy areas affecting cities. These include: economic development, the environment, transport and mobility, social affairs, culture, the information and knowledge society, and services of general interest.

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## INTRODUCTION

e-Government is the public administration's true revolution. It brings major changes in the way the administration works, the way it delivers services to citizens and companies and the way citizens are interacting with it. It is a radical transforming process that can be carried out thanks to Information and Communications Technologies enabling a wide range of possibilities to rethink the whole public organization's way of working.

According to EUROSTAT, the public sector is responsible for nearly 40% of the GDP in Europe. These figures point out how the transformation of the public sector is of capital importance for European economic growth. In addition, in Europe, the subsidiarity principle ensures that decisions are taken as closely as possible to the citizen. That means that the European Union does not act unless it is more effective than action taken at a national, regional or local level. Moreover, surveys carried out in Member States, are showing that between 50% and 80% of the citizen's interactions with public bodies are done at sub-national level (Heeks, 2006). In such a context, European cities - which benefit of a noteworthy autonomy with an important number of competencies - are thus playing an important role in the organization of the European Society. Therefore, although e-Government is a reality at all public organizations levels (state, regional and local), it has its biggest impact at a local level.

Nowadays, all city governments and administrations find themselves in a transition from traditional models of local public organisation to a new one more efficient and more effective (e-Government Progress in EU27+, 2007). At the same time, the relationship with citizens is changing from a scenario based on a multiplicity of specialized counters to a "one-stop-shop" model. What is behind this process is the transformation of the whole organization putting citizens at the centre of the action, that is creating a real citizen-oriented organization capable to understand who the citizen is and what are the citizen needs in each case. In other words, these changes try to lead to proactiveness and an increase in public value.

As this transformation touches the core business of the local public administration, cities must carefully manage the process in order to shorten it and ensure a satisfactory output. City managers need to have relevant information about what processes to tackle first, how to remodel them, and how to measure the progress (Dunleavy, Margetts, Bastow, & Tinkler, 2006). From the cities' point of view, two important things are needed to lead the transformation process successfully: the existence of an e-Government city model and the measurement of the city's e-Government development. How is the city doing the journey? Where is the city going? At which stage of this journey is the city? These are capital questions each CEO needs to answer to make the transformation process a success.

The previous survey about e-Government City Models entitled "e-Government City Models: cases from European cities" (Rodríguez, Batlle, & Esteban, 2007), conducted during 2006 and 2007 in the context of EUROCITIES network, provides a valuable tool for city managers to initiate and guide the e-Government transformation. That survey, which

constitutes a qualitative approach to e-Government on European Cities, shows how seven leading European cities faced such transformation along the past ten years, which were the key decision taken and the main inspiration of their policies.

Although a lot of lessons can be learnt from that survey, it is only one of the needed contributions to successfully manage the local public administration transformation. The other missing dimension is the measurement of how a city is progressing in this important process.

There is a lack of information regarding e-Government on the local government level. Up to now, the most relevant studies about e-Government measurement comparing e-Government evolution has been tailored at country level (Capgemini, 2006) and (Capgemini, 2007). Although some information is also available at regional level, only little information is focused on local level e-Government.

Furthermore, while indicators at country level are widely accepted and commonly used, the presence of such standards at regional level decreases. And finally, at local level, there is such a low use of standard indicators that it is not possible to perform quality comparisons between different city cases.

The Capgemini Benchmark has a long tradition, and constitutes a valuable source of well measured data concerning e-Government. However, it was designed nearly 10 years ago in the framework of the e-Europe Action Plans for Member States to ensure a generalized electronic access to main basic public services. As a consequence, it is focused on e-Government at a state level, which can be easily derived from the list of the 20 basic services analysed. A quick view on these twenty services shows that they are not applicable to local e-Government measurement.

Furthermore, the Capgemini Benchmark introduced four levels of e-Government services sophistication: information (T1), one-way interaction (T2), two way interaction (T3) and transaction (T4). Nowadays, city e-Government services are evolving quickly and deeply transforming “business” processes and including citizen’s contribution. Although the Capgemini model recently evolved including a 5<sup>th</sup> level of sophistication, it still does not fit with local e-Government characteristics. That is the reason why this survey comes back to the original model of four phases of e-Government introduced by Gartner Group (Baum & Di Maio, 2000), which are: presence, interaction, transaction and transformation and adapt it to describe higher sophistication levels that are currently appearing at local level.

Moreover, regarding local level, benchmarking surveys mainly focus on the general aspects of the official website. Although, there are some exceptions such as the “eCitizenship for all benchmark report” (Deloitte & EUROCITIES, 2003, 2004 and 2005 editions) carried out by Deloitte and promoted by the EUROCITIES network with the special support of The Hague City Council, in general, surveys rarely focus on e-services quality or citizen adoption of e-services. Therefore, a complete view of the e-Government process in cities is not possible today.

This lack of information about the progress of local e-Government initiative and the real need of having this information to better manage the e-Government transformation process motivated Barcelona City Council to propose in June 2007 the creation of a new working group.

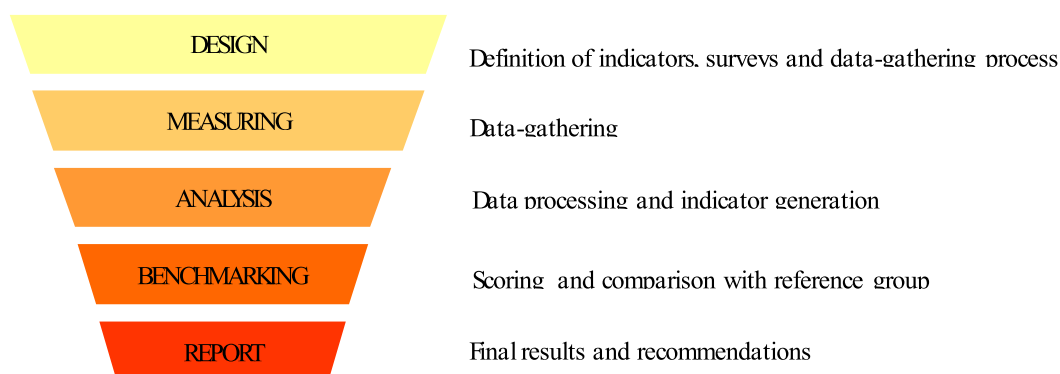
The working group was eventually created in October 2007 with the aim of defining a measurement framework for local e-Government based on a bottom-up approach and focused on e-Services maturity and citizen's adoption and, at the same time, performing the first measurement over 15 European cities. This report is presenting the results of this working group.

# 1. METHODOLOGY

Far from being a typical benchmarking exercise in which the results show only rankings of cities, the work proposed aimed to be a bottom-up exercise starting to listen cities and understanding the kind of services they provide and the real needs they have when managing the e-Government transformation. Developing a measurement framework designed from the scratch by the cities and for the cities. The selection of services was based on those actually provided by cities. The results are presented through “City Maps” that compare each city with the European average. This bottom-up approach led us to a clear learning process in which after a detailed analysis of the provided services, best practices are well identified, listed and described to facilitate sharing of knowledge and dissemination. These are the reasons why the survey was also qualified as a Benchmarking project.

The team was composed by Barcelona City Council acting as team leader, Penteo ICT Analyst that carried out the Technical Coordination, data collection and analysis, Dr. Mila Gascó of the Pompeu Fabra University as Scientific Advisor and 15 cities belonging to the EUROCHES Network.

The methodology employed has been based on Penteo's METRICA methodology including some ad-hoc arrangements which were necessary due to the nature of the survey.



*Figure 1: Penteo's METRICA methodology*

Penteo's METRICA methodology was chosen since one of the goals of the survey was to provide an agreed measurement framework applicable to local administrations. Therefore, it seemed a suitable source since it is a contrasted measurement methodology. On the other hand, it proved to have a wide amount of experiences behind which had allowed benchmarking in some cases along with the detection of best-practices.

As the figure shows, Penteo's METRICA is a five-stage methodology. The first stage is related to the definition of suitable indicators, surveys and data-gathering process. This stage is of course crucial since it will determine the final results. The objective is to choose indicators that will both provide the information looked for and suitable to be

rigorously measured. Once these indicators have been chosen, the process to gather the data necessary to measure these indicators is also defined.

On the second stage, the actual data-gathering process takes place following what has been designed during the first stage. Once the information is gathered, the next stage starts: the information is processed and the indicators are generated. Then, the fourth stage of the process takes place: with the generated indicators, the scoring is calculated along the differences towards the reference group. Finally, during the last stage, a report is generated stating the benchmarking stage results (scoring and comparison with reference group), including an interpretation of the results according to each particular cases.

However, as it has been stated in the introduction, when approaching e-Government measurement at local level, there are no suitable standards defined yet. Therefore, the design phase included the consensus over a common reference: the global catalogue. As it will be explained further down, all services included in the catalogue were gathered following cities' proposals. Also, the catalogue's categories were discussed and agreed among participants.

Another difference among Penteo's METRICA methodology and the resulting methodology is the fact that this survey aimed to avoid the rankings of cities. Therefore, the analysis and benchmarking stages combined into one: instead of a reference group, the reference used for comparison has been the global result, the indicator being the differences between each city and the group result. This has proven to be a very constructive way of comparing, because it highlights the areas where cities excel as well as the areas where they have to improve without recurring to rankings. Indeed, rankings are not suitable for local cases due to the wide variety of cases.

The resulting methodology consisted therefore of four phases developed during 2008:

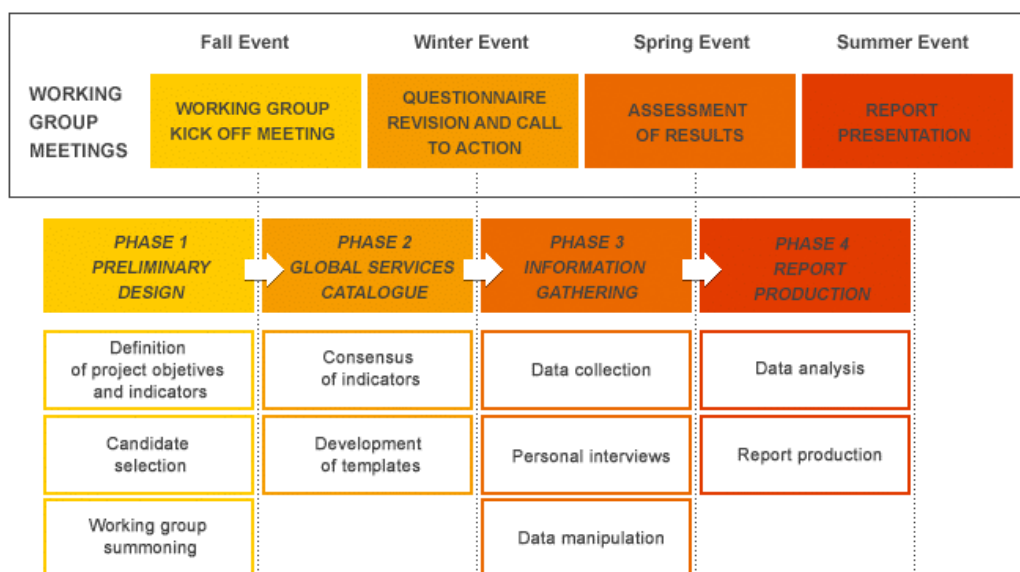


Figure 2: Survey's resulting methodology's phases



During the first phase, the survey was designed. Once all the participant cities had joined the survey, the common objectives and a work plan were agreed.

The second phase of the survey was focused on the elaboration of the Global Services Catalogue. Each city drafted a list with a description of some of the e-Services they provided. Amongst all the e-Services gathered, a common set of services was selected on which the bench-learning exercise was performed. This list of services is of fundamental importance for a successful work and it can be seen as consequence of the cooperation philosophy adopted for this survey. Also, along with the services integrating the global catalogue, the service categories were as well agreed.

The third phase consisted on the gathering of all information related to each and one of the services included in the global services catalogue in order to measure both their maturity level and their perception of adoption level as detailed in Chapter 4. A specific set of templates was designed and agreed in order to satisfy this need.

Once all cities submitted the templates fulfilled for one and each of the services integrating the global catalogue, the analysis process started: averages, differences and dispersions were calculated. With this, the European global results were obtained as well as two maps showing each city compared with the reference.

Finally, this report gathers all the information related to the survey and hopes to set the path for further exercises of this sort. Again, a draft of this report was presented to all participants, who had the right to present correction proposals, and a meeting took place in order to share and discuss the final results.

The main characteristic of the resulting methodology has been its bottom-up approach, which is coherent with the survey's aim of providing a useful tool for city managers. To that aim, the collaboration of cities in the whole process has been of paramount importance.

Each phase included at least one workshop with all project members and several project coordination meetings. Apart from attending and participating in the meetings, each member from all the involved cities has taken active part on each phase of the survey. They have been asked to contribute to the definition of indicators, questionnaire preparation, reporting structure outlining and data provision.

Also, a collaborative website was set up so that all surveyed cities could share all the documents generated during the process as well as to keep up a discussion forum to continue debating the main topics treated during the working groups meetings. Finally, a constant communication has been held between Technical Coordinator and participants to guide the work and solve questions during the picking up processes.

The sample of this survey is composed of 15 European cities which are listed in the next table:

Antwerp (Belgium)	Barcelona (Spain)	Bergen (Norway)
Bilbao (Spain)	Birmingham (UK)	Bologna (Italy)
Enschede (Netherlands)	Helsinki (Finland)	Milan (Italy)
Murcia (Spain)	Riieka (Croatia)	Tallinn (Estonia)
Turin (Italy)	The Hague (Netherlands)	Vienna (Austria)

*Table 1: Participant cities*

With these 15 participant cities, 10 European countries are present at the survey. The sample is quite representative of the European urban areas, with half of the cities belonging to the northern part of Europe and another half located in the southern part. Moreover, out of the 15 cities, more than 50% are either capitals or second cities (3 capitals and 4 second cities) and the rest are either medium or small cities. Their GDP, number of civil servants, percentage of household Internet access or educational level is also much diversified, proving the sample's suitability for the survey.

In total, the 15 cities participating in this survey represent:

10.087.736 inhabitants, going from the 144.043 inhabitants from Riieka, to the 1.677.867 inhabitants from Vienna. An average population per city would be of 672.516 inhabitants.

214.334 civil servants, going from the 455 civil servants of Riieka, or the 1.700 of Tallinn and Enschede to the 38.623 of Helsinki or even the 57.000 of Birmingham.

An average GDP per capita of 26.744€, going from the 12.305€ per capita of Riieka to the 60.322€ per capita of Bergen.

## 2. GLOBAL SERVICES' CATALOGUE

As one of the first steps, the participant cities were asked to list the main services they offer through electronic means. That information showed that not all cities deliver or have the authority or competences to deliver the same services to citizens. Each country's history and experience in e-Government differs from its neighbours in multiple ways. Therefore, there is a need of having a common list of European services that can be used as a measurement reference. With that aim, a Global Cities Catalogue was created out of all the information recollected.

The Global Cities Catalogue intends to bring together all the common services from all the cities as well as the specific local services that were worth mentioning, both by their success or innovation. Once all services were collected, they were grouped according to municipal action areas. The result of the process was a list of nine categories. At the same time, these categories help to evaluate cities showing services delivery differences across Europe.

In total, eighty-one services have been identified and grouped into nine main categories, listed below:

- *Citizens' engagement:* 10 services are considered in this category devoted to attract citizens' attention to electronic channels and to foster citizens' participation. The services included in this category encourage the relationship between the citizens and their administrations promoting or being on themselves a path to e-Democracy
- *Channelling:* 10 services are included in this transversal category related to enhance the contact between the citizenry and its municipality. This group of services includes city web pages, personal folders or bulletins.
- *Education:* 13 services are included in this category related to satisfy citizens' Educational needs. This family of services includes services related to children, adult and virtual learning services, services related to cultural projects and libraries.
- *Employment & business:* 7 services are considered in this category devoted to help citizens obtain a job or make business procedures easier. Services devoted to recruitment, tendering and small business promotion are included in this division.
- *Environment:* 7 services are admitted in this category related to Environmental care. This group includes services related to the maintenance of the communal properties as well as to the encouragement and acquisition of habits supporting sustainable urban growth.
- *Lifecycle:* 10 services are included in this category devoted to ease the necessary transactions among citizens and municipalities related to the life cycle of a person living in the city, such as Personal Certificates, digital documents management systems or census.
- *Social care:* 14 services are considered in this category related to integrated services that are available from public health and Social Care providers. This group also includes housing services and care for people with special needs

(disabled, children or aged people).

- *Transport*: 6 services are admitted in this category devoted to satisfy citizen's mobility needs. This family group includes services related to ease the physical mobility through the city by various means of Transport.
- *Urban planning*: 4 services are included in this category related to land use and property related issues as permits for construction, building regulations, certificates or land acquisition.

Moreover, once categorized, all the services have also been divided according to the number of cities that are offering them, thus analysing their percentage of coverage.

Service coverage is defined as the percentage of surveyed cities that are providing a service. Therefore, if a concrete service is offered by all of the cities its coverage would be 100%. This parameter will be further used in this study to assess how common a service is among the surveyed cities. Moreover, coverage at category level also informs about common understanding in such category. According to our methodology, coverage was assessed by self-evaluation. Once the Global Services Catalogue was created, a questionnaire with the eighty-one services was sent to every city, which was asked to point out if they delivered that service or a similar one.

According to the previous consideration, if the service is offered by 50% or more of the participant cities it is labelled as Standard Service. If not, it is called Additional Service, as shown in table 4:

Service Coverage > 50 %	Standard Service	53 services
Service Coverage < 50 %	Additional Service	28 services

*Table 4: Services' division*

Standard services, which represent 65% of the identified services, show common interests in European municipalities' services deployment. It is important to remark that the standard services concept does not represent a group of services that all cities must deliver. It is not a group of mandatory European e-Services. On the contrary, it aims at describing general e-Government behaviour among the surveyed cities using a very simple categorization.

On the other hand, the additional services' concept, 35% of the identified services, highlights differences on the city's role -competencies- across European countries and shows the innovation capabilities of the local public sector.

## 2.1 CATEGORIES

The list below offers a detailed view of the Global Services Catalogue per category. It includes a short description of each service considered, both standard and additional.

### 2.1.1 CITIZENS' ENGAGEMENT

#### a. STANDARD CITIZENS' ENGAGEMENT SERVICES:

- ***City Council Plenary Session's Access:*** service that offers the possibility to follow the meetings of the city council live on the website. It may also include the possibility to consult communal and municipal decision, read documents and view political issues debated within the City Council. It may include information regarding presentation/availability of all political members.
- ***Participation Processes:*** use of classical as well as electronic tools in a collaborative path to the development of new forms of e-participation. It may include development of areas devoted to on-line studies, questionnaires, projects and on-line forums.
- ***City Council Listens:*** on-line service to make complaints and notifications through the digital desk. The citizen may, for example, file a complaint or make a notification about the environment or even the illegal construction of a building. There may be a service level agreement in terms of providing an answer to the citizen.
- ***City Archives Consultation:*** Citizens on-line access, usually through the archive homepage, to the digitalized archives from the city. Citizens may request to view an archive (previously browsed through the content list) by filling a form obtainable in the reading hall of the archive building or on-line in the archives' homepage.
- ***Reservation for Municipal Buildings:*** a citizen wishing to reserve a municipal building for any special event may visit the municipal website and contact the service in charge of reservations. This service may be charged.
- ***Kiosks:*** Automatic machines through which any resident may access city council information such as e-Services, the agenda or his/her personal folder. There may also be a free e-mail service. The service may include also an option to purchase tickets for any event that takes place in the city. The kiosks may be located in public areas like libraries, markets or municipal buildings.

#### b. ADDITIONAL CITIZENS' ENGAGEMENT SERVICES:

- ***Lost and Found:*** on-line service through which a citizen may submit a request to retrieve a lost thing. The qualified officer will contact him/her for more information and/or to give back the object.
- ***Second Life Island:*** inclusion of the municipality's desk in the virtual world of Second Life.

- **City's Blogspace:** website hosting the city's blog, that is, a site containing regular entries of commentary, descriptions of events, or other material such as graphics or video. Entries from citizens may be placed after a check for offences or inappropriate language.
- **Chat-line:** direct communication line through which a citizen can query a municipal worker regarding municipal services and obtain an immediate response.

## 2.1.2 CHANNELLING

### a. STANDARD CHANNELLING SERVICES:

- **City's Homepage:** main website of the municipality. It is thought to be the sole entrance to all the other sites and services offered by the city council. It is also the front image of the city.
- **Citizens' Personal Folders:** it should include personalized useful information for the citizens. The details included in the folders may vary from one municipality to another. Some examples of provided information would be fiscal information, on-line payments or access to paid tributes.
- **Consultation On-line (email, chat, phone...):** tool for citizens to make requests on any service or information concerning the City Hall and its services. This consultation can be made through several channels. According to the channel chosen the answer can be immediate (chat or phone). There may be a service level agreement in terms of providing an answer to the citizen.
- **Bulletin/Newsletter:** bulletin delivered on-line to the citizenship containing any kind of service or activity of general interest. The service may be available under subscription. The citizen may choose the contents he/she wants to receive and its regular recurrence.
- **GIS and Virtual Flight:** The GIS (Geographic Information Systems) service may provide information regarding city maps and may include an address locator service. The municipality may provide other kinds of information integrated with a GIS map, for instance, hospitals exact situation, schools around a user house, churches or street markets. The virtual flight is an advanced simulator through which the citizen can perform a 2-D, 3-D or even 4-D visit to the city's main attractions or the whole city.
- **Customized Web Pages:** possibility to customize any municipal website according to citizens' interests and impairments. This concept can be very wide. Some examples of webpage customization could be: possibility to change the font size of the webpage, possibility to choose which information is shown in the main website according to the user (through the use of cookies) or the possibility to listen to the information shown on the screen.
- **Procedures Information with other Public Administrations (local, regional and national):** information about procedures with other public administrations shown on the municipality's website. It may include the possibility to download the needed forms or redirect the municipal site to the desired service.

