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## Smart City Networks' Governance: the Spanish Smart Cities Network Case Study

**Key words:** smart cities; network; governance; case study; impact; Spain

### Abstract

The governance of the smart cities' networks emerges as new research area intersecting smart governance and public networks studies. This work aims to contribute to the literature on smart cities governance by studying councillor's governance in complex networks and on network performance. To carry out this analysis, the Spanish Network of Smart Cities (RECI), one of the first of its kind and an international reference for city networks, is reviewed as case study, with the main objective of establishing a theory on its global innovation capacity and operations, together with the local level spurring influenced on its members. A PEST (Political, Economic, Social and Technological) analysis was carried out in order to assess the impact of the smart city network both at local, national and international level. This research was completed with a consultation carried out among some of RECI's most senior signatory cities. The results of the analysis show how RECI can be considered an example of a well organised network with quantifiable saving for its members, capable of configuring future policies in local administration, necessarily related to efficiency, digitalization and citizen-centricity and with key topics to build the future.

### 1 Introduction

Attention to smart governance is growing in importance (Meijer & Bolívar 2016) as key aspect within the smart cities panorama. Going beyond the individual cities, the involvement of the local city government inside smart city networks governance is a critical factor understanding the success of local smart city initiatives from the benefits acquired by participating in these networks.

The influence of these kind of networks in the public sector has been questioned in literature, especially when practitioners and policy-makers hold questions about whether networks really do work or are counterproductive for cities (Provan & Kenis 2008; Turrini et al. 2010). Therefore, this work aims to contribute to the literature on councillor's governance in complex networks and on network performance by focusing on the existing network coordination mechanisms, with a particular interest on how coordination mechanisms can contribute to the success of the governance network, particularly in the case of smart cities.

In order to study a particular successful case, the article presents the analysis of the Spanish Network of Smart Cities, in Spanish Red Española de Ciudades Inteligentes (RECI), originally formed by a group of 20 Spanish cities in 2012 and with over 75 members by 2017, as a case study for successful city governance networks. Through a qualitative analysis (Marshall 1996), this illustrative single-case study seeks establishing a theory behind RECI' impact on the innovation capacity at the local authority level spurring from its networked way of operation, and how this relates with new trends in city governance (Eisenhardt & Graebner 2007; Chetty 1996; Yin 2014). The scope of this work is not to provide statistical validity or reliability on establishing a successful smart city network, but analysing RECI's cause and effect in a particular moment where the smart city concept is embedded in most political, economic, social and technological initiatives taken by local and national governments.

Considering the structure of the article, Section 2 presents the most relevant streams of literature in relation to network governance, which provide a benchmark to leverage and analyse the impact on innovation and governance. Next, in Section 3, RECI's structure and working mechanisms are introduced. Section 4 presents RECI's case study against the backdrop of the literature on network governance previously introduced, considering the relations between RECI and the local governments in the Spanish political, economic, social and technological panorama. In the same section, the case study is supported with the results of a consultation carried out among RECI's most senior members on its impact on their local smart city initiatives and their level of participation within the network. Finally, in Section 5 the conclusions of the case study are presented.

## **2 Network Governance in the public sector: literature review**

Governance networks are more or less stable patterns of social relations between mutually dependent actors, which form around public issues, and which are formed, maintained, and

changed through interactions between the involved actors (Koppenjan & Klijn 2004; van Meerkerk & Edelenbos 2014). Current literature on local governance stresses the increasing operation of councillors in complex governing networks, including public and private bodies (Copus 2015). In these networks, councillors have to devise strategies to influence and shape policy decisions taken by individual players (Copus 2015). A second stream of literature points to the role of mixed groups as essential components of the governance structure regulating service ecosystems in cities (Connolly et al. 2014). There is also another interesting stream of literature, studying the conditions for success in shared-governance networks (Cristofoli et al. 2012).

These three different research streams provide interesting insights that help understanding networked governance; first, by showing the importance of councillors' soft power to influence public and private bodies; second, by showing the relevance and shape of service ecosystems within the framework of city governance; and third, deeply studying shared-governance. This last stream claims that a network success would depend on: 1) the importance of formalised coordination mechanisms; 2) formalised rules to increase the liability of decisions made; 3) well organised network meetings, contractual agreements and informal relationships (Cristofoli et al. 2012); 4) contracts with partner organizations that are also key understanding the performance of these networks. Furthermore, the stream of literature studying the conditions for success in shared-governance networks makes a distinction among three forms of network governance: Shared-Participant governance, Lead Organization governance and Network Administrative Organization, following Provan & Kenis (2008).

