CITYkeys

Co-funded by the European Commission within the H2020 Programme.
Grant Agreement no: 646440.
2015-02-01…2017-01-31 (24 months).

Deliverable 1.1: Overview of the needs

Revision 5

Preparation date 2015-05-31 (m4)

Due date 2015-05-31 (m4)

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Dissemination level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
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Deliverable administration										
No & name	**D 1.1 Overview of the needs**									
Status	Released		**Due**	m4		**Date**	2015-05-31			
Author(s)	Nikolaos Kontinakis Anja Katalin De Cunto									
Description of the related task and the deliverable in the DoW	This deliverable will present an overview of the needs for performance measurement per city/sector/stakeholder as input for 1.2. Moreover, this deliverable will help to scope the needs for new services in the domain of smart city development, as input for WP3.									
Planned resources PM	VTT	AIT	TNO	EUR	TAM	ROT	VIE	ZGZ	ZAG	Total
Comments										

V	Date	Authors	Description
0.1	2015-05-04	EUR	First draft
0.2	2015-05-18	EUR	Second draft
0.3	2015-05-27	EUR	Third draft
0.4	2015-05-28	EUR	Final draft
1.0	2015-05-31	EUR	Release

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1. SUMMARY

This report presents an overview of the needs of the cities and the needs of citizens & stakeholders for: smart cities and smart city projects performance measurement, measurement and evaluation tools, data collection and use of open data. The results will be used as one of the key inputs for the next technical tasks of the project and especially the definition of the CITYkeys set of performance indicators and the definition of the data collection system.

A two-questionnaire survey was used to gather input from the cities and their citizens and stakeholders respectively. 20 cities from all areas of Europe participated in the first part of the survey submitting as well 50 questionnaires (in total) from citizens and stakeholders for the second part of the survey.

Cities

Cities confirmed that the topic of "smart city" is high in their agenda as they expect a lot of benefits from becoming smart: *efficiency, sustainability, participation of society* and *better quality of life.* In describing what a smart city looks like, they agree that a "smart city" uses a lot of technology, combines energy, mobility and infrastructure, increases performance and efficiency, increases the participation of citizens, enables innovation and improves the social and economic fabric of the city.

In both planning and implementing smart city solutions, performance measurement is one key component. Nevertheless, and although they would like to do so, cities haven't yet widely adopted or implemented such performance measurement systems and CITYkeys could become a "facilitator" in this direction.

Most cities would also like to have help in the development of harmonised and transparent schemes for data collection as well as for the secure and ethical opening of their data.

Citizens & stakeholders

Citizens and stakeholders follow adequately what their cities plan and implement and are definitely looking for more results, both in terms of quality and quantity. They define a "smart city" and its objectives in terms similar to the ones used by the cities' experts; nevertheless they put more emphasis in three objectives that are directly important to them:

- Improvement of quality of life;
- Better services from the city to the citizens;
- Creation of an innovative, competent and with high skilled jobs city.

The outputs of CITYkeys need to take into account the priorities of all city stakeholders and replying citizens and stakeholders gave two different sets of answers when asked what makes a "smart city project" useful. Useful *for the citizens* means a better environment and quality of life but mainly means better and more efficient services, tackling the social and economic challenges and a focus on innovation and jobs creation. Useful *for the cities* means tackling social issues but mainly means making the city more efficient and sustainable, more competitive and financially robust.

2. INTRODUCTION

2.1 About

The objective of Task 1.1: "Requirements of cities/citizens" of CITYkeys is to identify what are the needs of the cities and the needs of citizens & stakeholders with regard to the CITYkeys outcomes and results. Moreover, to identify the citizens and city stakeholders' criteria with regard to how smart city projects are evaluated, selected and accepted. This way, the indicators that will be used for the performance measurement of smart city solutions are expected to be adopted and supported by a wider audience (e.g. city administrations, citizens, industry, non-technical stakeholders, etc.).

This report (Deliverable D1.1 of CITYkeys) presents an overview of the needs of the cities and the needs of citizens & stakeholders for: smart cities and smart city projects performance measurement, measurement and evaluation tools, data collection and use of open data. The report will be used as input for the Task 1.2: "Evaluation and integration of existing frameworks and gaps to smart city requirements" and Task 1.3: "Smart city KPIs". Moreover, this report helps to scope the needs for new services in the domain of smart city development, as input for work package 3 "Recommendations for deployment".

2.2 Connection with the rest of CITYkeys work

The results of this report will be used as one of the key inputs for most of the next technical tasks of the project.

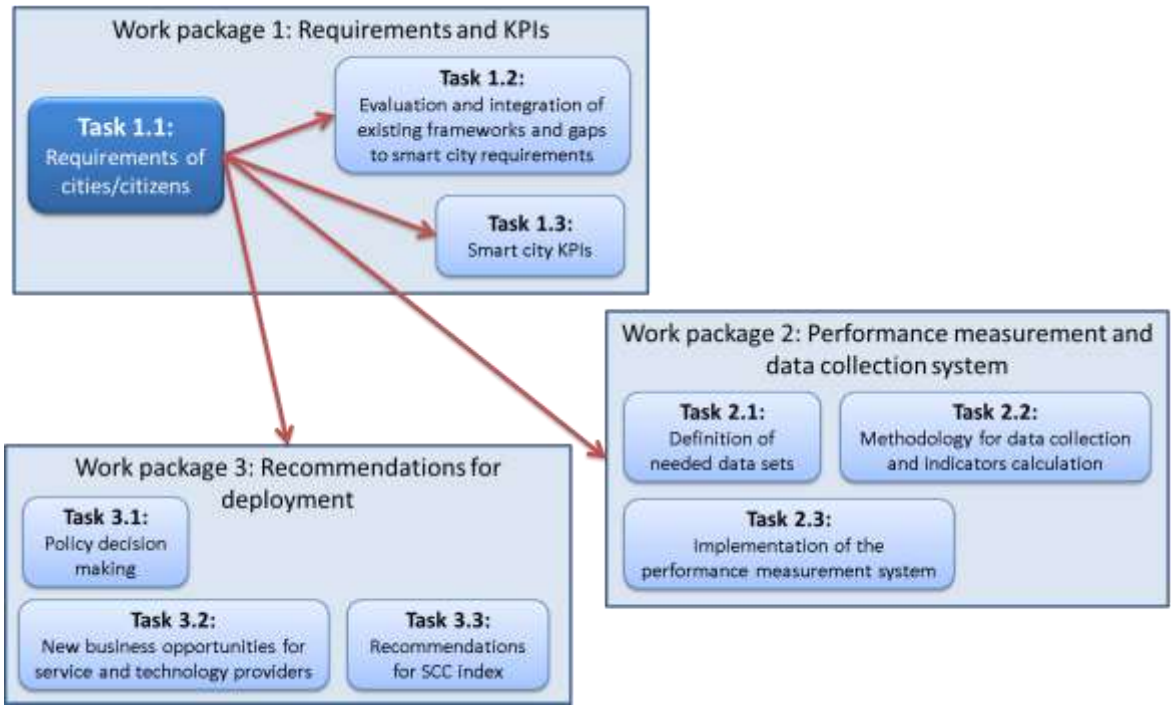

Figure 1: Future project work that will use this report

All partners have contributed and worked to deliver this report and bring better results. EUROCITIES has coordinated the corresponding Task and compiled the report. It also coordinated the workshop that took place in Tampere on 17 February and in which the methodology for the collection of input from cities and stakeholders was finalised.

Afterwards, partner cities were asked to contribute input for both parts of the report. In an agreed methodology that minimises risks regarding participation of cities while, at the same time, takes advantage of the other partners' expertise, AIT worked with Vienna, VTT with Tampere, TNO with Rotterdam and EUROCITIES with Zagreb and Zaragoza.

2.3 Methodology of the survey

Starting in the first month of the project (February 2015), project partners agreed to approach cities and stakeholders and gather input through structured questionnaires that would refer to all categories of expected CITYkeys outcomes.

A technical workshop was organised in Tampere back-to-back with the kick-off meeting of the project. In that, all partners discussed and finalised the content and format of two survey documents (questionnaires): one for the needs of cities and a second one for the needs of citizens and other stakeholders.

During the workshop the existence of two different levels of "smartness" that may need different sets or subsets of indicators were identified: first, the level of a *smart city* as a whole and, second, the level of a single *smart city project/solution* that contributes to the city plans and objectives.

EUROCITIES coordinated the reviewing of the draft questionnaires and the merging of all feedback for the final documents/questionnaires that were used for the survey. Afterwards, EUROCITIES distributed the questionnaires to key experts in more than 100 cities (project partner cities, EUROCITIES member cities and cities that had expressed their interest to contribute to the project) and disseminated the survey through its corporate and sectorial communication channels. VTT, AIT, TNO and city of Vienna also used their contacts to disseminate further the project and the survey.

An effort was made to reach cities of different size and geographic location in Europe. This way, different needs, variations in strategic priorities and objectives, differences due to different climate conditions, economic development, historical practices, etc. were expected to be recorded and analysed.

Contacts with cities took place though selected contact persons that are believed to be close to the smart city development of each city:

- CITYkeys partner cities through the experts that participate in the project
- Contributing cities through experts that have identified when declaring their interest to contribute in the last 12 months
- EUROCITIES knowledge society forum member cities through their representative in the forum
- EUROCITIES environment forum member cities through their representative in the forum
- EUROCITIES mobility forum member cities through their representative in the forum
- TRANSFORM project cities were contacted by Vienna through the experts that participate in that project

All contact persons were guided to disseminate the questionnaires within the city, gather replies from different departments and then combine the different replies in one city-wide reply.

During the following month, partner cities organised one round of discussion with a small number of identified citizens' and business related organisations in order to obtain input for the identification of the citizens' criteria and the new services/possible new business opportunities. They also disseminated the "needs of cities" questionnaire to city experts and departments whose work is relevant to smart cities projects and solutions. Contributing cities followed the same approach for the "needs of cities" questionnaire. In all cases, a contact person for each city was responsible to merge internal replies and return an aggregate version to EUROCITIES.

2.4 Participation

In total, 19 cities submitted completed questionnaires and/or offered additional input for the "needs of cities" survey, "needs of citizens" survey or both. The following table summarises these contributions while the graph that follows shows the 19 cities on the map. It can be seen that the gathered answers come from cities that cover the whole of Europe and reflect many different urban realities and economical, cultural and social environments.

Table 1: Cities that participated in CITYkeys surveys

City	"City needs" questionnaire	"Citizens needs" questionnaire	Additional input
Amsterdam	√	√ (1)	√
Barcelona	√	√ (1)	
Burgas	√	√ (5)	
Dresden	√		
Heraklion	√		
Manchester	√	√ (7)	
Munich			√
Newcastle	√	√ (2)	
Preston	√		
Rotterdam	√		
Rzeszow	√		
Syracuse	√		
Tampere	√	√ (8)	
Terrassa	√		√
Thessaloniki	√		
Utrecht	√	√ (3)	
Vienna	√		√

City	"City needs" questionnaire	"Citizens needs" questionnaire	Additional input
Zagreb	√	√ (7)	
Zaragoza	√	√ (15)	

Figure 2: Cities that contributed to the CITYkeys surveys

3. IDENTIFYING THE NEEDS OF CITIES

3.1 Structure of questionnaire

During the preparation of the survey and the partners' discussions, six research areas, important for CITYkeys, were identified. The structure of the survey followed these six areas and is summarised in the following table along with a short description and targets for each of the six areas:

Table 2: Structure of the questionnaire for the "needs of cities"

1. Smart city framework	Questions in this section refer to the wider city strategy, whether a city is following any smart city initiatives (integrated or sectorial) and how these are implemented	Target: • Assess the progress of a city in planning and implementing "smart city" policies • Understand whether and how the city measures its progress towards its "smart city" targets • Identify which indicators the city is using to assess its progress • Identify which sectors of the city (life) are the most important to monitor and measure
2. Smart city performance measurement	Questions in this section refer to whether a city measures its "smart city" performance and progress at a city level. Further to that, the indicators that are used and their results are investigated	
3. Smart city project performance measurement	Questions in this section refer to whether a city measures the performance and results of its smart city projects. Further to that, the indicators that are used and their results are investigated	Target: • Understand whether and how the city measures the results and impact of its "smart city" projects • Identify which indicators the city is using to assess the results and impact of its projects • Identify which impacts or results of "smart city" projects are the most important to monitor and measure
4. Measurement tool properties (city and project level)	Questions in this section refer to any tool that cities are using to systematically measure, process and present their performance in either city level or project level	Target: • Identify whether the city is using a central tool/ platform/ software that gathers some or all of the following functions: data collection, calculation of indicators, performance measurement, publication/ sharing/ visualisation of results • Understand whether and how the city collects data that are used for "smart city" related activities and
5. Data collection (city and project level)	Questions in this section refer to whether and how a city collects data: to measure performance, to subsequently release as open data, etc.	

6. Open data	Questions in this section refer to whether the city has produced and made available to various stakeholders and under which procedures sets of open data	projects • Identify whether and how the city is working with and/or providing open data to its citizens and stakeholders

3.2 Analysis of the needs of cities

3.2.1 Smart city framework

Questions in this section refer to the wider city strategy, whether a city is following any smart city initiatives (integrated or sectorial) and, if yes, how they are implemented.

Cities were asked how important the topic of "smart city" in their agenda is. Rating from "1" (lowest) to "5" (highest) the replies gave an ***average score of 3.9***, a clear indication that the replying cities have a strong interest in exploring, compiling and adopting smart city strategies and objectives.

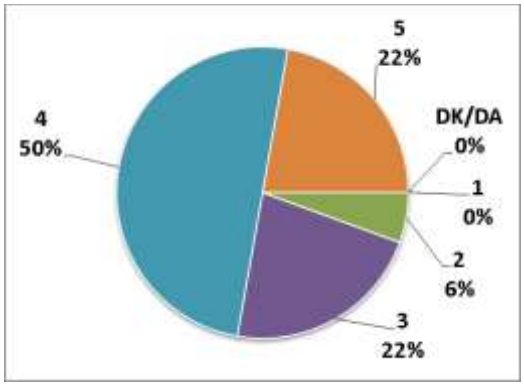

Figure 3: How high is the topic of "smart city" in your city's agenda?

Some of the cities already have and share a clear definition of what a "smart city" is, nevertheless, even if lacking a definition, most of the cities have formed a clear idea of what a smart city *consists of*. Composing from all replies, a smart city should act on all or most of the following:

- Using/employing ICT for its aims;
- Combining energy, mobility, infrastructure;
- Maximising synergies and interoperability to add value to public sectors and citizens;
- Increasing performance and efficiency of the city operations;
- Demonstrating good governance, openness and transparency;
- Actions should be continuous, taking into account the dynamic profile of users' needs;
- Concept of "sharing, participation and accessibility";
- Enabling innovation and local skills;
- Increasing resource (including energy) efficiency;
- Providing a more attractive environment while reducing the eco-footprint of the city;
- Opening city operations and data and turning them into a platform for development and innovation;

- Discovering and adopting new business models and ecosystems for public-private co-creation
- Increasing the citizen's quality of life

Currently, there are many different ways in which cities are coordinating their smart city strategies and activities:

- Most cities coordinate these activities through their ICT, economic development, European projects or innovation/technology offices/departments;
- Some cities have created dedicated "smart city" offices/departments that have an increasingly horizontal and inter-department role within the city organisation;
- Finally, in a small number of cities, "smart city" concept is incorporated in wider structures (e.g. Amsterdam Smart City) that integrate smart city objectives with economic development and innovation objectives, thus creating flexible and competent organisations

One of the first tasks for a city to become smart is the compilation of an integrated smart city strategy or action plan. For the CITYkeys survey, 1/3 of the cities replied that they don't yet have a smart city strategy, another 1/3 of the cities replied that they are preparing/approving one and the last 1/3 of the cities replied that they have a strategy/action plan in place. Some examples of different approaches include:

- Amsterdam smart city organisation: http://bit.ly/1e6Jcmk
- Barcelona smart city strategy: http://bit.ly/1HmGXrn
- Rotterdam smart city approach: http://bit.ly/1bWeqLf
- Tampere city strategy for 2025: http://bit.ly/1KUmU1e
- Vienna smart city framework: http://bit.ly/1GetFMe

Trying to understand what the priorities for a smart city strategy/action plan should be, cities that have or are preparing one were asked to select the sectors included in their strategy/action plan.

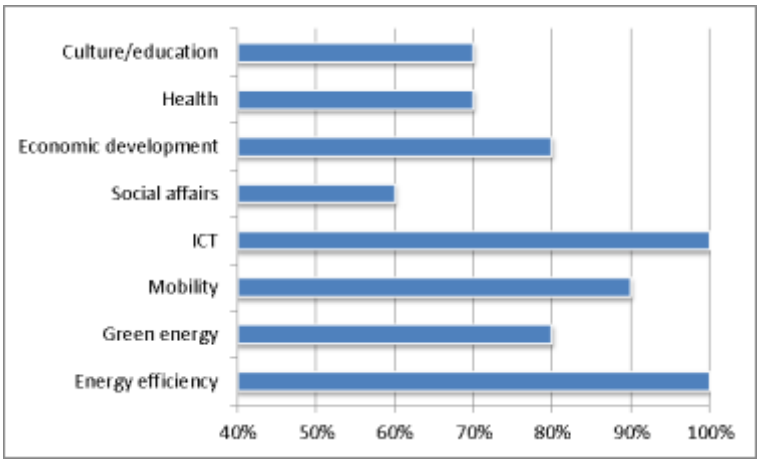

Figure 4: Which sectors does your smart city strategy/action plan include?

Replies show that cities primarily perceive "smart city" as an integration of ICT, energy/energy efficiency and mobility (following in this sense the policy developments of the European Commission EIP SCC[1]), including then green energy and economic development and leaving a bit behind social affairs, health and culture/education.

In any case, all sectors are included in a large percentage of the replies indicating that cities are, indeed, in the process of integrating objectives, activities and results in new ways.

A different story comes up when cities are asked which sectorial strategies they have developed in the absence or while waiting for an integrated smart city strategy. In this case, mobility, economic development and culture/education are the primary candidates. On the contrary, ICT is the least preferred option, stressing the idea that "smart cities" is a technology-driven concept that has put ICT and its operations in the centre of integrating city objectives and operations.