- **GIS Based Directory:** service that would allow citizens to search any public building or service according to a GIS map. It could also be possible to give feedback directly to a certain place of service.

b. ADDITIONAL CHANNELLING SERVICES:

- **Enterprises Folders:** personalized useful information for enterprises. Information included in the folders may vary from one municipality to another. Some examples of information would be: fiscal information, on-line payments or access to already paid tributes.
- **SMS for Citizens:** citizenship contact through the use of the Short Message Service (SMS). The service could be used to receive different kinds of information directly on the mobile phone. The service may be upon request and may require some kind of identification.

### 2.1.3 EDUCATION

a. STANDARD EDUCATION SERVICES:

- **Pre-School Children Education:** on-line service that may include information about pre-school's inscription and the possibility to perform and pay the inscription on-line. The service may request any kind of identification from the user and may be integrated with a GIS map.
- **Children Education:** on-line service that may include information about school's inscription and the possibility to perform and pay the inscription on-line. The service may request any kind of identification from the user and may be integrated with a GIS map.
- **Adult Education:** on-line service that may include information about adult courses and activities, both in public and private centres, and the possibility to perform and pay the inscription on-line. The service may request any kind of identification from the user and may be integrated with a GIS map.
- **Cooperation Home-School:** on-line space for parents, teachers and students to exchange information about school evolution (homework, activities or exams). The service may request any kind of secure identification from the users.
- **Libraries:** on-line database shaping a whole integrated catalogue of all the public libraries in the city. The citizen would only have to make a unique search to find a book-CD-DVD-magazine and would have the chance to reserve it on-line or extend loan periods.
- **Cultural Heritage Sites:** on-line information and booking to certain museums (municipal or not) or cultural sites and activities. There may be the possibility to pay the reservation on-line.
- **Funds for Cultural Projects:** possibility to find information and apply on-line for any kind of fund for cultural projects. There may be the possibility to digitalize the already submitted information of those organizations that yearly apply for the funds so that no extra effort is needed.
- **Summer Camps or similar:** on-line service regarding information about

Summer Camps for kids or teenagers. The service may include the possibility to make an inscription and to make the payment on-line.

- **Portal for Events and Extracurricular Activities:** on-line website that may include all the activities performed in the city. Any event organizer may be able to register their events in the portal. There can be a filtered search utility to find any event.

#### b. ADDITIONAL EDUCATION SERVICES:

- **Media workshop:** service offered in the neighbourhoods of the municipality. The city may sustain initiatives from citizens building media-projects about their own neighbourhood and share it with local residents.
- **Oral History Preservation:** on-line site where citizens may exchange information about the past of the city. For example, a user may upload an old picture and other users may make comments on it. This service may be available under subscription.
- **Games and sports lending:** reservation of equipment for games or sports on-line via the digital desk. There could be the possibility to borrow the sports material if needed.
- **e-Learning:** technology supported education at any level where the medium of instruction is computer technology, particularly involving digital technologies. In some instances, no in-person interaction takes place. Electronic learning could be used, for instance, to offer adult education courses without face-to-face attendance.

### 2.1.4. EMPLOYMENT AND BUSINESS

#### a. STANDARD EMPLOYMENT AND BUSINESS SERVICES:

- **Recruitment (jobs in private sector):** job-search utility promoted by the city. Users would have the possibility to download the relevant form or to apply for a job on-line. Also, the service could also be integrated with other employment services from the city or from other public administrations.
- **Public Tenders (jobs in public sector):** job-search utility to inform about open or vet to open public tenders. There could be available forms to download. Also, there could be the possibility to apply on-line.
- **Portal for Companies:** specific website for companies containing information on, for instance, taxes, fees or pertinent procedures. Certain services could be fully performed on-line. There would also be a notification service for credits, education programs or even public tenders.
- **Portal for Entrepreneurs:** specific website for brand new or vet-to-be companies. Procedures could be fully performed on-line, including business registration. There would also be a notification service for credits, education programs or public tenders.
- **On-line Business Registration:** service to perform a registration for any type of commercial enterprise completely on-line. This service may also include



the option to make taxes payment on-line.

b. ADDITIONAL EMPLOYMENT AND BUSINESS SERVICES:

- **SMS for Business:** free SMS service to inform registered local business about municipal programs, recently opened public tenders, availability of credits, events or education opportunities.
- **Ideas' Bank:** supportive tool for the entrepreneurs who lack of knowledge or experiences in their business area. This creative space should give an opportunity to find creative solutions to problems or find new ideas for developing new products and services.

## 2.1.5 ENVIRONMENT

a. STANDARD ENVIRONMENT SERVICES:

- **Recycling Parks:** information available on-line regarding recycling parks' areas and times of collection and any other useful information. The service may also be integrated with a GIS map and may require identification.
- **Public Property Maintenance (streets, roads, public buildings...):** on-line service to report damage on a public property (graffiti, potholes...). Citizen could request feedback notification. A service level agreement in terms of providing an answer to the citizen may also be stated.
- **Bulk Waste Collection:** special on-line site that indicates the areas and times of collection for bulk waste. Citizens would have the option to request collection in their neighbourhoods.
- **Operational Information:** The citizens may subscribe for continuous notices about Operational Information of the city (including road maintenance and repair sites about road-making, closedown roads, accidents, earthwork or excavation, and interruptions of gas or electricity) on the requested e-mail address. The service is integrated with a GIS map.
- **Air Quality:** on-line air quality monitoring website. This service may help the citizenship be aware of which is the quality of the air in their neighbourhood, workplace or any desired location from the city. Also, information regarding Air Quality management, concentrations of particles, lead, sulphur dioxide, carbon monoxide or other impurities.

b. ADDITIONAL ENVIRONMENT SERVICES:

- **Web Flea Markets:** on-line service through which the citizen can upload items he/she wants to sell or give away including pictures, characteristics and any other useful information. Other users may contact him/her to buy the product if they are interested. The service may be offered upon registration. Also, the service could offer information about physical web flea markets integrated with a GIS map.
- **Pollution Charge:** tax to discourage the use of polluting private vehicles inside the central part of the city by applying an entrance charge related to the polluting emission levels. The service may be completely performed

through the municipal website.

## 2.1.6 LIFECYCLE

### a. STANDARD LIFECYCLE SERVICES:

- **Personal Certificates:** possibility to request any kind of personal certificate (birth, death, marriage ...) on-line. The required information should be sent directly to the user either by e-mail or through the desired channel. If the service requires any payment, this may also be performed completely on-line.
- **Population Registry:** possibility to perform a registration in the census on-line. The city council may provide the user with a confirmation either on-line or through the requested channel.
- **Residence Registration:** possibility to officially register a citizen change of address on-line. This information may be used as the official address through which the communication citizen-municipality shall be done, including the official voting address. The city council may provide the user with a confirmation either on-line or through any other channel.
- **Digital Documents Management System:** service offered on-line by the city council through which the user may request any needed document regarding his/her lifecycle (request of extracts, copies...). If the service requires any payment, this may also be performed completely on-line.
- **On-line Fines Consultation and Payment:** on-line service that would offer the possibility to consult and pay any type of fine mounted up by the citizen. The service may be provided with an alert system that would inform the citizen of any close payment deadline.
- **On-line Taxes and Fees Payment:** on-line service that would offer the possibility to consult any tax or fee status and pay it. The service may be provided with an alert system that would inform the citizen of any close payment deadline.
- **On-line Marriage / Civil Union Register:** on-line service that aims to enhance effectiveness in any procedure related to marriage or civil union: request for an available date or an available municipal room, inscription in the official register or a help guide with all the steps to be taken.
- **Utilities:** on-line service that will allow the user download any bill related to municipal services (gas, water or waste). Payment should also be performed on-line.

### b. ADDITIONAL LIFECYCLE SERVICES:

- **On-line Vehicles Registration:** service that would allow a citizen to register his/her vehicle on-line. If the service requires any payment, this may also be performed completely on-line.
- **Search for Burial Places:** on-line service that allows search for burial

places, buried persons and historical monuments. There may be integration with a GIS map.

### 2.1.7. SOCIAL CARE

#### a. STANDARD SOCIAL CARE SERVICES:

- ***Housing for People with Low Incomes or Under Threat of Homelessness:*** on-line service through which people with economic hardships may apply for any housing help in terms of economic funding or providing a provisional accommodation itself.
- ***Disabled Parking Permits:*** on-line service through which disabled people can request a parking license that will allow them park in the restricted areas or ask for a personal parking place next to their houses.
- ***Discounts for People with Low Incomes:*** service through which any resident with economic hardships may receive help from their municipality in form of discounts for any activity or service.
- ***Permits for Organizing Public Events:*** on-line service through which civil servants receive applications from citizens, claim accordance and issue permits for arranging public events.
- ***Individual and Family Care Service Aid-calculation:*** on-line service related to the municipality's social work that may include special aids for those families or individuals with special needs, economic or not.
- ***Physicians' Database:*** an open catalogue where any user may find the address of any medical doctor in the city. The service may be integrated with a GIS map.

#### b. ADDITIONAL SOCIAL CARE SERVICES:

- ***Monitoring Children during Holiday Seasons (before and after school):*** tool that parents can use to look after their kids anytime they cannot be taking care of them. The tool may include monitoring during holiday seasons and before and/or after school activities, that is, the possibility to let the citizen directly enter the requests for playing squares and the monitoring before and/or after school hours.
- ***Birthday Benefits:*** on-line service through which kids under a certain age may receive a present (economic or not) from their municipality. This service may be oriented to large families only or families with economic hardships. Bank account number or other information may be required under identification.
- ***Childbirth Allowances:*** on-line service through which the new parents may request an economic benefit paid by the municipality in case of birth. Bank account number or other information may be required under identification.
- ***Health Services offered to Elderly through Domotica:*** any kind of domotic tool used to reinforce the care of old people's health. The service may be upon request and may require some type of registration.

- ***e-Monitoring of Health Status of elderly through Domotica:*** tool used to alert the care centre through electronic means in case, when monitoring elderly people health, certain parameters are exceeded or in case an active or passive alarm goes off.
- ***Ambulatory Care Coordination through PDAs:*** provision of hand held computers or PDAs to all nurses so that time-consuming tasks like prescriptions or health reports become shorter. This service may help enhancing effectiveness and efficiency of the medical professionals that, in some cases, have to visit patients in their houses.
- ***Police Works through PDAs:*** provision of PDAs to policeman in charge of traffic control. This service may help enhancing effectiveness in fines and other notifications treatment since it can be sent directly to the central office.
- ***Animals Register:*** register for domestic animals and wild animals living in captivity. Inscription for dangerous animals should be mandatory. Also, a document proving that the animal has an identification microchip may be required.

## 2.1.8 TRANSPORT

### a. STANDARD TRANSPORT SERVICES:

- ***Public Transport Services:*** on-line service regarding information about public Transport in general and more specifically: journey-planners, virtual tickets acquisition or touristic routes. There may also be an alert system to inform users about any incidence.
- ***Car Parking:*** on-line service that may include information about municipal car parking areas or on-line acquisition of electronic parking vouchers. The service may be integrated with a GIS map. Payment should also be performed through mobile phone.
- ***Traffic Web Cameras:*** on-line access to the information received by the traffic cameras in order to keep the citizenship updated on traffic jams, accidents or news related to traffic in the city.

### b. ADDITIONAL TRANSPORT SERVICES:

- ***Municipal Bicycles Lending:*** on-line service that would allow the citizen use any municipal bicycle. These bicycles would be placed in several pickup areas around the city. The service may be under subscription and may require on-line payment.
- ***Car Pooling:*** service that intends to promote sustainable mobility by promoting the share of private cars that daily make the same route. It could be based in a web-based software platform that would allow users to define pooling preferences (origin, destination, number of seats available, etc.) and find available cars.
- ***On-line Ticket to enter the Limited Traffic Area:*** on-line acquisition of the permit to enter the historical/limited traffic zone. Identification should be

required.

### 2.1.9. URBAN PLANNING

#### a. STANDARD URBAN PLANNING SERVICES:

- **Construction Permits:** on-line service that may include the possibility to ask for any kind of construction permit through the Internet. If payment should be done, this may also be performed completely on-line.
- **Land-use Plans and Building Regulation:** on-line public information regarding actual and future land-use plans and cadastre regulation. The service may be integrated with a GIS map. Some information may require identification.
- **Certificates (cadastral information, taxation, mortgage statements...):** on-line service that would let the user ask for any urban certificate on-line. The certificate may be sent electronically or at the requester's house. If payment is required, there could also be the possibility to be performed on-line.

#### b. ADDITIONAL URBAN PLANNING SERVICES:

- **Acquisition of Land by Foreigners:** on-line information for immigrants on how to obtain a property in their host city. The purpose of this application may be to allow foreigners wishing to purchase any kind of property in the city to apply for the required approval via the internet. This could be done by a local lawyer or a public notary.

## 2.2 DIVERSITY

As stated early in this chapter, selected services have been grouped according to their European's percentage of coverage resulting in two groups: standard and additional services. While standard services may seem to identify general patterns, additional information must surely complement them since the fact that a general pattern exist does not mean that there are no important and interesting exceptions. These exceptions will be expressed in the form of a diversity mark focusing in the variety of circumstances that exist while surveying e-Government in several cities. This valuable information obtained from the additional services should not be unnoticed (Ragin, 1994). In short, the survey of diversity avoids an exclusive focus on what is common or on dominant patterns.

Therefore, different cases' fundamental diversity will be expressed through the use of the following comparative factor:

$$\text{diversity} = 1 - (\% \text{ services provision} / \% \text{ perfect coverage})$$

The diversity factor compares the current coverage of all services (both standard and additional) to the perfect scenario: the total provision of all services by all cities. Therefore, diversity helps analysing the variations in e-Government provision in Europe.

As it can be noticed, diversity is well delimited:

$$0 < \text{diversity} < 1$$

Specifically, diversity will be used in this survey to compare coherence in cities delivery of services for each of the nine considered categories.

A large diversity number would imply a big difference in service provision among European cities. A category with a diversity of 0.67 will show a low coherence. In concrete, European cities would offer quite different services achieving only a 33% of coincidence in services delivery.

On the contrary, a small diversity mark would mean that participants in different cities deliver the same kind of services for a particular category. For instance, a category with a diversity mark of 0.15 will show high coherence in services' provision meaning that European cities would offer services with an 85% of coincidence.

## 2.3 GENERAL ANALYSIS OF COVERAGE AND DIVERSITY

An analysis of the Global Service Catalogue must be performed taking into account both parameters: standard coverage and diversity. On one hand, the percentage of coverage can tell which the coincidence of standard services in Europe is. It can inform about common interests or maybe common political European actions affected e-Services deployment and helped to create a shared vision of services' delivery through the use of electronic means.

On the other hand, diversity shows variations in e-Government considering both additional and standard services. Therefore, comparing standard services' coverage and diversity can help discovering how additional services coverage may differ from one category to another.

Next, there is a table comparing the European percentage of standard services coverage and the diversity mark per category. Also, in order to facilitate its comprehension, the total number of services and detailed number of standard and additional services per category is provided.

Category	Total services	Standard services	Additional services	Standard Coverage	Diversity
<i>Citizens' engagement</i>	10	6	4	82.22%	0.45
<i>Channelling</i>	10	8	2	80.83%	0.26
<i>Education</i>	13	9	4	77.78%	0.32
<i>Employment &amp; Business</i>	7	5	2	76.00%	0.35
<i>Environment</i>	7	5	2	80.00%	0.43
<i>Lifecycle</i>	10	8	2	67.50%	0.39
<i>Social care</i>	14	6	8	80.00%	0.52
<i>Transport</i>	6	3	3	75.56%	0.46
<i>Urban planning</i>	4	3	1	82.22%	0.32

Table 4: Standard Services Coverage and Diversity per category

It is quite remarkable that all categories achieve percentages of standard coverage always in a range between 67% and 83% with no correlation with the number of standard services. Hence, this result confirms not only the suitability of the services chosen while constructing the Global Services Catalogue submitted to study, but also the high degree of standard services consolidation in Europe.

To explain the meaning of these figures it must be also observed how populated are the set of standard services on each category. It could be supposed that a category with a high standard coverage and a well populated set of standard services is a well established category. In other terms, the majority of cities show a common understanding on the basic services to be delivered or even a high degree of alignment across European countries regarding city competences in that category.

When looking specifically at the standard coverage scores in table 4, categories more related to improve citizens' attention and enhance the municipality-to-citizen communication like *Citizens' engagement* or *Channelling*, or *Social care* appear to be the most well established categories, reaching the highest coverage scores with a well populated set of standard services.

Also we find *Urban planning*, and *Environment* which present an important standard coverage but with a very low population of the standard set of services, both with only 3 standard services which could contribute to the high mark on standard coverage.

On the other hand, *Lifecycle* along with *Transport*, *Employment & business* and *Education* appear to be the categories with the lowest standard coverage among European cities, with percentages between 67% and 78%. *Lifecycle* and *Education* categories are two of the most populated categories in this survey, whilst *Transport* and *Employment & business* are categories that present a short list of services.

Regarding diversity scores per category found in Table 4, the analysis here has to take into consideration how populated is the set of additional services and how is it related to the total number of services.

When a category shows a high diversity mark it means that there is an important number of different offers of services provided by cities. If, at the same time the set of additional services is well populated, this category can be considered as an active category in which cities are currently working and putting efforts. The category, a part of being well established or not, is evolving. This process could be due to a reaction to citizen's demand, political priorities or even European recommendations.

*Social care* despite being a well established category shows the highest diversity mark and presents the most populated set of additional services. It is the best example of an active category in which European cities are delivering a rich variety of services. *Transport* and *Environment*, are also good examples of active categories.

*Citizens' engagement*, although shows a good mark on diversity, has at the same time a low number of additional services which means that the category is well established and consolidated.

On the other hand, *Urban planning*, *Education* and *Channelling* show the lowest diversity

marks, hence appearing to be the most inactive categories in which municipalities provide very similar services and low percentage of additional services.

Finally, *Employment & business* and *Lifecycle*, shows mid diversity marks with also a non significant set of advanced services. Those categories show also ones of the smallest marks on standard coverage. Both seems to be quite well established categories.

## 2.4 STANDARD COVERAGE AND DIVERSITY PER CATEGORY

More specifically, a special focus on each of the different categories' services provision is presented. The following nine maps graphically represent standard services provided per participant city for each of the nine categories. Since provision of service is very much related to the city competences on each of the categories, it is indicated as well when the service is not a competence of the city because it is provided by another administration -so it is beyond the city competences, but the city does offer information -or transactional links- relate to this service. Finally, in order to complement the vision of the standard services offered by each city, a detail of the number of additional services is offered.

CITIZENS' ENGAGEMENT	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Rieka	Tallinn	The Hague	Turin	Vienna
City Council Plenary Sessions Access															
Participation Processes															
City Council Listens															
City Archives Consultation															
Reservation for Municipal Buildings															
Kiosk															
Additional Services		2				1			1		1		1	1	1

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

*Standard Coverage for Citizens' engagement services*

*Citizen's engagement* is one of the two most covered European categories with a total number of 6 standard services and a total standard coverage of 82.22%.

Despite of no service with 100% coverage, there is a high coverage of all the standard services. Some of them stand out like *City council listens*, a service that intends to strengthen the line between the citizen and its municipality and also offer a strong all-purpose communication line, therefore creating a vivid feeling of support. Citizen participation related services like *Participation processes* or *City Council plenary sessions* reach a high coverage percentage meaning that municipalities strategies have been focused on e-Democracy's strategies.



Despite being among the most well established categories, its high diversity mark (0.45) shows that there is no level playing field for European municipalities in this area.

CHANNELLING	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Rieka	Tallinn	The Hague	Turin	Vienna
City's Homepage															
Citizens Personal Folders															
Consultation On-line															
Bulletin/Newsletter															
GIS and Virtual Flight															
Customized Webpages															
GIS Based Directory															
Enterprise Folders															
Additional services		2	1	1	1	2	1	2	1		1		1	1	

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

#### Standard Coverage for Channelling services

As seen before, *Channelling* is the third most covered category in Europe with a standard coverage of 80.83%, at the same time, it has a high number of standard services (8).

Some services such as City's homepage, Consultation on-line or Bulletin/Newsletter show a very high percentage of provision, in the first case reaching a total coverage. However, some work regarding customised web pages or Enterprise Folders has still to be done, both services related to the concept of Web 2.0.

Moreover, *Channelling* diversity mark (0.26), which shows in this category its lowest score, has also proved that the work carried out by the participant cities shows a high understanding, and there is not so much activity in deploying differential services. Therefore, this category can be considered as one of the most consolidated categories.

EDUCATION	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Rijeka	Tallinn	The Hague	Turin	Vienna
Pre-school Children Education															
Children Education															
Adult Education															
Cooperation Home-School															
Libraries															
Cultural Heritage Sites															
Funds for Cultural Projects															
Summer Camps															
Portal for Events and Extracurricular Activities															
Additional services			1		3	2	2	2		1		1	2	4	2

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

#### Standard Coverage for Education services

*Education* is a quite diversified group, showing the highest number of standard services (9) among all the nine considered categories in the survey and a standard coverage of 77.78%, below the average.

Certain services reach quite high coverage, such as the *Cultural heritage sites*, a wide on-line service offering information about any cultural site in the city, or *Pre-school Children Education*. However, other services like *Cooperation home-school* and *Portal for events* only reach a 53% provision. Besides, it is important to remark that all cities are offering a wide charter of culture-related services such as *Adult Education*, *Libraries* or *Funds for cultural projects*.

The category's low diversity score (0.32) along with its moderate coverage and highest number of standard services is probably a consequence of the existence of important differences in cities competences in this area.

EMPLOYMENT & BUSINESS	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Riieka	Tallinn	The Hague	Turin	Vienna
Recruitment (for jobs in private sector)															
Public Tenders (jobs in public sector)															
Portal for Companies															
Portal for Entrepreneurs															
On-line Business Registration															
Additional services		2			2	1					1	1		1	1

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

#### Standard Coverage for Employment & business services

*Employment & business* is a quite diversified category, with only 5 identified standard services and a total standard coverage of 76% below the average. With the exception of public tenders (jobs in public sector) that are offered by all cities, all other services have a low standard coverage marks.

Although the 80% of the cities are considering a deployment of a portal service for companies and entrepreneurs in order to enhance and fasten business relation with the municipality, *Employment & business* reaches a medium diversity score (0.35) that, accompanied by a medium number of standard services, shows that European cities do not widely share a common agreement in terms of providing an answer to employment and business topics.