In the recent development of public network research literature, scholars have set aside their interests on network structure and have focused on the skills of the network manager as a way of predicting network performance. This focus on the network manager is based on the assumption that managerial skills have a direct impact on network performance (Kickert et al. 1997; Agranoff & McGuire 2001; Mandell 2001; Meier & O'toole 2001). Some authors even argue that network managers, in some cases, play an even bigger part in comparison to the network structure and mechanisms (Kort & Klijn 2011).

Against this backdrop, public network management skills might be split into two broad categories: those who nurture the network, and those who steer it. Abilities of the former kind are typical of network "*facilitators*" and '*mediators*', while those of the latter kind are associated with network '*leaders*' (Agranoff & McGuire 2001; Agranoff & McGuire 2003; McGuire 2002; Cristofoli et al. 2014).

The network facilitator-mediator is expected to foster an environment of good partner interaction in order to nurture the network. This is made by establishing working rules to govern partner participation, promote information exchanges between network partners, maintain harmony and develop ways to cope with strategic and operational complexity (Kickert et al. 1997; Agranoff & McGuire 2001; O'Toole & Meier 2004; Cristofoli et al. 2014). This person is also expected to build commitment to the mission and the goals of the network, not only among network members but also among external stakeholders (Agranoff & McGuire 2001; Cristofoli et al. 2014).

Following Cristofoli et al. (2014) when it comes to steering the network, the network leader is expected to be able to perform three tasks: action planning, activating and re-planning. Action planning consists of establishing clear missions, developing focused strategies and measures for the network and for the organization in which the leader works (Agranoff & McGuire 2001; Shortell et al. 2002). Activating consists of selecting the appropriate players and resources for the network (Mitchell & Shortell 2000; Agranoff & McGuire 2001; Agranoff & McGuire 2003), tapping the skills, knowledge and resources of others, gaining trust and building consensus (Agranoff & McGuire 2001). Finally, re-planning consists of altering and repositioning the network objectives when important changes occur in the network environment (Shortell et al. 2002). Tying together the former streams of literature in a network governance environment, the mechanisms for the coordination of the network partners and the ability of the network manager to run the network are reliable predictors of a network governance performance.

Kern & Bulkeley (2009) propose three governance mechanisms available to city-networks: information and communication; project funding and coordination; and, recognition, benchmarking, and certification. All three aim to encourage cities to convert commitments into action.

This network governance theoretical framework is employed as backdrop in the following section for the particular case study of RECI, where organisation and performance of this city network is thoroughly analysed in line with these network principles.

### 3 RECI (Spanish Network of Intelligent Cities): the case study

RECI, created in 2012 with the signing of the *'Manifest for the Smart Cities' Innovation for Progress'*, is an initiative sponsored by elected councillors in Spain who are committed to create an open network to promote the economic, social and business progress of cities through innovation

and knowledge, based on information and communication technologies (ICTs). Since this moment, the number of signatories has rapidly grown to 76 members in March 2017.

RECI is based on the final objective to exchange experiences and work together on the development of a sustainable city management model which is sustainable and improves the quality of life of citizens. In order to achieve this, the association promotes the automatic and efficient management of urban infrastructures and services, reduction in public spending and improved service quality, focusing on aspects such as energy saving, sustainable mobility, e-Government, social care or security. All these cities share the vision and motivation that a smart city should know how to make the most out of the possibilities offered by the ICT to enrich the life of its citizens and turn the administration into a closer, more accessible, efficient and sustainable public service.

The network encourages its technical members to actively participate in cooperation activities in a pro bono way, leveraging the potential of physical and virtual social networks as collaboration tools, offering their time and availability. Far from political parties and ideologies, the focus is put on technical questions. This collaboration entails a mix of formal and informal coordination mechanisms.

### 3.1 RECI's structure

Considering its organisational structure, RECI is governed by a Board of Directors formed by a president, two vice-presidents, one secretary, and one representative from each founding member. Currently, the president and vice-president roles are held by the majors of Hospitalet de Llobregat, Logroño and Rivas-Vaciamadrid, respectively.

