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“(Re) building a Smart City. The role of local ICT-based services in emergency response and recovery. The case of earthquakes in Emilia-Romagna region”

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“(Re) building a Smart City. The role of local ICT-based services in emergency response and recovery. The case of earthquakes in Emilia-Romagna region”

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1. Introduction.

Recently Public Sector all around the world had to deal with some economic, political and socio-cultural crises. In addition, in some contexts governments had to face specific natural disasters, like earthquakes or some incidents. Thus the intersection of these situations have been generating extremely complex scenarios for public management.

Those critical conditions open new difficulties and challenges to local, national and international governments. Identifying the factors that contribute to effective response to crises, and the conditions under which relatively minor events may lead to the breakdown of the local public sector (*e.g.* Schneider 1995, 2011 *et al.*) can help to overcome those situations; but this is only a part of the solution, since more structural actions are needed. For this reason, it is important to analyse how the public sector currently manages crisis and emergency situations, not only through austerity and cutback management, but also considering, for instance, the competences of public managers in charge of emergency management (*e.g.* Van Wart & Kapucu, 2011), the local government response in managing disasters as ordinary situations (*e.g.* Noordegraaf & Newman 2011), the inter-organizational coordination of different public entities in disaster relief and recovery (*e.g.* Nolte *et al.* 2012). Therefore innovation, re-organization and re-thinking of public organizations and their management, administrative and governing activities seem to become a necessity in times of financial austerity and in general of crisis.

Recently this seems particularly relevant for the local public sector that have been deeply affected by crises effects. In fact after reform processes aiming to decentralization, nowadays many local governments are not only responsible of governing, but also of delivering a great amount of local services and of investing for city growth and territorial competitiveness. In addition cities have a significant importance in the globalized world (*e.g.* Sassen, 2000) and their management is object

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of a wide and multi-disciplinary literature (e.g. Wheeland, 2000, Nalbandian & Nalbandian, 2003).

In the last few decades the Public Sector has been involved in a vast trend of reform and modernization, inspired especially to the New Public Management (NPM) (e.g. Hood 1991, 1995; Ferlie et al. 1996) which proposed solutions for reinventing, modernizing and improving the public management through the adoption of instruments from the business world. Nevertheless this theoretical approach have been partially amended and implemented by Public Governance (e.g. Kooiman, 1993; Minogue et al., 1998) which has focused on the relevance of the systemic nature of public sector and on the importance of the contribution of both public and private actors on public sector governance and management. Therefore some suggested to realize the New Public Governance (e.g. Osborne, 2010) while the Network Management (e.g. Kickert et al. 1997; Klijn & Koppenjan, 2000) and the Network governance (e.g. Klijn & Skelcher 2007) has enlightened the importance of network organization and public- private partnerships and on their management issues for an effective public management, claiming that it is “a governance activity of complex networks in a specific social context”. Consequently to these theoretical approaches a new research movement on public sector innovation was created (e.g. Borins 2000; Kelman 2008), focusing on the capabilities of innovative public managers and on innovative ideas for public management change.

Thus, considering the general context of crisis, the trend of reform and modernization of the Public Sector, together with the wide adoption of Information and Communication Technologies (ICTs) and e-Government solutions, some cities have decided to adopt initiatives aiming at transforming them in ‘Smart Cities’ in order to face those political, managerial, democratic or material challenges.

Nevertheless, considering that e-Government and the use of ICTs in local governments can be conceived as a component of Smart Cities, this paper aims at investigating the role of ICTs and of innovative measures on emergency response and recovery in a context of implementation of a Smart City. Hence the research questions concern:

1. how do local innovative and e-Government practices impact on emergency response and recovery;
2. and if the implementation of these practices is capable of sustaining radical, innovative changes in local governance.

In addition the paper aims at understanding if ICT-based measures on emergency response and recovery could be enough to enable the Smart City concept in those areas. In order to evaluate this, we propose and try to apply to the case study presented a framework of effective Smart City and of its development process.