ENVIRONMENT	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Riieka	Tallinn	The Hague	Turin	Vienna
Recycling parks															
Public Property Maintenance															
Bulk waste collection															
Operational information															
Air quality															
Additional services		1			2	1			1	1		1		1	1

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

#### Standard Coverage for Environment services

When focusing only in the European provision of standard services, *Environment* has a good standard coverage of 80%. but it has only 5 standard services.

Nevertheless, diversity shows a high category mark (0.43) proving that it is a very active category. According to that, cities appear to offer very wide and different additional services to their citizenry, only converging in recycling services, property maintenance and waste collection. This situation is likely to change in the following years since European funding lines have identified *Environment* services as a priority for e-Government evolution. Therefore, the total number of standard services is likely to grow and the diversity mark is expected to decrease in the following years.

LIFECYCLE	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Riieka	Tallinn	T.Hague	Turin	Vienna
Personal Certificates															
Population Registry (census)															
Residence Registration															
Digital documents Management system															
On-line Fines Consult and Payment															
On-line Taxes and Fees Payments															
On-line Marriage/Civil Union Register															
Utilities															
Additional services				1	1	1	1		1		1	1	1		2

	Provided		Provided by another administration.
	Not provided		Provided by another administration.
			No information offered

*Standard Coverage for Lifecycle services*

*Lifecycle* is the less covered European category out of the nine categories considered in this survey with a standard coverage of 67.50%. although it has one of the highest number of standard services (8). Each of its standard services' provision varies from a minimum of 53% to a maximum of 80%. showing that there is no agreement by the participant cities in terms of life cycle services.

The most covered services are *Residence registration*, a service that helps regulating citizen contact and provides an official written record of citizens and *Personal certificates*, a service that offers a certain number of useful *Lifecycle* certificates such as marriage, death or birth.

Besides, diversity reached an intermediate mark (0.39) showing that Europe has a quite populated charter of life cycle services that vary from one country to another.

SOCIAL CARE	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Riiika	Tallinn	The Hague	Turin	Vienna
Housing for Low Incomes															
Disable Parking Permits															
Discounts for Low Incomes															
Organizing Public Events															
Family Aid-Calculation															
Physicians Database															
Additional Services	3	2	1			6		3	5	1	1	4	1	4	2

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

*Standard Coverage for Social care services*

*Social care* is a group with 6 identified standard services and a standard coverage of 80%. Therefore, it could be stated that this category is well established. It has to be mentioned that all standard services are related to the care of needy people, may it be in terms of housing, discounts or family allowances. The most covered standard services is *Housing for low incomes* a service that helps finding housing facilities for people with economic needs.

On the other hand, *Social care* includes 8 different additional services and being so far the most populated category regarding services not reaching the minimum 50% of coverage. In addition, diversity reaches the highest score (0.52) in this category showing a high discordance in *Social care* related additional services which means a great activity in this area.

TRANSPORT	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Riiika	Tallinn	The Hague	Turin	Vienna
Public Transport Services															
Car Parking															
Traffic Web Cameras															
Additional services		2		2	1	3	1	1	3			1			1

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

*Standard Coverage for Transport services*

*Transport* is a special category since it has the smallest set of standard services, only 3, although 2 of them with an excellent coverage over 80%. Therefore, this proves that European cities are aware of the extreme importance of its citizens' mobility.

In addition, diversity has the second highest categories' mark (0.46) showing that there are disparate *Transport* services that vary from one city to another highlighting it as an emerging active category.

Again, as commented in the last section, this unequal situation is expected to change since *Transport* related on-line services have been identified as one of the key success factors for the evolution of e-Government services during the next years. Therefore, the number of standard services is likely to grow and diversity factor is expected to decrease in the following years.

URBAN PLANNING	Antwerp	Barcelona	Bergen	Bilbao	Birmingham	Bologna	Enschede	Helsinki	Milan	Murcia	Riika	Tallinn	The Hague	Turin	Vienna
Construction Permits															
Land-use Plans and Building Regulation															
Certificates															
Additional services							1		1					1	1

	Provided		Provided by another administration.
	Not provided		Provided by another administration. No information offered

*Standard Coverage for Urban planning services*

*Urban planning*, considering its low number of standard services (just 3), is one of the two most covered categories. A total of 93% of the cities admit provide a kind of on-line construction permit or offer land use plans and building to its citizenry. Data shows very little dispersion in standard services' provision and a common approach to *Urban planning* topics by almost all the participant cities.

The low diversity factor (0.32) along with the smallest set of services shows that the municipalities covered a small set of standard services and are doing no more activity in that area, proving that cities consider few similar and already established plans in *Urban planning*-related additional services.

### 3. MATURITY AND PERCEPTION OF ADOPTION

#### 3.1 MATURITY LEVELS

The service's maturity has been measured since the beginning of e-Government, being the most accepted definition the four maturity levels proposed by Baum & Di Maio in the “*Gartner's Four Phases of e-Government Model*” (Baum & Di Maio, 2000). Our survey uses this framework as the starting point extending the range of maturity to include a new fifth level on the top to reflect a more advanced degree of maturity as is already recognized in the last releases of the Capgemini benchmark report (Capgemini, 2007). In our case, this new level reflects the new features in user interaction taking into account the use of emerging technologies mainly based on Web 2.0. This new trends is promoting citizens' participation in service provision, quality evaluation and discussion about services' improvement, hence the new level is called “participation level”.

The measurement framework used in this survey is based in the five levels defined below:

##### a. Information Level:

Ability to offer relevant information in a one basic provision process, usually website based. Users will only be able to consult or receive information and not to download any kind of form or give feedback. It is essentially the first step when entering the web world.

*Example:* daily cultural agenda.

##### b. Interactivity Level

Users can generate basic content -email, template, queries- which is introduced in the government databases. It is also a one-way interaction process in which the user can, for instance, download or submit forms on-line. However, the process cannot be completed on-line and sometimes physical attention at the municipal offices is required.

*Example:* on-line download of the required form to perform a school subscription. Once it is filled, the user will sent it back on-line.

##### c. Transaction Level

Transactions -payments, certificates- can be completed throughout an electronic channel. The achievement of this level implies the possibility to completely perform a service on-line through the use of electronic means. Therefore, this is a two-way interaction with the user in which not only the forms can be downloaded on-line but also sent back on-line.

*Example:* on-line acquisition and payment of municipal museums tickets.

#### d. Transformation Level

Full availability on-line, that is, full integration for all e-Government services into a single portal. Users can access all services from a unique virtual office from any place. This level will usually imply a business reengineering process both in the back office and the front office of a city's administration. Moreover, it would also imply an internal change in order to integrate as much user's information as possible in the front office so that its delivery would undergo a complete change in order to make it as easy and clear as possible. This would mean in many cases that personal information from users will be previously remembered so that when performing any kind of service only identification is needed.

*Example:* requirement of identification (i.e. electronic ID) when filling the form to ask for a construction permit. The remaining user's information will be automatically remembered and introduced in the form by the system.

#### e. Participation Level

Enable and promote citizens participation in all e-Service's levels so that opinions are taken into account to enhance quality and effectiveness. Also it is expected that the user receive some sort of feedback for those contributions. This 5<sup>th</sup> level provides an indication of the extent to which on-line provision is based on new models to use available information obtained from the citizenry, reaching a high degree of pro-activeness in services' delivery. In short, this level is based on the application of the Web 2.0 premises to the on-line municipal services delivery.

*Example:* possibilities to make comments on any event announced in the cultural agenda and see other user's contributions.

a. Information	Ability to offer relevant information in a one basic provision process, usually website based.
b. Interactivity	Users can generate basic content -email, template, queries- which is introduced in the government databases.
c. Transaction	Transactions -payments, certificates- can be completed throughout an electronic channel.
d. Transformation	Full availability and integration for all e-Government services. Users can access all services from a unique virtual office from any place.
e. Participation	Enable and promote citizens participation in service provision, quality evaluation and discussion about service's improvement.

*Table 2: Services' maturity levels*

The aforementioned levels have been used in this survey to assess city's maturity for each one of the services included in the Global Cities Catalogue. According to our methodology, data assessment has been performed through self-evaluation. The data gathering process was performed through the use of a questionnaire that was sent to all the surveyed cities. In this questionnaire, cities were asked to self-evaluate the maturity of their services according to Table 2.



Also, it will be interesting to observe the difference between the maximum level and the minimum level achieved by a city for all the categories submitted to study. To do so, we define the following delta factor:

$$\Delta = \text{maximum maturity level} - \text{minimum maturity level}$$

$$\Delta > 0$$

Delta must be positive by definition. This factor will show how homogeneous the city e-Government offer is.

On one hand, if delta is high, all categories will have a heterogeneous maturity development proving that the city is devoting its efforts to evolve first certain selected categories.

On the other hand, a low delta factor will show how all categories seem to have similar maturity development. Therefore, it will prove that the city is evolving all its services homogeneously.

### 3.2 PERCEPTION OF ADOPTION LEVELS

The on-line service adoption measures the share of citizens that are using the e-Service from the total population to which the e-Service is targeted. Citizen's adoption of the offered e-Services is a key factor to assess the real success of an e-Government transformation. It provides valuable information to successfully manage local e-Government policies and the project's portfolio. As a consequence, the understanding of how to increase citizen awareness and take up of on-line services is critical to enhance the performance of any European municipality.

However, only few studies face the adoption measurement of e-Service due to the inherent difficulties (e-Citizen Project, 2009) (Esd Toolkit, 2007).

To measure adoption of e-Services, first of all, there is the need to find a suitable set of indicators. The measures of visits in a specific web site or even the number of pages served are both indicators commonly accepted to assess the popularity of a web site. But adoption of on-line services is not only access. In this case, data transactions performed through e-Services applications would be a better indicator. However, it is not applicable to all range of services due to their different level of maturity. As a consequence, there is no unique magnitude, to measure adoption in a consistent way. Each e-Service needs to define which the best magnitude to measure take up is.

Secondly, a rigorous adoption measurement must take into account the real target of each service and its inherent characteristics. Each service is focused on a specific target of citizens (youngsters, elderly people, parents, entrepreneurs, immigrants...) which has different characteristics (literacy, digital literacy, ratios of internet access...). Therefore, the maximum adoption level is different for each service.

This survey, understanding the importance of measuring adoption but also recognizing its inherent difficulties that surpasses the limitations of the project, has defined an alternate magnitude: the perception of adoption. The perception of adoption is defined as the adoption

of the on-line service as it is perceived (not measured) by the service provider, in other words, the local public administration department responsible of the service provision.

To set up a homogeneous criterion, a measurement framework based on five levels has been defined. Each level defines a degree of perception of adoption easy to be recognized by the service owner on each city, and ranging from a complete failure to a big success as shown in table 3 below:

1. No adoption	The service has been a complete failure and the municipality is considering its withdrawal.
2. Low adoption	The service is being used by fewer citizens than previously expected.
3. Medium adoption	The service is being used by the average of citizens expected.
4. High adoption	The service is being widely used among citizenship.
5. Excellent adoption	The service has been a complete success and the municipality is devoting more Human Resources and investment on it.

*Table 3: Services' perception of adoption levels*

The aforementioned levels have been used in this survey to assess city's perception of adoption for each one of the services included in the Global Cities catalogue. Again, the data gathering process was performed through the use of a questionnaire that was sent to all the surveyed cities. In this questionnaire, cities were asked to self-evaluate the perception of adoption of the services they provide according to Table 3.

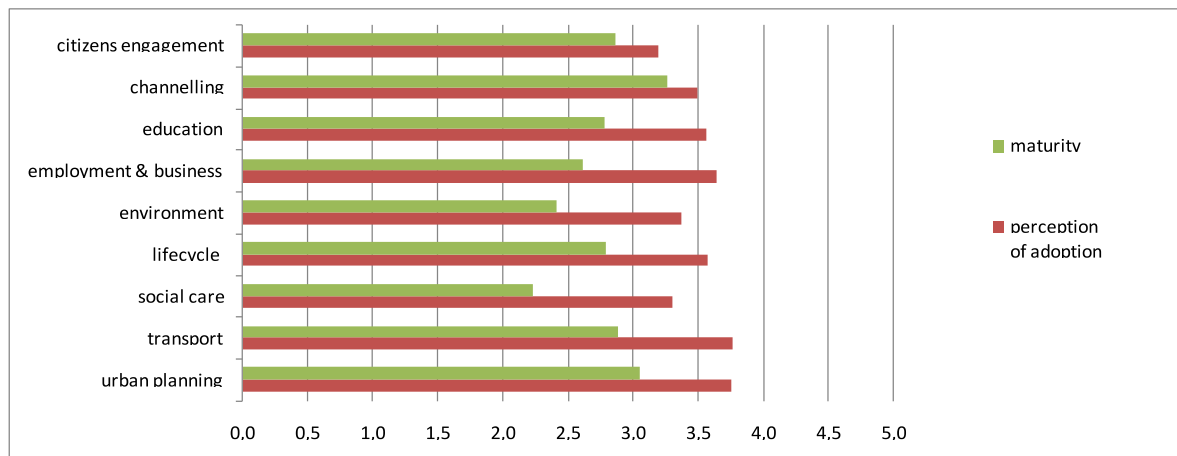
This measure, although is based on self-assessment, informs about the success of the e-Services provided by each municipality and makes possible the analysis of existing relations with service's maturity and adoption.

### 3.3 EUROPEAN AVERAGES PER CATEGORY

The next figures show the European averages for each category of the Global Services Catalogue. These averages include all services submitted to study by all cities, whether services are standard or additional. Further down, the results are presented according to this classification.

The European average maturity level is 2.8, which means that the maturity average of local e-Government services of the sample doesn't still reach transactional level 3. Only two out of the nine categories -*Channelling* and *Urban planning* - are reaching or slightly surpassing level 3.

The European average perception of adoption is 3.5 with a maximum of 3.8. This shows that local e-Government services are being used by an average of users higher than initially expected. Although, all categories achieve perception of adoption scores always above 3, thus proving that the perception of adoption for all the categories is positive, it can not be considered as highly adopted.



*European average perception of adoption and maturity levels*

Another conclusion than can be extracted from the figure is that it seems not to be correlation between service's maturity and perception of adoption.

Regarding specific categories. Channelling is the category with better mature services, reaching a 3.3 mark which is somewhere between Transactional and Transformation levels. Although being the most mature category it reaches only a medium level of perception of adoption.

The category with the worst combination of figures is Social care. The average maturity level of its services is the lowest -with a 2.2 result that does not even reach transactional level: the average perception of adoption is as well the second lowest. Of course this has to do with the complexity of the category as well as with the fact that there are very different competences and social policies.

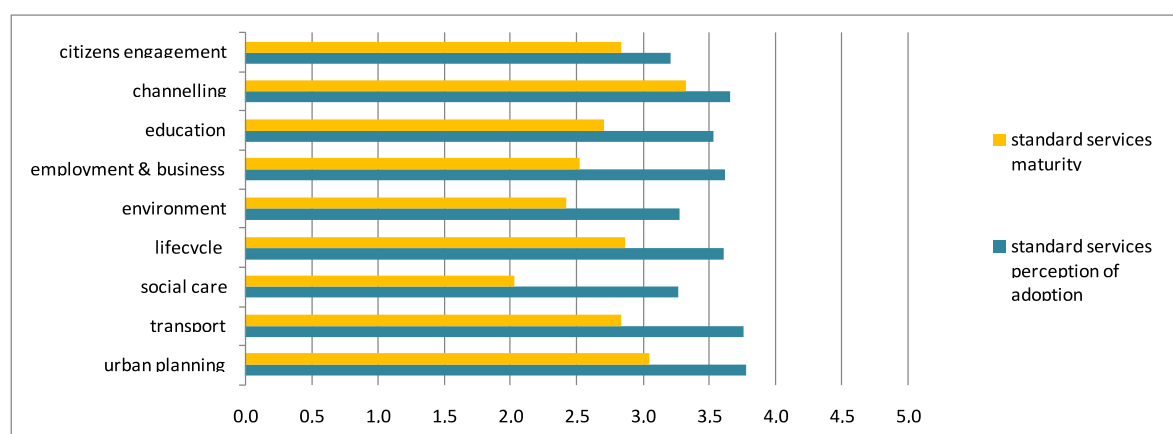
*Environment* shows the second worse maturity average and a perception of adoption slightly below the average.

*Transport* and *Urban planning* are following *Channelling* category in best maturity. However, in that case, both reach the highest marks of perception of adoption.

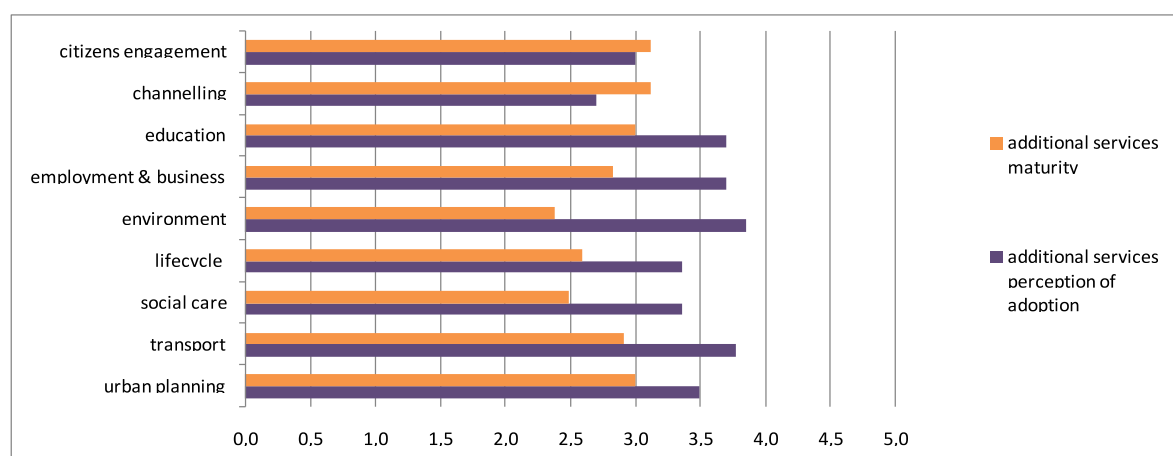
*Citizens' engagement*, *Education*, *Employment & business* and *Lifecycle* are categories that show mid maturity marks along with mid perception of adoption scores.

### 3.4 STANDARD AND ADDITIONAL SERVICES AVERAGES

The averages above presented include all services submitted to study by all cities, whether services are standard or additional. In the next figures, the results are presented according to this classification, in order to offer a different perspective.



*Average perception of adoption and maturity levels for standard services*



*Average perception of adoption and maturity levels for additional services*

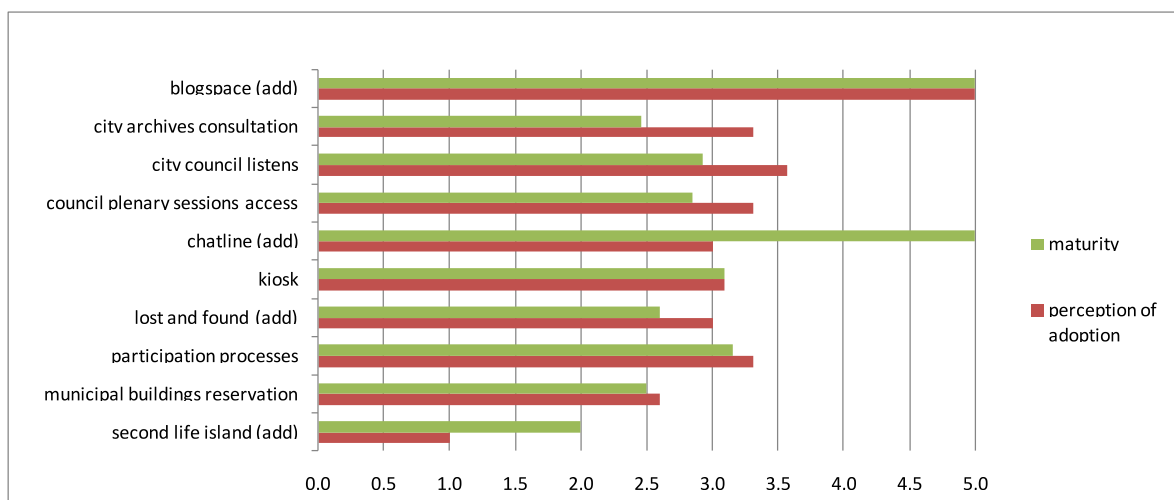
The maturity levels for additional services are always slightly above the levels reached for standard services, with the exception of *Urban planning* and *Lifecvle*. *Social care* and *Environment* are the only two categories for which the distance among standard and additional maturity is above half a point (0.7 and 0.6 respectively).

Looking at the perception of adoption levels, they are as well very similar among standard and additional services, with the exception of again two categories: *Environment* -where the perception of adoption of additional services is 0.6 above the perception of adoption of standard services- and *Channelling* -where the perception of adoption of additional services is 1 point below the perception of adoption of standard services.

When focusing on the relation between maturity and perception of adoption, two general conclusions could be inferred. Regarding standard services averages, the bar chart shows a correlation between maturity and perception of adoption scores. That is, the more sophisticated a service is, the higher its perception of adoption is. On the contrary, in the additional services bar chart no clear correlation between maturity and perception of adoption scores can be observed.

### 3.5 EUROPEAN AVERAGES PER SERVICE

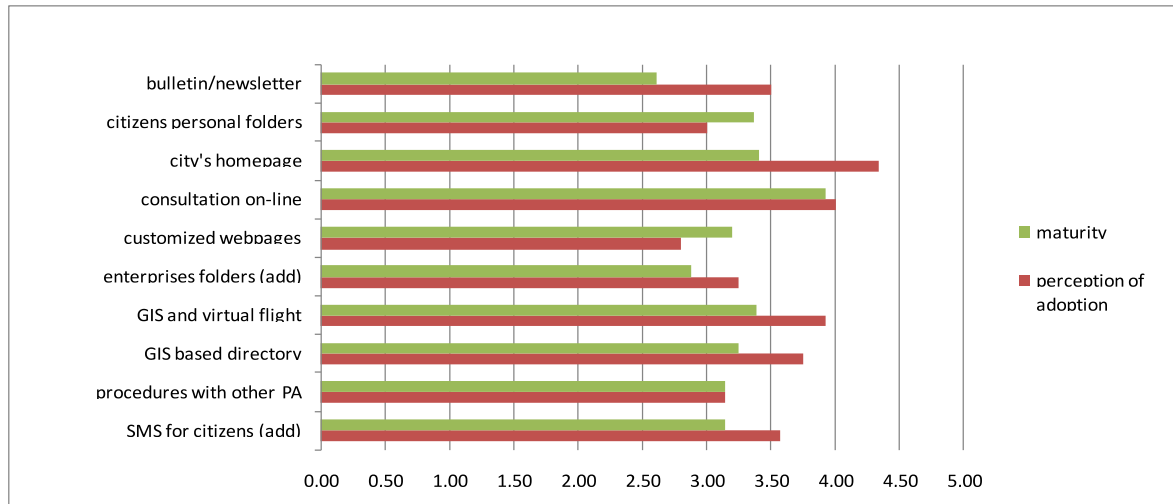
The next figures allow comparison among maturity and perception of adoption level per service, classified according to their categories. Also, it has been indicated which services are standard and additional, since the coverage figures are very different.