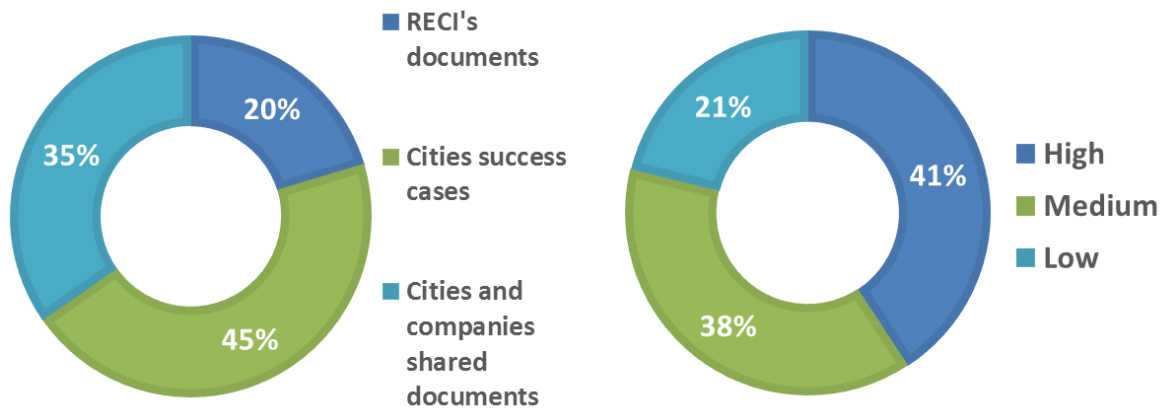
On the technical side, RECI's ongoing work is developed under five working groups (WG), in which one or two cities act as WG leaders. These five groups, their leaders and their key activities are described in Table 1. Promoted by this division, the smart city policies promoted by RECI are, mainly, sectoral policies. Member cities choose participating in groups based on their particular local interests and motivations. Consequently, RECI offers local politicians and local technical staff the possibility to frame engagement and co-creation processes in multiple phases of the workflow.

**Table 1:** RECI’s working groups

<b>Working Group</b>	<b>Areas</b>	<b>Group Leader/s</b>
<b>WG 1 Social Innovation</b>	Accessibility, Culture and Sports, Citizen Involvement, e-Health Emergency and Security management, Tourism, Education and Open Data	A Coruña
<b>WG 2 Energy</b>	Energy Efficiency Dissemination Municipal Facilities: smart buildings, efficiency in public lighting, renewable energy installations	Murcia
<b>WG 3 Environment, Infrastructures and Livability</b>	Environmental Quality, Sustainable Buildings, Building Control Automation, Management of Public Infrastructures and Urban Facilities, Parks and Public Gardens Management, Livability, Urban Parameters Measurement, Waste Collection and Treatment, Urban Planning	Vitoria Rivas-Vaciamadrid
<b>WG 4 Urban mobility</b>	Electric vehicle (EV), Intelligent Transport Systems (ITS)	Burgos Valladolid
<b>WG 5 Governance Economy and Businesses</b>	e-Government, New Business Models, Employment, e-Commerce and NFP Payment Platforms, Cloud Computing, Virtual Data Centres.	Valencia

### 3.2 RECI as a knowledge-based sharing platform

RECI can be seen as a platform that offers formalised coordination mechanisms, as well as network facilitator and mediator services, to promote cooperation among cities. As part of its ICT based coordination mechanisms, the network provides local governments with a technical document repository service, also known as Content Management System (CMS) which was initially donated by Santander city hall; the CMS acts as a best practice repository which sometimes leads to practices widely adopted by several RECI members and, as such, becomes a sort of *informal norm* or common practice. One example of this situation is the development of applications and application programming interfaces (APIs), shared among RECI cities, to replicate and adapt software applications locally –such as those linked to tourism. In the CMS all the documents shared are classified by type and level of replicability. Currently, the CMS document count is at 275 documents (by April 2016), which are classified as shown in Figure 1. This collaborative work promotes the creation of innovative bidding documentation among local governments of member cities. At the same time, it provides technical staff, civil servants, and hired labour with a wide amount of information to employ in their local projects.



**Figure 1:** CMS content considering document classification (left) and replicability level (right)

#### 4 RECI's Impact on Spanish Smart Cities

Since its foundation, RECI has been an active organisation searching for innovative advances in all areas within the vast smart city field through its five working groups. The participation of the different city councillors and local technical staff in the activities of these groups has helped defining the innovation strategies sought by the network. As expressed by Angelidou (2015), the network activities aided by the technological push (e.g. its online document sharing platform for knowledge exchange, or web-based meeting platforms) produces a broad input of knowledge, creativity and collective intelligence; leading to further knowledge creation and enhanced innovativeness, multi-perspective of the city's problems and delivery of new and improved services. The positive impact of innovation networks on the rise of smart cities is also defended by (Komninos 2009) since they promote the appearance of new knowledge functions and business models relying on collective intelligence.