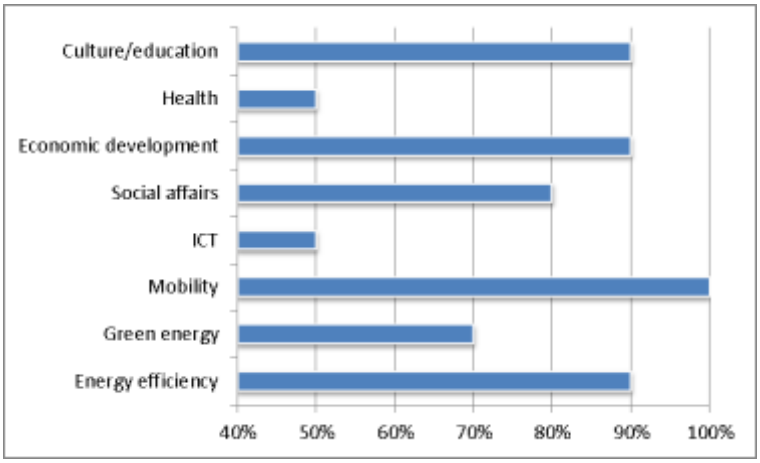

Figure 5: If not an integrated plan, do you have sectorial strategies for these sectors?

An important question for European cities is "*why does your city want to become smart?*" and then "*what are the challenges in becoming a smart city?*"

For the first question, the reasons mentioned by cities follow very closely the ingredients of the smart city definition:

- To become more efficient in everyday city operations;
- To achieve better management and provision of higher quality services;
- For a better efficiency in the use of local resources;
- For better energy and resources efficiency; water and waste management;
- For a better participation in the future society of extended knowledge;
- To offer a higher urban quality of life;
- To increase equal opportunities and tackle social challenges;
- To improve city governance and giving the opportunity to citizens to influence local government decision-making;
- To efficiently regenerate parts of the city;
- To materialise the possibilities for better/smarter/cheaper/more efficient solutions for a better environment and climate;

[1] The European Innovation Partnership on Smart Cities and Communities (http://ec.europa.eu/eip/smartcities/)

- To foster innovation with growth, economic development and creation of new jobs;
- To reform and ensure the sustainability of the public sector and services;
- To manage more efficiently specific urban challenges (e.g. high seasonal influx of tourists, large numbers of incoming commuters from neighbouring areas, etc.).

Nevertheless, a number of challenges to be tackled have been identified by cities:

- Change in the management culture of the city is needed;
- Monitoring and evaluation frameworks for smart cities have to be created;
- The smart city culture has to be incorporated in the "DNA of the citizens";
- All city stakeholders need to be involved through sustainable processes and structures;
- Cities need to implement consistent policies and projects towards the smart city objectives;
- There is an need for better integration of ICT in the city operations;
- European cities are operating in an environment of constantly reducing budgets and resources;
- Many solutions lead cities to vendor and technology lock-ins;
- Extended use of ICT solutions raise the questions of privacy and data security;
- It's difficult to identify solutions that offer benefits for all aspects and objectives of a smart city;
- Required business models and co-creation platforms are not yet there.

To this end, cities would like to see some of these issues included more consistently in the ongoing discussion on smart cities at the European level. More specifically, these issues include:

- Measuring "smart services" impact, performance and effectiveness;
- How to transform thinking and planning in terms of "solutions" to thinking and planning in terms of "processes";
- Even more, how to transform technological innovation and ICT into operational innovation;
- How open and interoperable ecosystems can be created;
- Security of currently used and new systems, IPR issues, data security and protection of privacy;
- How the social impact of the smart city solutions will be maximised (inclusion, new skills, creation of jobs, etc.);
- How smart city solutions can be replicated and up scaled with respect to different local conditions;
- How smart cities solutions can be funded.

A very interesting and important trend that can be deduced from the cities' replies is that European cities are increasingly involved in research & development projects, both national and international, with regard to smart cities, performance measurement & indicators and open data & platforms. This fact indicates that cities are readier to be part of the frontline that will design, test and deploy the next concepts of smart cities.

Indicatively, some of the projects mentioned with regard to smart cities are:

- FP7-RERUM project

- MUSIC project
- The IBM smarter city challenge
- Tarmo+ project
- Käpälä project
- H2020 SCC lighthouse projects
- TRANSFORM project
- TRANSFORM+ project
- City-ZEN project
- Green eMotion project
- ZEEUS project
- IREEN project
- FUPOL project
- Smart-IP project
- CLUE project

With regard to performance measurement & indicators, projects that are mentioned include:

- A study to evaluate the progress of 70 European smart cities, ran by the University of Vienna
- Rotterdam Wijkprofielen
- Amsterdam Energy Atlas
- City Protocol initative
- Green Digital Charter & NiCE project
- PEPESEC project
- CONCERTO Renaissance project
- H2020 SCC lighthouse projects

Finally with regard to open data & platforms, replying cities brought examples like:

- Rotterdam open data platform
- Greek Geodata platform
- HachaThess project
- Open and Agile Cities initiative
- ITS Factory project
- Opencities project
- Cloud opting project
- CitySDK project
- Open Data Manchester platform
- CONTSEM project

3.2.2 Smart city performance measurement

Questions in this section refer to whether a city measures its "smart city" performance and progress at a city level. Further to that, the indicators that are used and their results are examined.

A central question for CITYkeys is whether cities already measure their smart city performance as a whole and ***if yes*** in which ways and with what tools. From the replying cities, only 2 replied positively:

- Rotterdam that uses ISO 37120 (in combination with local data and GIS which they call the smart city planner);
- Barcelona that uses "Outcome Based City Transformation" evaluation methodology.

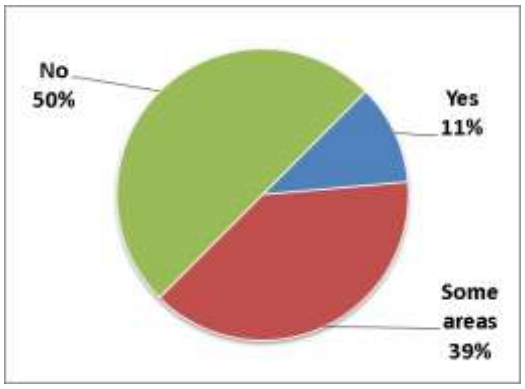

Figure 6: Does your city measure its smart city performance?

Another 7 cities are currently measuring some key areas of their smart city performance, a number that is expected to increase since some cities have stated their readiness to implement frameworks of performance measurement.

Currently there are many approaches on how to organise (classify/cluster) the performance measurement frameworks and indicators that cities use or plan to use. Taking from the cities' answers, some alternative schemes of classification are:

- People – Profit – Planet;
- Mobility – ICT & digital public services – energy efficiency – air quality & noise – waste;
- Health – logistics & traffic – energy – circular economy – water;
- Healthy urban living – green economy – smart citizens;
- Open city – attractive city – accessible city – "your own" city;
- Services for the people – urban regeneration – economic reactivation;
- Live – work – place – move – organise – learn;
- Resources & energy – quality of life – innovation.

All 9 cities that measure totally or partially their smart city performance reported about the key areas that their measurement framework includes; also whether they use a detailed or a simple method for this measurement.

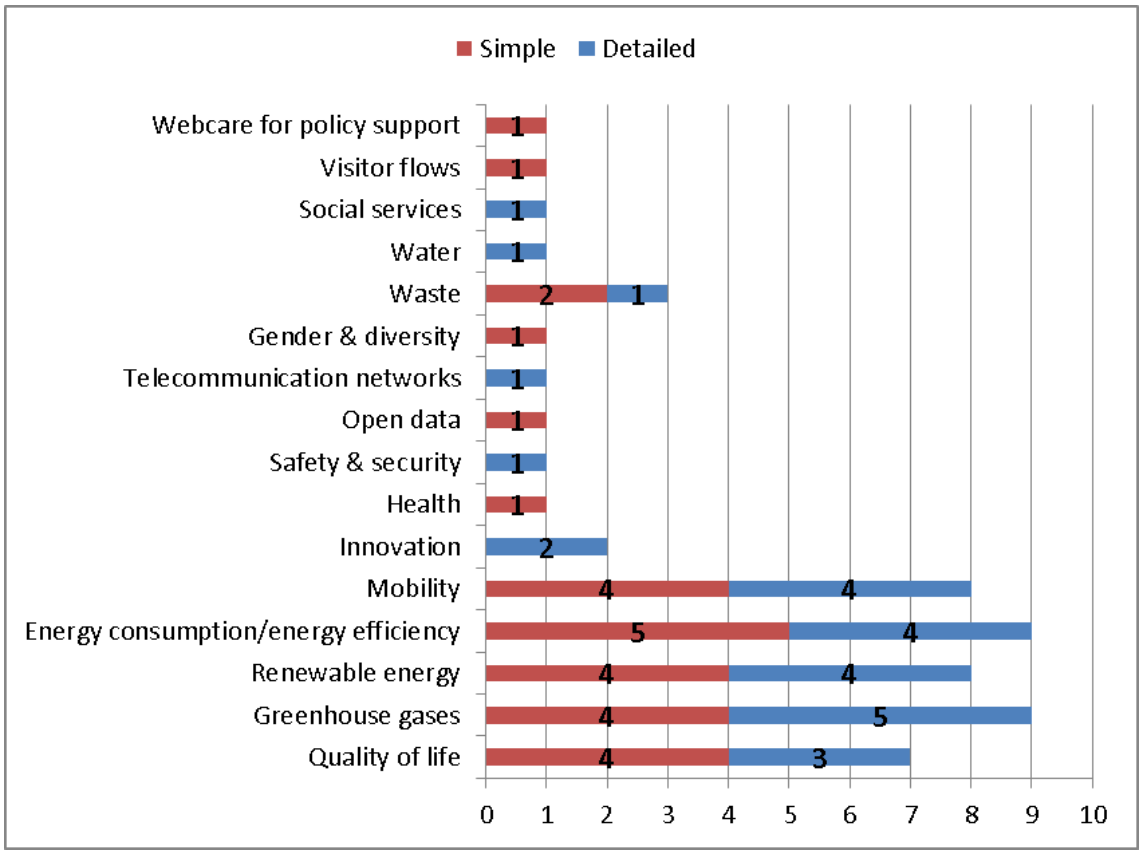

Figure 7: Key city areas included in the performance measurement system

Regarding the methods and handling of the smart city performance measurement, cities are reporting different approaches and results. From the collected replies, it's evident that a set of guidelines and/or a performance measurement framework (like the one that will be developed by CITYkeys) is a much needed facilitator for more cities to get involved in performance measurement that is consistent, transparent and can allow for the exchange of experience and comparability of the results between cities.

Some city stories of different approaches follow:

- Amsterdam has integrated all its energy related performance measurement under one department using the Energy Atlas tool but still misses a tool that will help measure all levels of its smart city activities. As a result, Amsterdam is closely looking at the development of standards like ISO 37120 to evaluate how it can proceed. In the meantime, results of the Energy Atlas tool are both internally and publicly available;
- Barcelona has started working with a central smart city performance measurement system. The first results are satisfactory and next steps are been examined (e.g. improve quality of data). Being in its first steps, only key results of the system have been presented for the moment;
- Rotterdam measures its performance using both detailed and simple methods, a procedure for which many internal and external departments are responsible. This results are not yet meeting the city's expectations for several reasons (obstacles to gather data, use of different systems, departmentalisation, etc.). For the same reasons, dissemination of the results, either internally or to the other city stakeholders is partial or ad hoc;

- Rzeszow has created a procedure to monitor some of its smart city dimensions, managed by the "promotion and international cooperation" department. The results are made available internally and key facts are made public in a weekly basis;
- Tampere is developing and enriching the sets of indicators for the smart city areas it measures and an analytics platform to present the results will be launched in 2016. Although the process is run by a small number of departments, more coherence is needed to improve the process and results. The latter are used internally for planning and management purposes. Some strategic results are also publicly available;
- Utrecht is for the moment missing an integral approach, meaning that the performance measurement is done and shared in an ad hoc manner by the respective departments.

Given the fact that most of the cities have not yet implemented a smart city performance measurement framework, a key question is what the obstacles for putting up such a framework are. Answers vary and an interesting collection of obstacles was assembled:

- City hasn't yet defined the scope of "smart city";
- There is not yet a culture of measuring so many different indicators in the higher levels of cities;
- City needs to adopt a measurement and data collection standard before starting the process;
- An integrated set of smart city key performance indicators is not yet available;
- Used or proposed key performance indicators need to be adequately validated;
- The impact of the implemented measures cannot always be measured;
- There are not enough reliable data available yet;
- Needed data is scattered in various sources;
- Too many departments and stakeholders are involved;
- Sometimes departments or stakeholders refuse the idea of being monitored;
- Lack of human and financial resources.

Having identified the obstacles, cities are able to propose what would help them (also as an outcome from CITYkeys project) to implement a smart city performance measurement framework:

- A number of political decisions need to be taken in order to (per case):
    - define a smart city strategy & its goals;
    - define the operational structure and its mandate;
    - select a performance measurement system;
    - facilitate collaboration and gathering of data;
    - define handling, privacy and dissemination policies;
- A better exchange of information and best practices between cities could help them evaluate and decide among the different options;
- A comprehensive city-oriented performance measurement framework including sets of key performance indicators;
- Easy to understand and present results;
- More, better-quality, more dynamic sources of open data;
- Adequate resources to consistently lead and run performance measurement;
- Technical guidance on how to select, set-up and run such a framework;

Following the last two paragraphs, cities have given a number of reasons and expected benefits from using a performance measurement framework at the level of the "smart city":

- Qualitative and quantitative evaluation of progress towards achieving the city's strategic goals;
- Understanding of the efficiency of various policies;
- Better and more informed decision-making;
- Better understanding of how the city evolves;
- Better insights on future challenges;
- Evaluation of innovation and encouragement for more;
- Promotion of collaboration and work across departments;
- Dissemination of "success" of smart solutions;
- Promotion of the smart city projects to private financing;
- Identification of best examples within the city and in other cities.

Specifically for policy operations, cities were asked to select why they would use a performance measurement framework at a city level.

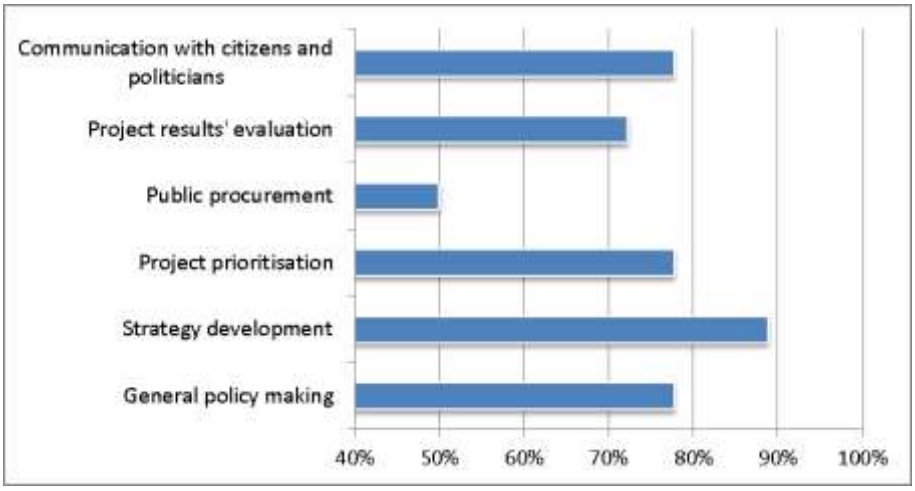

Figure 8: For what kind of decisions would you need performance measurement for?

Added to the predefined options in the graph, some cities added more reasons:

- Development of the smart city ecosystem;
- Entrepreneurship development;
- Private-public partnerships development;
- Comparison with other cities.

Examples of using performance measurement to take decisions include:

- Burgas: decisions based on real-time air quality measurement;
- Manchester: The climate change action plan is driven by the gap between targets and achievements;
- Rotterdam: decisions based on real-time measurement of "city use" dynamics (for example all kinds of flows, especially people/behaviour);
- Rzeszow: Selection of projects to be implemented based on decision supporting tool;

- Syracuse: Solving challenges by taking sharing decisions based on an electronic social platform;
- Utrecht: Dissemination and promotion based on real time analysis of social media;
- Zaragoza: Targets and operational details agreed with the public transportation operators are updated based on relevant indicators.

Regarding the key performance indicators that cities use for performance measurement, it's interesting to note that usually cities participate directly and actively in their development. To this end, different schemes of collaboration were mentioned. In different cases, cities appear to have developed their indicators:

- Alone;
- In cooperation with other cities;
- In cooperation with private partners;
- Through international projects.