*Average perception of adoption and maturity levels for Citizens' engagement services*

*Citizens' engagement* shows six standard services and four additional services. Two of the services offered - *Blogspace* and *Chatline* - reach a maturity level of 5 and one of them reaches as well a perception of adoption level of 5. Apart from those services, it is remarkable that maturity averages remain below transactional level 3.

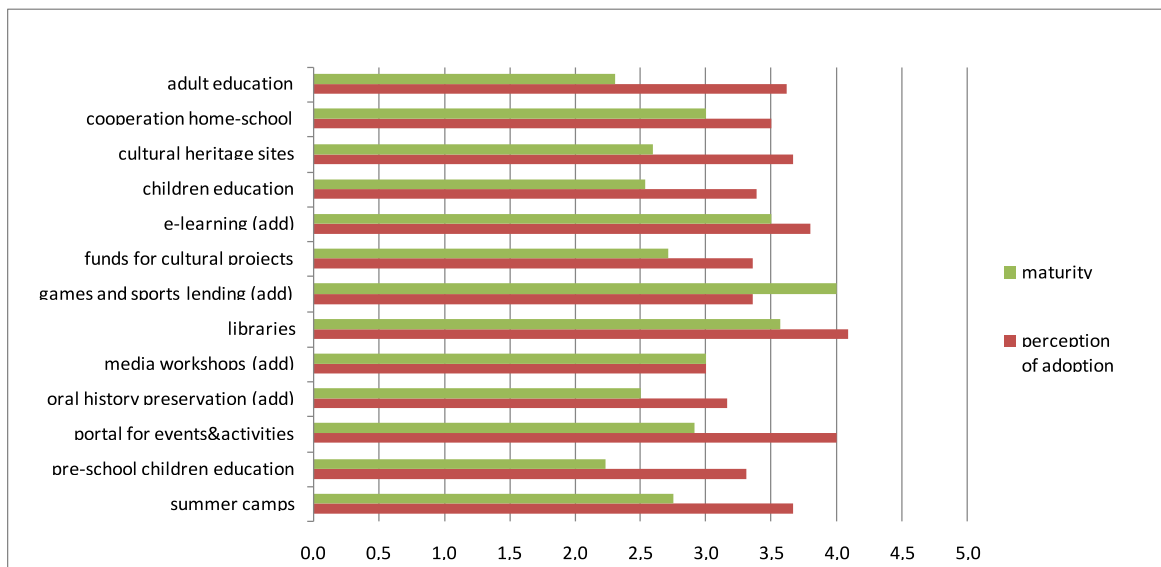
Regarding perception of adoption, two general comments should be remarked: the high perceived adoption of the *Blogspace*, which could be considered a successful service, and the low mark of *Second Life*.



*Average perception of adoption and maturity levels for Channelling services*

As it has been stated above, *Channelling* has the highest maturity averages. It shows eight standard services and two additional services and even so, all maturity averages remain between transactional and transformational level, which shows a much consolidated category.

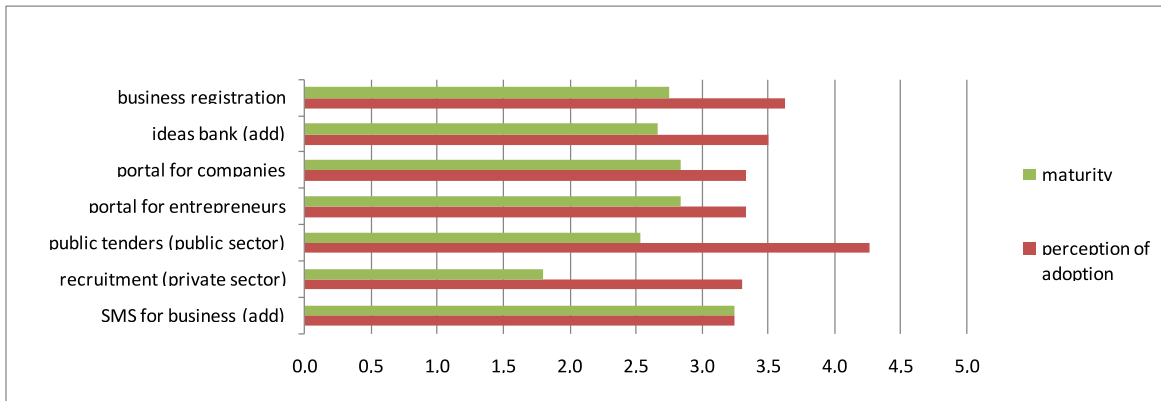
Regarding perception of adoption, it must be mentioned the high marks of *City's home page* and *Consultation on-line*, both largely over the average. The two services with less perceived adoption are at the same time the newest: *Customized web pages* and *Citizens personal folders*.



*Average perception of adoption and maturity levels for Education services*

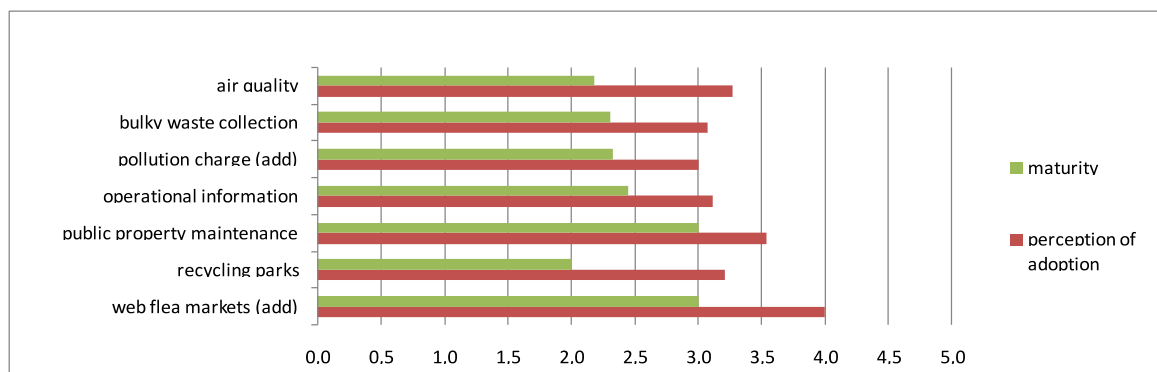
Education is a category with very disparate figures, although it shows mid levels of maturity and perception of adoption. Maturity levels tend to be among level two and three with very rare exceptions such as: e-learning, Libraries and Games and sport lending, this last one

showing a maturity level of 4. *Libraries* also shows the highest perception of adoption level - above level 4.



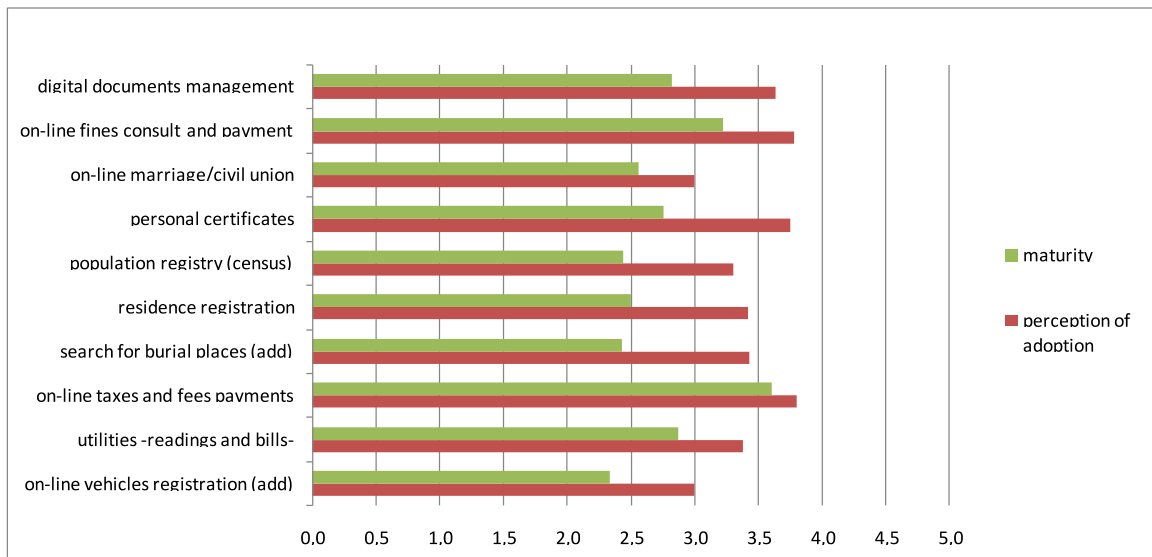
#### *Average perception of adoption and maturity levels for Employment & business services*

Maturity levels of *Employment & business* are mostly among level 2 and 3, whereas the perception of adoption levels is among 3 and 4. However, *Public tenders* is largely perceived as the most adopted service in the category, surpassing level 4.



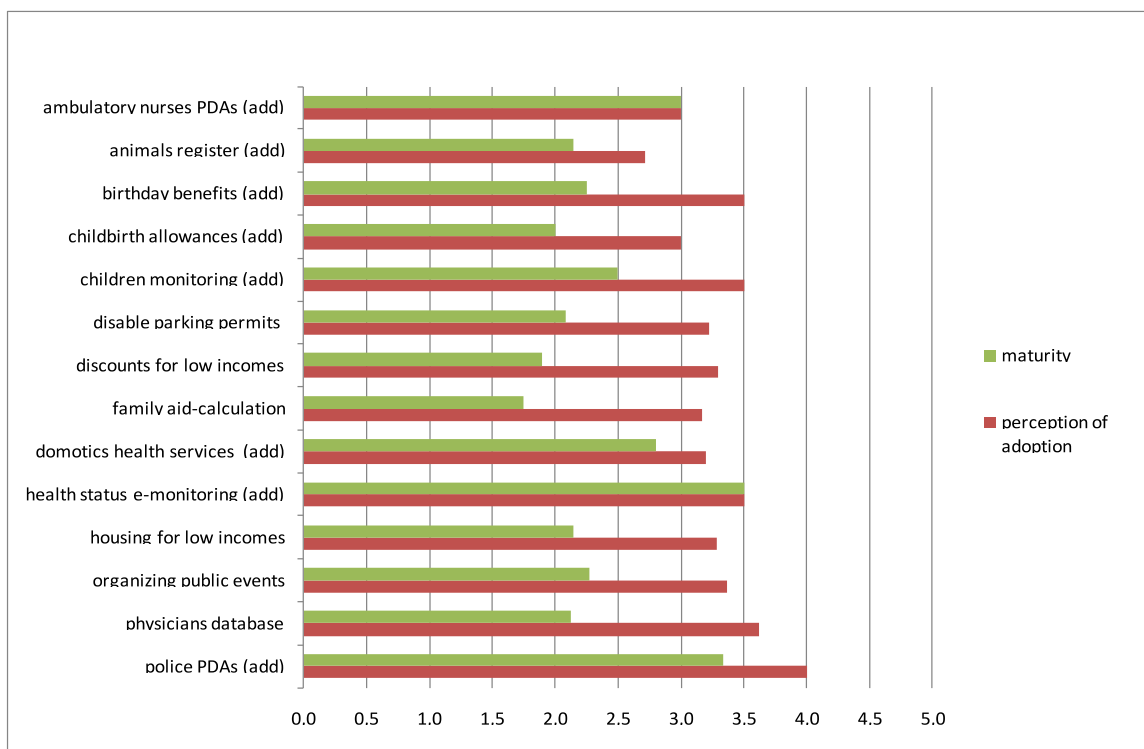
#### *Average adoption and maturity levels for Environment services*

Again for *Environment* services, the maturity levels are mostly among level 2 and 3, whereas the perception of adoption levels is among 3 and 4. There is only one additional service (*Web flea markets*) showing a perception of adoption of level 4.



#### *Average perception of adoption and maturity levels for Lifecycle services*

As it happened with *Channelling* and *Education*, when looking at *Lifecycle* services, we find a category with an important amount of standard services - eight - and two additional services. Therefore, we could think of a much consolidated category. However, when looking at the maturity levels, they are among 2 and 3, with only two exceptions (*On-line fines consult and payment* and *On-line taxes and fees payments*). Perception of adoption levels stay pretty close and are among 2.5 and 3.5 with very rare exceptions.



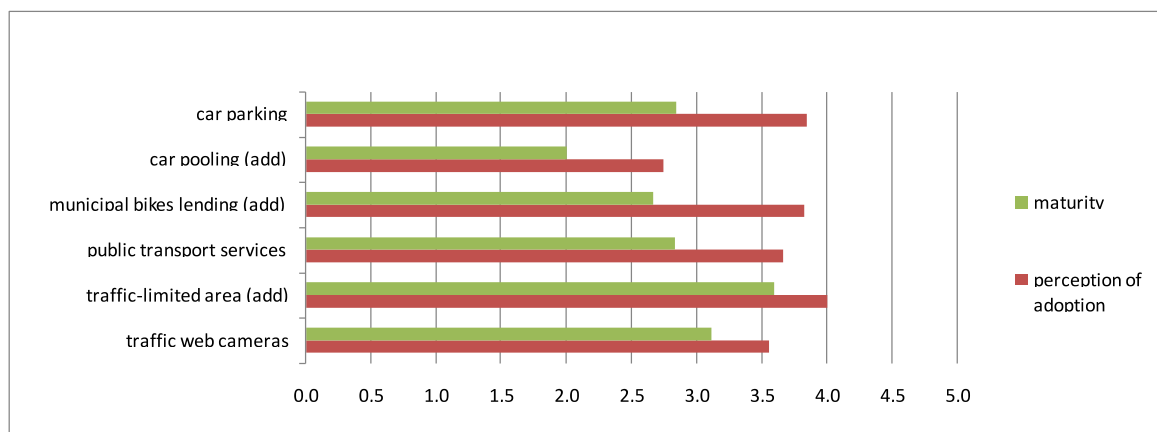
#### *Average perception of adoption and maturity levels for Social care services*



Social care is another disparate category, with the highest disparities between maturity and perception of adoption. As it has been stated before, of course this has to do with the complexity of the category as well as with the fact that there are very different competences and social policies. We can remark that it is the category with the highest number of additional services.

Only three services reach transactional level - Ambulatory nurses PDAs, Health status e-monitoring and Police PDAs - and they happen to be additional services. On the other hand, there are only two services showing a maturity below level 2 - Discounts for low incomes and Family aid calculation.

Regarding perception of adoption scores, only one additional service - Police PDAs - reaches level of 4, thus it is considered highly adopted.

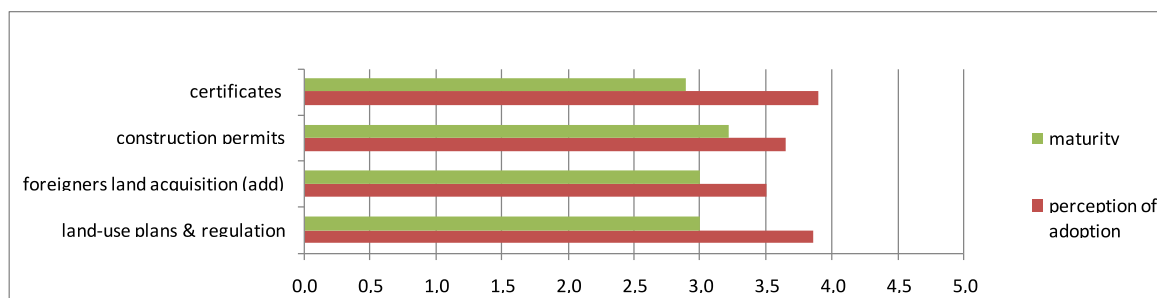


*Average perception of adoption and maturity levels for Transport services*

As it has been stated before, *Transport* shows a mid maturity level but the highest perception of adoption.

All services - with the exception of *Traffic web cameras* and *Traffic limited area tickets* - show a very similar maturity, with values among 2 and 3.

Regarding perception of adoption, all services are high adopted with a score above level 3.5, with the exception of *Car Pooling*.



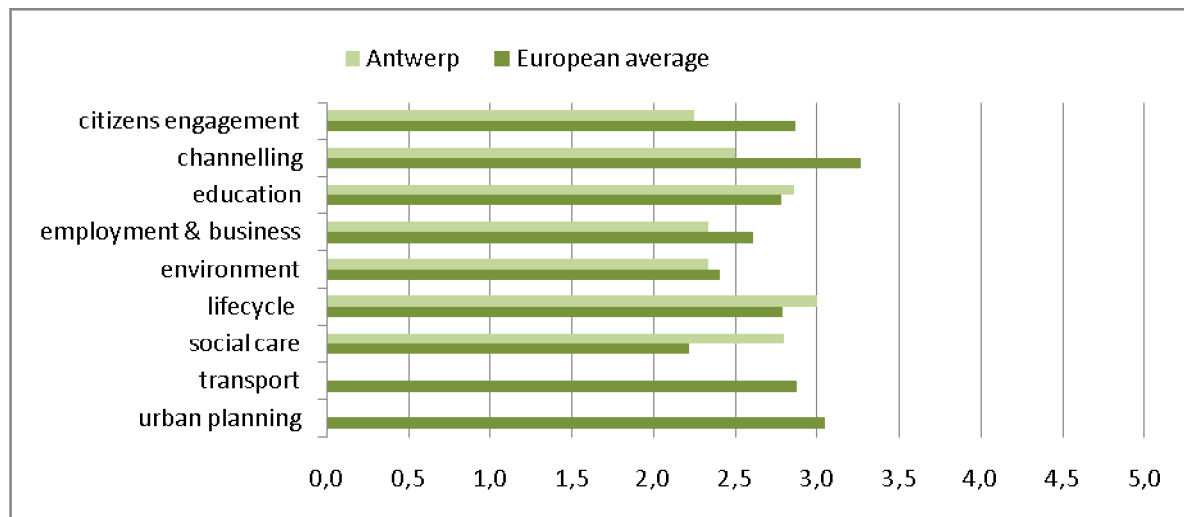
*Average perception of adoption and maturity levels for Urban planning services*

Urban planning shows as well a good combination of figures and presents itself as a quite uniform category with only one additional service against three standard services. The maturity levels are clearly around transactional level and the perception of adoption levels are as well very similar and close, with a central value of 3.5.

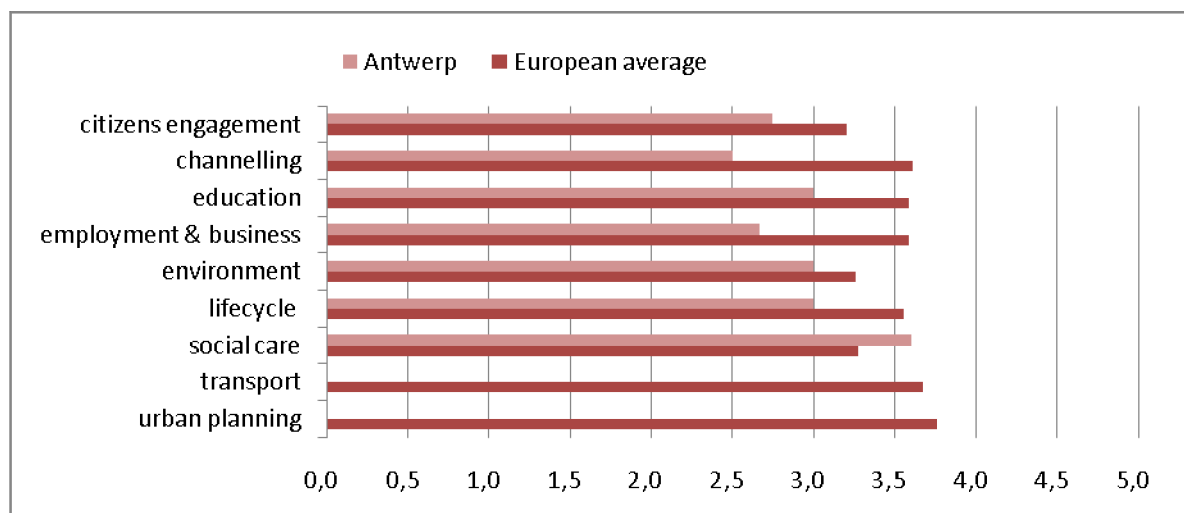
## 4. CITIES MAPS

### ANTWERP

#### Maturity



#### Perception of adoption



The city of Antwerp has submitted to study services in seven out of the nine categories of the global catalogue, since the municipality does not have competences for services related to *Transport* nor *Urban planning*.

Antwerp shows maturity level values quite similar to the European averages, with the exception of *Citizens' engagement* and *Channelling* that are more than half point below the average and *Social care* that is half point above the average.