This collaborative work has not only benefited the individual evolution of RECI's members towards more innovative, more sustainable and smarter cities. In addition, other organisations such as the Spanish Association for Standardisation and Normalisation (AENOR) has benefited from this venture. In 2012 AENOR together with RECI created the Normalisation Technical Committee 178 for Smart Cities (CTN 178) with the objective of promoting smart city normalisation and standardisation at a national level (AENOR n.d.). RECI plays an important role within the CTN 178 since four of its chair members are also members of the subcommittees. The proactivity of this technical committee, in particular in the publication of ICT-related norms, has led to the recognition of RECI and AENOR's work in the ICT applied to smart cities field by the International

Telecommunications Union (ITU). In addition, the international interest on RECI's work has spread over other different foreign smart city networks<sup>1</sup>.

In order to assess RECI's overall impact, a PEST analysis (Political, Economic, Social, and Technological) analysis was carried out focusing on the most successful cases in these four areas. Furthermore, this analysis was supported with a consultation conducted among some of the most senior RECI's members in order to extract their direct impressions on the local benefits obtained by being part of the network, and potential improvement points.

#### 4.1 PEST analysis of RECI's impact

PEST, as an analysis framework of macro-environmental factors, is also referred to as, STEP (Clulow 2005), SEPT (Narayanan & Fahey 1994). The constituents of PEST can be considered as macro-environmental factors and its usefulness lies in the assumption that the success of a particular organisation or management solution cannot be understood without having the information relevant to the specific business environment (Buchanan & Gibb 2008).

In this context, a PEST analysis is expected to support RECI's case study by aiding to identify the key impact drivers of RECI on the Spanish cities. The expected result is a qualitative analysis which theoretically explains this particular phenomenon (Eisenhardt & Graebner 2007; Yin 2014).

##### 4.1.1 Political impact

Innovative smart city policies and regulations are needed to enable large scale project implementation and roll-out (Angelidou 2015; Taewoo & Theresa 2011). Cities need an adequate set of framework conditions in the field of policy and regulations in order to be able to smarten up. To achieve this goal, cities can collectively learn from each other to yield general lessons for the circumstances in which specific strategies are appropriate, and the forms of localisation that can best contribute to success. This is especially true when more information about their real outcomes, wider impacts and long-term consequences becomes available.

Therefore, the impact of RECI in that point is highly valuable to promote replication, scaling and ecosystem seeding among its members. This work contributes to align smart city strategies from local to national level. On one hand, knowledge sharing is a positive mechanism for policymakers

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<sup>1</sup> RECI has had expressions of interest from countries such as Portugal, France and Italy in Europe; Latin American countries like Peru, Chile, Argentina, Bolivia, Brazil or Colombia; North America, from cities of the United States and Mexico; and other countries like Egypt and Israel.



who have to take faster decisions than in the past due to a rapidly evolving socio political context. On the other hand, another positive effect is the response to forward thinking in policy making practices (Accordino 2013). Finally, an additional positive effect has to do with the fact that access to contacts and information may leverage differences among cities with bigger and smaller sizes.

RECI's objective to promote replication and standardisation among smart cities has already produced its results through its collaboration with AENOR. To date, the CTN 178 technical committee has published a total of 20 norms on smart cities, most of them in the area of infrastructures, with other 28 norms currently planned and already being developed.

#### 4.1.2 Economic impact

The beneficial political impact that RECI produces over the city governments also gets translated into a positive economic impact where, first, cities can reduce their expenses; and second, they can obtain R&D funds to develop innovative projects. RECI's proactivity has produced a chain reaction by stimulating the national government investment in R&D project calls in the area of smart cities. Among them, the inclusion of the National Plan for Smart Cities as the ninth pillar of the *Digital Agenda for Spain 2015 -2020* (with more than 3.1 Billion Euro allocated to fulfil the European Commission's Digital Agenda for Europe in 2015-2020) represents an unprecedented initiative of the government to help the Spanish cities empowering their local technological industry and supporting local authorities in their development as smart cities and smart tourism destinations (Ministry of Energy Tourism and Digital Agenda, 2015).