A very positive finding is that 2/3 of the cities replied that they are in some stage of developing performance indicators for their smart city performance measurement. Important feedback comes from the question of which are the most important areas that cities need indicators to measure their smart city performance[2]. Adding together the "5: necessary" & "4: very important" answers gives the following results:

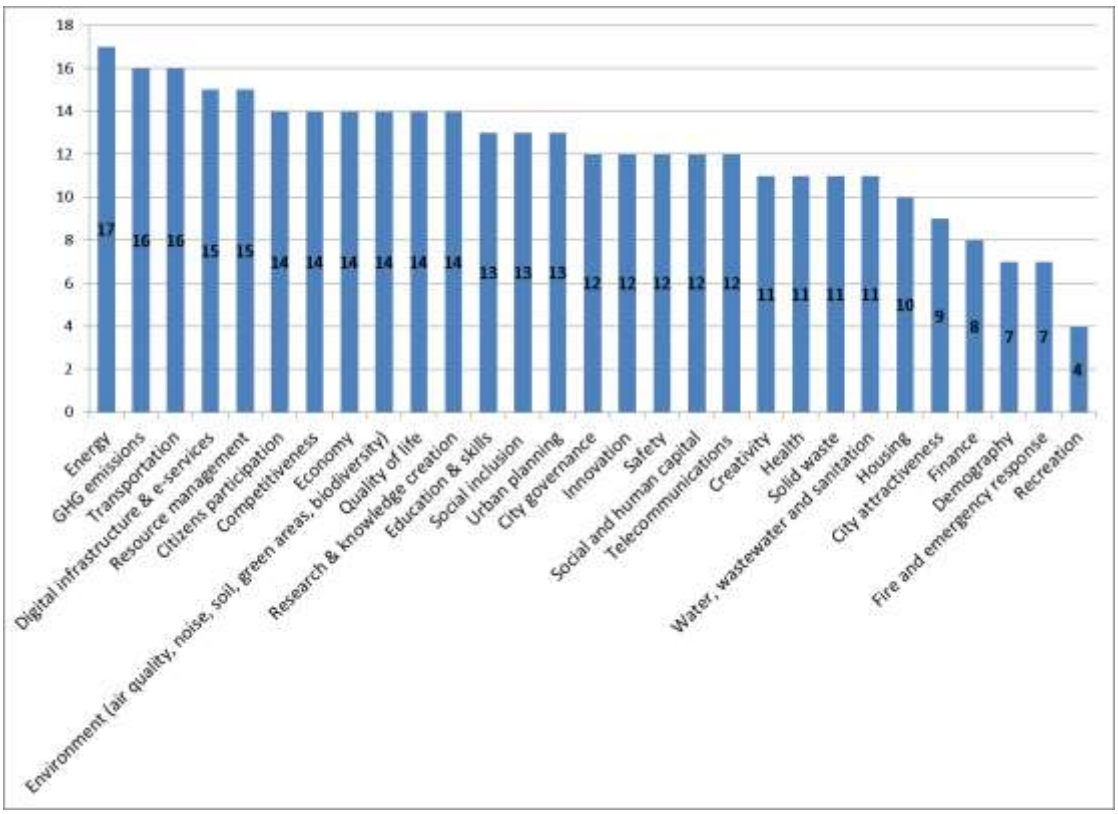

Figure 9: Areas where cities mostly need indicators to measure their smart city performance ("5"+"4")

[2] **DK/DA**: Don't know/don't answer, **No**: not needed, **1 to 5**: from not important to necessary

The full results can be seen in the next graph:

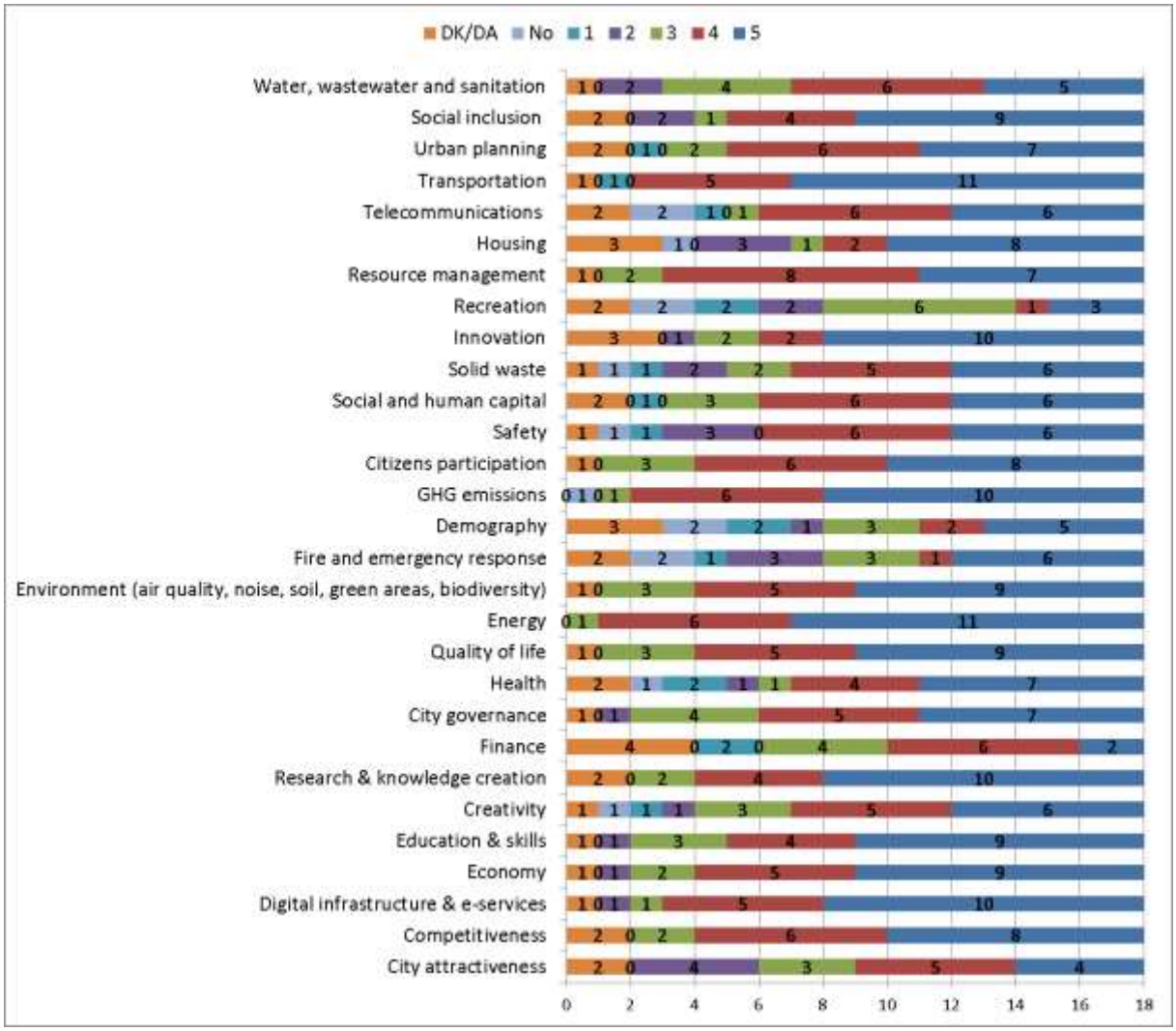

Figure 10: Areas where cities need indicators to measure their smart city performance

Other additional areas that were mentioned to be included are:

- Cultural and historical heritage;
- Agricultural and typical goods;
- Extroversion of the city;
- Cleanliness of the city;
- Energy and GHG emissions embedded in the construction sector.

It's also interesting to depict in which areas of a smart city replying cities least need performance indicators to measure their development.

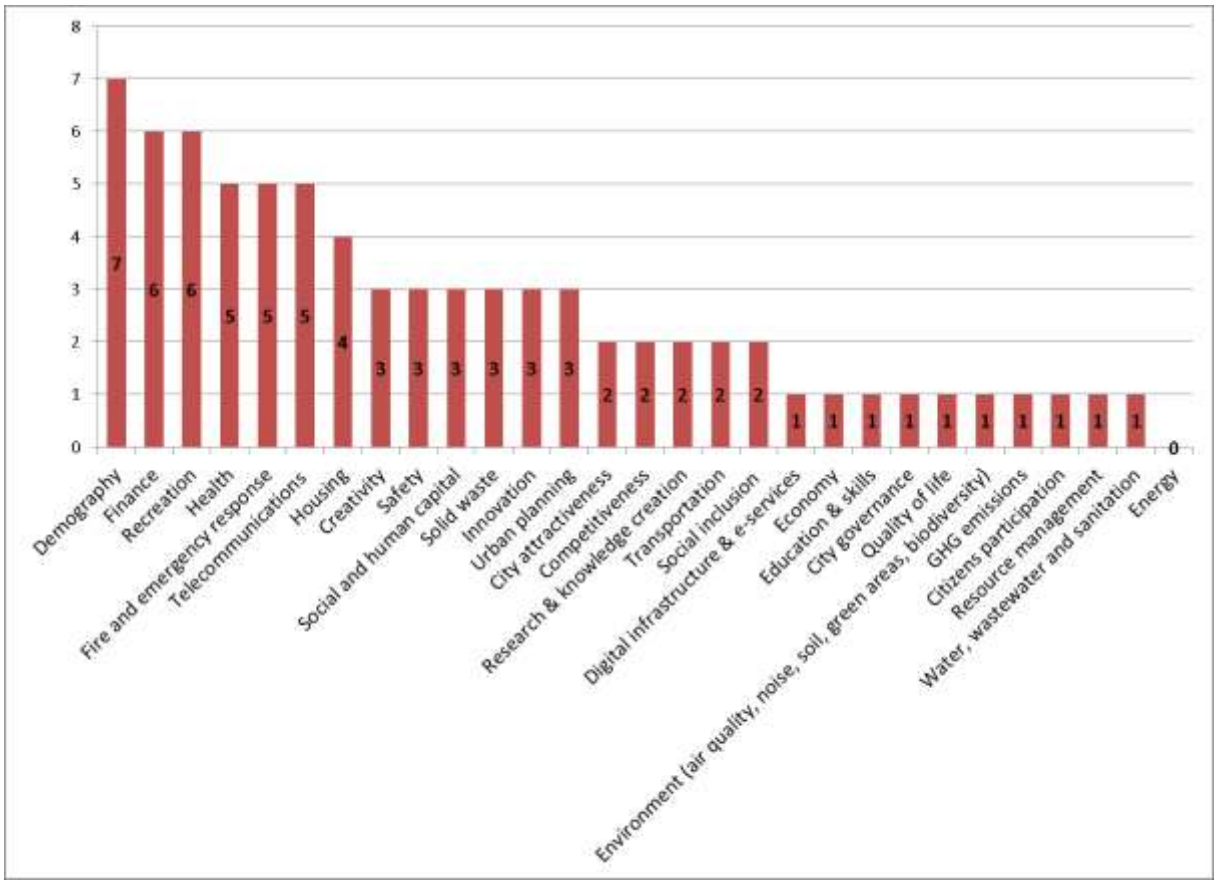

Figure 11: Areas where cities less need indicators to measure their smart city performance ("DK/DA"+"No"+"1")

3.2.3 Smart city project performance measurement

Questions in this section refer to whether a city measures the performance and results of its smart city projects. Further to that, the indicators that are used and their results are investigated.

Cities have many reasons why they need to measure performance in the level of a single smart city project:

- To objectively assess the success or failure and results of a project;
- To be able to match project outcomes with the general smart city objectives;
- To be able to match projects with the expectations of the citizens;
- To steer the strategy according to the outcomes of the various projects;
- To be able to understand the impact of a single project in the smart city progress;
- To move from experimentation to more elaborate and pragmatic projects;
- To be able to share best practices;
- To get more knowledge and understanding of the interconnection between projects and district/city level;
- To better manage human and financial resources.

Specifically for city operations, cities were asked to select why they would use a performance measurement framework at a project level.

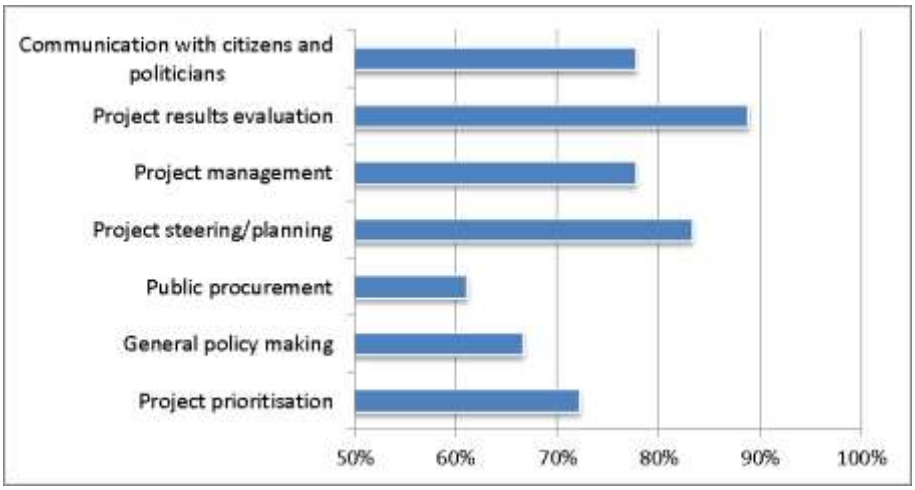

Figure 12: For what kind of decisions would you need project performance measurement for?

Added to the predefined options in the graph, some cities added more reasons:

- Exhibit the change in the quality of the environment;
- To improve collaboration;
- To improve learning, especially in the planning phase.

In project level, while cities measure performance using traditional methods and indicators (cost, jobs created, energy saved, etc.), they still miss a set of indicators that is transversal and matching their smart city agenda.

Cities have stated that they have already identified the need to update the performance indicators they use according to the wider smart city performance measurement.

In any case, the results of project's performance measurement are equally disseminated within the city structure, although, less to the citizens as they miss to connect each project with the "big picture".

Apart from the lack of proper or updated sets of performance indicators, cities identify a number of other obstacles that hinder the performance measurement in the project level:

- Lack of a smart city strategy does not allow for the definition, measurement and monitoring of a smart city projects as such;
- Such a measurement process is not yet integrated in most cases;
- There is a lack of common vision among different departments or external stakeholders to use a common performance measurement;
- Heavy workload deters city departments/experts from adopting more elaborate measurement processes;
- The ability to return (cost) savings to all departments involved in a smart city project;
- Lack of suitable ICT infrastructure/technology;
- Not enough or suitable data.

Important feedback comes from the question of which are the most important areas that cities need indicators to measure their smart city projects performance[3].

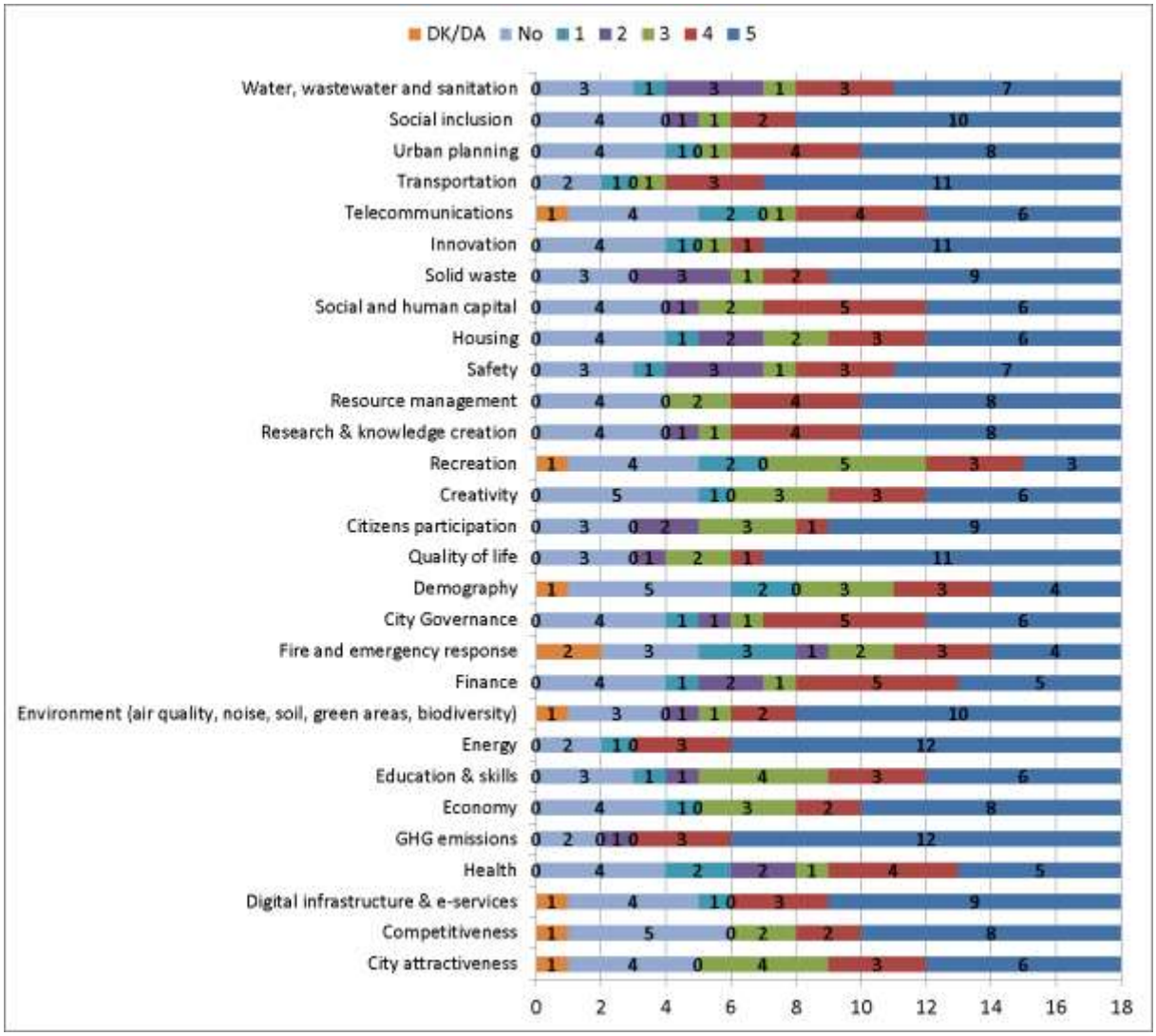

Figure 13: Areas where cities need indicators to measure their smart city projects performance

Other additional areas that were mentioned to be included are:

- Cultural and historical heritage;
- Agricultural and typical goods;
- Social mix (age, ethnicity, income, etc.);
- Usage mix (residential, office, school, etc.);
- "City of short distances".

Like in the smart city level, the most and least needed performance indicators at the smart city project level, according to the replying cities can be identified.