Significantly, all maturity levels remain between level 2 and level 3 without big distances, seeming to have a similar maturity development. The difference between the categories with the lowest and highest levels is less than one point, the lowest difference among all the surveyed cities.

$$\Delta = 0.7$$

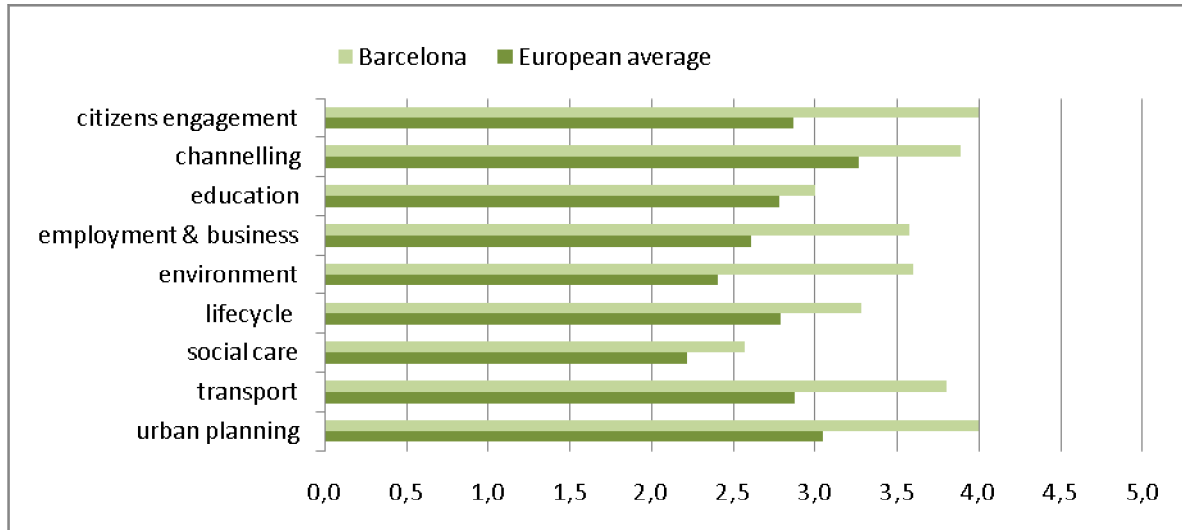
Therefore, this result proves that the city of Antwerp is evolving all its services following a homogeneous action plan.

In terms of perception of adoption, the levels are mainly below the European average, with the exception of *Social care* which is slightly above the average. All perception of adoption levels remain between level 2.5 and 3, therefore slightly below the expectations. The exception is again of *Social care* that surpasses level 3.5, meaning that the adoption of these services is estimated higher than the initially expected.

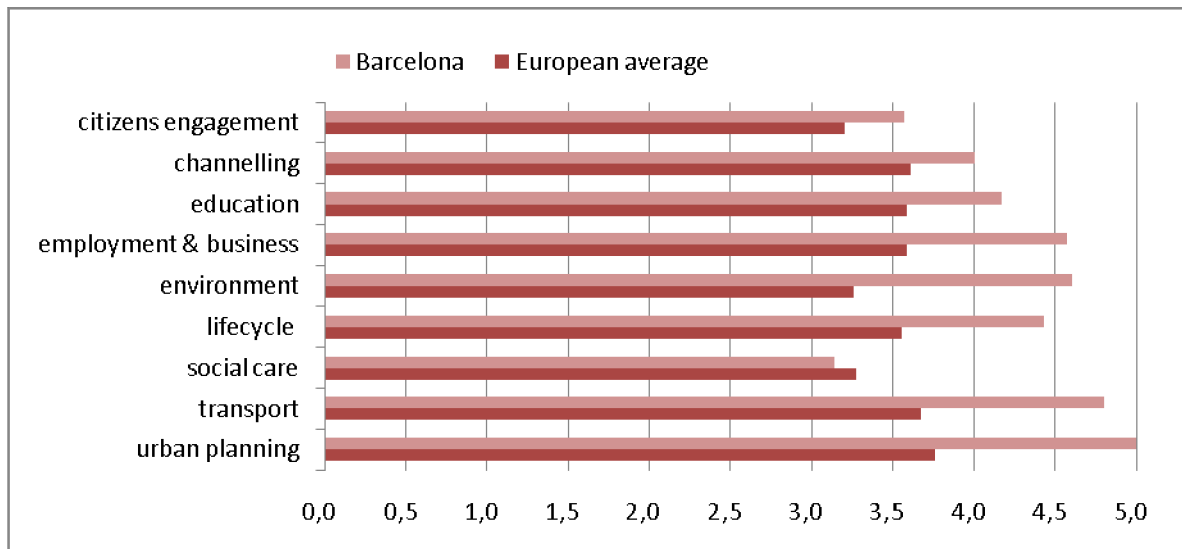
It is worth mentioning one of Antwerp's *Social Care* services that has surely helped the city achieve the aforementioned results. The Vinca Project developed a PDA assistant for ambulatory nurses helping them through a number of their tasks. Ambulatory nurses can register their activities through the use of an electronic identification (e-ID) and subsequently create invoices for their patients, who are also registered in the system. This project has been an answer to the need of easily capture interesting and necessary information for the purpose of a healthcare job whereby the mobility of the care provider is crucial. Moreover, it has helped avoiding mistakes and restrictions born from the many mandatory formalities nurses are daily confronted with due to the rather long intervals between the action date and the moment the information is entered in the system.

## BARCELONA

### Maturity



### Perception of adoption



The maturity levels for Barcelona are about an average of half a point above European results. Six categories clearly stand out: *Citizens' engagement*, *Channelling*, *Employment & business*, *Environment*, *Transport* and *Urban planning*, since the maturity level for these categories is above European averages and beyond transactional level, almost reaching transformational level in some cases. Regarding the remaining categories, they are all very similar to the European averages and mostly related to a maturity level around the transactional level 3.

The city of Barcelona is having a quite homogeneous development in all surveyed categories. The difference between the categories with the lowest and highest levels is slightly below one point and a half.

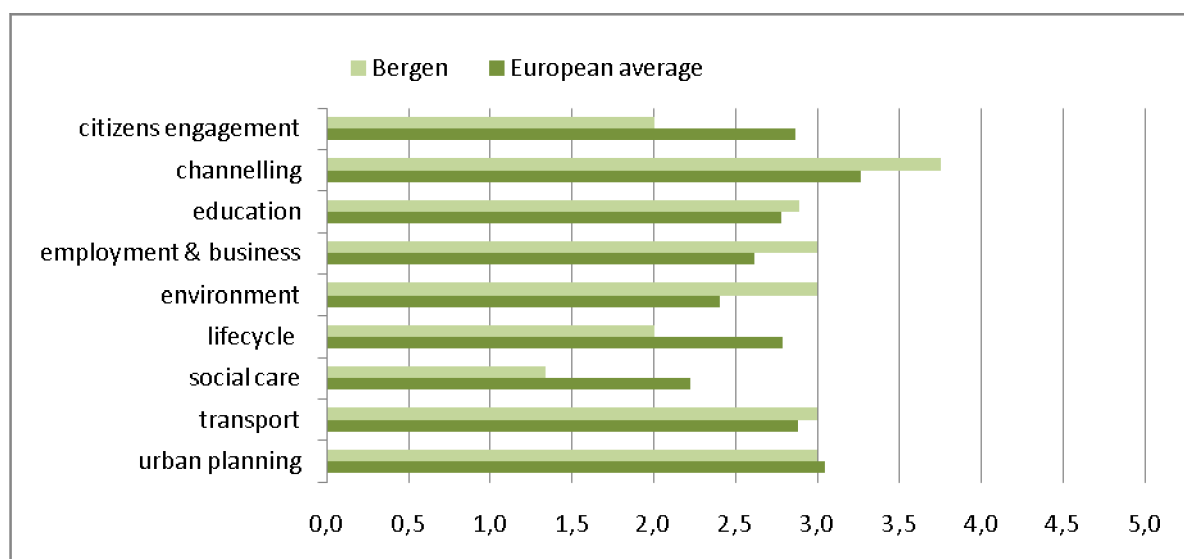
$$\Delta = 1.4$$

The perception of adoption levels are as well above European averages in almost all categories. Five cases stand out - *Employment & business*, *Environment*, *Lifecycle*, *Transport* and *Urban planning* -, since the distances to the averages are remarkable and the final result is above level 4, therefore, with a perception of adoption remarkably higher than expected. Out of the aforementioned five categories, two cases - *Urban planning* and *Transport* - are the best adopted by Barcelona's citizens, almost reaching level 5. On the other hand, *Social care* is the only category slightly below the European average, even though surpassing the satisfactory level 3.

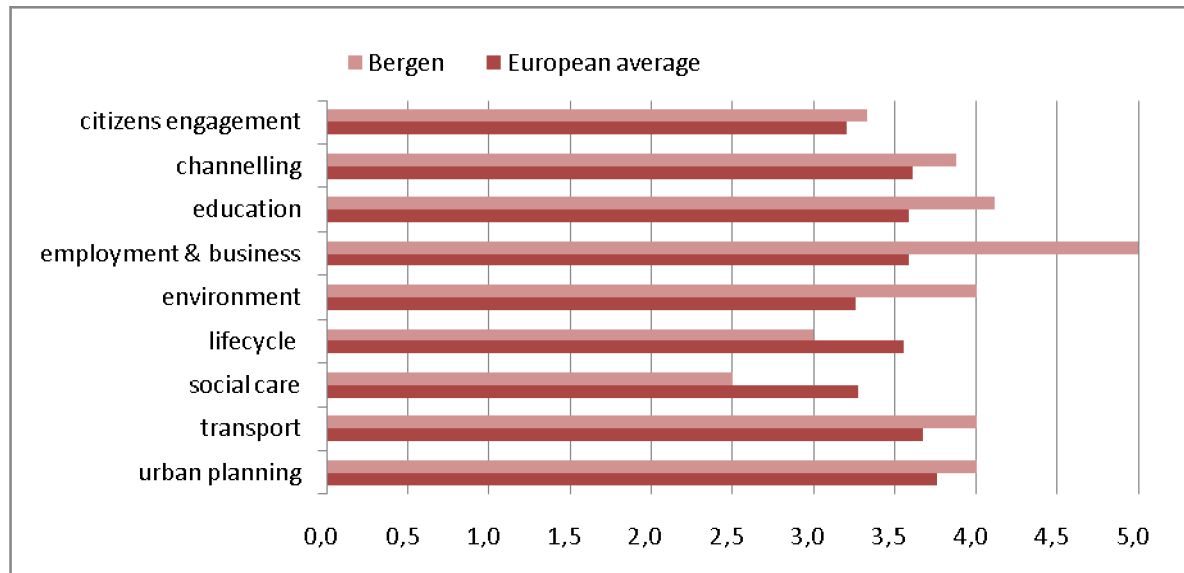
One of the reasons that feed into the noticeable success of *Urban planning* services is the OROM Project, a new way to manage building permits. OROM is a multi-channel integrated solution to manage permits for building works in the city. It represents a complete re-engineering effort including changes in legal, organisational, staffing and systems' issues. The new system reduces the time to obtain licences from months to minutes in most cases and allows the transfer of technical resources from bureaucratic tasks to value-added activities. It required an approach to partnership and technology development in order to achieve full integration of internal and external agencies in a seamless simple process.

## BERGEN

### Maturity



## Perception of adoption



The city of Bergen shows excellent maturity results, with values above European averages for most of the categories. Within the *Employment & business* and also the *Environment* and *Channelling* categories the city achieves scores half point above the European average. However, there are three cases, *Citizens' engagement*, *Lifecycle* and *Social care*, where the maturity of the services shows a distance of about one point below European averages, presenting therefore a maturity level corresponding with interactive services rather than with transactional services.

*Channelling* is the only category surpassing the transactional level 3 regarding maturity levels, surely the result of the municipality's effort to push e-Government towards a new full integration model of delivering services to citizens. One of the reasons of this success could be the service e-Dialog, through which any citizen can contact the municipality through the use of a chat line. The application gives the inhabitants the possibility to *chat* with an officer at the information desk and receive answers immediately on questions regarding public services offered by the municipality.

Notably, all categories seem to have quite a heterogeneous maturity evolution. The difference between the categories with the lowest and highest levels is exactly of two points and a half, being the highest difference among all the participant cities in this survey.

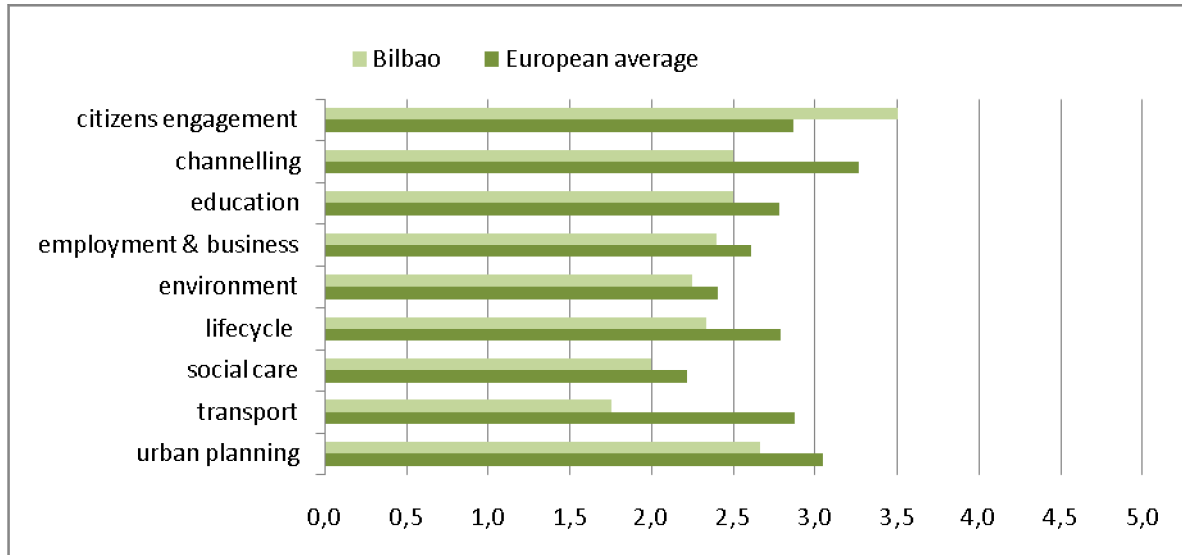
$$\Delta = 2.5$$

This result proves that the city of Bergen has devoted its efforts to evolve certain selected categories in first place, leaving other categories evolution for future releases of its e-Services.

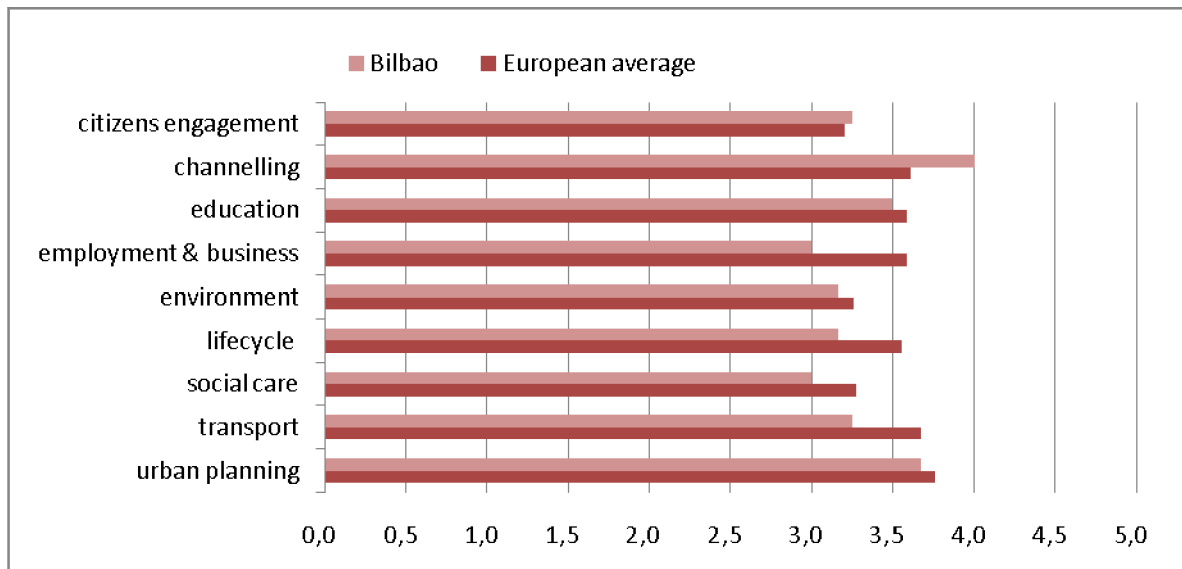
Regarding perception of adoption levels, again Bergen's values are above European averages with two exceptions, again *Lifecycle* and *Social care*. It is as well remarkable the result reached with the category *Employment & business*, which presents a top perception of adoption level value, proving that services included in this category have become a complete success, according to those responsible for its delivery.

## BILBAO

### Maturity



### Perception of adoption



Bilbao presents maturity level values quite close in general to the European averages, although always slightly below the European results. There is the sole exception of the *Citizens' engagement* category where the maturity level result is about half a point superior to the average and clearly surpasses the transactional level 3. For the rest of categories, they all remain between maturity level 2.0 and 2.5, therefore showing that Bilbao's services still remain in the interactive level.

On the other hand, two other categories, *Channelling* and *Transport*, present maturity levels significantly below the average -particularly in this last case where the difference is one point, presenting only interactive services instead of transactional services as most European cities provide.

Significantly, all categories seem to have a slightly heterogeneous maturity evolution. The difference between the categories with the lowest and highest levels is over one point and a half.

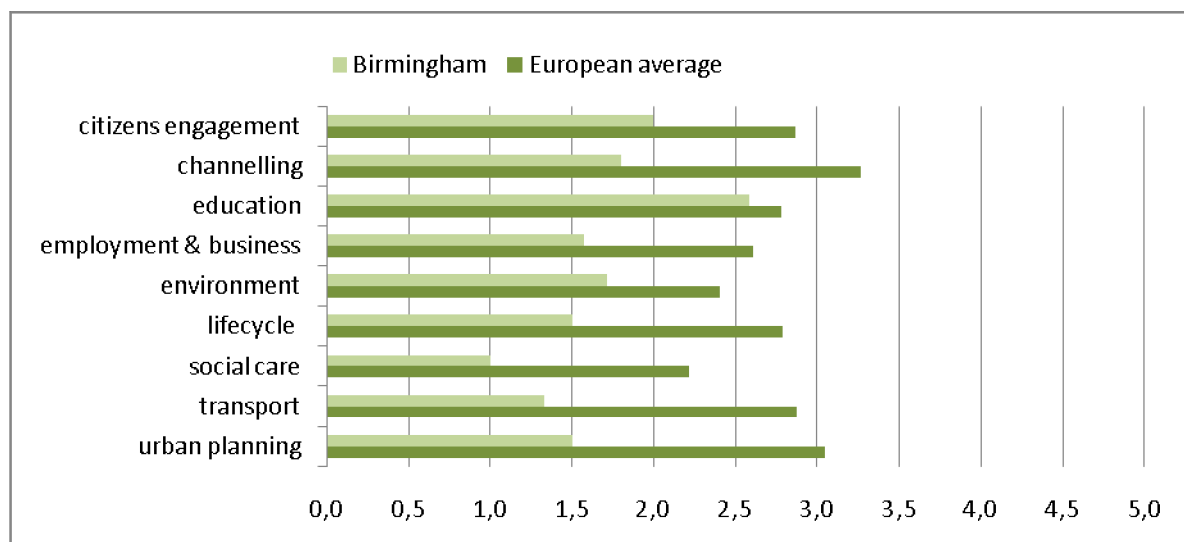
$$\Delta = 1.7$$

One of Bilbao's services related to *Citizens' engagement* has surely helped the city achieve the obtained results. What's On Bilbao is a concrete part of the municipal website devoted to deliver information regarding cultural activities both to citizenship and tourists. The site offers a search engine for advanced searches by type of event, date or place and the downloadable agenda for the next month. Also, it offers the possibility of searching the movies and films on Bilbao's cinemas at the moment. Moreover, and what makes this service particular is the possibility to find information posted by other associations from the city.

The perception of adoption level of Bilbao is very similar to the European averages even if slightly below, although with distances of only half a point. The case of *Channelling* stands out significantly, since the perception of adoption level is above European average and above level 4.0 as well, although its maturity score is far below from the European average.

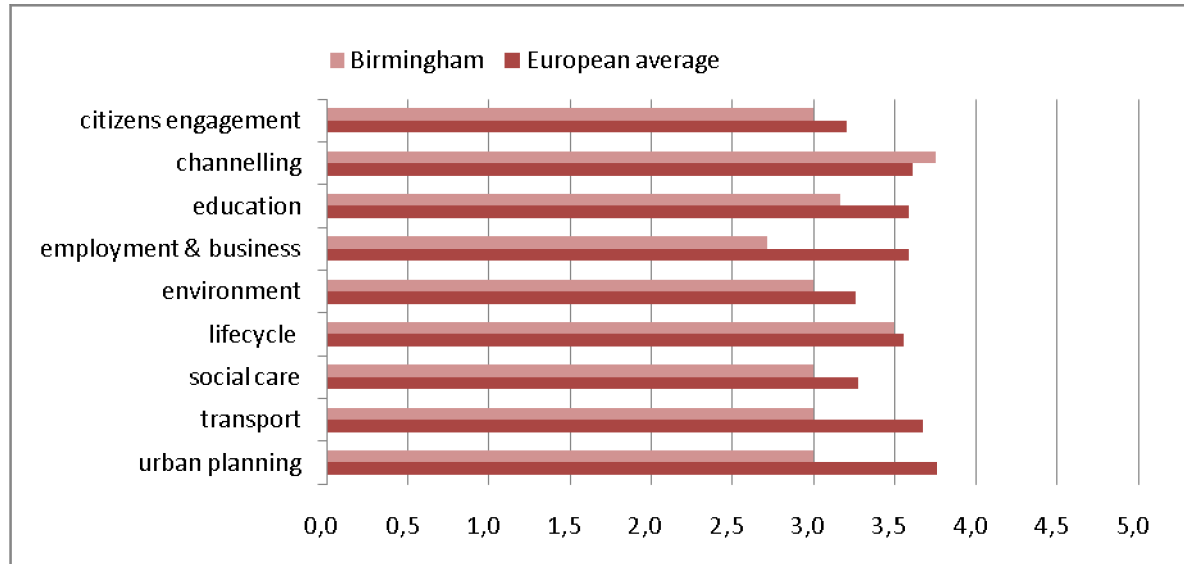
## BIRMINGHAM

### Maturity





## Perception of adoption



The city of Birmingham is below European average when talking about maturity and slightly below the average when talking about perception of adoption, with the exception of *Channelling* in which perception of adoption is slightly above the European pattern.