Overall, the economic impact of RECI onto the Spanish cities can be considered from three different aspects: expenses reduction based on shared knowledge and staff training, stimulation of the national investment on smart city projects, and stimulation of other RECI members to seek participation in European funded projects.

#### 4.1.3 Social impact

Generally, there is a tendency for associating the term smart city with just new technologies, forgetting about other aspects linked to human, social, relational and environmental capital, which are considered also key factors for urban development (Caragliu et al. 2011; Angelidou 2015). In a smart city, integrated actions that promote the relationships between the citizens and the different institutional, urban and technological elements are crucial to ensure both urban growth and knowledge and innovation economy. In fact, Caragliu et al. (2011) show consistent evidence of a positive association between urban wealth and the presence of a vast number of creative professionals, a high score in a multimodal accessibility indicator, the quality of urban

transportation networks, the diffusion of ICTs (most noticeably in the e-government industry), and, finally, the quality of human capital.

Overall, an integrated smart city model should work towards these four goals (Angelidou 2015):

1. Advancement of human capital: citizen empowerment (informed, educated, and participatory citizen), intellectual capital and knowledge creation.
2. Advancement of social capital: social sustainability and digital inclusion.
3. Behavioural change: sense of agency and meaning, or feeling that we are all owners and equally responsible of our city.
4. Humane approach: technology responsive to the needs, skills and interest of users, respecting diversity and individuality.

In alignment with the importance of building a smart society integrated within a smart city, one of RECI's working groups (Table 1) is only and fully dedicated to social innovation; in particular, it is focused on the areas of accessibility, culture and sports, citizen involvement, e-Health, emergency and security management, tourism, education and open data. The main objective behind this working group is identifying the needs of a smart city society, so the smart city solutions adopted are not disconnected from its social context and fail to solve the city challenges.

#### 4.1.4 Technological impact

In the current digital society, ICT appear as the main support element for the development of society, cities and countries. While some studies emphasise the effect of new technologies on economic development (Tranos et al. 2013), and others focus on the analysis of the key factors related to ICT use (citizens' use and access to new technologies) and capability (investment in R&D, staff, training, etc.) (Alfaro Navarro et al. 2017), all studies agree that new technologies play an essential role in the development of cities.

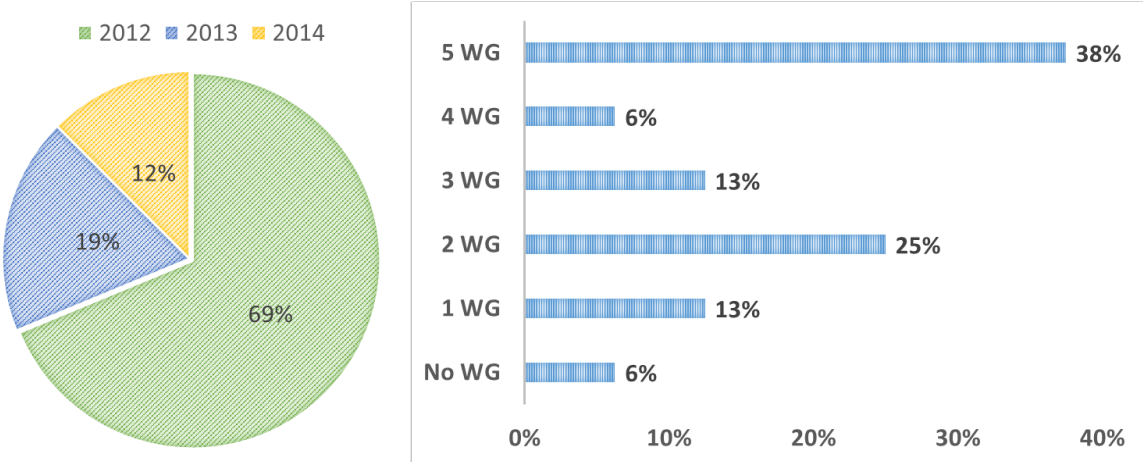
From the work carried out by RECI it is well understood that many cities share the changes and decisions involved in their individual challenge to become a smart city. In addition, some of these decisions are not even individual but global, such as necessity of smart cities to share information with each other. In this context, normalisation bodies play an extremely important role in the development of common norms which should be adopted by all smart cities.