This explorative paper has a descriptive and interpretative nature. It mainly adopts an inductive approach and a qualitative methodology. It is based on a literature review, a documental analysis, participant observation and on a case study, concerning the emergency response and recovery based on ICTs in a context of implementation of a smart city, after the earthquakes that occurred in 2012¹ in the Italian region named *Emilia-Romagna* situated in the North of Italy.

In order to support the first emergency response and to speed up the recovery and reconstruction

¹ The more violent earth quakes took place from the 20th of May to went ahead until about middle July 2012.

processes, several innovative solutions were implemented on this territory, as to bypass shortcomings and the lack of financial resources - which were granted only later, and partially, from the central government - . This response to a crisis could represent an opportunity for innovation of governance practices.

In order to deal with these issues, we will proceed as follows: first, we will present the theoretical background of the paper through a short review of literature; we will then present smart cities in literature and propose a model for their development; and finally, we will try to examine the case study through this model and to evaluate the potential power to change local governance reactions to the crisis situations of these ICT-based solutions for emergency response and recovery.

2. The theoretical background.

International literature has paid attention to topics like economic crises, fiscal stress, austerity and cutback management and on emergency response and recovery.

As Cepiku and Bonomi Savignon (2011) underline, the literature on “cutback management”, i.e. management initiatives in leading “organizational change toward lower levels of resource consumption and organizational activity” (Levine, 1979) – in particular the mainstream of the contemporary public administration literature on managing austerity (*e.g.* Pollitt, 2010, 2011; Pandey, 2010; Bozeman, 2010) – has emphasized the need for a holistic and pluralist view and for a pragmatic and a long term, future-oriented approach in order to overcome the crisis.

In this era of austerity several challenges and contradictions are expected to arise, but the depth and precise nature of the crisis varies considerably between different countries and so it’s necessary that each government conducts its own detailed analysis and assessment of its crisis, socio-economic situation and finally of its self-reform capacity. As enlightened by Pollitt (2010; 2011) relationships among reforms and cutbacks are complex, variable and ambiguous. In any case public services are indispensable for citizens and local economy, then it’s necessary to identify a way to join service delivery, efficiency and money savings.

Risk management, is considered an essential matter at a time of downsizing (Stanton, 2013), in case of (natural) disasters, together with risk assessment and risk financing (*e.g.* OECD, 2004). This issue has become quite popular after some recent natural disasters, and therefore object of several academic contributions². Recently t’ Hart (2013) for instance highlighted the challenges, technical, professional but also institutional and cultural, of developing and operating risk regulation and crisis management regimes in an era of highly complex and tightly interconnected socio-technical systems, sketching an agenda for public administration research in this area. *and*

Considering literature on emergency response and recovery, a first interesting perspective can be found in Schneider (1995, 2011), in a study on government successes and failures in response to natural disaster situations. By contrasting the traditional bureaucratic principles that dominate governmental activity with the disruptive effects of disaster and the forms of human behaviour that

² *e.g.* Public Administration online special issue of 2011 on crisis and disaster management or t’ Hart, 2013

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emerge during disaster situations, the author identified the factors that contribute to effective response to disasters, as well as the conditions under which relatively minor crises may lead to system breakdown.

But literature has also focused on specific aspects of emergency response and recovery.

Van Wart and Kapucu (2011) for instance studied the specific features of public managers in charge of emergency management, focusing on understanding what competencies are needed in the response phase of crises. The findings of the authors indicate that senior emergency managers in administrative leadership positions do not abandon emergency management practices, but rather adapt them selectively. Thus, change management is important, but it must be targeted and time sensitive, since crises do not usually much leave time to reorganize adequately operating response systems, much less try to implement wholesale organizational changes. The research reinforced the understanding that different emergency circumstances call for different competencies.

Noordegraaf & Newman (2011) have then been looking at the local government response in managing disasters as ordinary situations. The authors do not look at how local institutions and communities deal with sudden disorder and how they restore social order as ‘crisis management’, as the management of disorder and renewal will be related to the capacity of public management in everyday and orderly circumstances. Cities should help by constituting public spaces through which citizens can be effectively engaged in the process of local restoration and renewal. Managerial templates must then be made meaningful not only after, but also before, emergencies.