[3] **DK/DA**: Don't know/don't answer, **No**: not needed, **1 to 5**: from not important to necessary

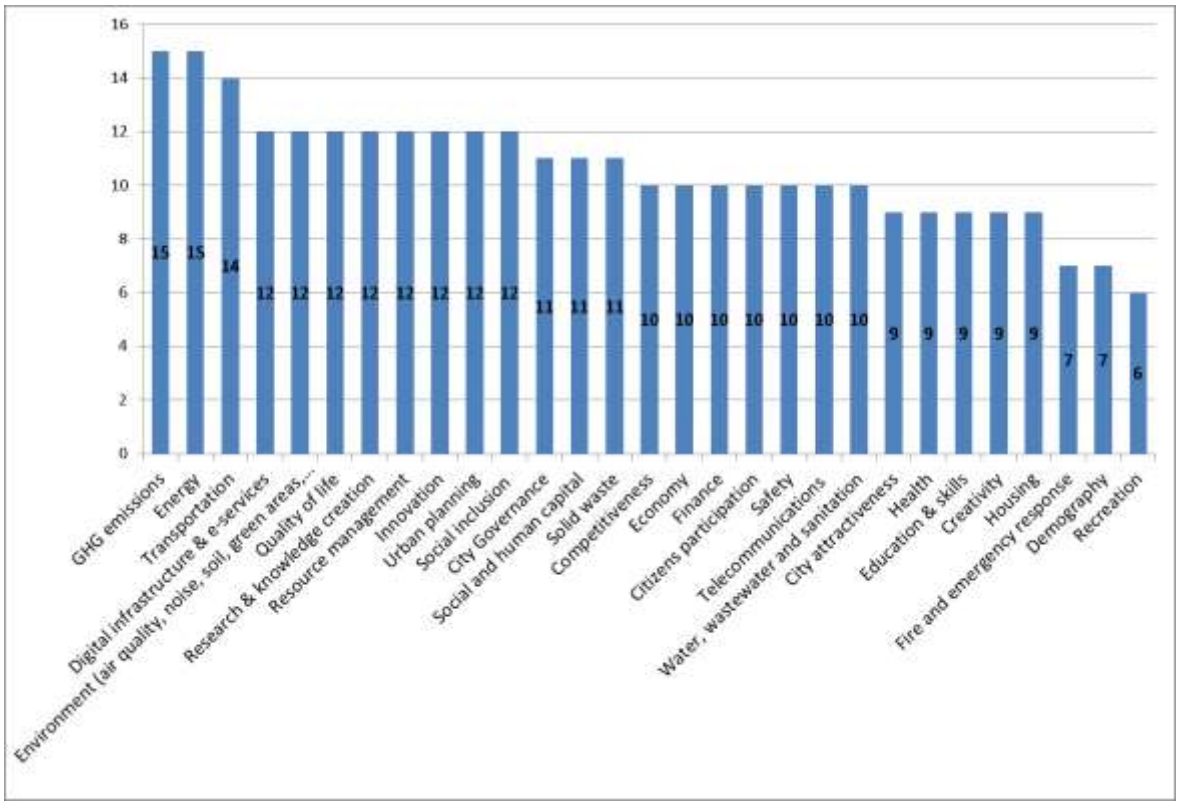

Figure 14: Areas where cities mostly need indicators to measure their smart city projects performance ("5"+"4")

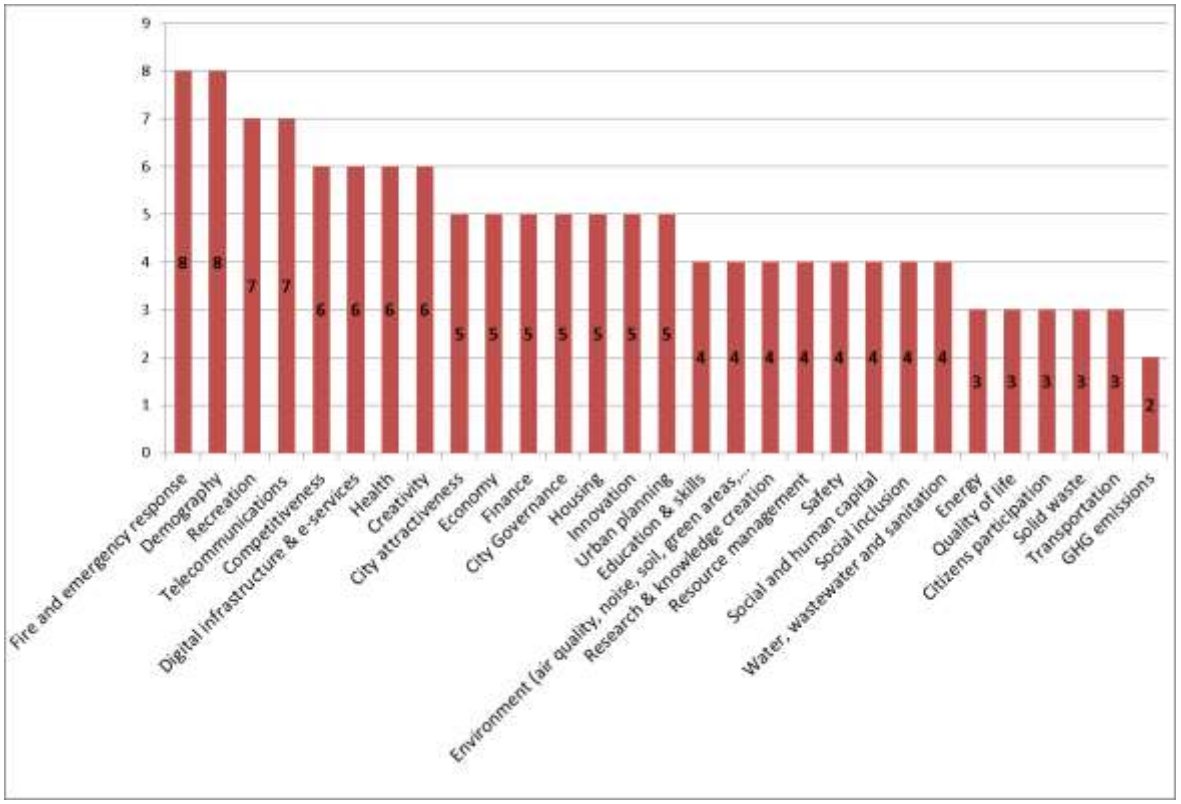

Figure 15: Areas where cities less need indicators to measure their smart city projects performance ("DK/DA"+"No"+"1")

3.2.4 Performance measurement tool properties

Questions in this section refer to any tool that cities are using to systematically measure, process and present their performance in either city level or project level.

Following the answers of the previous sections, it is expected that cities don't have yet measurement tools in place. Indeed, only 3 cities replied that they have some system of measurement in place for the city level, and only 5 cities replied that they have some system of measurement in place for the project level. Indicatively:

- Amsterdam has created the "smart city canvas" tool;
- Preston uses the inphase[4] software to monitor and manage performance indicators, key work areas and corporate projects;
- Rotterdam uses ISO 37120 to measure and plan its smart city activities;
- Tampere is presenting the innovation snapshot of Tampere region[5];
- Zagreb is using the ARIS[6] business process analysis software.

Despite the current situation, a strong 72% of the replying cities would be interested in having a tool/platform to systematically measure, process and present their performance, especially if the tool:

- Integrates all operations from data collection to performance measurement;
- Is compatible with existing tools/platforms;
- Is easy to use.

Also, most of the cities (>80%) agree that a performance measurement tool/platform should have an interface to citizens and other stakeholders of the city, at least for part of the information that it will contain.

Regarding the features that such a tool/platform should have, combined replies[7] can be seen in the following graph.

[4] www.inphase.com

[5] http://verkkolehti.pirkanmaa.fi/fi/list/8/22

[6] http://www.softwareag.com/corporate/default.asp

[7] **DK/DA**: Don't know/don't answer, **No**: not needed, **1 to 5**: from not important to necessary

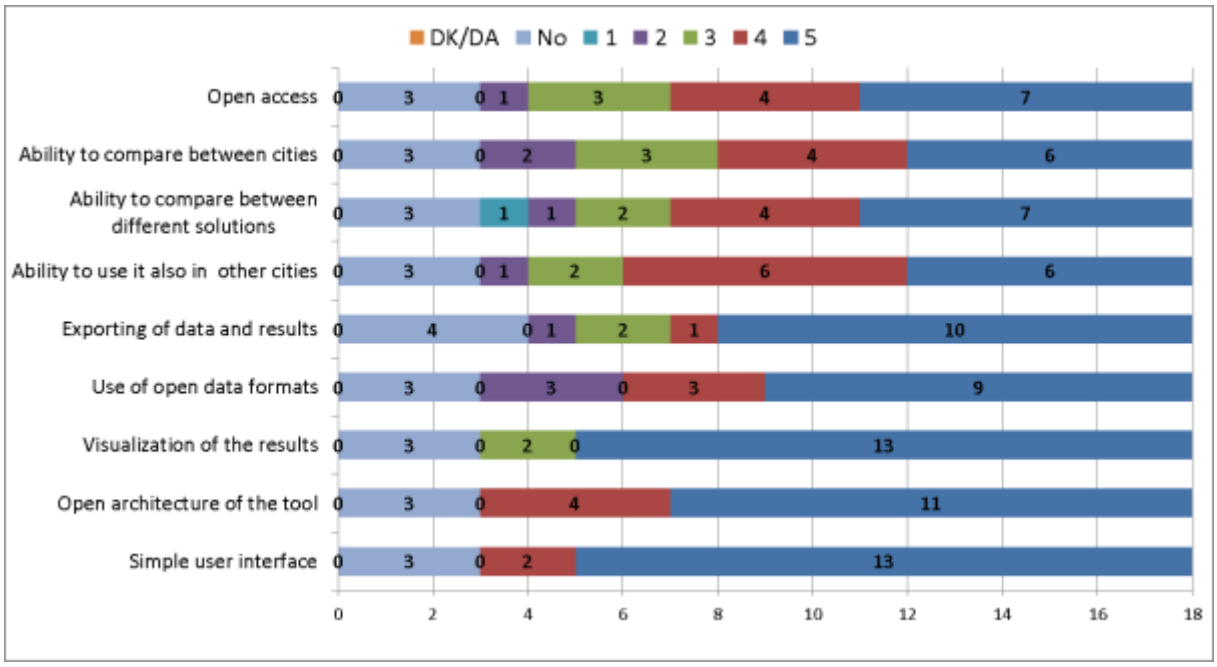

Figure 16: Desired features of a measurement tool/platform

3.2.5 Data collection

Questions in this section refer to whether and how a city collects data: to measure performance, to subsequently release as open data, etc.

Following the identified lack of a standard or a widely adopted performance measurement framework in the previous paragraphs, replying cities are reporting that they are following a mix of approaches for the collection of data.

Although half of the cities have replied that they are using some kind of standard procedures to collect data, in most cases this is limited to a small number of datasets and not all the data collection that takes place in the city. Moreover, data collection procedures can change as one goes from one department to the other or from one project to the other.

In most cases that standard procedures for data collection have been introduced, the reliability of the data is ensured while three cities report that an even more standardised procedure (ISO 37120) is followed.

Cities that are not (yet) collecting data for performance measurement explain that the two main reasons for not doing so are:

- A standard procedure to collect data is not in place or is in the phase of preparation;
- The city lacks adequate resources to support the procedure.

In total, 2/3 of the cities reported that they are in some stage of developing a (harmonised and transparent) scheme for data collection or would like to have one.

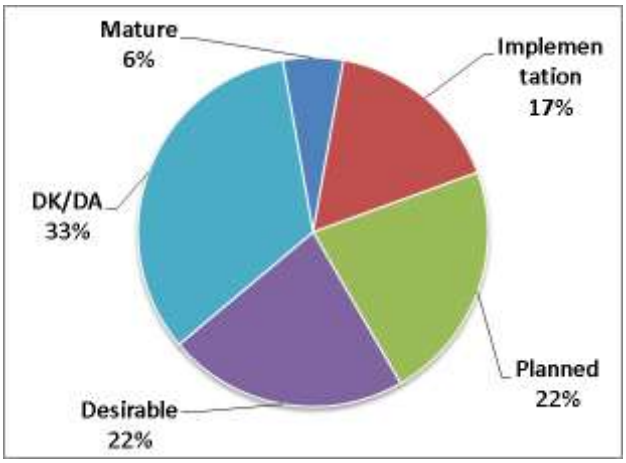

Figure 17: Is the city following a scheme for data collection?

A positive outcome is that open data formats are increasingly used for the collected data. Some examples of this trend can be found in:

- Amsterdam: http://maps.amsterdam.nl/
- Tampere: http://www.tampere.fi/tampereinfo/avoindata.html;
- Vienna: https://open.wien.gv.at/site/datenkatalog/.

Regarding privacy and security issues, all cities that collect data have made clear that both issues are handled with most care and according to the national and European legislation. Some indicative ideas on dealing the privacy of collected data include:

- Preston: The city collects data that doesn't contain personal or sensitive information in the first place;
- Rotterdam: A decision matrix indicates to all involved city stakeholders how to handle personal or sensitive information for each category of data;
- Tampere: Data are anonymised before uploaded in the data warehouse. For operational data, different levels of security ensure that visibility of sensitive data is appropriately restricted;
- Utrecht: A privacy officer is responsible to decide ad hoc if and how data can be handled and published.

3.2.6 Open data

Questions in this section refer to whether the city has produced and made available to various stakeholders and under which procedures sets of open data.

Two thirds of the cities that participated in the survey replied that they provide (some) open data. More important, in all these cases, the process is performed according to an existing open data or a smart city strategy.

From the cities that gave a negative answer a number of obstacles are reported:

- Security considerations;
- Open data rules and policies are not yet in place;
- Legislative obstacles, especially for the free provision of data;
- Cities/departments cannot support a mechanism for the collection and publication of data due to shortage in resources;

- Benefits are not yet clear.

It's important to note that (virtually all) cities that provide open data are also opening their own data as part of the process. In addition, most of the open data are provided in open formats and are easily accessible through the open data portals of the cities. Open data protection and privacy protection are equally important, which translates into opening of data according to the existing legislation as well as creation of new regulations for areas that the legislation is considered as inadequate.

The number of datasets that cities provide as well as the city sectors that the open data refer to can vary a lot. Indicatively:

- Barcelona provides more than 350 datasets[8];
- Heraklion provides 9 datasets[9];
- Rotterdam provides 140 datasets[10];
- Terrassa provides 153 datasets[11];
- Thessaloniki provides 19 datasets[12];
- Vienna provides 249 datasets[13].

It has to be mentioned that according to the available answers, most of these datasets are updated either manually or automatically in a periodic fashion (not real time).

Looking for their next steps, 50% of the cities replied that they are developing new approaches related to open data protocols, interfaces and databases; 56% of the cities are developing an ecosystem of innovation & open data in collaboration with other (mainly local) stakeholders; 50% of the cities collaborate with other stakeholders to jointly open data, set up common platforms, etc.

To this end, some cities are already working with other cities or regional and national organisations for the development of common concepts and solutions. Also, 25% of the cities are developing or have started applying procurement rules for the provision of open data by their service providers.

For the future and reflecting all the aforementioned points, cities have mentioned a number of challenges they face in order to expand their open data activities:

- Definitely more resources (human and financial) are required;
- More collaborations with organisations that are willing to share datasets with cities need to be established;
- More open data/API standard and format specifications are needed;
- Open data business cases often require SLA and some kind of data quality assurance which are expensive to implement;
- Best practices and user examples for privacy and other legislation issues can be useful;

[8] http://opendata.bcn.cat/opendata/en

[9] http://heraklionopencity.gr/dataset

[10] www.rotterdamopendata.nl

[11] http://opendata.terrassa.cat/

[12] http://opendata.thessaloniki.gr/

[13] https://open.wien.gv.at/site/datenkatalog/

- Value of opening data, not just economic, but also in social, environmental and economic as well as city profiling terms needs to be understood;
- More integration of open data practices to the private sector as well.

3.3 Additional input

A number of cities have either given additional input through the questionnaires or provided free-text input that reflects their approach and ideas about how key performance indicators and performance measurement processes fit their strategic plans and development.

This input comes either as support material (as e.g. in the case of Terrassa) or after large focus group meetings (as e.g. in the case of Vienna) and can help other cities that are now shaping their strategies but also CITYkeys project to better understand cities' aspirations and needs.

3.3.1 Amsterdam

In the latest edition of the "Sustainable Amsterdam - Agenda for renewable energy, clear air, a circular economy and a climate-resilient city", Amsterdam proposes the following scheme of target and activity indicators for the evaluation of the total progress and contribution of its smart city projects:

Are we generating more renewable energy in the city?

Indicators for goals	Benchmark	Target values		
	Zero measurement 2013	2016	2018	2020
Annual renewable energy production per capita	100 (approx. 3.3GJ/capita)	106	113	120
Indicators for activities				
Capacity of set-up solar energy sources in MW	9MW	25MW	75MW	160MW
Capacity of set-up wind energy in MW	67MW	67MW	76MW	85MW

Are we saving more energy in the city?

Indicators for goals	Benchmark		Target values		
	Zero measurement 2013		2016	2018	2020
Annual energy consumption per capita	100 (68GJ/capita)	91	85	80	80
Indicators for activities					
Number of home equivalents connected to district heating	62,000		70,500	81,000	102,000
Zero-Energy Buildings arranged	0			1,000	

Figure 18: Amsterdam's target and activity indicators: energy & renewables

Is Amsterdam's air becoming cleaner?

Indicators for goals	Benchmark	Target values		
	Zero measurement 2014	-	-	2025
NO_2 concentration in most heavily affected location	100 (46.2 micrograms)			65 (30 micrograms)
Highest measured concentration of soot	100			70
Indicators for activities		**2016**	**2018**	**2025**
Number of public charging points for electric transport	1,000	2,500	4,000	
Number of cargo hubs	3	-	5	

Are we separating more household waste in Amsterdam?

Indicators for goals	Benchmark	Target values	
	Zero measurement 2013	2016	2020
Percentage of separated waste	19%	30%	65%

Figure 19: Amsterdam's target and activity indicators: air quality & waste

3.3.2 Munich

According to Munich's input, the purpose of evaluation should always be to examine, evaluate and present in an objective way project processes and results. Especially, the evaluation of the profitability of operational plants or systems in smart city projects can provide transparency and clarity.

Evaluation of project performance should focus on:

- *Time*: The realisation phase of projects
- *Space*: In the frame of the continuous development of an area/spatial unit, the ways in which a project affects this area, its buildings and residents needs to be evaluated

There should definitely be the possibility of continuous evaluation. In many cases it is very beneficial to evaluate the same indicators over regular time periods.

The main themes of performance measurement should be energy costs, demand and production. Additional indicators will depend on the type of the project, but could be related to education, jobs or mobility.

It is essential, that the evaluation is carried out by independent evaluators who can be either external or internal. Employees of a review or audit team coming from the city can sometimes be more independent than a contracted external partner so independency and qualifications should be the critical factors. It's always helpful if the contracting or the selection of an evaluator is not done by the project members.

There are two main target groups for the results of the projects' evaluation:

- The decision makers, taking decisions about the continuation, the financing and the implementation of the project
- The city and the urban society that shall be adequately informed

As for the reporting format, usually the city officials doesn't require all the details but appreciate a summarized, clear and visual representation On the other hand, city experts need and appreciate a comprehensive documentation. Finally, citizens prefer an open and simple approach that is easy to handle and understand.

3.3.3 Terrassa

The city is developing a "smart city strategic plan" in which a "balanced score card" will combine the vision of the city, its strategic management and a set of indicators in order to select and implement projects in a more efficient way. The city plan and score card concepts can be seen in the following schemes:

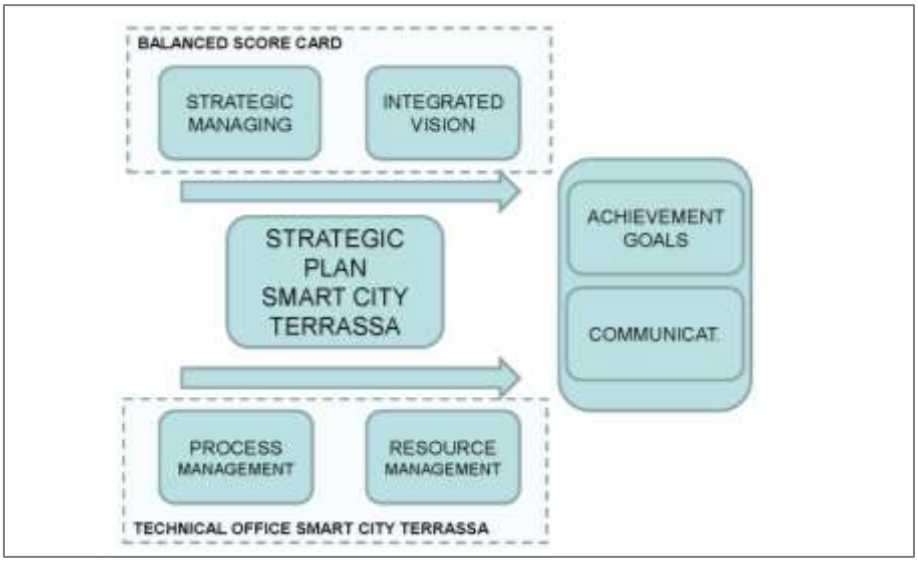

Figure 20: Evolution of Terrassa smart city strategic plan

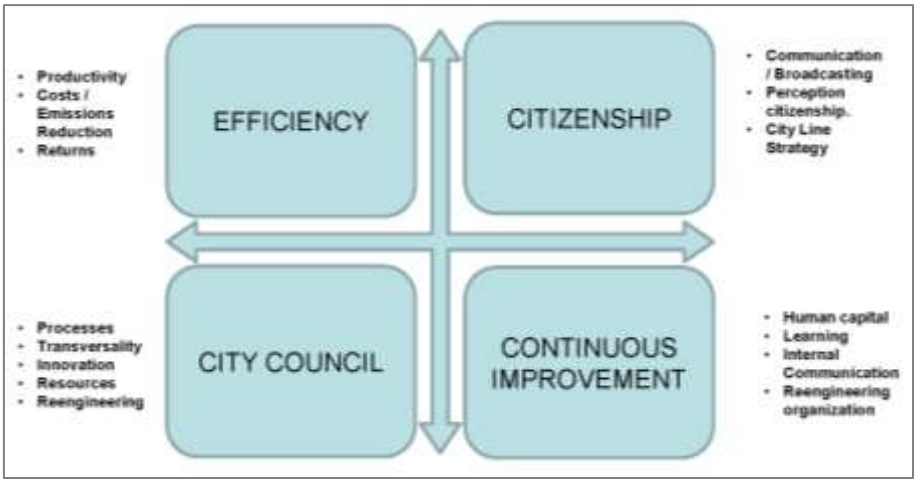

Figure 21: Balanced score card concept of Terrassa

3.3.4 Vienna

The "Smart City Wien"[14] initiative was established in 2011 and was largely driven by the Mayor of Vienna. One of the main strategic documents for the initiative is the Smart City Framework Strategy[15] which was adopt in 2014 and sets long-term strategic targets until 2030/2050.