For AENOR and RECI, ICT are the key elements for the development of cities since most of their infrastructures show an ICT nature. The normalisation subcommittee focused on infrastructures has notably been the most active group out of the five in terms of both published and under

development norms. This leadership has been a direct result of two factors. Firstly, most of ICT-related normalisation topics, such as transport and access networks, fall into this category. Secondly, the relevant role of RECI’s members play in the normalisation committee and their experience earned in the ICT field applied to smart cities , empowered by its own best practices repository or CMS.

### 4.2 Survey’s empirical results

In order to assess the degree of impact that the activities promoted by RECI has had over the local management and the smart city approach of its members, a consultation was carried out among some of the first members that conformed RECI between the years 2012 and 2014. These members, being among the most senior ones within the organisation, were selected because they were particularly suitable for establishing a theory on RECI’s impact on their smart city initiatives (Eisenhardt & Graebner 2007). The consultation was formed by a combination of questions in two different topics: their involvement in RECI (i.e. signatory year, number of working groups they are involved and group leaderships) and the impact of RECI in their local administration. The latter was addressed using a combination of 5-level Likert scale (Likert 1932),, to determine the current level of satisfaction with the impact RECI has had on their smart city activities; open-ended questions to find out specific data on impacted areas and good practices, and tabulated questions to measure the economic impact.



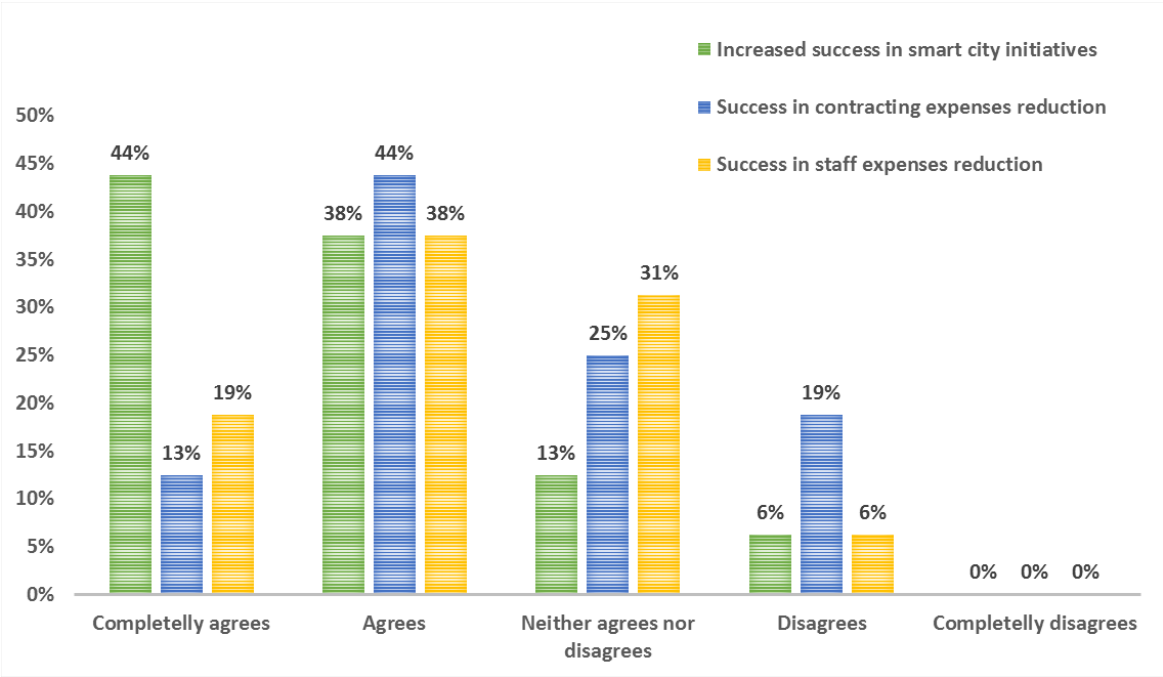
**Figure 2:** Year of adhesion to RECI of participants (left) and number of working groups where participants are involved (right)

The replies obtained, with 64% participation, mainly corresponded to members who initially founded RECI in 2012, with 19% participation from the 2013 signatories, and 12% from the 2014

members, as shown in Figure 2. Looking at the affiliation of the members within the different working groups that form RECI, almost 40% of them were involved in the activities of five working groups, whereas the rest varied from four to none, with 25% of them involved in two working group.