Nolte, Martin, and Boenigk (2012) looked at the inter-organizational coordination of different public entities in disaster relief and recovery. By studying the response of aid workers in disaster response and recovery, the authors understood the importance of common incentives and inter-organizational equality for perceiving effective network coordination. In the case study, large and public organizations involved in the disaster response network led to improved network coordination: these results indicate the need for mechanisms that enable smaller organizations to participate in network coordination and leadership.

However, the biggest challenge of reconstruction is not just financial, as a recent OECD report³ (2013), explains. Rather, it is about how to properly implement reconstruction. Reconstruction should help make the afflicted area more resilient, which means not only better able to effort future exceptional shocks or disasters, but become stronger than before, with a sustainable local economy and a long-term development strategy. The report argues citizens’ voices should be an important part of this process, through specific spaces for community deliberation, both physical and online created by authorities which should also ensure that the opinions expressed can influence the decision process. International experiences show that community engagement does have an important role in post-disaster regions since it can help decision makers to determine redevelopment plans and can help ensure that these fit local circumstances, thus creating a sense of community ownership⁴.

³ Policy Making after Disasters: Helping Regions Become Resilient – The Case of Post-earthquake in Abruzzo (Italy)

⁴ According to OECD (2013) the eight recommendations for (re-)building resilient regions after a natural disaster concern not only the necessity to adopt a long term perspective, to develop an integrated strategy locally led for re-development after natural disaster by strengthening the dialogue among stakeholders to raise the profile of needed reforms and quality of decisions, and finally to use the occasion of a crisis to introduce reforms or standards for the country; but also to involve citizens and local stakeholders to help decision making, foster public participation make

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ICTs and e-government in general can for sure help in this processes.

Focusing on change and innovation in the public sector, as suggested by the OECD, literature shows a specific interest on it, even at the local level. Innovation is a complex and multidimensional concept, whose definition is ambiguous and opens a "definitional dilemma" (Behn, 2008) since it is difficult to define it and to explain how it works. As about the public sector innovation, a significant part of literature - referring to the "Kennedy School" school of research on innovation in government - focuses on the capabilities of innovative public managers and on innovative ideas for public management change (e.g. Borins 2000, 2008; Kelman 2008).

As Pollitt (2010) underlines, innovation and change in the public sector look particularly critical in crisis and cutback times like the one we are currently facing, and therefore also for fronting emergencies. In fact efficiency savings often appear from a political and organizational point of view the most desirable way of making savings, but they are not the only solution. Other desirable solutions might come from innovation ("new ways of organizing and new technologies") that is "the heart of management reform", but at the same time innovation needs to be nourished by motivation and responsiveness, therefore the effectiveness of innovation is not assured.

The adoption, use and management of Information and Communication Technologies (ICTs) in the Public Sector and their implications is usually defined as e-Government. But it is also described as a complex phenomenon usually involving technical, business process, relationship and institutional changes, then it can be considered as an outcome of the interplay between ICTs, the public sector and individuals using them (e.g. Bellamy & Taylor, 1998; Dunleavy et al., 2006).

ICT applications can offer some solutions when responding to those political, managerial, democratic or material challenges. In fact e-Government applications are not only able to enhance cost efficiency and effectiveness in the Public Sector, but also to "bring about transformational change in public service provision, administration and engagement with the general public" (OECD, 2005). Thus ICTs have an enabling role in establishing transformational change in the Public Sector. But past experiences with technological revolutions show that transformation enabled by technology is neither linear nor a rational development: "ICT-enabled transformation is in fact a process as much as it is an outcome" (Lips, 2008) and the transformational potential of using ICTs in government and its relationships with society is both substantial and fundamental (e.g. Schuppan, 2009). Consequently an adequate understanding of the impact and implications of the e-Government requires a holistic, integrated analysis of both the technological (the "e") issue and the public management (the "government") one (e.g. Lips & Schuppan, 2009). In general scholars will need a holistic integrated analytical framework in order to access appropriately and explore empirically ICT-enabled informational developments happening in the public sector.