*Education* and *Environment* appear to be the categories in which huge efforts have been devoted since they are the only categories that surpass level 2 and evolve towards the transactional level. Meanwhile, *Social care* is the category achieving the lowest maturity level only offering information through electronic means. On the other hand, the rest of categories remain in level 2 or slightly above, meaning that the majority of services remain still in the interaction level through which users can generate basic content in a one way communication process web-site based.

Significantly, all categories seem to have similar maturity evolution. The difference between the categories with the lowest and highest levels is slightly over one point and a half.

$$\Delta = 1.6$$

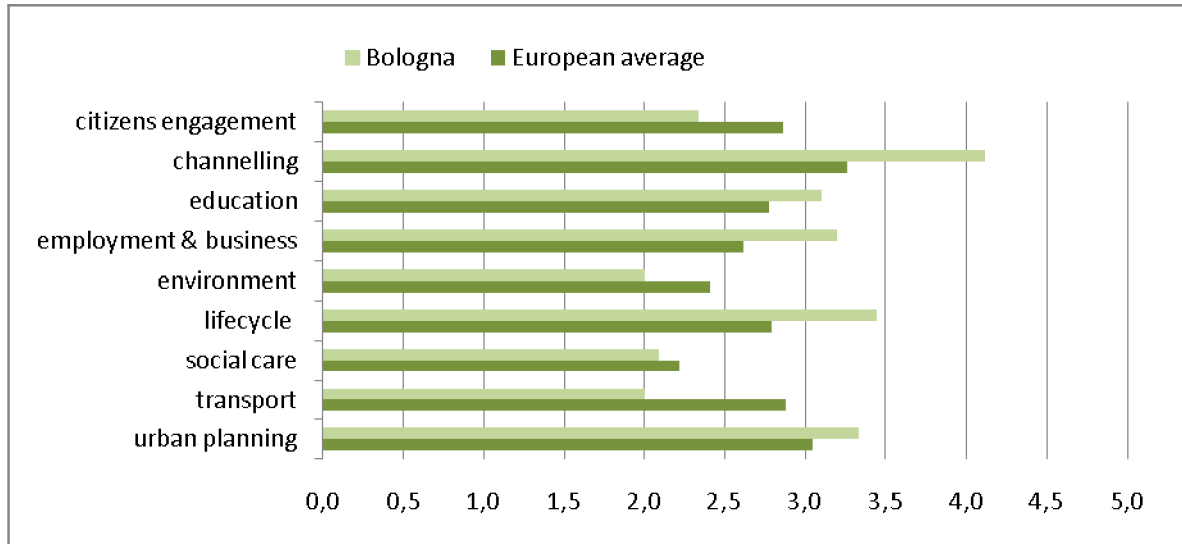
therefore proving that the city of Birmingham is having a homogeneous evolution of all its services.

One of the services that might have helped the city of Birmingham achieve its *Environmental* results is Bulk Waste Collection. The citizenship is offered the possibility to apply for the removal of bulky waste items at any address. The service is available on website and interactive television. The easiness of this service that helps keeping the city clean and green and the availability through multiple channels is remarkable.

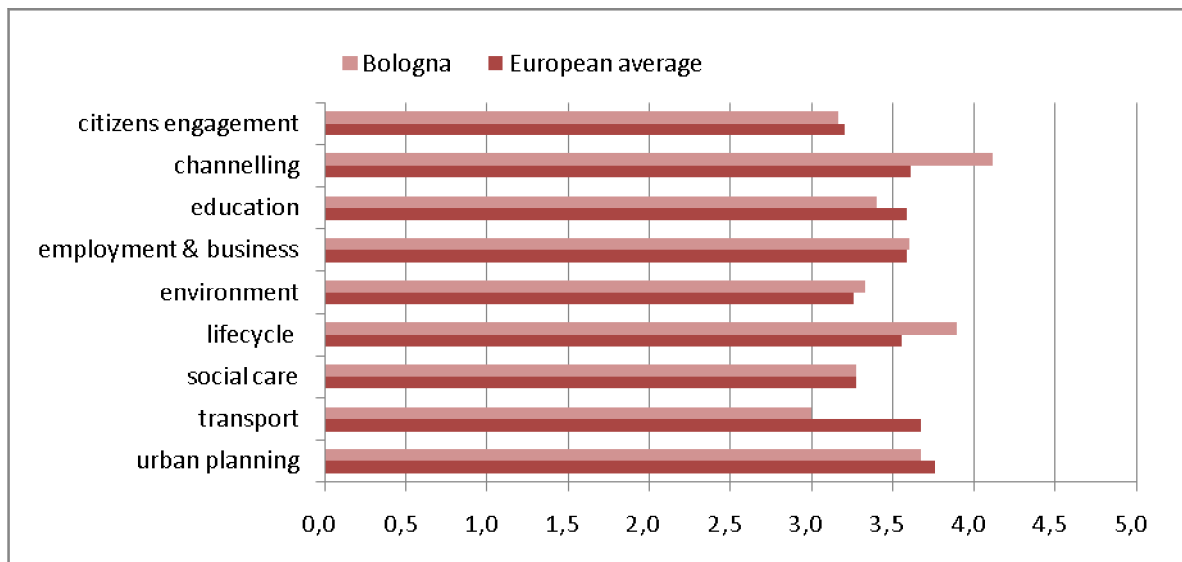
Regarding perception of adoption levels, almost all categories remain above level 2.5. That means that the municipality's perception of e-Services citizen's use is as expected or surpassing initial expectations.

## BOLOGNA

### Maturity



### Perception of adoption



Bologna presents quite a consolidate offer of e-Services for half of the categories, with values remarkably above European average, but quite low figures for the other half of the categories, with values remarkably below the European pattern. Five categories stand out: *Channelling*, *Education*, *Employment & business*, *Lifecycle* and *Urban planning* since they show results that go beyond transactional level 3, where most European cities are. Also, for the category of *Channelling*, Bologna presents a top value of 4.2, evolving towards new user-centred models of public services delivery. The good results for the other four categories are as well remarkable since the European averages for these categories present rather low results. However, for the categories of *Citizens' engagement*, *Environment*, *Social Care* and *Transport* it happens exactly

the opposite, that is, their scores remain clearly below European averages even though it is very remarkable that all categories surpass the interactive level 2.

The difference between the categories with the lowest and highest levels is higher than two points, the second biggest difference among all the surveyed cities.

$$\Delta = 2.1$$

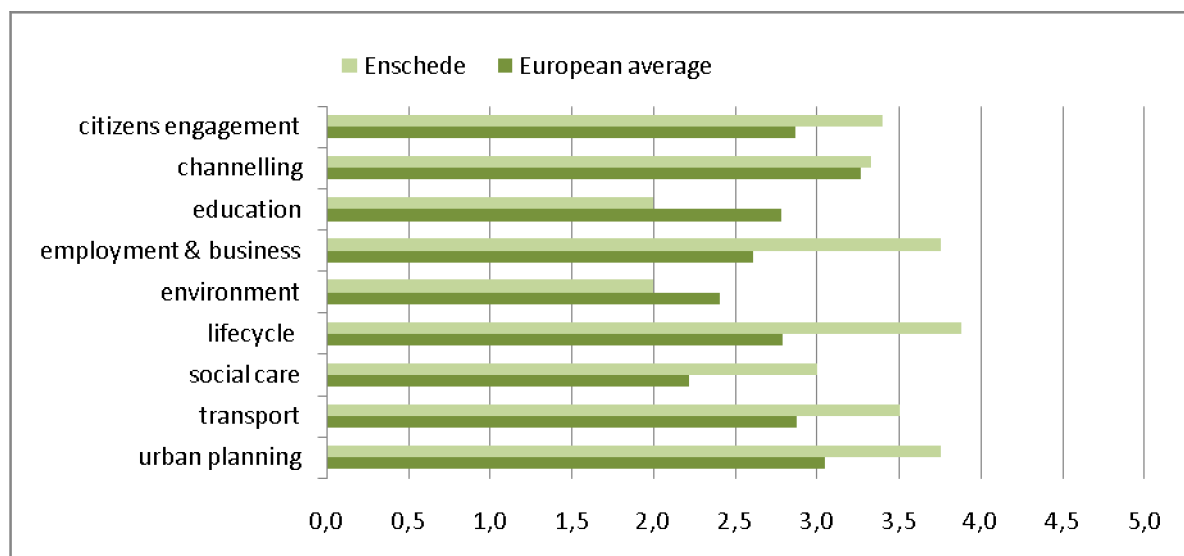
This result proves that the city of Bologna had a heterogeneous e-Services evolution which is coherent with the city's maturity map.

On the other hand, when looking at the perception of adoption levels for Bologna, they are very similar to European averages, without big distances.

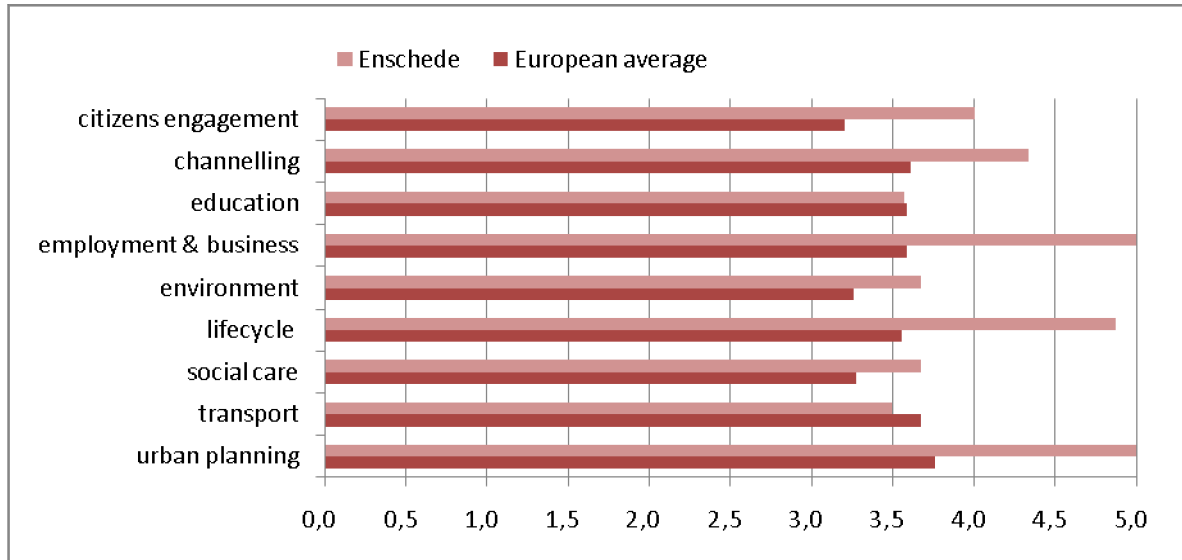
It is remarkable to mention the maturity results achieved by the *Channelling* category in the city surpassing the transformation barrier and entering level 5, thus not only full integrating e-Government services but also promoting citizens' participation in service provision and quality evaluation. One of the reasons of this success could be the service *La Mia Iperbole*, a new web portal created according to the web 2.0 principles. Information and services are structured in modules allowing users to organize their own home pages. The modules can be managed very easily: it is possible to shift, close, compress / expand and personalize them.

## ENSCHDE

### Maturity



## Perception of adoption



Enschede presents quite nice figures of maturity, above European average for all cases but two -*Education* and *Environment*-. Five cases clearly stand out: *Employment & business*, *Lifecycle*, *Social care*, *Transport* and *Urban planning*, since the maturity level of the services offered in these categories is mostly transactional, remarkably above European averages, and clearly evolving towards transformational level 4. Also, the category of *Lifecycle* presents one of the top values with a result of 3.9. This is a very significant result since most European cities show results underneath transactional level whereas Enschede presents more evolved e-Services.

The difference between the categories with the lowest and highest levels is slightly below two points.

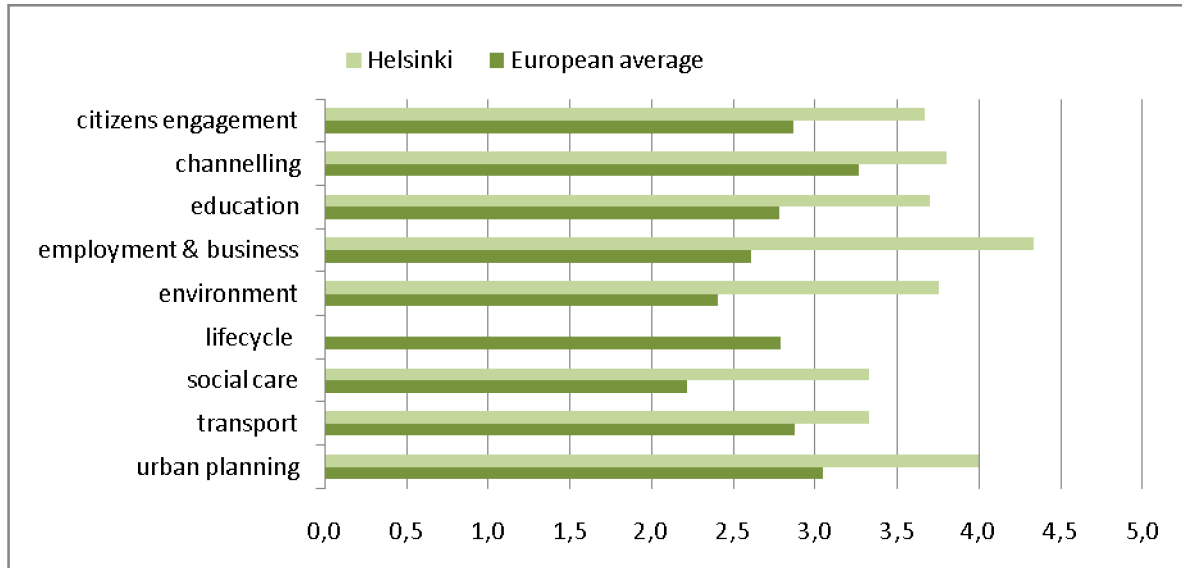
$$\Delta = 1.9$$

Therefore proving that, even though certain work has been devoted to have a homogeneous development, some categories need to be improved. That is the case in *Education* and *Environment*, the only two categories remaining in interactive level 2.

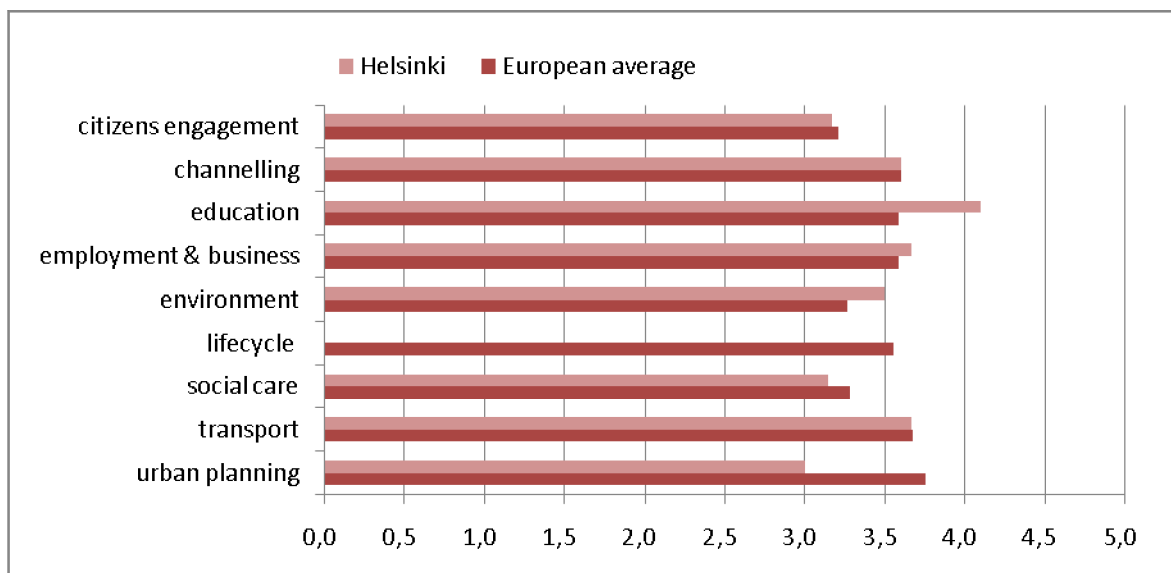
Regarding perception of adoption, Enschede shows perception of adoption patterns above European averages for all cases without exception, presenting three top values as well for *Employment & business*, *Lifecycle* and *Urban planning*, categories with a maturity level above average as well. On the other hand, all perception of adoption results remain above level 3.5, proving that all services have been used by a number of citizens higher than initially expected, according to those responsible for its delivery.

## HELSINKI

### Maturity



### Perception of adoption



Maturity of Helsinki's services is clearly above European average in all categories except from *Lifecycle*, a services' category in which the municipality has no competence. All categories achieve levels above the third transactional level. Therefore, services maturity has gone beyond the interactivity level barrier promoting complete transactions through the several available electronic channels. Moreover, the city of Helsinki is starting to develop more complex and advanced services in which citizens' participation is starting to enhance its importance level. *Employment & business*, *Environmental* and *Social care* are the three categories that clearly stand out from the rest achieving scores more than one point above the

European average.

All categories seem to have similar maturity levels. The difference between the categories with the lowest and highest levels is exactly one point.

$$\Delta = 1$$

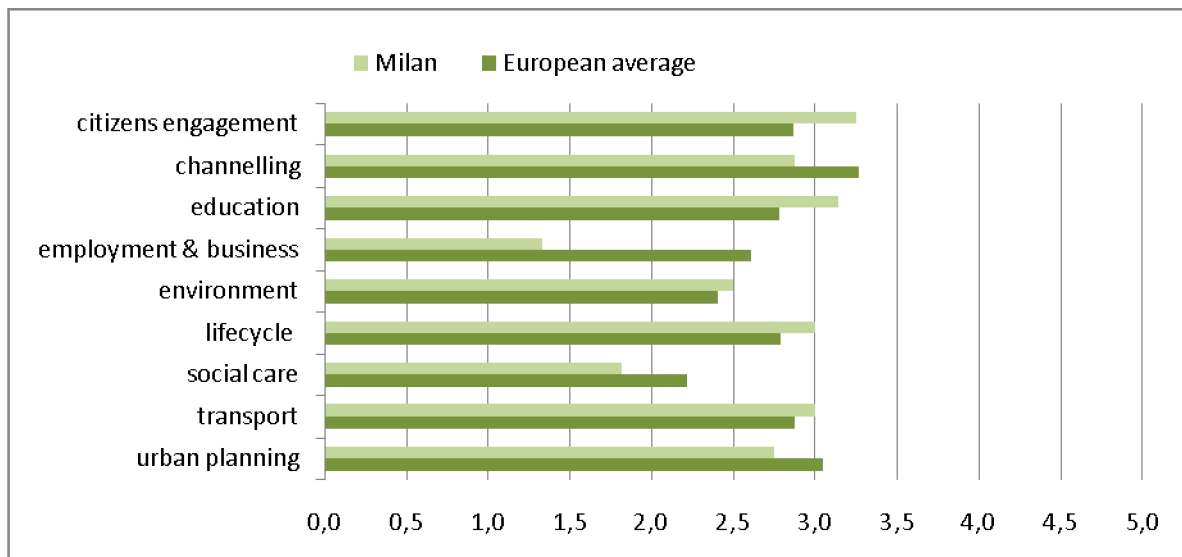
therefore proving that the city of Helsinki has been working on its e-Services delivery following a homogeneous work plan.

On the other hand, it can be stated that Helsinki's services' perception of adoption is similar to the European average up to 3. This fact demonstrates that citizen's perception of adoption of services provided through electronic means is thought to be slightly higher than initially expected, therefore proving that Helsinki's citizens are ready and willing to receive and massively use electronic services.

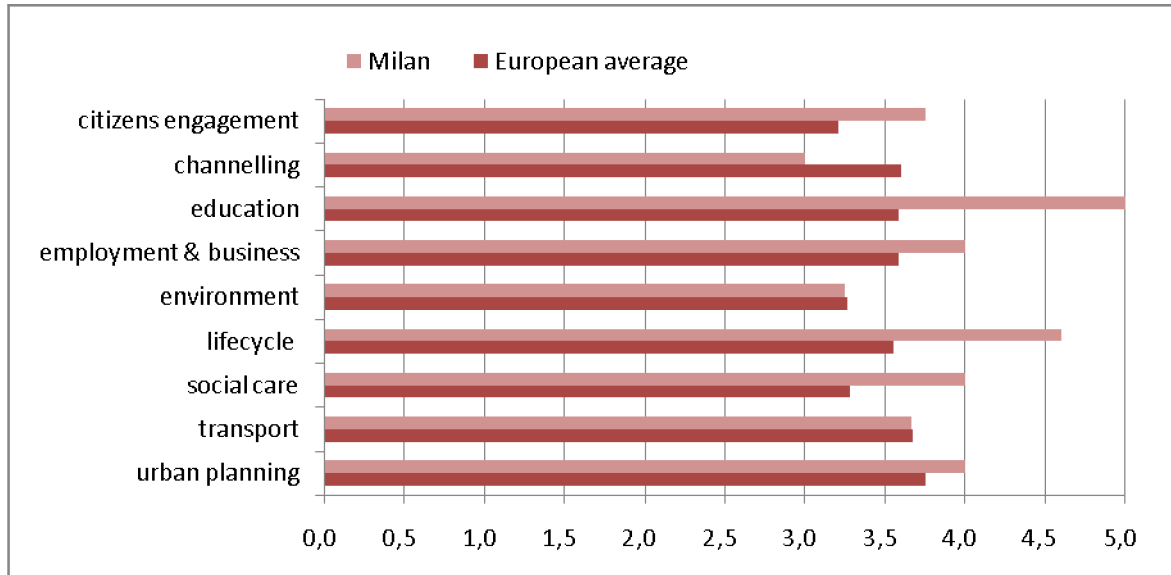
Two other cases are especially remarkable: *Education* is the category with the highest perception of adoption mark (higher than 4), whereas *Urban planning* is the less adopted category even satisfactory reached the expected target (level 3).

## MILAN

### Maturity



## Perception of adoption



Milan's e-Services present maturity levels quite close to the European averages. It is especially remarkable the case of the following four categories: *Citizens' engagement*, *Education*, *Lifecycle* and *Transport*, all with levels at or surpassing the transactional level 3. They have reached the transactional level in which a request can be completed throughout an electronic channel and are evolving towards a new transformation level 4.