The consultation targeted extracting information on the influence of RECI’s activities on the success of the smart city initiatives promoted by the city government, the impact on the reduction of expenses linked to adjudicating smart city services to contractors, and local government staff development. The results extracted from the answers received are shown in Figure 3.

Overall, the largest impact was associated to the increased success in smart city initiatives where 82% of the participants either agreed or completely agreed with the impact of RECI activities in their particular local success. Regarding savings in contracting and staff development, in both cases over 50% of the participants agreed or completely agreed that there had been actual savings in these two areas, with the rest neither agreeing nor disagreeing. Overall, only a small percentage of the surveyed cities disagreed on getting any economic savings in their local smart city initiatives thanks to their participation in RECI.



**Figure 3:** Perception of impact of RECI activities on local smart city activities

**Table 2:** Specific areas of improvement for smart cities services contracting and staff development

Areas of improvement in relation to contracting services	Areas of improvement in relation to staff development
1. Waste management	1. RECI events
2. Parking and mobility management	2. Training
3. Smart city platform	3. Discounts and free passes to conferences, workshops, fairs.
4. Energy management	4. Travel
5. Public-private partnerships in sensor-related projects	5. Common interest topics
6. Open Data, e-Government, transparency and citizen participation	6. Best practices and lessons learned by others
7. Define the expected quality of service by contractors	

When quantifying the level of savings, only around 50% of the participants were able to monetise this impact in their expenses. This indicates a necessity to introduce mechanisms, procedures and indicators for economically quantising their RECI’s participation impact. Among those who were able to quantise their savings, these were mainly detected in areas related to contracting, with 6% declaring over 60,000 Euro savings in both contracting and staff expenses related activities. In particular, the economic activities benefiting from this savings are enumerated in Table 2.

Addressing RECI’s nature as a meeting point for innovative smart city projects and best practices learned, the consultation surveyed the participants on the level of promotion and adoption of good practices among the members. As it can be seen in Figure 5, about 90% of the participants claimed that they had shared good practices using RECI’s channels. Among them, 65% were aware that their own good practices had been implemented by a different city. In addition, 65% claimed that they had implemented someone else’s good practices. The results display a healthy sharing-adoption culture of good practices in RECI where sharing prevails, empowering the concept of “knowledge-based cities” (Angelidou 2015).



**Figure 5:** Good practices sharing and adoption among RECI members

**Table 3:** Participants' best practices adopted by others

Best practices from other RECI members implemented
1. Valencia City application
2. Energy efficiency plan from Sabadell
3. Transparent governance from Zaragoza
4. Elaboration process of Torrent Smart City strategic plan
5. Smart city KPIs from Malaga
6. RECI's CMS has proven really useful for extracting important information
7. Electronic administration of Valencia
8. Contracting process centralised through the National Centralised Contracting System

**Table 4:** Potential improvements for RECI proposed by consultation participants.

Area of Improvement	Improvement Actions Suggested
<b>Management</b>	<ol style="list-style-type: none"> <li>1. Presentations of good practices and success cases with more technical details, maybe hosted by the cities where they are implemented with live demos.</li> <li>2. Recognition system to reward the most active members, motivating a higher participation and collaboration from some passive members in the working groups initiatives.</li> <li>3. Increase information in periodic communication (e.g. newsletters) with information on RECI and the technical office activities, funding calls, and other relevant information; and CMS, with meeting minutes, assembly decisions and agreements.</li> </ol>
<b>Projects</b>	<ol style="list-style-type: none"> <li>1. Subdivision of working groups projects into smaller tasks with easier management and faster development.</li> <li>2. More initiatives to address common issues where several members share a project, and therefore the contracting process, to reduce expenses such as technical specifications.</li> <li>3. Translate results from the working group projects into practical results that can be extrapolated to other cities.</li> <li>4. Lead project proposals for national and international calls where the interested members can take part.</li> </ol>

To gather further knowledge on the type of best practices shared, the participants were specifically asked about the best practices they had adopted from other cities. These are shown in Table 3. The fields in relation to the best practices adopted expand from governance related (i.e. electronic administration, transparent governance), to tourism (i.e. Valencia city application), to project planning and execution (i.e. Torrent’s smart city strategic plan and Malaga’s KPIs), and energy efficiency (i.e. energy efficiency plan from Sabadell). In addition, when they were asked about their level of satisfaction with the practises adopted, a high degree of satisfaction was expressed.