This is relevant for the framework of smart city we propose in the next paragraph of this contribution, since we intend to focus not only on the technological side of smart cities and of the connected (expected) innovation, but also the effects on internal management, on governance and on the implementation of policies.

public deliberation a regular component of the regional development strategy, to build trust, increase accountability of policy making and improve capacity of administrations.

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Several contributions show that often public sector transformation facilitated by e-Government initiatives is limited to change looking as instrumental rather than systemic: in fact, as O'Neill (2009) states, often the transformation formula is doing things differently, i.e. instrumental transformation, rather than doing different things, i.e. systemic transformation. Consequently political, legal and constitutional structures and relationships of government frequently remain unchanged. In fact available results of e-Government research often point at incremental changes in the public sector as a result of introducing and using ICTs, while leaving the inner structure of existing institutional arrangements and external relationships intact since often organizations and their elites use ICTs to “reinforce existing organizational arrangements and power distribution rather than to change them” (e.g. Bellamy & Taylor, 1998, Kraemer and King, 2006) .

Currently many governments are investing in ICTs in order to evolve towards Open Government. It is often identified as an active initiative that is both characteristic of - and required for – a democratic society (Bertot et al., 2012), and it is typically associated with the concepts of government transparency (e.g. Meijer, 2009) and accountability. Therefore Open Government approach pays particular attention to some Public Management values and objectives such as transparency, accountability, public reuse, participation in terms of citizens' engagement and contribution to government decision-making - as to realize e-Democracy - , citizens' sourcing and collaborative service delivery that entails enabling citizens and partner organization to participate in the design and delivery of services/products (Linders & Copeland Wilson, 2011).

Open Government implementation is also fundamental for the development of Smart Cities.

3. The development of a Smart City: from literature to the framework proposed.

Innovation and ICTs adoption in municipalities and local governments can be conceived as a component of a “Smart City”.

Recently, the diffusion of this concept has been promoted by managers, policymakers and researchers around the world, with a plurality of definitions focusing generally on different features of innovation at the local level. Also the European Commission recently started a “Smart City” initiative, initially focused on environment and on energy measures (e.g. smart grids, etc.).

Nevertheless in order to understand the concept of smart cities a useful definition has been provided by Caragliu *et al.* (2009). In fact in their opinion a city can be defined smart “when investments in human and social capital and traditional (e.g. transport) and modern (ICT) communication infrastructures are able to fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”.

Yet there is a plurality of definitions in literature (e.g. among other Nam and Pardo 2011; Chourabi *et al.*, 2012), but the main features of smart cities can be summarized in the technological innovation, the policy innovation and the management innovation. Technological innovation is a mechanism to change and update technological instruments in order to improve services and create conditions for the best use of these instruments. On the other hand policy innovation is a mechanism to respond to local problems and create, through strategic guidelines, enabling condition for the development of a Smart City. Finally management innovation can be defined as a mechanism to provide effective managerial capabilities to facilitate creation and use of innovations.

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Although it is impossible to identify a single model, or a single strategy, to plan and to create a Smart City, in practice, we can find several different approaches, all featuring the three aspects above summarized (Schaffers 2012). However technological innovation, though central in a smart city, is not the focus neither of this work, nor of Smart Cities implementation: from your perspective it is particularly relevant to consider also policy and management innovation.

In effect starting from policy innovation, Giffinger *et al.*(2007) identifies the main policy dimensions for the development of a Smart City, as characteristics: Smart Economy; Smart People; Smart Mobility; Smart Environment; Smart Living and Smart Governance. For each characteristics they also suggest many influencing factors. Figure 1 shows different characteristics and the related influencing factors.