On the other hand, there are two categories remaining below maturity level 2 and clearly below European average: *Employment & business* and *Social care*. In these cases only information or downloadable forms can be obtained through electronic means. Nevertheless, information regarding its perception of adoption shows that, despite being quite immature services, citizen's adoption has been higher than initially expected.

The difference between the categories with the lowest and highest levels is exactly two points.

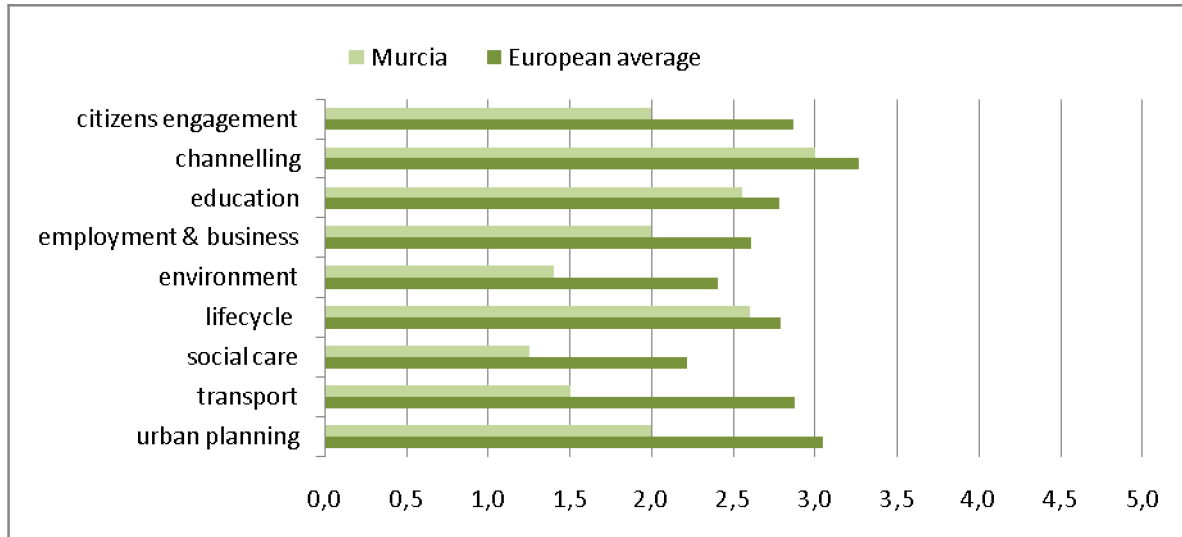
$$\Delta = 2$$

The aforementioned result proves that the city of Milan has been working on its e-Services evolution following a quite heterogeneous working plan. Therefore, this has led to a situation in which some categories have been left behind.

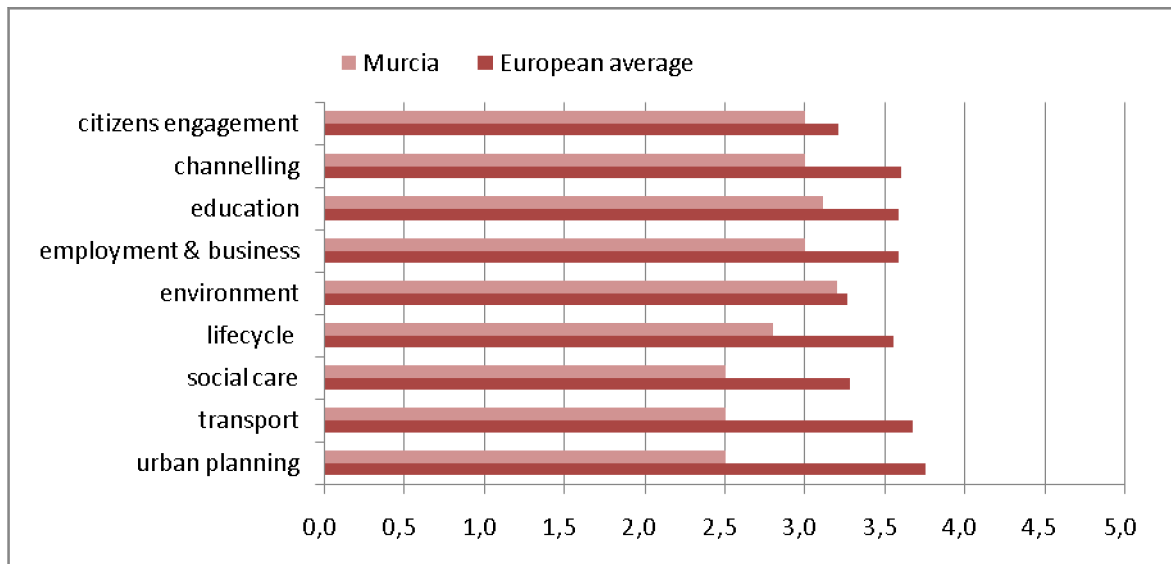
Regarding perception of adoption, it has to be mentioned that Milan's citizenship has widely accepted electronic services provided by the municipality as seen in the perception of adoption figure. All categories show levels over the third stage indicating a bigger use than initially foreseen. *Education* and *Lifecycle* are especially remarkable since they reach or at close to the maximum perception of adoption score, being both considered successful categories.

## MURCIA

### Maturity



### Perception of adoption



The city of Murcia is below European maturity average in all the categories submitted to study. *Channelling* appears to be the category in which huge efforts have been devoted since it is the only category that reaches the transactional level 3. On the contrary, *Social care* is the category achieving the lowest maturity level only offering information through electronic means. It should be taken into account that Spanish municipalities do not have competences on *Social care*. Also, the *Citizens' engagement*, *Transport* and *Urban planning* categories have the lowest maturity level scores remaining in level 2 or slightly above. That means that the majority of services remain still in the interactivity level while the European average is around transactional.



One of the services that might have helped the city of Murcia achieving a great result in *Channelling* is *murci@informa*, a mobile service that provides municipal information regarding cultural activities, exhibitions or conferences. The service is used as a new channel to enhance the communication with citizens through the use of new technologies.

The difference between the categories with the lowest and highest levels slightly over one point and a half, showing a quite heterogeneous evolution of e-Services.

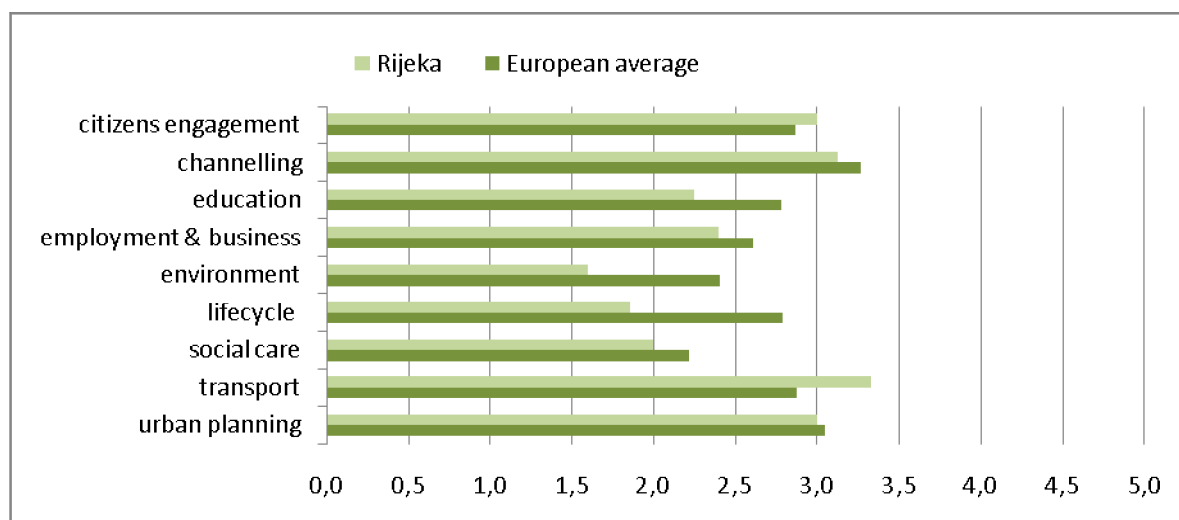
$$\Delta = 1.7$$

Regarding perception of adoption levels, almost all categories remain below European average showing rates between level 2.5 and 3. This means that, according to service providers, use of services in all categories has been satisfactory.

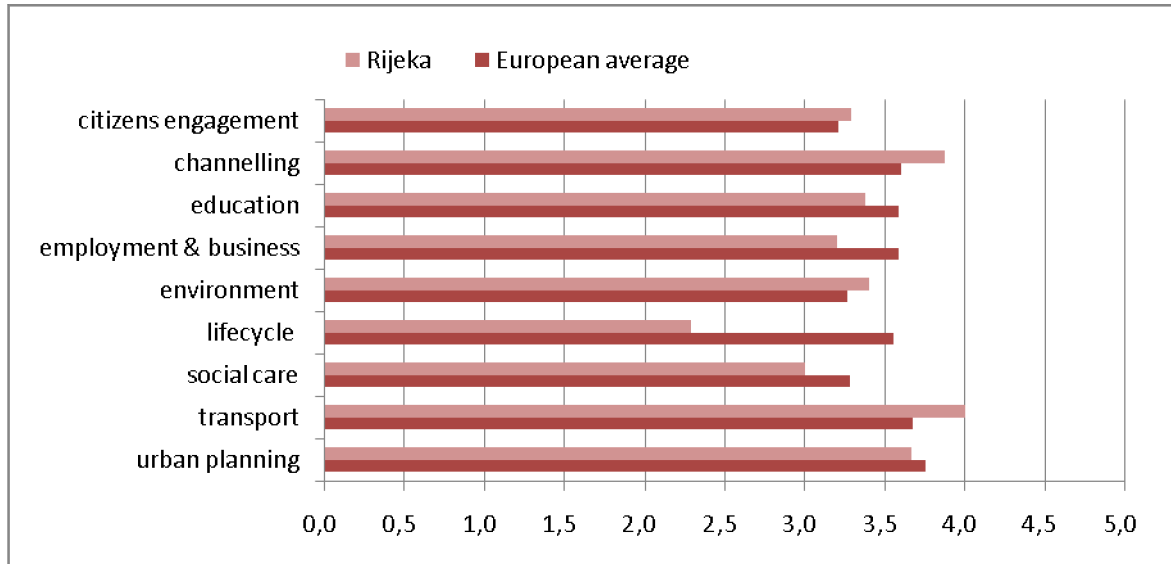
In short, the city of Murcia needs some extra effort to evolve all the categories considered in this survey in order to reach the corresponding European averages, especially in *Citizens' engagement*, *Environment*, *Social care* and *Transport*. In the last two mentioned categories, special care should be taken to raise adoption results.

## RIJEKA

### Maturity



## Perception of adoption



The city of Rijeka achieves results similar to those expressing the average of Europe when talking about maturity, with the exception of *Environment* and *Lifecycle* categories that need to be improved since both are more than half point below European average. Those categories remain at maturity level 1, therefore only providing information through the use of electronic means while the European average is close to the transactional level.

The city of Rijeka has gone beyond the interactivity level 2 barrier in half of its categories, thus starting to promote complete transactions through the several available electronic channels. Inside this advanced group, *Citizens' engagement*, *Channelling*, *Transport* and *Urban planning*, stays or slightly surpasses transactional maturity level 3, showing that huge efforts are being done to gradually evolve services towards a full integration service delivery model.

The difference between the categories with the lowest and highest levels is slightly over one point and a half.

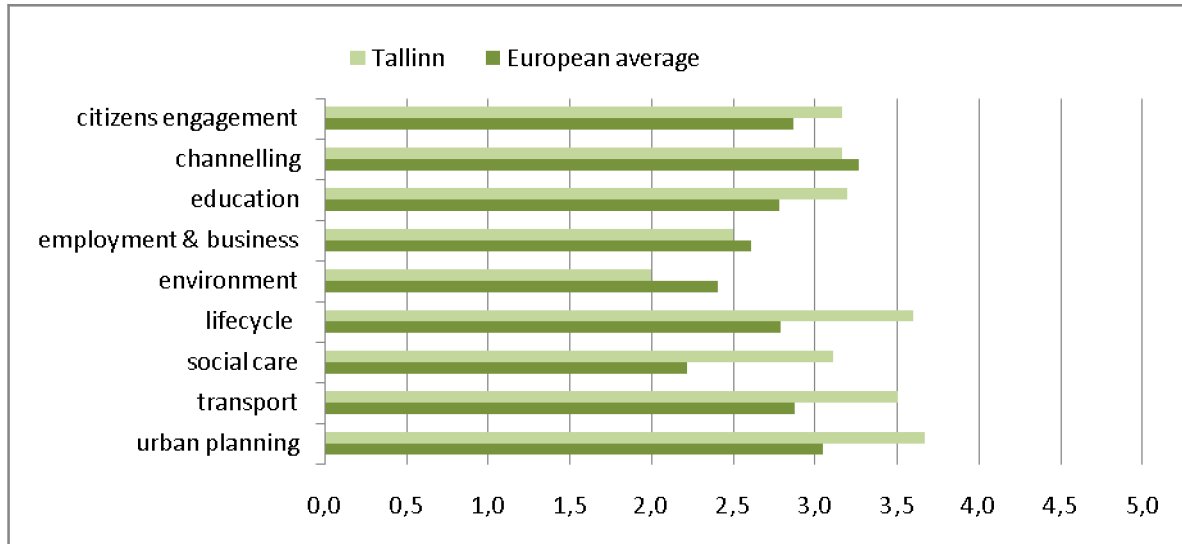
$$\Delta = 1.7$$

The aforementioned result proves that the city of Rijeka has followed a quite heterogeneous work plan when developing its e-Services. Therefore, this situation has left some categories behind in the evolution process.

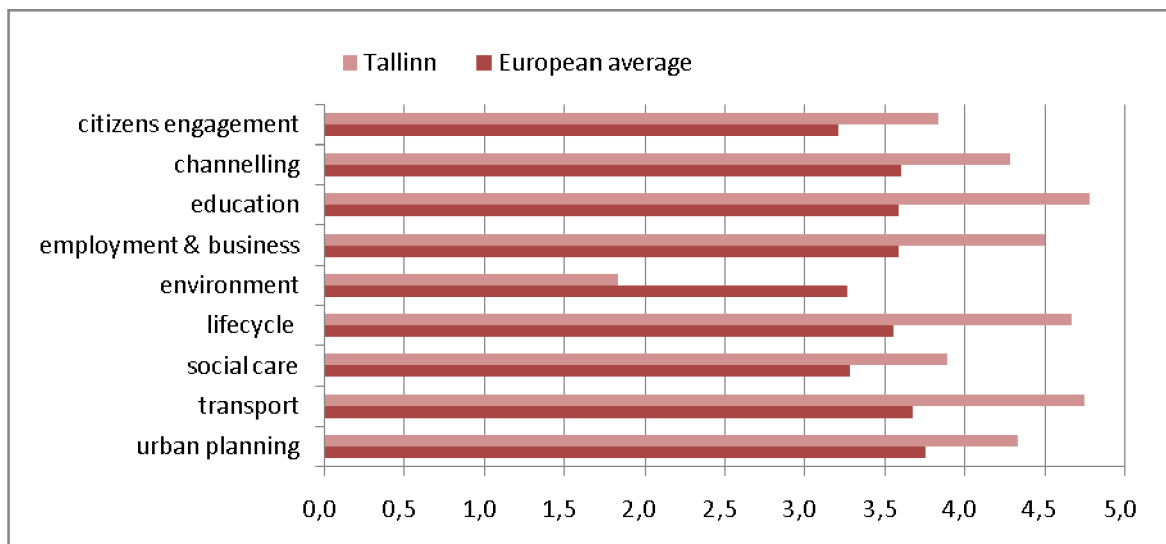
One of the reasons that might have helped the *Channelling* category achieve the aforementioned results is the *Kiosks* service. The city has successfully installed several free automatic stands in key areas like info shops, libraries or municipal buildings that help residents' access city services and information on-line. Moreover, users may have the possibility to send free email, text messages and video from the kiosks.

## TALLINN

### Maturity



### Perception of adoption



Maturity of Tallinn's services is above European average in all categories except from *Channelling*, *Employment & business* and *Environment* that achieve scores slightly below European results. All other categories achieve levels above the third transactional level. This result proves that the city of Tallinn is evolving the majority of its services towards the transformational level 4, that is, towards a new integration model of service delivery in which citizens will access all services from a unique portal.

Significantly, all categories seem to have slightly heterogeneous development since the difference between the categories with the lowest and highest levels is slightly below two points.

$$\Delta = 1.7$$

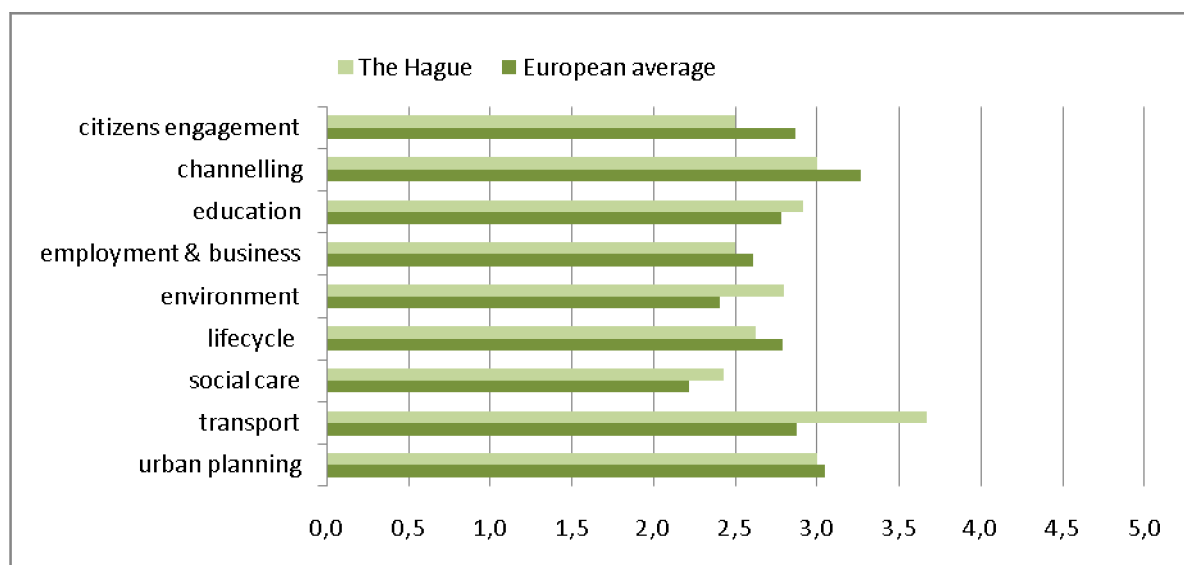
This result could also show that the city of Tallinn has devoted its efforts to evolve certain selected categories up to higher levels of maturity involving citizens' participation, leaving some other categories behind this process.

One particular service to mention is Tallinn's virtual ID ticket for public Transport created on the basis of the national identification card in Estonia. ID ticket users might prove that they have acquired a ticket only showing their national ID cards to the controllers when using any kind of public Transport. Tickets are sold via electronic payment system and can be purchased from several distribution channels: phone, internet and face-to-face.

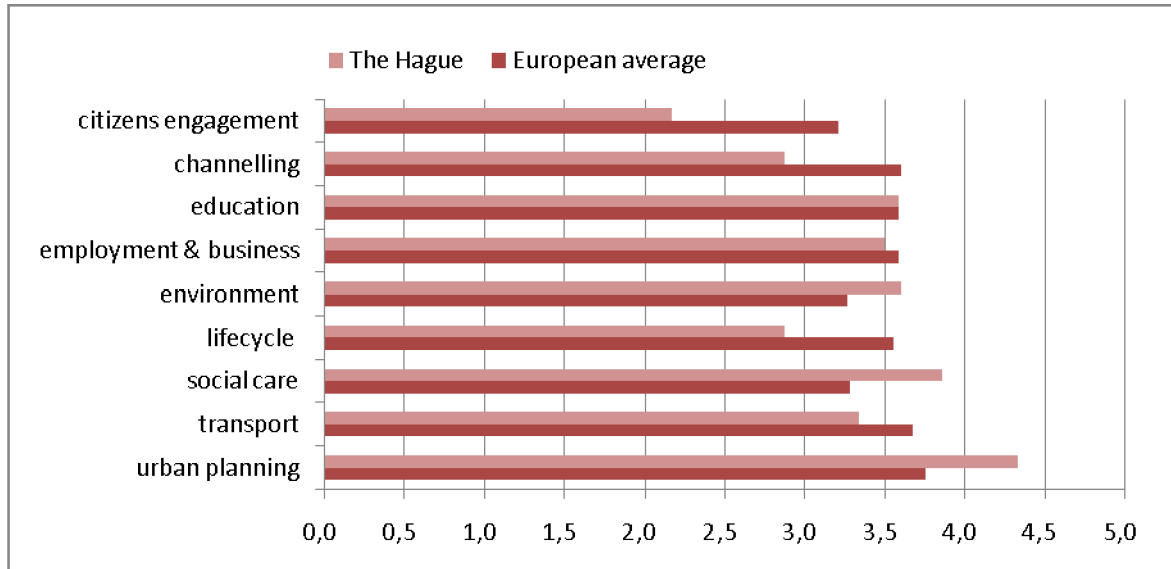
Regarding perception of adoption levels, it is also remarkable that all categories' perception of adoption is clearly above European average, except from *Environment* that is far below from the European average. Four out of the nine categories' perception of adoption - *Education*, *Employment & business*, *Lifecycle* and *Transport* - is around level 4.5 which mean that they have been adopted by more citizens' than previously expected and are close to be considered a success.

## THE HAGUE

### Maturity



## Perception of adoption



The city of The Hague shows quite a stable offer since all its categories' maturities are very similar to the European pattern. All the city's categories are slightly below or above the European averages except for the case of the *Transport* category which is significantly above the European average.