The Smart City Framework Strategy has identified and set 3 key objectives for Vienna:

- **Quality of living**: high and socially balanced quality of living

[14] https://smartcity.wien.gv.at/site/en/

[15] https://smartcity.wien.gv.at/site/files/2014/09/SmartCityWien_FrameworkStrategy_english_onepage.pdf

- **Resources**: radical resource preservation
- **Innovation**: development and productive use of innovations/new technologies

As an example, for "Resources" the main objective is described as "*Per-capita greenhouse gas emissions in Vienna drop by at least 35% by 2030 and by 80% by 2050 (compared to 1990)*". In the second, more detailed level, objectives for *Energy*, *Mobility*, *Buildings* and *Infrastructure* are described. Eventually, a system of indicators corresponding to this structured approach will be established.

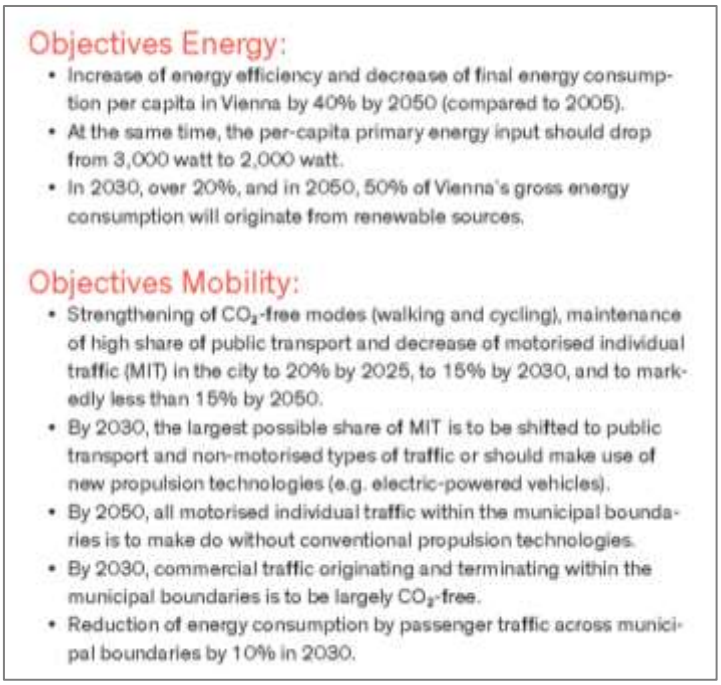

Figure 22: Level-2 objectives for key objective "Resources": energy & mobility

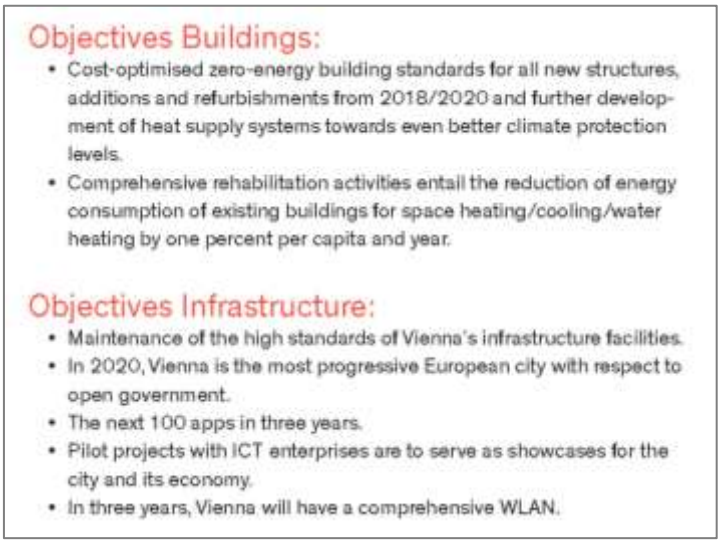

Figure 23: Level-2 objectives for key objective "Resources": buildings & infrastructure

The monitoring of Vienna's smart city framework strategy is crucial for its success. At the moment efforts are taken to develop a monitoring system in order to set necessary actions towards achieving its targets and to develop the strategy further. Like in most cities, many different departments within the city administration deal with smart city topics. Therefore the collaboration between the different departments is highly important but can be challenging due to the organizational structure of the City Administration. Furthermore. the data availability and the distribution of the data across various departments provide an additional challenge for the monitoring processes of the smart city strategy.

3.4 Conclusions

Cities that participated in the survey confirmed that the topic of "smart city" is high in their agenda. They can see or expect a lot of benefits from becoming smart: *efficiency*, *sustainability, participation of society* and *better quality of life* are some of the keywords used to describe these benefits.

The first challenge in this path is the development of a smart city strategy and it's encouraging that two thirds of the cities replied that they are in some stage of developing or implementing such a strategy. ICT, mobility and energy efficiency are the three more frequently included areas followed by renewables and economic development.

Defining what a smart city should look like in the end is not an easy task: during the last years the definition of a smart city has repeatedly change let alone the activities that are needed to implement it. Nevertheless, cities agree that a "smart city" uses a lot of technology, combines energy, mobility and infrastructure, increases performance and efficiency, increases the participation of citizens, enables innovation and improves the social and economic fabric of the city.

In both planning and implementing smart city solutions, performance measurement is one key component. Two levels of performance measurement can be identified:

1. *Smart city level*: only 11% of the cities replied that they measure their smart city performance as a whole. Another 39% replied that they measure parts of this performance. Strategy development is the most cited reason for a city to measure its performance. Mobility, Energy consumption & efficiency, renewables, GHG and quality of life are the most measured areas of a smart city
2. *Smart city project level*: Cities are or would like to measure the performance of their projects for various reasons. Primarily to evaluate their results but also to plan and steer on-going projects and communicate project results to city's stakeholders.

In both cases the performance indicators that cities find more important are related to energy & resources, transportation, digital infrastructure, citizens' participation and economic development.

Following the lack of measurement, the vast majority of replying cities don't use performance measurement tools. Nevertheless, 72% of them would like to have such a tool at its disposal, especially if this tool integrates all operations from data collection to performance measurement, is easy to use and is compatible with existing tools/platforms.

On the side of data collection, half of the cities are already collecting data, although following under a process that is usually limited to a small number of datasets. More cities are preparing to join in by developing (harmonised and transparent) schemes of data collection, in all cases putting security and privacy issues as a top priority of their data policies.

All these data, in most cases, are then released as open data to various stakeholders of the city. Two thirds of the replying cities provide some kind of open data that they have collected by themselves or through partnerships with other organisations. Cities recognise the benefits from the opening of data but, apart from more resources, they would like to see more open standards, collaborations with third organisations and sustainable business models materialise in order to be able to contribute more in this direction.

4. IDENTIFYING THE NEEDS OF CITIZENS

4.1 Structure of questionnaire

During the preparation of the survey and the partners' discussions, four research areas, important for CITYkeys, were identified. The structure of the survey followed these four areas and is summarised in the following table along with a short description and targets for each of the four areas:

Table 3: Structure of the questionnaire for the "needs of citizens"

1. Smart city	Questions of this section will provide an understanding of how stakeholders perceive "smart" policies of the city	Target: • Understand how citizens & stakeholders perceive their cities' "smart" policies and strategies
2. Smart city projects	Question of this section identify which "smart city" projects are visible from the citizens and stakeholders. In addition, which projects are considered as "smart"	Target: • Understand what "smart city" projects are visible to the citizens & stakeholders but also what the latter consider as priorities for a better city and life in it
3. "Smart city" projects evaluation & acceptance	This section tries to understand what are the project categories and impact priorities for citizens and stakeholders	Target: • Understand what the citizens & stakeholders consider as priority projects or as priority projects' impacts and results. The latter relates to the acceptance of a project
4. Open data	Question refer to the open data activities (if any) of the city and what stakeholders of the city think about them	Target: • Understand what the citizens & stakeholders think of the open data activities of their city

4.2 Analysis of the needs of citizens

4.2.1 Smart city

Questions of this section will provide an understanding of how stakeholders perceive "smart" policies of the city.

Stakeholders and citizens submitted well-informed answers to this section: asking what "smart city" means to them gathered 36 different answers. One first conclusion is that stakeholders and experts adequately follow what their cities plan and implement and are definitely looking for more results, both in terms of quality and quantity.

From the 36 different answers, some of the most elaborate follow:

- One which provides opportunities for the young people, has high level of employment, efficient infrastructure and combines that with the modernity, which is of high level of importance;
- A city which manages to combine a thriving economy and high living standard for its citizens, while caring for the environment;
- City applying new technologies, engaging its citizens in the process of making the life in it better, environmental friendly and more organised;
- City that works on the latest technologies which allows its citizens easier and better life in the city. The latest technology also needs to be energy efficient in order to encourage sustainable development;
- Innovative administration and openness of the city administration to the citizens;
- The use of new technologies in order to improve life quality. Now, it is mostly used in traffic sector or to achieve some energy savings and to improve general everyday life but the goal is to develop city strategies and to achieve smarter, different and attractive city in the field of business, transport, communications, water, energy, city services, and other systems;
- A city that strides for social, environmental and economic sustainability, and when necessary it leverages ICT to achieve these purposes. The final purpose is to make cities better for citizens, both the current dwellers of the city and the future ones, and therefore, any smart city approach has to be citizen centred and with a long term vision;
- A smart city is one that is enabling and adaptive in support of its citizens and visitors through the appropriate use of talent, technology and policy;
- Intelligent, open, equal, sustainable, dynamic, democratic and leveraging new technologies and infrastructures to create greater opportunities;
- A city that is using ICT to improve the quality of life of its citizens and businesses through processes of information and participation. A city that improves efficiency, sustainability and provides more and better public services at lower cost;
- A city in which public data is accessible for all (willing) citizens to be used to check (public, democratic) performance or create new (business) services. As well as information used to reduce citizens environmental footprint (energy/CO_2, water, clean air, biodiversity, etc.) by making smart use of existing systems and/or to help create new more sustainable city-systems. Smart concepts contributing to enhance a transition towards or more civilian-facilitation organisation than top-down dictating (grass roots movements like Transition Towns) and making social connections easier between different citizen-groups;
- A city that is open to its citizens, cares about their opinion and tries to help them with their needs by using innovative technology;
- The following aspects are thought as components of a smart city:
    - Knowledge based management
    - Smart usage of information and knowledge
    - Digitalisation, using technical solutions for better performance of actions
    - Digitalisation of services and different functions are not automatically smart, we have to think about what the actual benefits are
    - The decision making in a smart city is transparent and open; people should be part of the decision making processes
    - Production of smart services that are cost efficient, but also helps the citizens everyday lives (e.g. bus schedules and trip planners)
    - A smart city is not necessarily visible to the citizens, and it doesn't have to be; digitalisation of cities back end systems

- The process in itself has to be smart, not only the product (e.g. how the data is collected)
- Smart and agile, quick reaction to different circumstances
- Public transportation should be organized in a way that the use of an own car is not necessary (services and different modes of transportation are connected in a web)

Nevertheless, the fact that 28% of the replies didn't answer needs to be noted. As it will be shown also later, many city stakeholders are still unaware of the smart city concept and the work that their city is doing to this direction. Increase of awareness, increase of participation, better promotion of activities can be – depending on the case – the needed solutions.

After that, stakeholders were asked to evaluate whether their city is "smart" or not. The replies varied in intensity and as it was expected only few participants replied with just a "yes" or "no". In an effort to classify them, the replies were grouped and presented below:

- Positive when the city is becoming (or is already) "smart" and its current position is evaluated positively;
- Negative when the city is not (yet) doing enough to become "smart";
- 26% of the citizens/stakeholders didn't reply to this question.

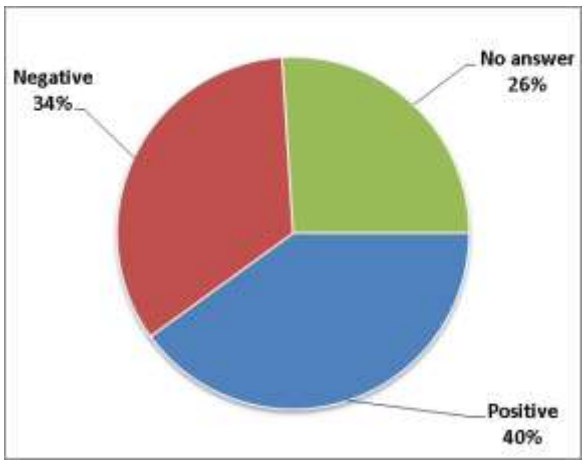

Figure 24: Do you think your city is "smart"?

In all cases, stakeholders were asked to mention one action that would make their city more smart or innovative. The replies advise cities[16] on a wide range of issues and include:

- Better capitalise the results and outcomes of international projects that the city has participated;
- Develop more opportunities for the participation of citizens in decision-making;
- Increase the use of green energy & improve the quality of the environment;
- Implement more "smart mobility" projects;
- Create better e-services for the citizens;
- Raise awareness among citizens for:

[16] Although each citizen/stakeholder has replied for his/her own city, the different replies have been grouped and combined for this paragraph

- Environmental issues;
- Innovative projects of the city;

- Develop and support more co-creation/innovation spaces for the city community;
- Support creation & culture in general;
- Pursue higher level of education (new universities/institutes in the city);
- Include teaching of technology in primary/secondary education.

4.2.2 Smart city projects

Question of this section identify which "smart city" projects are visible from the citizens and stakeholders. In addition, which projects are considered as "smart".

While city stakeholders are usually very well informed, the challenge of raising awareness about "smart cities" and related city activities is confirmed when city stakeholders are asked if they know "smart city" projects that their city is implementing. 62% named one or more projects, nevertheless, a 38% either replied that they don't know such a project or didn't answer at all.

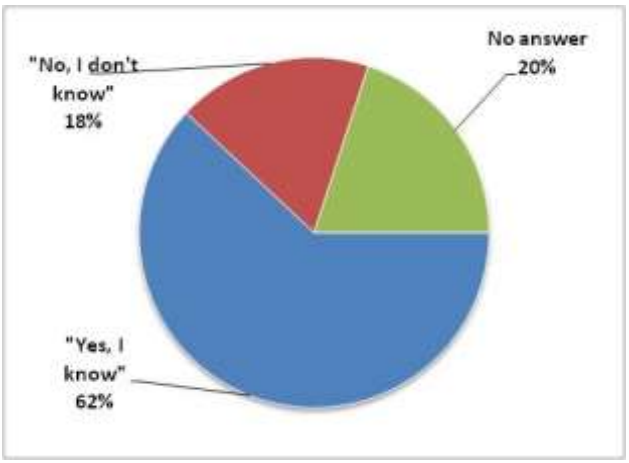

Figure 25: Do you know any "smart city" projects that your city is implementing?

Citizens/stakeholders were, in addition, asked to indicate in which sectors are the projects they know about as well as to what degree they are satisfied with the results of these projects[17].

The first graph depicts the sectors with which citizens and stakeholders are most satisfied with ("5" and "4") while the second one depicts the full results.

[17] **DK/DA**: Don't know/don't answer, **No**: No knowledge of a project, **1 to 5**: from least to most satisfied

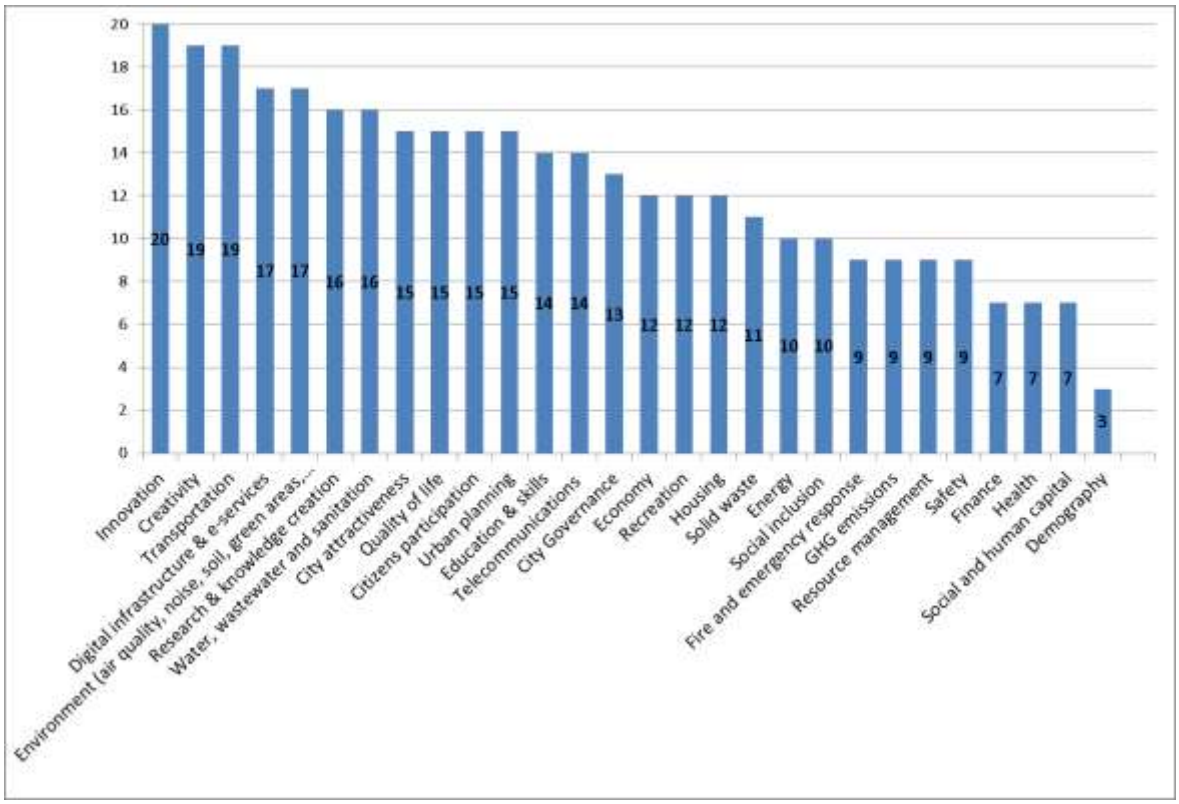

Figure 26: Projects' areas and level of satisfaction of the citizens ("5" and "4")

The need for raising awareness is confirmed by the general trend of the citizens/stakeholders to ask for better promotion of the city projects. Proposals on how to implement the desired level of promotion/information include:

- More use of social media;
- New and dynamic communication tools;
- Improve the city website;
- Involve stakeholders as communication focal points;
- Use education in schools to promote new concepts;
- Organise face-to-face events/ promote during community events and festivals;
- Use efficiently traditional mediums, like newspapers and radio.