Figure 1. List of characteristics and factors of a Smart City

SMART ECONOMY (Competitiveness)	SMART PEOPLE (Social and HumanCapital)
<ul style="list-style-type: none"> • Innovative spirit • Entrepreneurship • Economic image and trademarks • Productivity • Flexibility of labour market • International embeddedness • Ability to transform 	<ul style="list-style-type: none"> • Level of qualification • Affinity to lifelong learning • Social and ethnic plurality • Flexibility • Creativity • Cosmopolitanism/Open-mindedness • Participation in public life
SMART GOVERNANCE (Participation)	SMART MOBILITY (Transport and ICT)
<ul style="list-style-type: none"> • Participation in decision-making • Public and social services • Transparent governance • Political strategies & perspectives 	<ul style="list-style-type: none"> • Local accessibility • (Inter-)national accessibility • Availability of ICT-infrastructure • Sustainable, innovative and safe transport systems
SMART ENVIRONMENT (Natural resources)	SMART LIVING (Quality of life)
<ul style="list-style-type: none"> • Attractivity of natural conditions • Pollution • Environmental protection • Sustainable resource management 	<ul style="list-style-type: none"> • Cultural facilities • Health conditions • Individual safety • Housing quality • Education facilities • Touristic attractivity • Social cohesion

Source: From Giffinger *et al.*(2007)

Finally, it is possible to reflect on management innovation in/for Smart Cities. From this perspective, it is useful to look at a Smart City not as a final “state”, but as a continuous process where the municipal management coordinates the constant and incremental action of public intelligence development through innovation. This reflects, then, the idea of smart cities as “ecosystem of local innovation”: following the change in structure and processes of innovation in cities, a trend towards decentralization and bottom-up procedures can be found. Local innovation ecosystems can then defined as a combination of top-down and bottom-up approaches, all working towards the creation of local collaborative networks with the main stakeholders, as innovation

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communities.

Starting from the above mentioned concepts, it is then possible to assert that only an integrated approach and implementation process can generate a proper and effective “Smart City”. In fact, several innovative actions are proposed in local governments, but these actions need to be integrated in an holistic vision to be defined as a “Smart city” effort. In fact as above stated, the concept of “smartness” should not be considered as a project, or a specific result, but as a continuous process of inter-action and dialogue involving the municipal government, civil servants and public managers, citizens and the other local stakeholders.

Focusing on crises response and recovery, as above mentioned, emergency conditions could foster innovation, since crises can be an enabling factor for innovation: several academics and experts have observed that a crisis, shock, or strong external challenge to the organization can help reduce resistance to change (e.g. Fernandez, Rainey 2006; Pollitt, 2010; OECD, 2013), although literature is not unanimous on this concept.

From a careful study of theory and practice, we can anyhow affirm that an integrated approach is required to combine response and recovery actions into a “smart” city reconstruction strategy.

Observing some experiences of European local governments trying to implement smart cities strategies, we can affirm that, in most cases, an integrated strategy is present. An international good practice of smart city could be for instance Amsterdam City; or focusing on Italian local governments some possible good examples can be the local Smart City plans of Genua and Turin . All these experiences have in common strategic plans for the governance of Smart City processes.

Hence we can propose an integrated framework for the development of a Smart City and, according with literature, this framework is based on the improvement of the three features of innovation above described:

1. Technological innovation;
2. Policy innovation;
3. Managerial innovation.

While the main actors involved in the processes of implementation of a smart city should be

- a. Politicians;
- b. Civil servants
- c. Citizens/Businesses and other local stakeholders.

In addition, in our opinion it is important to analyse the main features of network governance connecting the actors above described and driving to the overall development of Smart Cities.

The main issues of a Smart City (networked) governance could be for instance: the institutions involved, the rules played by different actors involved, the kind of relationships created, the content of relations, etc....

Finally, the emergency conditions should also be considered in the framework. In fact as stated before (e.g. Van Wart and Kapucu 2011), change management must be targeted and time sensitive for effective change to happen, since in crises recovery actors involved tend to react according to their specific education and role. In this case, an integrated vision is even more important, as well as

flexibility, as Behn (1988) clarifies with the theory of “management by groping along”.