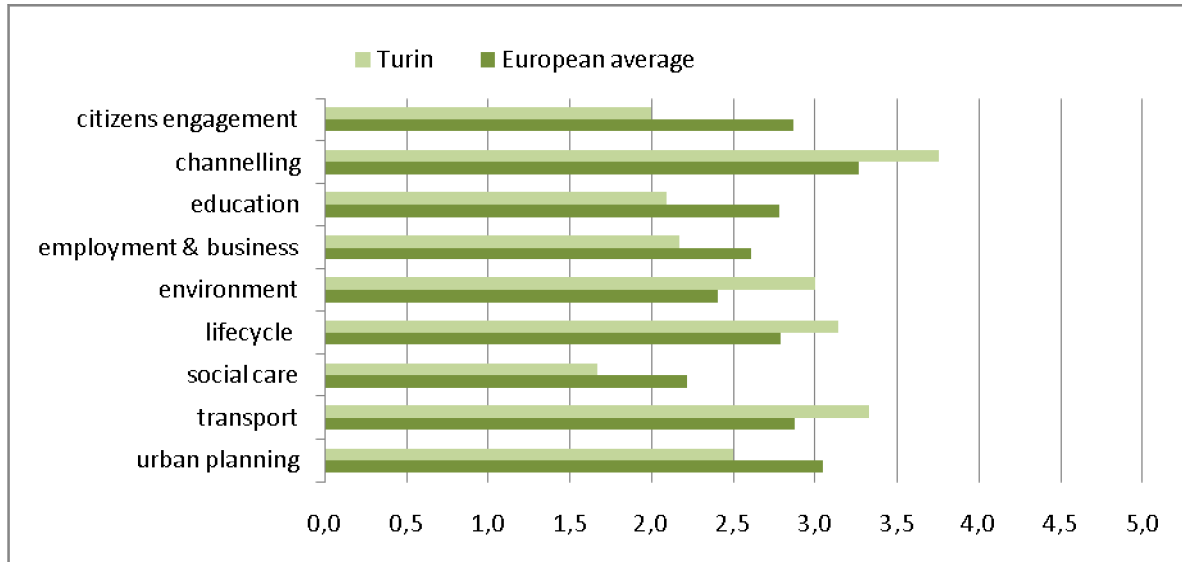
Moreover, no category of The Hague goes beyond the third transactional maturity level, except for the case mentioned before -*Transport*- in which maturity is evolving clearly towards transformational level 4. All the remaining categories are between level 2 and 3, showing that the city's offer is quite well-balanced with all its services in the same maturity area. Actually, the difference between the categories with the lowest and highest levels is slightly over one point.

$$\Delta = 1.3$$

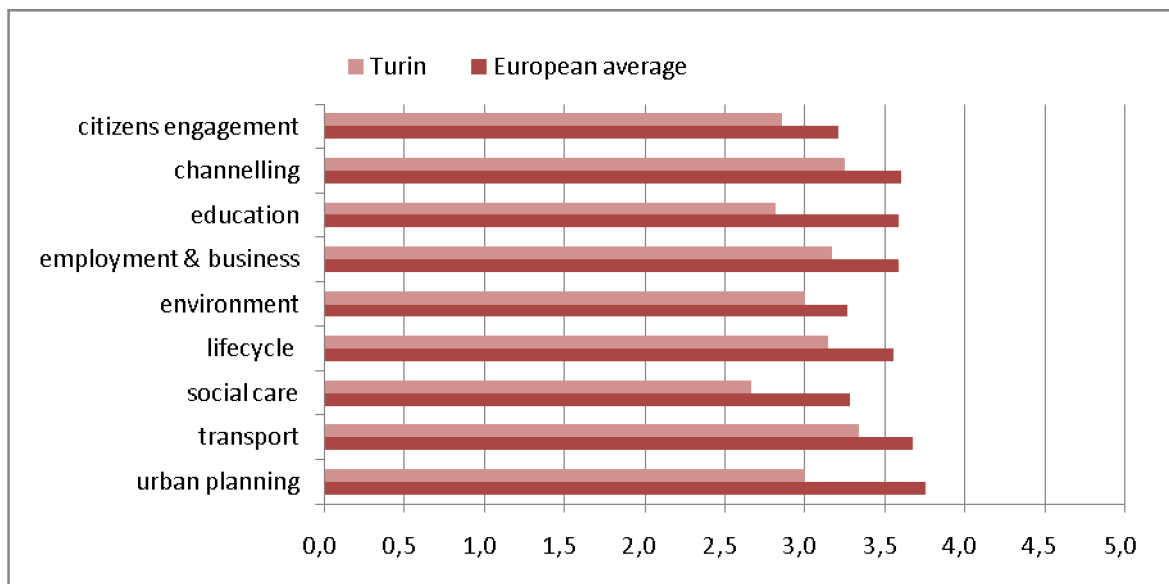
Regarding perception of adoption, there are two clear groups: those categories not surpassing the level three barriers - *Citizens' engagement*, *Channelling* and *Lifecycle* - thus not achieving the expected perception of adoption, and those categories that are above level three - *Education*, *Employment & business*, *Environment*, *Social care*, *Transport* and *Urban planning*. Only one of these categories - *Urban planning* - clearly surpasses the fourth level, which means that the category enters the excellent perception of adoption area.

## TURIN

### Maturity



### Perception of adoption



There are two clear identified groups when talking about the maturity evolution of Turin's e-Services: those services clearly above the European average - *Channelling*, *Environment*, *Lifecycle* and *Transport*- and those services clearly below the European pattern - *Citizens' engagement*, *Education*, *Employment & business*, *Social care* and *Urban planning*.

On one hand, some categories remain still in a more immature group - between level 1.5 and level 2.5 - between the information and the interactivity level, trying to reach or slightly

surpassing a one-way communication with the citizen level. On the other hand, the rest of the categories have successfully achieved the transactional level 3, in which a two-way communication with the citizenship is possible, and are now evolving towards a more complex future in which services will be integrated to readapt to citizens' needs.

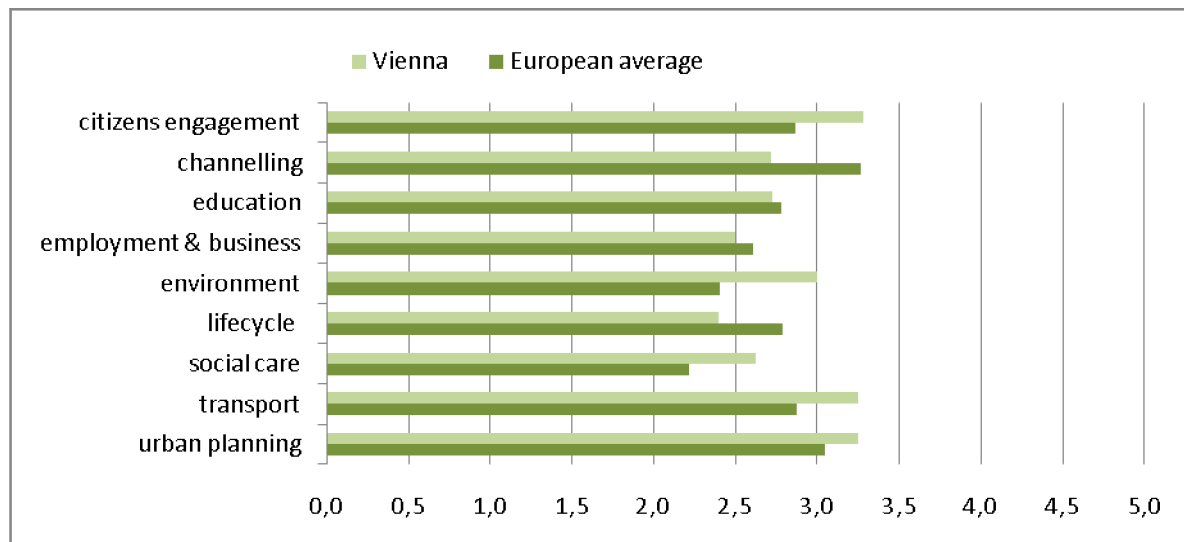
The aforementioned division is related to the fact that the difference between the categories with the lowest and highest levels is more than two points, the second biggest difference among all the analysed cities:

$$\Delta = 2.1$$

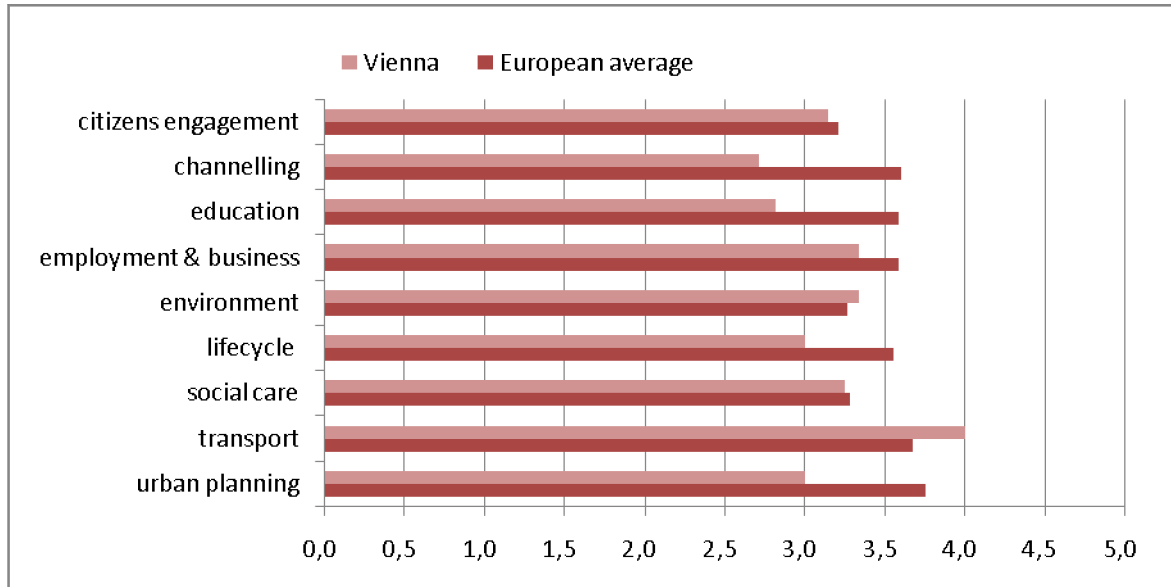
When focusing the attention on the perception of adoption levels, all categories are quite similar to the European average remaining always below the European pattern, sometimes with differences bigger than half point - *Education*, *Transport* and *Urban planning* -. Moreover, all the perception of adoption results reach level 3 or above except from three cases - *Citizens' engagement*, *Education* and *Social care* - in which the perception of adoption mark is slightly below. In conclusion, all the services included in the categories submitted to study have achieved the initially expected perception of adoption, thus showing that Turin's citizens are willing to receive and massively use electronic services.

## VIENNA

### Maturity



## Perception of adoption



The city of Vienna shows a quite stable offer with categories achieving results very similar to the European averages when talking about maturity levels. All categories remain slightly below the European pattern with very slight difference, not more than half point.

Also, all the categories achieve results slightly above or below the third transactional level. Notably, all categories seem to have a quite homogeneous maturity development. The difference between the categories with the lowest and highest levels is slightly below one point, the second lowest difference among all the participant cities in this survey.

$$\Delta = 0.9$$

Regarding perception of adoption, the overall situation is quite similar to the maturity scenario: all the categories achieve scores similar to the European averages, with the exception of *Channelling*, *Education* and *Urban planning* that are clearly below the average with differences higher than half a point.

Moreover, all the categories achieve level 3 or above regarding perception of adoption scores. Therefore, it could be stated that Vienna's citizens seem to have widely accepted electronic services. It is important to note the case of the *Transport* category in which the perception of adoption result achieved is reaching level 4 and ready to enter the excellent adoption area.

The *M-Parking* service may have contributed to the great results achieved in the *Transport* category in the city of Vienna. *M-Parking* facilitates the payment of on-street parking charges as short-term parkers no longer have to buy conventional parking vouchers from sales points and, therefore, are independent of opening hours. By sending a SMS, an electronic parking voucher can be booked. Also, a reminder SMS is sent ten minutes before the voucher expires. Before using the service, registration and creation of a parking account is required.



## 5. HIGHLIGHTED SERVICES

Sharing of experience, across Europe, has been pointed out by the European Commission as one of the main drivers to accelerate e-Government in Europe in its e-Government Action Plan.

This survey makes a contribution in that direction. One of the outputs of this survey is a set of identified good practices using a well defined methodology in which the different e-Services are compared in maturity and perception of adoption with the sample's average. In that process the most relevant e-Services of each category are highlighted.

Most significant examples have been identified using the following Rho factor:

$$\sigma = M - \overline{M}$$

Where,

$M$  = maturity mark of a concrete service delivered by a concrete city

$\overline{M}$  = European average maturity of the concrete service

The first selection has been made taking services showing a Rho factor upper than 1, which means that these selected services have been chosen based on how developed a service is compared to their closest European "competitors", thus compared to the European average of the service.

From the resulting list of services, only those having achieved a perception of adoption (PoA) higher than 3 has been selected to be part of the final list of highlighted services resulting a list of 95 services. These services, advanced in maturity over the average and having been widely adopted by the citizens can help other cities to foster their e-Services provision and making a quantum leap on local e-Government maturity.

Category	Service	$\sigma$	PoA	City
Citizens' engagement	City council listens	1.1	5	Barcelona
Citizens' engagement	City council listens	1.1	5	Enschede
Citizens' engagement	City council listens	1.1	4	Tallinn
Citizens' engagement	City council plenary sessions access	1.2	5	Milan
Citizens' engagement	Lost and found	1.4	4	Vienna
Citizens' engagement	Participation processes	1.8	4	Barcelona

Category	Service	σ	PoA	City
Citizens' engagement	Participation processes	1.8	4	Enschede
Citizens' engagement	Participation processes	1.8	5	Riieka
Channelling	Bulletin/Newsletter	1.4	5	Bilbao
Channelling	Bulletin/Newsletter	1.4	4	Bologna
Channelling	City's homepage	1.6	5	Bologna
Channelling	City's homepage	1.6	5	Helsinki
Channelling	City's homepage	1.6	4	Turin
Channelling	Consultation online	1.1	5	Bergen
Channelling	Consultation online	1.1	4	Bologna
Channelling	Consultation online	1.1	5	Enschede
Channelling	Consultation online	1.1	5	Helsinki
Channelling	Enterprises folders	1.1	5	Bologna
Channelling	Enterprises folders	1.1	5	Enschede
Channelling	GIS and virtual flight	1.6	5	Helsinki
Channelling	GIS and virtual flight	1.6	4	Turin
Education	Cooperation home-school	1.0	5	Tallinn
Education	Cultural heritage sites	2.4	4	Helsinki
Education	Cultural heritage sites	1.4	5	Milan
Education	e-learning	1.5	5	Birmingham
Education	e-learning	1.5	5	Helsinki
Education	Funds for cultural projects	1.3	5	Bergen
Education	Funds for cultural projects	1.3	4	Bilbao
Education	Libraries	1.4	5	Birmingham
Education	Libraries	1.4	5	Helsinki
Education	Media workshops	1.0	4	Helsinki
Education	Portal for events and extracurricular activities	1.1	5	Bologna
Education	Portal for events and extracurricular activities	1.1	4	The Hague
Education	Pre-school children education	1.8	5	Bergen
Education	Pre-school children education	1.8	5	Milan
Employment & business	Ideas bank	1.3	5	Barcelona
Employment & business	On-line business registration	1.3	4	Barcelona
Employment & business	On-line business registration	1.3	5	Enschede
Employment & business	Portal for companies	1.2	4	Barcelona
Employment & business	Portal for companies	1.2	4	Bologna
Employment & business	Portal for companies	1.2	5	Enschede
Employment & business	Portal for entrepreneurs	1.2	4	Barcelona

Category	Service	σ	PoA	City
Employment & business	Portal for entrepreneurs	1.2	4	Bologna
Employment & business	Portal for entrepreneurs	1.2	5	Enschede
Employment & business	Public Tenders (jobs in public sector)	2.5	5	Helsinki
Employment & business	Public Tenders (jobs in public sector)	1.5	4	Bologna
Employment & business	Recruitment (for jobs in private sector)	1.2	5	Barcelona
Environment	Air quality	1.8	4	Milan
Environment	Bulk waste collection	1.7	5	Barcelona
Environment	Pollution charge	1.7	4	Milan
Environment	Public property maintenance	1.0	5	Barcelona
Environment	Public property maintenance	1.0	5	Enschede
Environment	Public property maintenance	1.0	4	Helsinki
Environment	Recycling parks	3.0	4	Helsinki
Environment	Web flea markets	1.0	5	Barcelona
Environment	Web flea markets	1.0	4	Vienna
Lifecycle	Digital docs management system	1.2	4	Bologna
Lifecycle	Digital docs management system	1.2	5	Enschede
Lifecycle	Digital docs management system	1.2	5	Tallinn
Lifecycle	On-line fines consult and payment	1.8	5	Bologna
Lifecycle	On-line Marriage/Civil union register	1.4	5	Enschede
Lifecycle	On-line Marriage/Civil union register	1.4	4	The Hague
Lifecycle	Personal certificates	1.3	4	Bologna
Lifecycle	Personal certificates	1.3	5	Enschede
Lifecycle	Personal certificates	1.3	5	Tallinn
Lifecycle	Personal certificates	1.3	5	Vienna
Lifecycle	Population registry (census)	1.4	5	Enschede
Lifecycle	Population registry (census)	1.4	5	Tallinn
Lifecycle	Residence registration	1.5	5	Enschede
Lifecycle	Residence registration	1.5	5	Tallinn
Lifecycle	Residence registration	1.5	4	Turin
Lifecycle	Utilities (meter readings and bills)	1.1	5	Barcelona
Lifecycle	Utilities (meter readings and bills)	1.1	4	Turin
Social care	Discounts for low incomes	1.1	4	Antwerp
Social care	Housing for low incomes	1.9	5	Helsinki
Social care	Organizing public events	1.7	4	Enschede
Social care	Physicians database	1.9	5	Barcelona
Transport	Car parking	1.2	5	Tallinn
Transport	Car parking	1.2	5	Vienna
Transport	Municipal bikes lending	1.3	5	Barcelona
Transport	Municipal bikes lending	1.3	4	Vienna
Transport	Public transport services	2.2	5	Helsinki
Transport	Public transport services	1.2	5	Barcelona
Transport	Public transport services	1.2	5	Tallinn

Category	Service	$\sigma$	PoA	City
Transport	traffic web cameras	1.9	4	Riieka
Transport	traffic web cameras	1.9	4	The Hague
Urban planning	Acquisition of land by foreigners	2.0	4	Vienna
Urban planning	Acquisition of land by foreigners	1.0	5	Enschede
Urban planning	Certificates	1.1	4	Bilbao
Urban planning	Certificates	1.1	5	Enschede
Urban planning	Certificates	1.1	4	Tallinn
Urban planning	Land-use plans and building regulation	1.0	4	Bologna
Urban planning	Land-use plans and building regulation	1.0	5	Barcelona
Urban planning	Land-use plans and building regulation	1.0	5	Enschede
Urban planning	Land-use plans and building regulation	1.0	4	Helsinki

## CONCLUSIONS

This Bench-learning experience aimed at measuring the degree of local e-Government in cities by means of understanding and analysing e-Services. General results have been obtained thanks to the definition of a common framework to perform such measurements. In addition city maps have been drawn to show the position of each city. Finally, a selection of best practices has automatically been found as a consequence of the used methodology.

City maps and the best practices list are key elements of the learning component of this survey. City maps show cities the areas where they excel as well as the areas where improvements could be carried out without appealing to rankings which are not suitable for a learning process. Besides, the comparison system allowed objective detection of best-practices, selected according to how developed a service is. There is no need to explain what a best practice is. Here the innovation is that the best practices list is a result of the applied methodology of measurement and comparison.

The survey has been based on a sample of 15 European cities belonging to 10 different countries. The participant cities provided more than 1.200 inputs related with eighty-one different on-line services. These services were grouped according to nine main categories shaping the Global Services Catalogue. On-line services have been measured based on Standard Coverage and Diversity.

The findings show at first place the existence of a set of standard services shared by all the participant cities. Despite the existing differences in public administration organization across European countries, an important number of common services shared by all local public administration can be found. That corpus of common services makes possible to perform well founded measurements in all the categories. It is quite remarkable that all the Global Catalogue categories achieve percentages of coverage in a range between 67% and 83%.

Second, local e-Government development in Europe is still below transaction level (level 3) being above 3 for only two out of the nine categories -*Channelling* and *Urban planning*.

Third, local e-Government is in general, perceived as highly adopted by citizens. The European average of perceived adoption is always above 3 and even above 3.5 for five out of the nine categories, which means that in average e-services are being used by more people than initially expected.

Fourth, Web 2.0 is being incorporated to local e-Services provision, since several cities have started delivering level 5 services.

Fifth, additional services are more advanced than standard services. When analysing maturity it can be seen that additional services shows greater marks than standard services.

Sixth, there is no evidence of relation between service maturity and perception of adoption. Although it could initially be thought that more advanced services will also be more adopted, this survey, based on the information analysed, does not prove that relation.

Regarding categories it has been found that most active categories are also those tightly related with EU-funded programs that intended to foster concrete key areas (CORDIS 2008). *Environment*, *Social care* and *Transport* are the most active categories and at the same time are on the focus of current European policies.

Finally, two additional outputs deserve to be remarked: the Global Cities Catalogue and the selection of best practices. The Global Cities Catalogue intends to bring together all the common outstanding services from all the cities as well as the specific local services that are worth mentioning. Besides, 95 services have been found as best practices. Among the services that show a high perceived adoption, those that clearly stand out from the maturity average can be considered as real best practices cases. Best practices have been listed by category, service and maturity, allowing easy detection of the most suitable examples to cover each city's needs.

Unfortunately, some of the innovations of this survey have become part of its limitations. On one hand, the survey has been based on self evaluation. Even though providing common instructions, it is not possible to assure a complete homogeneity among city's results, along with the risk of misunderstanding maturity level 5 due to its novelty. In addition, since there is no common adoption criterion, the survey has taken into account a perception of adoption provided by service owners and not the real services take-up, which introduce yet another level of subjectivity. The definition of this adoption measurement framework should be a priority to be solved in future research. In addition, future works should include a larger sample of cities in order to increase statistical reliability; this would as well allow a segmented analysis distilling reference types for comparison according to city characteristics such as size or GDP per capita. Furthermore, a refinement at the measurement process is needed to reduce data subjectivity.

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