The following activities for which the citizens/stakeholders would like a better stream of information were mentioned:

- Concept and framework of "smart city";
- Sustainability (as an attractive concept for citizens);
- Applications and e-services;
- Innovation, research and knowledge creation;
- Progress of physical infrastructure;
- Healthcare and inclusion;
- Transportation projects, especially the ones for cyclists.

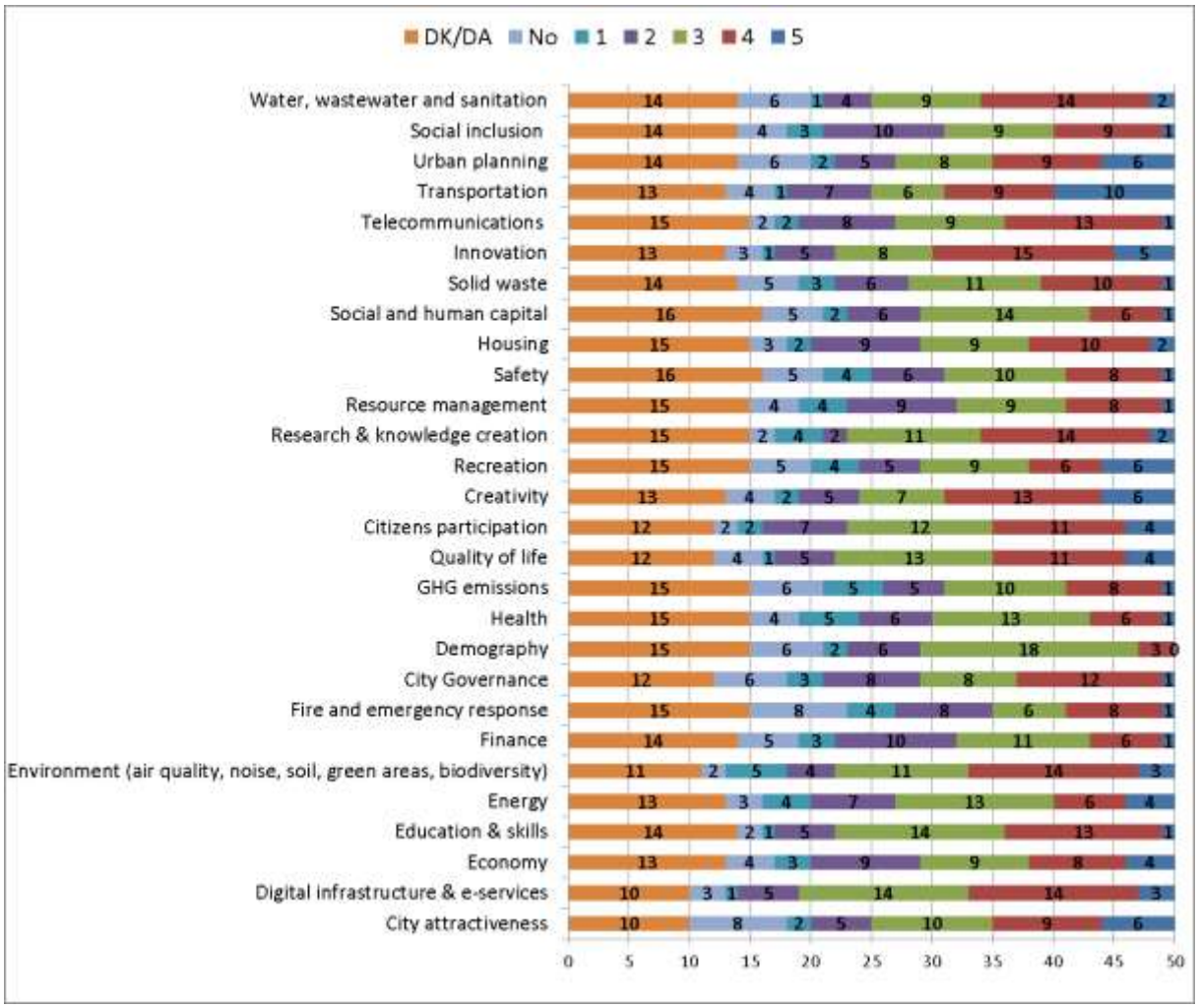

Figure 27: How satisfied are you with the results of the projects you know about?

4.2.3 Smart city projects evaluation & acceptance

This section tries to understand what are the project categories and impact priorities for citizens and stakeholders.

As CITYkeys tries to incorporate citizens' needs in its outputs, cities' stakeholders were asked to give their opinion on *what* makes a "smart city" project *useful for the* ***citizens***. One of the highlights of the answers is the need for a city to involve citizens in the process from the beginning but also give priority to projects that maximise the outcomes of public interest. In more detail, answers include:

- A smart city project is useful for citizens when citizens are involved in the identification of problems and have a say in the eventual decision;
- A smart city project is useful when it helps to reduce bureaucracy, improve transparency of the city, and broaden the means and moments where a citizen can interact with the municipality;
- Smart city projects should open cities to new ideas;
- Smart city projects should provide citizens with:
    - New jobs;
    - Better education;
    - Better social services;

  - Improved transportation;
  - More opportunities for social & cultural life;
  - Improved quality of life;
- Smart city projects should improve:
  - Environment;
  - Sustainability of the city;
  - Health of the citizens;
  - Safety;
  - Quality of life;
- Smart city projects should reduce poverty and social exclusion;
- Smart city projects should encourage research, development and innovation;
- A smart city project should raise citizens' awareness about how important it is to:
  - Be innovative;
  - Participate;
  - Save resources and be efficient;

Afterwards, cities' stakeholders were asked to give their opinion on *what* makes a "smart city" project *useful for the **city***. In general, answers focus at the same priorities for the *city* as, before, for the *citizens*. As one respondent put it: *"If it's useful for the citizens, it will be useful for the city"*. In detail, collected answers include:

- Projects should make the city:
  - More sustainable;
  - More desirable as a touristic destination;
  - An example to other cities;
- Projects should improve the:
  - Governance of the city;
  - Economical and financial situation in the city;
  - Competitiveness of the city;
  - Environment;
  - Attractiveness of the city;
  - Functioning of important sectors of the city: energy and energy efficiency, public lighting, traffic, urbanism and architecture, water supply and drainage and environment;
  - Management of the public services;
- Projects should be:
  - Sustainable;
  - Efficient;
  - Innovative;
- Projects should provide:
  - solutions in problematic areas;
  - sustainable positive social change, e.g. by increasing jobs, skills, quality of life etc.;
- Projects should create additional economic activities in the city;
- Projects should help the city to save money;

In an effort to prioritise the answers of the previous paragraph, citizens and stakeholders indicated how important they consider each of these *project results* when evaluating the importance and impact of a "smart city" project[18].

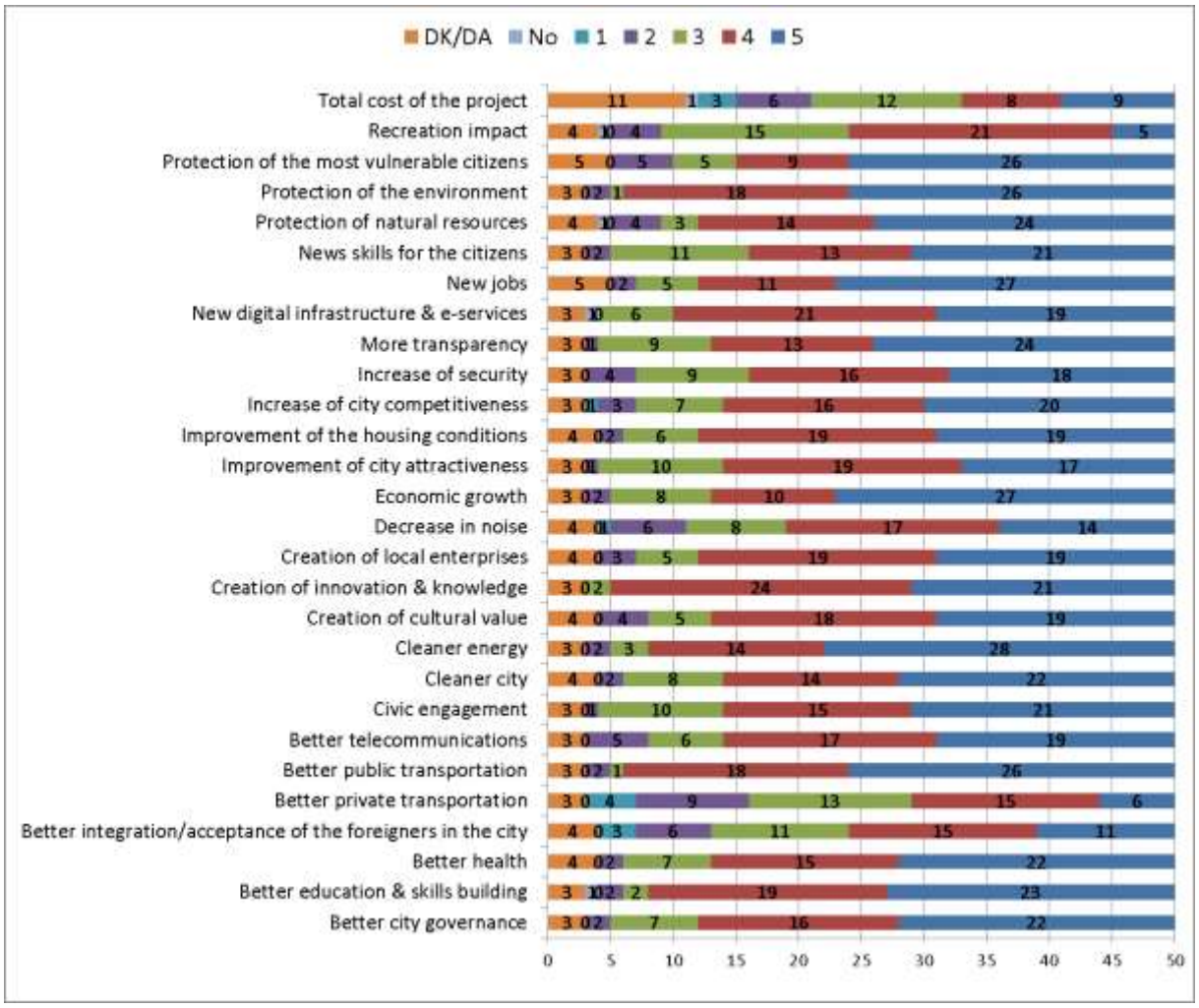

Figure 28: Importance of various project results for the impact of a project

[18] **DK/DA**: Don't know/don't answer, **No**: No importance, **1 to 5**: from least to most important

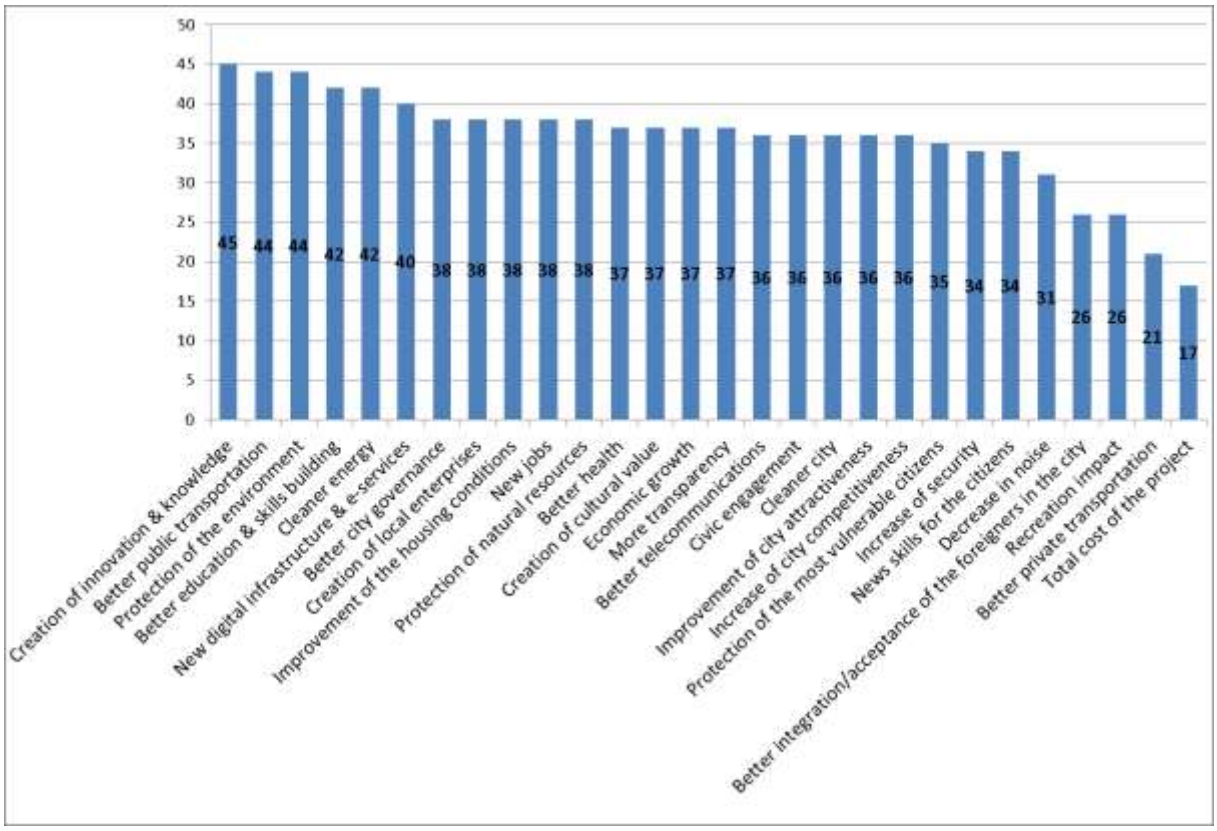

Figure 29: Most important project results according to the answers ("5" and "4")

The same types of project results were then split in four categories and citizens/stakeholders were asked to indicate the most important results per category. The four categories are:

Table 4: Classification of project results

City governance	People	Environment	Economy
Better city governance	More/ better recreation	Cleaner city	New jobs
Improvement of city attractiveness	Better education & skills building	Cleaner energy	Economic growth
Participation of the citizens	New skills for the citizens	Protection of natural resources	Less costly projects
More transparency in city operations	Improvement of the housing conditions	Better & cleaner private transportation	Increase of city competitiveness
	Better health	Better & cleaner public transportation	Better telecommunications
	Improvement of the social and human capital	Decrease in noise	New digital infrastructure & e-services

City governance	People	Environment	Economy
	Creation of cultural value	More sustainability	Creation of innovation & knowledge
	Increase of security	Protection of the environment	Creation of local enterprises
	Better integration/ acceptance of the foreigners in the city		
	Better quality of life		
	Protection of the most vulnerable citizens		

The results/priorities[19] per category are depicted in the following four graphs:

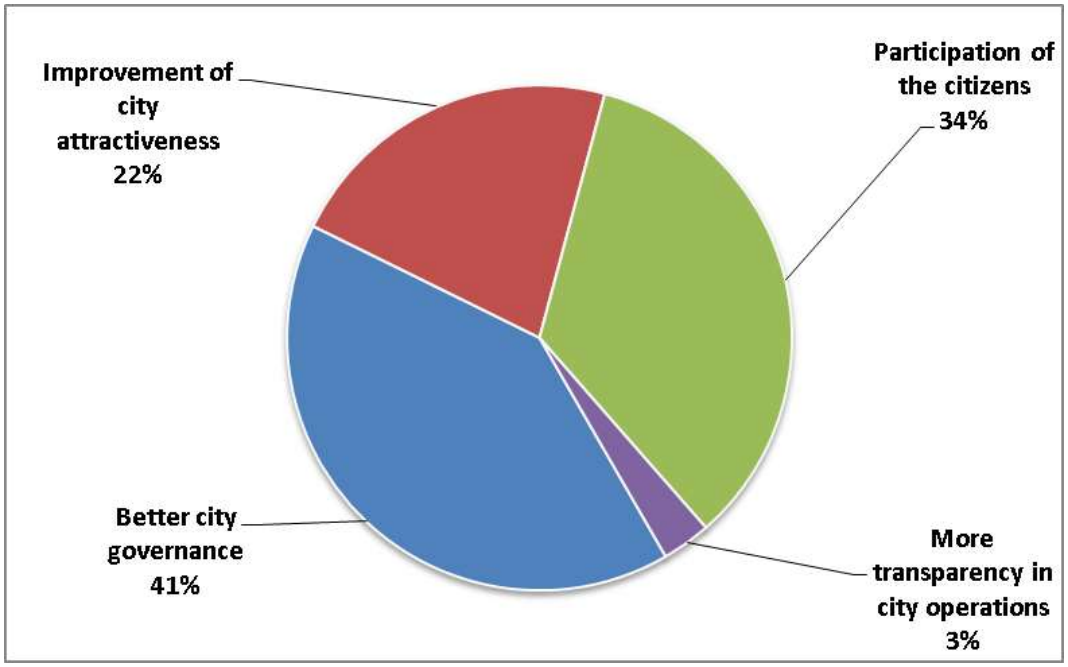

Figure 30: City governance

[19] Blank replies (per category) were not included in the graphs

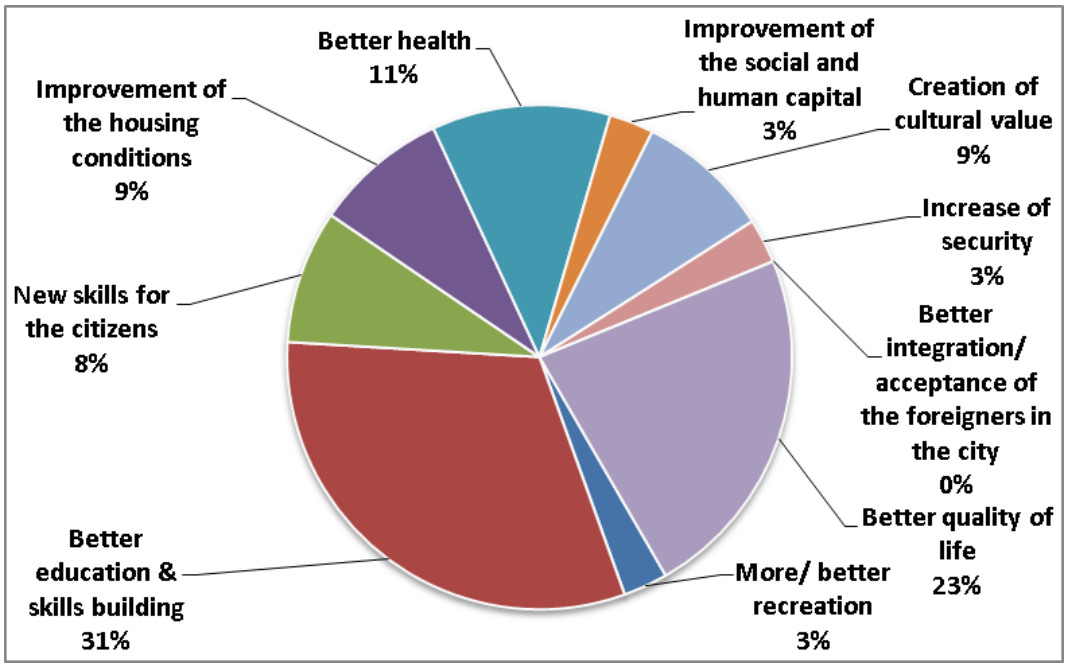

Figure 31: People

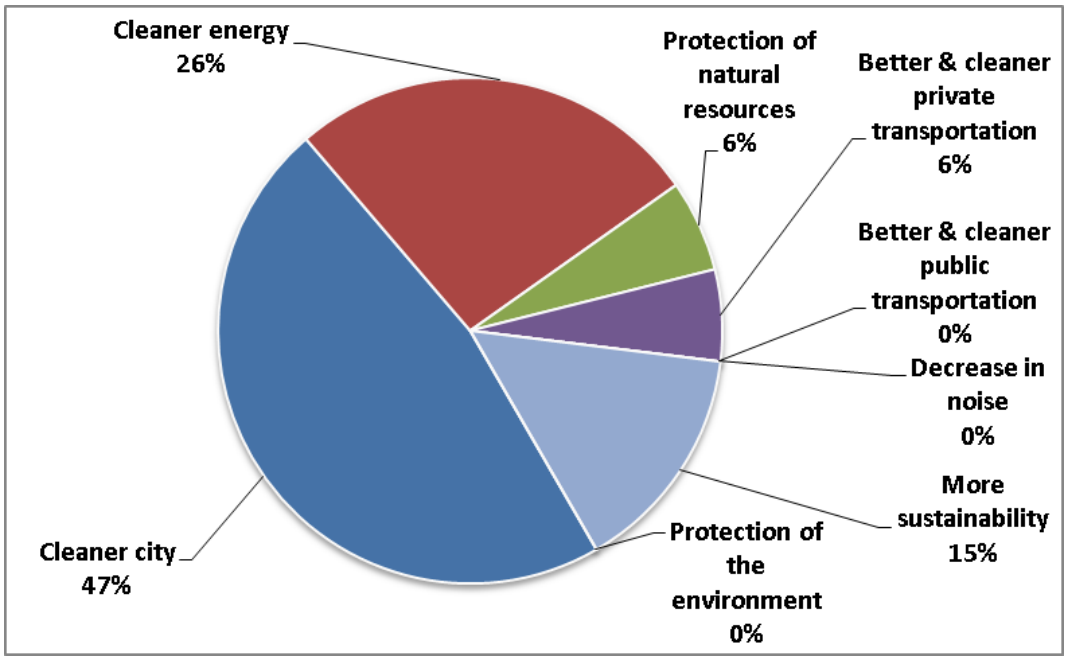

Figure 32: Environment

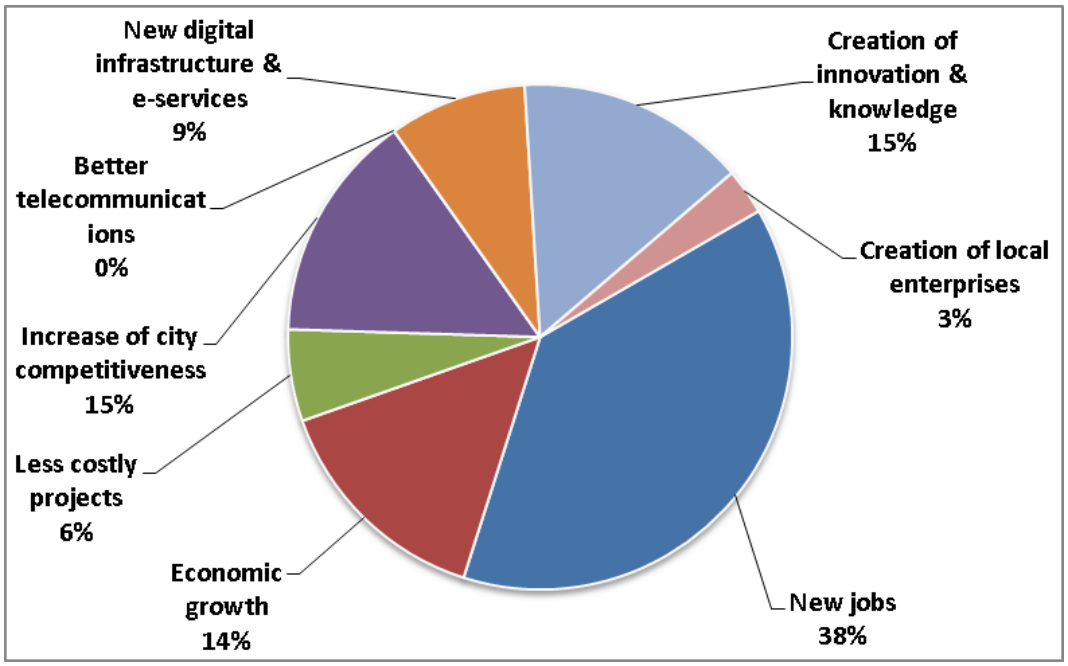

Figure 33: Economy

4.2.4 Open data

Question refer to the open data activities (if any) of the city and what stakeholders of the city think about them.

Open data projects and initiatives in cities seem to be not yet many or not yet well communicated. Only 28% of the stakeholders that participated in the survey replied that they know about their city's work in this area.

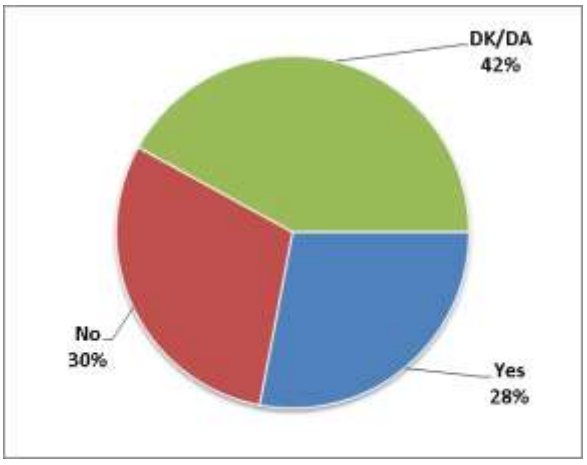

Figure 34: Do you know about open data initiatives in your city?

The main reasons mentioned by the cities are:

- Many citizens/stakeholders are not yet familiar with the concept and use of the "open data";
- Citizens/stakeholders cannot yet see the benefits from opening data in the city;

- Open data projects and results are not adequately communicated.

This is also the conclusion after asking whether stakeholders are adequately informed about the foreseen benefits that open data has for the city and the citizens.

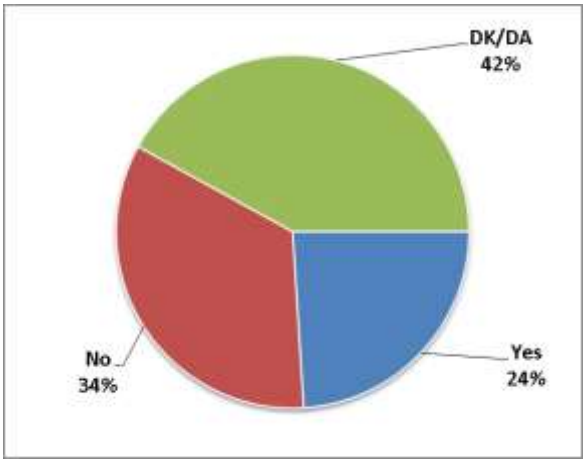

Figure 35: Are you adequately informed of the foreseen benefits for the city?

Finally, a number of potential positive outcomes of open data for the cities were presented and citizens/stakeholders were asked to grade them in terms of importance for the city.

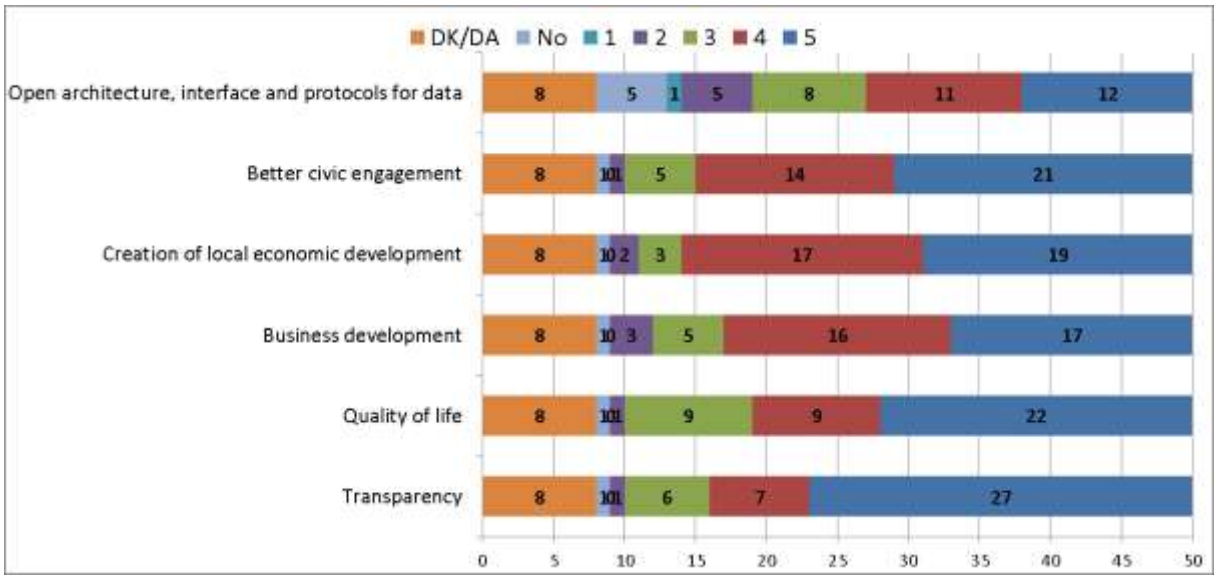

Figure 36: Importance of the open data results for a city[20]

[20] **DK/DA**: Don't know/don't answer, **No**: No importance, **1 to 5**: from least to most important

4.3 Additional input

4.3.1 Vienna

For the purpose of this report Vienna organised a focus group with eight representatives of different city departments, consultancy companies, research institutions and property and site developers, who elaborated on the cities' and stakeholders' requirements and needs regarding a project performance measurement framework.

One of the key messages was that there is a high need for evaluating neighbourhoods. In a growing city there are many sites that will be developed and renewed in the short- and long-term future. Therefore, it is crucial that they follow common smart city criteria to plan cost and time efficient, to ensure the quality of the new or renewed neighbourhoods and gain these projects as catalysers for the overall smart city strategy.

Another focus was set on the purpose of the project performance measurement. The participants of the focus group agreed that learning followed by recommendations and improvements would be one of the main opportunities. This also led to the further conclusion that the performance measurement framework has to be applicable to all different phases of the project implementation, such as the planning phase, the realization phase and the operational phase.

Following the "PEOPLE, PROFIT, PLANET" scheme, stakeholders of Vienna gave a draft list of themes that should be covered by a performance measurement system:

- PEOPLE (social sustainability)
  - Quality of housing (also PROFIT and PLANET)
  - Affordability of housing (also PROFIT)
  - Health: Accessibility, Emissions (Noise, Pollutants, Stench), possibility for sports and exercise
  - Quality of Life
  - Mixed usage (residential buildings, office buildings etc.) (also PROFIT and PLANET)
  - Compactness of the built environment (also PROFIT and PLANET)
  - Participation
- PROFIT (economic sustainability)
  - Long-term economic perspective
  - Short term economic perspective
  - Quality vs. quantity
  - "city of short distances" - local shops and supply of goods and services
  - Jobs
- PLANET (ecological sustainability)
  - CO2/Greenhouse gas emissions
  - Resources
  - Pollutants (also PEOPLE)
  - Mobility
  - Energy
  - Life Cycle perspective (energy, Greenhouse gases, etc.)
- ENABLERS
  - Economic and legal frameworks and mind-sets have to be modified
  - Innovation (social, technological, legal and economic innovation)

Experience from previous research projects also influenced the discussion. “Not another tool please!” was one clear statement during the focus group. It originated from the experience that in many research projects a tool was provided which was hardly used after the project was finished. In most cases the tool required too much data or was too complicated and too time consuming to be handled during daily business. In particular within city administrations little time and resources are left for research and self-training that would be required to use and understand a complex tool.

In line with the critical attitude towards complicated tools the issue of data availability was elaborated in more depth. Many performance indicator structures rely on the availability of data. The reality in most cities is that the data does not exist or is in poor quality. Additionally it is often distributed among many different departments or public-private companies and thus the collection would take up a lot of time or would be difficult to achieve due to the lack of authorization for collecting the data. CITYkeys performance measurement framework has to take that into account and propose alternative solutions in cases data are not available.

The specific key players of a performance measurement such as the contracting authority, the user and the target group still need to be determined. However, there was consensus that administrative bodies (urban planners, energy planners, district and site manager, etc.), planners (private, public, for research purposes), site and property developers, property owners and marketer as well as politicians will need to work together to realize a successful project evaluation.

Overall it can be said that there is a strong need for smart city project performance measurement. The participants agreed that smart city project performance measurement would be highly valuable for the successful implementation of smart city strategies and welcome efforts related to a simple and transparent framework that is applicable to various project phases and adaptable over time. To achieve a successful implementation of the performance measurement framework the participants recommend to address the issues related to data availability and (complex) tools and to foster an open design and a close collaboration between all relevant stakeholders.

4.4 Conclusions

Citizens and stakeholders that participated in the survey submitted well-informed answers particularly in the first two sections that refer to smart cities and smart city projects.

One first conclusion is that citizens and stakeholders follow adequately what their cities plan and implement and are definitely looking for more results, both in terms of quality and quantity. They define a “smart city” and its objectives in terms similar to the ones used by the cities’ experts; nevertheless they put more emphasis in three objectives that are directly important to them:

- Improvement of quality of life;
- Better services from the city to the citizens;
- Creation of an innovative, competent and with high skilled jobs city.

This finding is stressed by the kind of project areas that citizens and stakeholders think that have delivered the most satisfying results for their city. Looking at those that got the highest

marks, environment, transportation, digital infrastructure and water/waste is a first group, city attractiveness and quality of life is a second group and innovation, creativity and knowledge creation the third one.

Replying citizens and stakeholders gave two different sets of answers when asked what makes a "smart city project" useful. Useful *for the citizens* means a better environment and quality of life but mainly means better and more efficient services, tackling the social and economic challenges and a focus on innovation and jobs creation. Useful *for the cities* means tackling social issues but mainly means making the city more efficient and sustainable, more competitive and financially robust.

A fact that needs some attention is that a quarter of the responding citizens and stakeholders didn't give an answer to what a smart city means for them. The same percentage[21] didn't reply whether they consider their city smart and a slightly larger percentage didn't know any "smart city projects" to mention. This consistency indicates that there is still room for a better communication of the city activities, especially when these activities relate to new technologies and models of working.

Open data activities are still not followed or known to citizens and stakeholders, partially due to the fact that most cities haven't deployed major initiatives in this area. Roughly only one quarter of the respondents know about their city's open data projects or consider themselves informed of the foreseen benefits for the city. Nevertheless almost three quarters agree and expect that open data can bring economic development, transparency and better civic engagement to their cities.

[21] Although not necessarily the same respondents

5. ANNEXES

5.1 Questionnaire for the needs of the cities

CITYKEYS is a two-year European project which includes three research organizations (VTT, AIT and TNO), one cities network (EUROCITIES) and five partner cities (Rotterdam, Tampere, Vienna, Zagreb and Zaragoza). In addition to the 5 partner cities, more than 30 cities have shown their commitment to contribute with data and feedback to CITYKEYS.

The aim of CITYKEYS[22] is to develop and validate, together with cities, ***key performance indicators*** and ***data collection procedures*** in order to support the smart city development on two levels:

- On the level of the entire "smart city":

  "Smart City" refers to the whole of the city and how it progresses towards a desired state or target of being smart. Performance indicators at this level measure the combined and total performance of a whole city (or a geographical area) and can be used to evaluate sectors in which the city is doing well and sectors in which more work can be done

- On the level of "smart city projects":

  "Smart city project" refers to a single project and what its quantitative results and impact to a city are. By using a set of "smart project" performance indicators a city can assess the results of any project in various aspects of city life (economic, social, energy, environment, etc.), thus, making it possible to compare projects from different departments and city sectors. Moreover, by building similar sets of "smart city" and "smart project" performance indicators, a city can evaluate the contribution of each separate project to its targets and strategies

The first task within CITYKEYS consists of the identification of the city's needs. This survey has been compiled in order to serve this task. The aim of this survey is to understand what type of indicators should be covered within a performance measurement system and what characteristics a potential measurement tool should have.