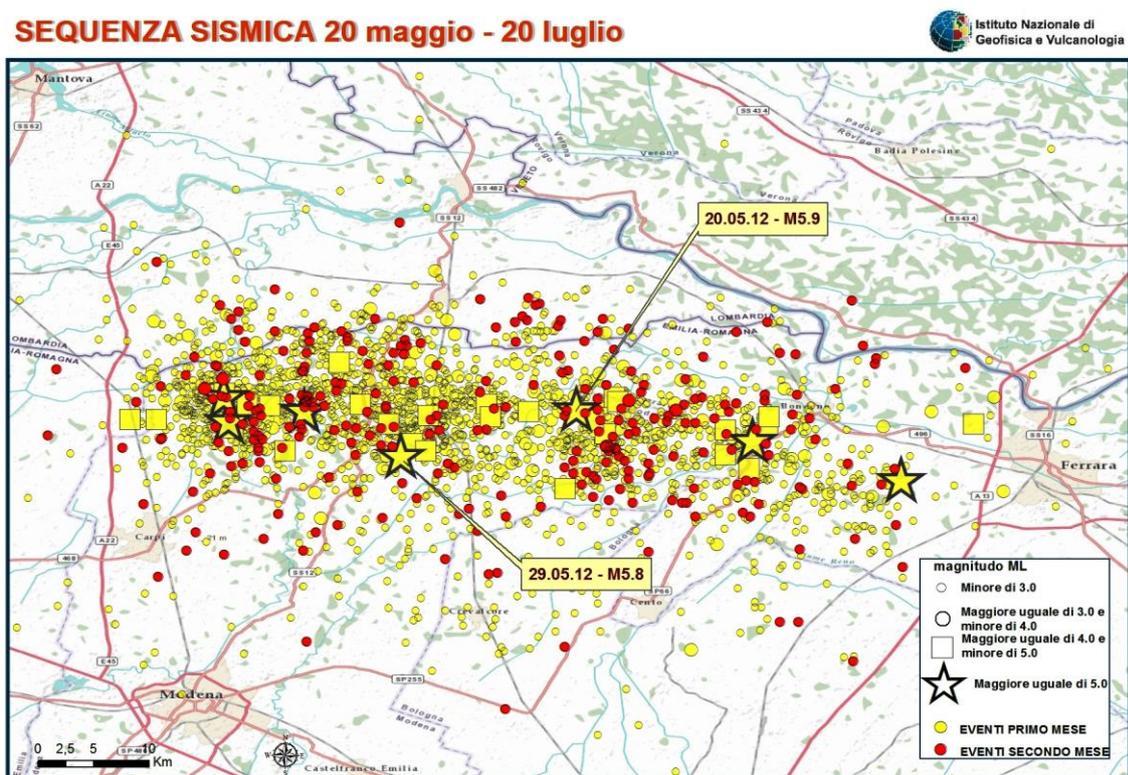
From our perspective the analysis of how these conditions impact on managerial innovation is particularly relevant.

4. The Case study.

The case study presented in this explorative paper concerns the emergency response and recovery initiatives based on ICTs instruments, enacted after the earthquakes of 2012 in the *Emilia-Romagna* region. Those emergency response and recovery initiatives based on ICTs instruments have been activated in a context of implementation of a Smart City.

The territorial area considered in the case study is a part of the *Emilia-Romagna* region, which is settled in the North of Italy. From the 20th May till the beginning of July 2012 a series of earthquakes affected this area killed inhabitants and workers, and destroyed civil, industrial, commercial and institutional building. Figure 2 represents all the earthquakes affecting Emilia-Romagna region from 20th May to 20th July 2012.

Figure 2. Earthquakes sequence in Emilia-Romagna Region from 20th May to 20th July 2012.



Source: Italian National Institute of Geophysics and Volcanology (*Istituto Nazionale di Geofisica e Vulcanologia*)⁵

Initial reports after the earthquakes of the 20th of May 2012 listed seven dead people (especially

⁵ <http://www.ingv.it/>

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workers), and about 5,000 people left homeless. At least 100 structures of historical significance have been damaged or destroyed. Many churches in towns around the epicentre suffered damages. There were also significant damages to factories and agricultural land in the region. The production of *Grana Padano* and *Parmigiano Reggiano* hard cheeses was badly affected; approximately 300,000 wheels of cheese, with an estimated value of €200 million, were destroyed. The magnitude 5.8 (Richter scale) earthquake of the 29th of May left 18 people dead, more than 350 injured, and more than 15,000 homeless. The earthquake was felt in most of Northern Italy, triggering evacuation of schools and other buildings. Some buildings in the Modena province and neighbouring areas, already damaged in the first earthquake, collapsed.