Finally, the participants were asked about their opinion on the capacity for RECI’s activities to be improved based on their experience. Out of them, 88% felt that there was still room for improvement despite that, in general, their perception of RECI’s activities so far was positive. Table 4 contains the summarised answers from the surveyed members when they were requested

to suggest specific improvement actions. As displayed in the table, these actions are mainly divided into two areas, management and projects. On the managerial side, slight improvements in the internal communication channels and meetings' system are suggested. In addition, many members agreed on the necessity to promote a more active participation in the network activities from the most passive members. On the project side, a demand for more technical information was expressed in order to demonstrate to other cities how to replicate the best practices promoted. Finally, some members suggested that RECI could impulse and coordinate the creation of project proposals for national and international funding calls.

Overall, the suggestions of the members address one main desire, the effective execution of projects or initiatives in relation to smart cities. This efficiency is seen from three different angles: economic expenditure, best practises maximisation and time constrains. From the economic side, some members would like to see initiatives covering common interests in several cities rising. This would allow a reduction in economic costs by sharing technical specifications and contracting administrative processes. The initiative of RECI to lead projects targeting national and international funding calls is also considered another way to join efforts between cities that might be interested in the same project objectives and which can together benefit from a funding grant.

Regarding best practices, it is believed that sharing more technical details on the execution process of the success cases would allow an easier replication in other cities. This could be complemented with a more effective way to share other relevant information through RECI's CMS, such as meeting minutes, agreements, or practical results from the projects carried out by the working groups; and the active collaboration with other international smart cities organisations. Considering the 30% difference between best practices promoted and adopted, it seems that the target should be focused on helping cities to replicate best practices promoted by others.

Thirdly, the members expressed their wish to make the activities and projects propelled by RECI more time efficient by maximising the participation of all interested parties. To achieve this, a more active collaboration of members should be promoted, together with other methods such as: the subdivision of projects in smaller tasks to permit an easier and more agile management and the creation of an award system to reward the most active and committed members. Other suggestions made range from the need to make more open-source software tool available for their use by local authorities, to the request to centralise the network meetings in Madrid to make the travelling efforts similar for all members.



## 5 Conclusions

By studying RECI's successful reference case study, this research intends to contribute to the existing academic literature analysing the successful governance and mode of operation of public networks. In particular, the operational analysis of RECI has shed light on new trends in governance in cities, more concretely in complex networks and network performance.

The literature studying the conditions for success in shared-governance networks (Cristofoli et al. 2014) claims that a network's success depends on the importance of formalised coordination mechanisms, formalised rules to increase the liability of decisions made, well organised network meetings, contractual agreements and informal relationships; and contracts with partner organizations that are also key understanding the performance of these networks. The analysis of RECI successfully confirms these conditions, as extensively described in this article, and extends to the relationship and influence to other stakeholders, such as the national government and standardization bodies.

With the promotion and development of the ultimate goals of interoperability and replicability for all different local initiatives, the case analysis shows a successful empowerment of these objectives through experience exchange. The local governments obtain different benefits from their network participation gaining synergies and efficiency in their operations. This replicability has already led to important savings in terms of contracting services and staff development. This positive nurturing is not only limited to the policy or political impact, but it also expands to important economic and technological in cities. RECI members' active attitude towards innovation has produced important results in terms of international projects funding and the creation of the first national plan for smart cities projects.

Furthermore, RECI empowers the limited power that municipalities have to influence wider decision and policy making through its dominant presence in AENOR through the smart cities normalisation technical committee (CTN 178). These norms do only take into account identified national best practises, but also other international norms and best practices from other countries.

Consequently, RECI can be considered an example of a well organised network, capable of configuring future policies in local administration, necessarily related to efficiency, digitalization and citizen-centricity (with a working group purely focused on the social aspects of smart cities) and with key topics to build the future (e.g. social innovation or environment). The network establishes a strong peer-to-peer collaboration with national and supra-national government and

also manages to influence the normalisation of smart cities procedures and technology usage, as a way to guarantee that their action and projects will be followed by other local administrations, with a clear purpose of reinforcing own strategies and plans.

Finally, despite RECI's overall success, the consultation performed among some of its members exposed several potential improvements that RECI could undertake. For example, the difficulties found by some cities to take on board some of the technological solutions promoted within the network due to their local lack of technical knowledge, and the promotion of joint contracting processes for members in need of a similar solution; were identified as potential improvements. Consequently, it can be considered that RECI still has room to improve in order to become equally useful to cities of different sizes, different technical expertise and different economical resources.

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