The structure of the survey is summarised in the following table:

1. Smart city framework 2. Smart city performance measurement	Target: • Assess the progress of a city in planning and implementing "smart city" policies • Understand whether and how the city measures its progress towards its "smart city" targets • Identify which indicators the city is using to assess its progress • Identify which sectors of the city (life) are the most important to monitor and measure

[22] CITYKEYS is a H2020 CSA project, selected under the call H2020-SCC-02-2014: "Developing a framework for common, transparent data collection and performance measurement to allow comparability and replication between solutions and best-practice identification"

3. Project performance measurement	Target: • Understand whether and how the city measures the results and impact of its "smart city" projects • Identify which indicators the city is using to assess the results and impact of its projects • Identify which impacts or results of "smart city" projects are the most important to monitor and measure
4. Measurement tool properties (city and project level) 5. Data collection (city and project level) 6. Open data	Target: • Identify whether the city is using a central tool/ platform/ software that gathers some or all of the following functions: data collection, calculation of indicators, performance measurement, publication/ sharing/ visualisation of results • Understand whether and how the city collects data that are used for "smart city" related activities and projects • Identify whether and how the city is working with and/or providing open data to its citizens and stakeholders

If you have questions or need more information and help about the questionnaire please contact EUROCITIES: Anja Katalin De Cunto (Anja.DeCunto@eurocities.eu) or Nikolaos Kontinakis (Nikolaos.Kontinakis@eurocities.eu).

1. Smart city framework

Questions in this section relate to the wider city strategy, whether a city is following any smart city initiatives (integrated or sectorial) and how these are implemented.

How high is the topic of "smart city" in your city's agenda?[23]		5	4	3	2	1	DK/NA[24]
Do you have a shared definition at city level of "smart city"? If yes, which one?							
Does your city have an integrated "smart city" strategy or action plan? What are the main targets of that action plan? Please provide a link to the plan if available							
If yes… which of these sectors does it include?	Energy efficiency						
	Green energy						
	Mobility						
	ICT						
	Social affairs						
	Economic development						
	Health						
	Culture/education						

[23] **5** being the highest and **1** the lowest score

[24] Don't know/Not applicable

If no… do you have sectorial strategies for these sectors?		Yes	No	DK/NA
	Energy efficiency			
	Green energy			
	Mobility			
	ICT			
	Social affairs			
	Economic development			
	Health			
	Culture/education			
Do you have a central smart city coordinator/ agency/ office/ department? Please provide their name(s) and contact details if possible				
Are you following an existing smart city framework or initiative? Name the most important one (max 5) at city, regional, national or European level		1. 2. 3. 4. 5.		
Why do you think your city wants to become smart? Please elaborate the probable benefits for the city				
What are the biggest challenges for your city to become "smart"?				
What issues should be included more in the discussion on smart cities at the European level?				
Has your city participated in research projects related to smart cities? Which ones? Please add links if possible				
Has your city participated in research projects related to smart city projects performance measurement & indicators? Which ones? Please add links if possible				
Has your city participated in research projects related to open data, data protocols & data collection? Which ones? Please add links if possible				

2. Smart city performance measurement

Questions in this section relate to whether a city measures its "smart city" performance and progress at a city level. Further to that, the indicators that are used and their results are investigated.

Does your city measure its "smart city" performance?						
If yes…	Do you use performance measurement for "smart city" as a whole or for some of the city's key areas?					
	If in whole…	What system that you are using (name, origin, etc.)?				
		What are your city's 3 - 5 overall smart city framework domains that cover all your topics related to smart city?[25]				
	If in areas…	What key city areas does your city include in the smart city performance measuring system? (Please mention which categories you are measuring)		Yes – detailed level	Yes - simple method	No
			Quality of Life			
			Greenhouse Gas			
			Renewable Energy			
			Energy Consumption/ Energy efficiency			
			Mobility			
	How is your city measuring its smart city performance? Please describe briefly					
	Who/ which department is responsible for this activity?					
	Is your city satisfied with the benefits/ results from the measurement procedure? What is missing? Please elaborate					
	Are the results of the measurement disseminated within the city administration? To which departments and how? How are the results being used?					

[25] Three examples: (1) "People, profit, planet", (2) "Energy, mobility and innovation", (3) "Quality of life, technology & innovation, energy & CO_2", etc.

	Are the results of the measurement available to the public or other stakeholders of your city (please add link or attachments)?	
If no…	Can you identify the main obstacles or reasons for not measuring your "smart city" performance?	
	What would help your city to implement smart city performance measurement?	
	What would you like us to develop to support you in implementing smart city performance measurement?	
	What would be the key characteristics of a performance measurement framework suitable for your city?	
What are the benefits for your city by measuring its performance as a "smart city"?		

For what kind of decision do or would you need smart city performance measure for?	Yes	No	DK/NA
General policy making			
Strategy development			
Project prioritisation			
Public procurement			
Project result evaluation			
Communication with citizens and politicians			

Can you give examples of your city using smart city performance measurement to take decisions (add link or attach document if possible)?		
Is your city using a set of indicators to measure its smart city performance?		
If yes…	One developed by a third party? Which one?	
	One that the city has developed by itself?	
	What are the main categories of the indicators that you use?	
	How[26] do you calculate the used indicators?	
	Is your city satisfied with the results of using these indicators? Please elaborate	

[26] Calculation formulas, software, algorithms, etc. that are used for the calculation

	Are the results of your city performance publicly available?											
If no…	Can you identify the main obstacles or reasons for not using indicators?											
	Are you in the process of developing/adopting a set of indicators for your city?											
	How would you define your progress in developing/adopting a set of indicators?	Almost there		Mature enough		At its beginning		DK/NA				
What are the most important areas for which your city needs indicators to measure its "smart city" performance?[27]		5		4		3		2		1		No
	City attractiveness											
	Competitiveness											
	Digital infrastructure & e-services											
	Economy											
	Education & skills											
	Energy											
	Environment (air quality, noise, soil, green areas, biodiversity)											
	Finance											
	Fire and emergency response											
	City Governance											
	Demography											
	Health											
	GHG emissions											
	Quality of life											
	Citizens participation											
	Creativity											
	Recreation											
	Research & knowledge creation											
	Resource management											
	Safety											
	Housing											
	Social and human capital											
	Solid waste											
	Innovation											
	Telecommunications											

[27] **5** being necessary (too important) and **1** not important

	Transportation						
	Urban planning						
	Social inclusion						
	Water, wastewater and sanitation						
What would you improve in your smart city performance measurement?							

3. Projects' performance measurement

Questions in this section relate to whether a city measures the performance and results of its smart city projects. Further to that, the indicators that are used and their results are investigated.

Why does your city think it's necessary to measure its "smart city" projects' performance?				
In what ways projects' performance measurement can help your city? (Please give practical example when possible, add links or attach documents)?		Yes	No	DK/NA
	General policy making			
	Project prioritisation			
	Public procurement			
	Project steering/planning			
	Project management			
	Project result evaluation			
	Communication with citizens and politicians			
Is your city measuring its "smart city" projects' performance?				
If yes…	What is it that your city is measuring in its "smart city" projects? Please name some indicators[28]			
	How is your city measuring its projects' performance?			
	Who/ which department is responsible for this activity?			
	Is your city satisfied with the benefits/ results from the measurement procedure? Please elaborate			
	Are the results of the measurement disseminated within the city administration? To which departments and how?			

[28] For example: project cost, indicators related to energy, environment, etc., citizen acceptance, jobs created, etc.

	Are the results of the measurement available to the public or other stakeholders of your city (please add link or attachments)?	
If no…	Can you identify the main obstacles or reasons for not measuring your "smart city" projects' performance?	
	What would be the key characteristics of a projects' performance measurement framework suitable for your city?	
Is your city using a set of indicators for smart city projects?		
If yes…	One developed from a third party? Which one?	
	One that the city has developed by itself?	
	What are the main categories of the indicators that you use?	
	How[29] do you calculate the used indicators?	
	Is your city satisfied with the results of the used indicators? Please elaborate	
	Are the results for each project publicly available?	
If no…	Can you identify the main obstacles or reasons for not using indicators?	
	Are you in the process of developing/adopting a set of indicators for your city?	

How would you define your progress in developing/adopting a set of indicators?	Almost there	Mature enough	At its beginning	DK/NA

What are the city sectors that you most need a set of indicators to measure performance?[30]	5	4	3	2	1	No
City attractiveness						
Competitiveness						
Digital infrastructure & e-services						
Economy						
Education & skills						
Energy						

[29] Calculation formulas, software, algorithms, etc. that are used for the calculation

[30] **5** being absolutely needing and **1** less needing

	Environment (air quality, noise, soil, green areas, biodiversity)							
	Finance							
	Fire and emergency response							
	City Governance							
	Demography							
	Health							
	GHG emissions							
	Quality of life							
	Citizens participation							
	Creativity							
	Recreation							
	Research & knowledge creation							
	Resource management							
	Safety							
	Housing							
	Social and human capital							
	Solid waste							
	Innovation							
	Telecommunications							
	Transportation							
	Urban planning							
	Social inclusion							
	Water, wastewater and sanitation							
What would you improve in your smart city project measurement system?								

4. Measurement tool (to be specified) properties at both city and project level

Questions in this section refer to any tool that cities are using to systematically measure, process and present their performance in either <u>city level</u> or <u>project level</u>.

Is your city using a specific tool/ software/ application to measure performance?		Smart city level	Project level
If	Can you please describe some of	1.	1.

yes…	the tools (please add link or attachments)? Please name tools or software	2.	2.
		3.	3.
		4.	4.
If no…	Would you be interested in having a tool/ platform that gathers all data collection & performance measurement operations?		
Do you think such a tool should have an interface to the citizens and other stakeholders of the city?			

What should the desired features of a measurement tool be for your city?[31]	5	4	3	2	1	No
Simple user interface						
Open architecture of the tool						
Visualization of the results						
Use of open data formats						
Exporting of data and results						
Ability to use it also in other cities						
Ability to compare between different solutions						
Ability to compare between cities						
Open access						

5. Data collection (both city and project level)

Questions in this section investigate whether and how a city collects data: to measure performance, to subsequently release as open data, etc.

Is your city using standard procedures (harmonised and transparent) to collect data needed for its performance measurement or indicators?		
If yes…	Is your city checking in a systematic way the reliability of the collected data?	
	Is your city following an existing scheme (e.g. ISO 37120) or has developed a scheme for data collection?	
	Are the data collected in open formats?	
	How is the city dealing with privacy issues related to the collected data?	

[31] **5** being absolutely desired and **1** less desired

	How is the city dealing with security issues related to the collected data?					
If no…	Can you elaborate on the lack of a systematic data collection procedure?					
	Are there some city departments that are gathering data and which procedures do they follow?					
	Is your city planning to follow a scheme for (harmonised and transparent) data collection?	Mature enough	In implementation	Planned	In vision / desirable	DK/NA

6. Open data

Questions in this section investigate whether the city has produced and made available to various stakeholders and under which procedures sets of open data.

Is your city providing open data?						
If yes…	In which areas[32]?					
	Does your city have an open data strategy?					
	Is your city opening its own data?					
	How many datasets approximately has your city opened (please add respective links)?					
	How many (in number or percentage) of these datasets are updated according to the table on the right?	Real time	Periodically (automatic update)	Periodically (manual update)	Never (static data)	DK/NA
	How many of them are geo-located?					
	How many of them are provided in open format?					
	Is your city developing new approaches related to data protocols, user interfaces, open databases, etc.?					
	Is your city developing an ecosystem of innovation/ living labs/ open data/ civic participation, etc.?					
	Is your city collaborating with other stakeholders to jointly open data, set up common platforms, etc.?					
	How can a third party get access to your city's open data?					
	Are you exchanging open data with other cities or external organisations?					

[32] For example: buildings, transportation, green areas, etc.

	Do your service providers have contractual obligations (included in the tender) to provide open data?	
	Do you have protocols/ standards on ethics for open data protection?	
	Which are your needs in order to expand your open data collection and activities?	
If no…	Can you identify the main obstacles or reasons for not deploying open data policies and practices?	

5.2 Questionnaire for the needs of the citizens

The aim of CITYKEYS[33] is to develop and validate, together with cities, ***key performance indicators*** and ***data collection procedures*** for monitoring and comparing *smart city solutions* across European cities.

The objectives of the CITYKEYS project are to:

1. Develop and validate a transparent performance evaluation framework for smart cities (key performance indicators, guidelines for data collection, measurement system prototype). The framework will be tested in 5 case-cities;
2. Develop recommendations for the implementation of the measurement system into the cities decision-making process and recommendations for the development of new business;
3. Engage stakeholders in identifying and exploiting opportunities for synergy and replicability; and establish a collaboration platform for European cities.

The consortium includes 3 research organizations (VTT, AIT and TNO), 1 cities network (EUROCITIES) and 5 partner cities (Rotterdam, Tampere, Vienna, Zagreb and Zaragoza). In addition to the 5 partner cities, more than 30 cities have shown their commitment to contribute with data and feedback to CITYKEYS.

The first task of the project is to identify what are the cities' and citizens & stakeholders needs in evaluating smart cities Moreover, the project will identify the citizens and city stakeholders' criteria with regard to how smart city projects are evaluated, selected and accepted by the citizens. This way, the indicators used for performance measurement are expected to be broadly supported by a wider audience (e.g. citizens, non-technical stakeholders, etc.) and that is especially helpful when cities and industry stakeholders will be presenting or evaluating future city projects. The following questionnaire is aimed at cities' stakeholders, such as: utility companies, citizen's associations, research institutes, smart city stakeholders, etc.

The survey that follows consists of four parts which have to be completed in ***March 2015***. Ideally, each city should arrange a meeting with key stakeholders of the city (indicatively, stakeholders working with citizens, professional groups, etc.) and try to fill in as many answers as possible. Combined with this approach, or alternatively, cities can ask the same key stakeholders for surveys, reports, results from field work, etc. that they have available and that can be relevant to CITYKEYS survey.

1. Smart city	Target: • Understand how citizens & stakeholders perceive their cities' "smart" policies and strategies
2. Smart city projects	Target: • Understand what "smart city" projects are visible to the citizens & stakeholders but also what the latter consider as priorities for a better city and life in it

[33] CITYKEYS is a H2020 CSA project, selected under the call H2020-SCC-02-2014: "Developing a framework for common, transparent data collection and performance measurement to allow comparability and replication between solutions and best-practice identification"

3. "Smart city" projects evaluation & acceptance	Target: • Understand what the citizens & stakeholders consider as priority projects or as priority projects' impacts and results. The latter relates to the acceptance of a project
4. Open data	Target: • Understand what the citizens & stakeholders think of the open data activities of their city

If you have questions or need more information and help about the questionnaire please contact EUROCITIES: Anja Katalin De Cunto (Anja.DeCunto@eurocities.eu) or Nikolaos Kontinakis (Nikolaos.Kontinakis@eurocities.eu).

Please add below your name (individual or organisation) and a short description of your capacity or background (area of activity or profession or group you represent)

Name	
Description	

1. Smart city

Questions of this section will provide an understanding of how stakeholders perceive "smart" policies of the city

In which city do you live?	
What does the term "smart city" mean for you?	
Generally speaking, do you think your city is "smart"?	
Generally speaking, do you think your city is "innovative"? Please list one or more things that would in your opinion make your city smarter / more innovative	

2. Smart city projects

Question of this section identify which "smart city" projects are visible form the citizens and stakeholders; in addition, which projects are considered as "smart"

Do you know of "smart city" projects that your city is implementing? Please provide some examples							
If yes…	Can you indicate to which of these general sectors relate the projects you know of?[34]	My city is working on…	I'm satisfied with the results…				
			5	4	3	2	1
		City attractiveness					
		Competitiveness					

[34] **5** being too satisfied and **1** not satisfied

		Digital infrastructure & e-services					
		Economy					
		Education & skills					
		Energy					
		Environment (air quality, noise, soil, green areas, biodiversity)					
		Finance					
		Fire and emergency response					
		City Governance					
		Demography					
		Health					
		GHG emissions					
		Quality of life					
		Citizens participation					
		Creativity					
		Recreation					
		Research & knowledge creation					
		Resource management					
		Safety					
		Housing					
		Social and human capital					
		Solid waste					
		Innovation					
		Telecommunications					
		Transportation					
		Urban planning					
		Social inclusion					
		Water, wastewater and sanitation					
If no…	Do you think that your city is not adequately publicising its activities? About which activities your city should inform more?						
	Is there some other reason for not being aware of your city's projects? How could your city improve their communication about smart city activities						

3. "Smart city" projects evaluation & acceptance

This section relates to the effort of understanding what are the project categories and project impact priorities for citizens and stakeholders of a city

Can you indicate what, in your opinion, makes a "smart city" project useful for the *citizens*?							
Can you indicate what, in your opinion, makes a "smart city" project useful for the *city*?							
Can you indicate how important you consider each one of these results when evaluating the importance and impact of a "smart city" project?[35]		5	4	3	2	1	DK/NA[36]
	Better city governance						
	Better education & skills building						
	Better health						
	Better integration/acceptance of the foreigners in the city						
	Better private transportation						
	Better public transportation						
	Better telecommunications						
	Civic engagement						
	Cleaner city						
	Cleaner energy						
	Creation of cultural value						
	Creation of innovation & knowledge						
	Creation of local enterprises						
	Decrease in noise						
	Economic growth						
	Improvement of city attractiveness						
	Improvement of the housing conditions						
	Increase of city competitiveness						
	Increase of security						
	More transparency						
	New digital infrastructure & e-services						
	New jobs						

[35] **5** being too important and **1** not important

[36] Don't know/Not applicable

	News skills for the citizens						
	Protection of natural resources						
	Protection of the environment						
	Protection of the most vulnerable citizens						
	Recreation impact						
	Total cost of the project						

Generally speaking, please indicate the 5 most important results that a "smart city" project should have	**City governance**	**People**	**Environment**	**Economy**
	Better city governance	More/ better recreation	Cleaner city	New jobs
	Improvement of city attractiveness	Better education & skills building	Cleaner energy	Economic growth
	Participation of the citizens	New skills for the citizens	Protection of natural resources	Less costly projects
	More transparency in city operations	Improvement of the housing conditions	Better & cleaner private transportation	Increase of city competitiveness
		Better health	Better & cleaner public transportation	Better telecommunications
		Improvement of the social and human capital	Decrease in noise	New digital infrastructure & e-services
		Creation of cultural value	More sustainability	Creation of innovation & knowledge
		Increase of security	Protection of the environment	Creation of local enterprises
		Better integration/ acceptance of the foreigners in the city		
		Better quality of life		
		Protection of the most vulnerable citizens		

4. Open data

Question relate to the open data activities (if any) of the city and what stakeholders of the city think about them

Do you know about the "open data" initiatives in your city (if any)? If yes, please describe briefly							
Are you adequately informed of the foreseen benefits for a city and its citizens and economy?							
Publication of open data can have some positive consequences.		5	4	3	2	1	DK/NA

How important do you think are the following results of opening data?[37]	Transparency						
	Quality of life						
	Business development						
	Creation of local economic development						
	Better civic engagement						
	Open architecture, interface and protocols for data						

[37] **5** being too important and **1** not important