In order to support the first emergency response and to speed up the recovery and reconstruction processes, several innovative solutions were implemented on this territory, in order to bypass shortcomings and the lack of financial resources which were granted, only later and partially, from the central government. This response to an emergency occurring in period of general socio-economic crisis has been also considered as an opportunity for improvements and innovations.

The ICT-based initiatives for emergency response and recovery adopted in the surroundings of Modena can be classified in: ICTs initiatives for emergency response and recovery; and “Smart City” tender projects for disaster recovery and prevention.

4.1. ICTs for emergency response and recovery

Among the different initiatives undertaken in Modena in order to respond to the earthquake emergency and to help small municipalities in the surroundings affected by the earthquake, we can identify some initiatives based on ICTs, like social network usage for public administrations in the earthquake area, and immediate collaboration tools for damage report form filing.

Public entities social network usage in the earthquake area.

Recently the digital social sphere has become receptive to major crisis events: from earthquakes to tsunamis, from sudden financial crises to riots. Social networks have in fact become increasingly popular, and helpful, in sharing useful information on disaster situations.

During the *Emilia-Romagna* earthquake emergencies social media have played a fundamental role in recovery and showed a very quick reaction rate since the news were first given by the users of the social networks and not by the official channels of communication. Thus a more “personal” approach of every user, a real solidarity race, matching demand and request for first response goods and manpower, was experienced through the digital media.

In addition it is relevant to point out that public entities themselves lost important instruments of communication and management: physical archives and communication networks were heavily damaged in the earthquake, and local governments and rescue officials had to find new ways to coordinate response efforts.

Therefore social networks have resulted particularly useful for the recovery of public institutions functions and activities too. First through spontaneous efforts, then through an institutional approval

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and diffused usage (by local politicians and official institutional channels), several key words were used on the main social networks to “tag” appropriate service communications (distress calls, requests for volunteer work or for commodities, etc.) and then to properly intervene and try to solve emergencies.

Immediate collaboration tools for damage report form filing

One of the biggest issues in Italian emergency response and recovery has been the national institutional system, deeply focused on a juridical-administrative perspective and on accomplishments that often contrast with the common sense and the managerial necessity to quickly intervene. After major seismic events, a compulsory form, named AEDES (which in Latin means building or house), has to be filled in by technicians to report damages and to evaluate the buildings’ usability level. The information contained in this form is used by mayors to assess building status and to approve possible evacuation orders⁶.

More than 39.000 local visits were organized in the few months after the earthquakes: for each of this, local government emergency teams had to fill a form and prepare related executive orders. This process has resulted quite difficult for small local governments, already in a difficult situation (town halls destroyed, etc.). So, a database was created, allowing remote access and executive order filing, with the support of other municipalities and in general of all public sector institutions involved.

Online form filing for reconstruction procedures.

The burden determined by the huge amount of bureaucratic procedures and documents to present for recovery and reconstruction processes in Italy has been testified in other recent major earthquakes occurred in Italy i.e. L'Aquila area in 2009.

One of the first recovery actions has then been the management of the huge dataset for reconstruction grants and procedures.

Thus, thanks to a partnership with other Italian Regions, an online platform was created, through the use of the MUDE (*Modulo Unico Digitale Edilizia* – unique digital form for building), a digital form⁷ allowing local governments and technicians to monitor the administrative and financial procedures for the reconstruction process.

Open data access for transparent financial support

After the earthquakes national, regional and local governments immediately proceeded in order to gather resources necessary to finance the reconstruction processes. At the same time, citizens and NGOs demanded for innovative and transparent instruments to monitor financial resources, their collection and their use. Thanks to a partnership between the *Emilia-Romagna* Region, the Association of Local Governments and other institutional partners, the “*Open Ricostruzione*”⁸ website portal was launched. This portal links resources and reconstruction projects through innovative visualizations.

⁶ All of this is enacted by executive orders, that have to be printed on paper and signed.

⁷ <http://www.regione.emilia-romagna.it/terremoto/mude-modello-unico-digitale-per-ledilizia>

⁸ <http://www.openricostruzione.it/>

4.2. “Smart City” tender projects: the case of disaster recovery and prevention.

We have analysed a plurality of small, innovative actions proposed by politicians and civil servants in different public entities, together with private businesses and citizens. But another approach can be undertaken. The Italian Ministry for Research approved in 2012 a public tender for private businesses and research centres on the topic of “Smart Cities”. The actors intending to participate to those projects had to merge into a temporary partnership, presenting a project on a specific “smart” topic (i.e. Education, health care, transports, etc.), and to find specific local governments willing to experiment the results of their research efforts, through a pre-commercial procurement agreement.

In this context, different projects, based on partnerships involving local governments in the earthquake region and aiming at experimenting innovative solutions for disaster recovery were presented, and approved for financial support by the Ministry.

For instance the municipality of Modena is involved:

- in the “SECURE” project ⁹ focused on the research of innovative ways of disaster recovery through the use of integrated and redundant networks and interoperable data centres and interfaces;
- and in the “PICO - Cultural Heritage” project proposing innovative solutions for cultural heritage (historical churches, etc.) registration, preservation and recovery.

Both those partnerships and related project are just at the beginning so it’s difficult to evaluate their content and implementation process.

5. Discussion and conclusions

In this section of the paper we aim at analysing and evaluating the selected case study considering the research questions about how do local innovative and e-Government practices impact on emergency response and recovery and if the implementation of these practices is capable of sustaining radical, innovative changes in local governance.

In addition the paper tried to understand if the ICT-based measures on emergency response and recovery adopted in the case study could be enough to fast forward the Smart City concept in those areas, through the framework proposed in paragraph 3.

Considering the first kind of initiatives, some innovative aspects are present together with the involvement of three main actors (politicians, managers, and citizens/businesses and local stakeholders). What appears to be lacking at moment is an integrated network governance of all the specific innovative measures.

But probably it is too early for a proper evaluation of the governance model and of the related networks.

Considering the second kind of initiatives of the case study, we can identify some specific

⁹ <http://www.comune.modena.it/salastampa/comunicati-stampa/2012/10/smart-city-modena-promuove-201cil-disaster-recovery201d>

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innovative aspects too. An integrated network governance creates coordination between the different actors involved, but the projects so far appear to be limited to specific thematic aspects and do not provide an exhaustive vision for a Smart City.

From the analysis of research results, it seems that ICTs applications have been actually very useful for a quick response and recovery from emergencies and for a smarter and more effective local governance. Thus, from the first feedbacks of the effective application and usage of the case study, we can affirm that innovative and ICT practices have a positive impact on crises response and recovery.

Nevertheless it is not clear whether results and improvements determine radical changes or innovations in local governments and in their activities. In particular, these studies still lack the integration between the different kinds of innovation and different actors that a “Smart City” process requires. Integrated “Smart City” projects supplied for ministerial grants have a larger dimension and provide more aspects to be considered, but they still have limits since they do not provide a general idea for a Smart City. Moreover it seems still early to say if local governments will be able to elaborate a coherent plan to integrate all these actions (several of which are “temporary” and “urgent” measures). Much will depend on the creation and on the development of networks between different actors. In addition it seems that local governments should keep integration and flexibility as the two main keywords for the development of local Smart City plans, especially in crisis response and recovery situations.

Actually at moment it looks quite difficult and demanding to evaluate the effective impact of ICTs-based solution for emergencies response and recovery implemented in Emilia-Romagna region, since little time has passed from the earthquake and from the initiatives’ effective start. In addition the present economic and general crisis is enhancing difficulties in recovery from the earthquakes.

From the first results, these initiatives of e-Government seems quite effective and satisfactory and some limited instrumental changes (e.g. O’Neill,2009), appear somehow in act.

Since many of the initiatives we considered in the case study are part of an overall project of territorial strategic re-definition, and the emergency seems to have played as a trigger for innovation and local governance change, it appears there are some of the conditions useful for a more systemic and radical transformation and for the implementation of an ‘real’ Smart City.

In any case only through deeper future research it will be possible to test literature perspectives and statements and our framework for the right development of a Smart City.

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