Smart community co-creation: the case of centocelle project

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ABSTRACT

Currently, one of major institutional challenges Italy is facing in the field of integrated sustainability is to further develop the local governance capacities in order to facilitate the energy transition; this challenge, which, up to now, was caused by poor adoption of technologies, can be solved through the socio-environmental-energy nexus, through open innovation processes and sharing approach.

This paper examines and describes a series of technological, social, economic and community empowering activities in the Centocelle district of Rome, that have been developed following the Social Urban Network Model.

The paper describes the theoretical basis of the model and the model itself, then it goes on pointing out all the activities in the district such as the establishment of a social-web, smart labs, living labs, circular economy practices and their consequences and impacts on the district itself. As a main result of the social part of the project the authors account for the birth of a new social organization, known as the Community Cooperative of Centocelle neighborhood. As the main outcome of the technological part of the project the authors detail the TRYBe App, i.e. a digital facilitator for the Centocelle district.

1. Introduction

This article is situated within the context of a research into sustainable models of smart cities and smart communities. The focus of the article is on the central role of citizens as actors of sustainable growth processes and urban regeneration in a smart sense through the use of governance technologies.

According to Demitri [2], a smart city is a set of urban planning strategies aimed at optimizing and innovating public services. This model of a smart city is able to relate the city's physical infrastructure to the human capital, intellectual and social life thanks to the widespread use of new communication technologies, mobility, environment and energy efficiency, in order to improve the quality of life and meet the needs of citizens, companies and institutions.

Article 20 of 221/2012 Act (Italian Digital Agenda) [3], defines a smart community as a community built to form a connective structure (open, aware and focused) and, at the same time, an adaptive structure, capable of generating data and knowledge and making one's behavior evolve. Therefore, a city is smart when its inhabitants are smart in terms of skills, relational capacity of inclusion and tolerance and when governance models are aimed at giving centrality to relational goods and attention to common goods. Moreover, a smart city creates

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opportunities to foster civic participation and builds public value.

As a consequence, a smart city is strictly connected to the creation of a smart community. As Meloni [4] affirms "training in social competences, structure of communities, active participation and spreading of cultural processes are initiatives that can activate sustainable behaviors in the citizens because profoundly anchored to tangible needs (mobility, economy, security, health, ageing…)". Therefore, in a smart community, citizens are able to participate in decisions, to co-design sustainable initiatives and to promote conscious behaviours concerning energy and sustainability issues.

Starting from a structural and functional socio-energy, homology and nexus [5,6], the approach of this study is based on mutuality and reciprocity aspects that could depend on a new structured system for the alliance between society and a policy of sustainable energy.

This delicate promotion of the socio-environmental-energy nexus, comes from intensified studies on: a) secondary institutions and projection strategies [7], b) pre-cultural dynamics, c) ontologies of social-technical transitions and the multilevel perspective [7].

Studies on new social organizations that influence energy technologies adoptions [8] are the basis for this nexus.

In addition, it usefully takes in account how socio-economic aspects and technology are in reciprocity to influence each other in a projection strategy and in a democratic mutuality [9]. For this mutuality and democracy of relationship they have to share same

organizational principles and forms of expression that gather social and energy behavior in a common perception [10].

2. Methodology

This research consists in the development of a methodology for the co-creation of a smart neighborhood community capable of actively participating in decisions, activating informed behavior among citizens through actions of best practices concerning energy and sustainability issues. The activity has been conducted within the project known as "Development of an integrated model of a smart urban district" funded by the Italian Ministry for the Economic Development through the "Electric System Research" Program Agreements. It lasted 39 months from 1st October 2015 until 31st December 2018; significant partners have participated in the project, such as research agencies, national universities, private companies, the Centocelle council, various associations and the general public.

The project focuses on a systemic approach in which smart technologies are integrated to offer efficient and sustainable urban services to meet citizens' needs.

To achieve that, a relevant cultural and relational network has been deemed necessary to create new conditions in order to grow and reorganize the social capital of a community that represents a crucial resource in terms of quality of life and welfare.

In Centocelle (Rome) urban district, a demonstrator of smart community was created; this paper describes

some experimental activities carried out with the aim of implementing a local Smart Community according to a model designed by ENEA [11].

The idea behind the Social Urban Network is that, through training courses, individual attitudes, synergies of social groups and so-called "smart" enabling technologies, it is possible to bring out resources and potential that reside in the local "communities" contributing to improve people's quality of life and the very direction of "urban and social regeneration".

The activity involves the development of a methodology based on a technological infrastructure and on initiatives aimed at triggering and enabling a process of growth in the participation and social cohesion of a community for the creation of a smart community.

This method, called "Social Urban Network" (SUN), is based on a system for the interaction of citizens in the urban context through an urban interactive installation and an urban social network.

The architecture of the Social Urban Network is composed of three main parts that concern the virtual, physical and conceptual world of the community in order to well represent what is the context offered to the citizen today, that is, a hybrid between physical and virtual worlds.

The developed methodology, therefore, focuses on the sharing of initiatives related to energy and environmental awareness in the community, sustainability, social planning of individuals or groups of citizens in such a way that the urban and social regeneration process can come together in a shared collective synergy.

One of the pivotal roles for the developing of a significant internal self-organization is the role of the "facilitators", i.e. citizens who, spontaneously or organised in non-profit associations or in professional contexts, are proposed to facilitate the specific topics.

In the Centocelle demonstrator, some groups of citizens have been engaged through participatory initiatives acting on several smart community dimensions, such as co-governance, circular economy, sharing knowledge and proactivity.

Citizens were involved in both the energy and social aspects at different levels; in fact, in a specific activity, named smart home, some citizens have been engaged to increase their own level of awareness within their home energy consumptions [12]. A platform [13] and an app were developed to support this achievement.

3. Smart technologies for sustainable behaviors

In this perspective, smart technologies are crucial for enabling sustainable behaviors related to energy and social aspects, and the introduction of these technologies is also crucial in other projects on the Italian territory [14].

In the Centocelle project, the projections and the convergences of new social organization and human-techno capacities have been empowered through the implementation of a coordinated set of activities that develops in the web (social networks, web portals) and on the social scene (interactive installations, local initiatives) as well as new technologies (for example smartphones App and digital rewards systems).

This infrastructure is named Social Urban Network (SUN) and it aims to stimulate the community to share information, to express their needs for the improvement of their quality of life and to give feedback on the effectiveness and efficiency of the provided urban services.

The Centocelle SUN, named "Centoc'è" is composed by a front-end and a back-end, both managed by the SUN Manager. The structure of the Centocelle SUN is illustrated in Figure 1. The front-end consists of a web page (www.centoce.it), a Facebook page, a Facebook open Group and a Twitter channel. News and events concerning the district, are usually published on the Facebook page that is linked to a social streaming subpage of the web portal. The Facebook Group is instead more focused on arising problems and opportunities in the district, and in general, focused on more dialectical issues. If something is very significant, it can be discussed in the Group, it can be shared in the Page and thus, in the portal. So, this makes the webportal the core of the SUN front-end, where every significant issue is recollected.

On the other hand, the SUN back-end is mainly made of a customized web based Social Analyzer (NetNoc App), which can trace citizens' sentiments and feedback from all the social networks and from the portal itself.

The NetNoc App records, for every post on the Centoc'è Facebook Page, the following items: time of publication, number of likes, reactions, comments, replies and shares. For every post the NetNoc App also computes three metrics: engagement, interactions and NetNoc score.

We have also installed, as part of the SUN, a Smart Node, which is a 45'' non-touch screen where citizens
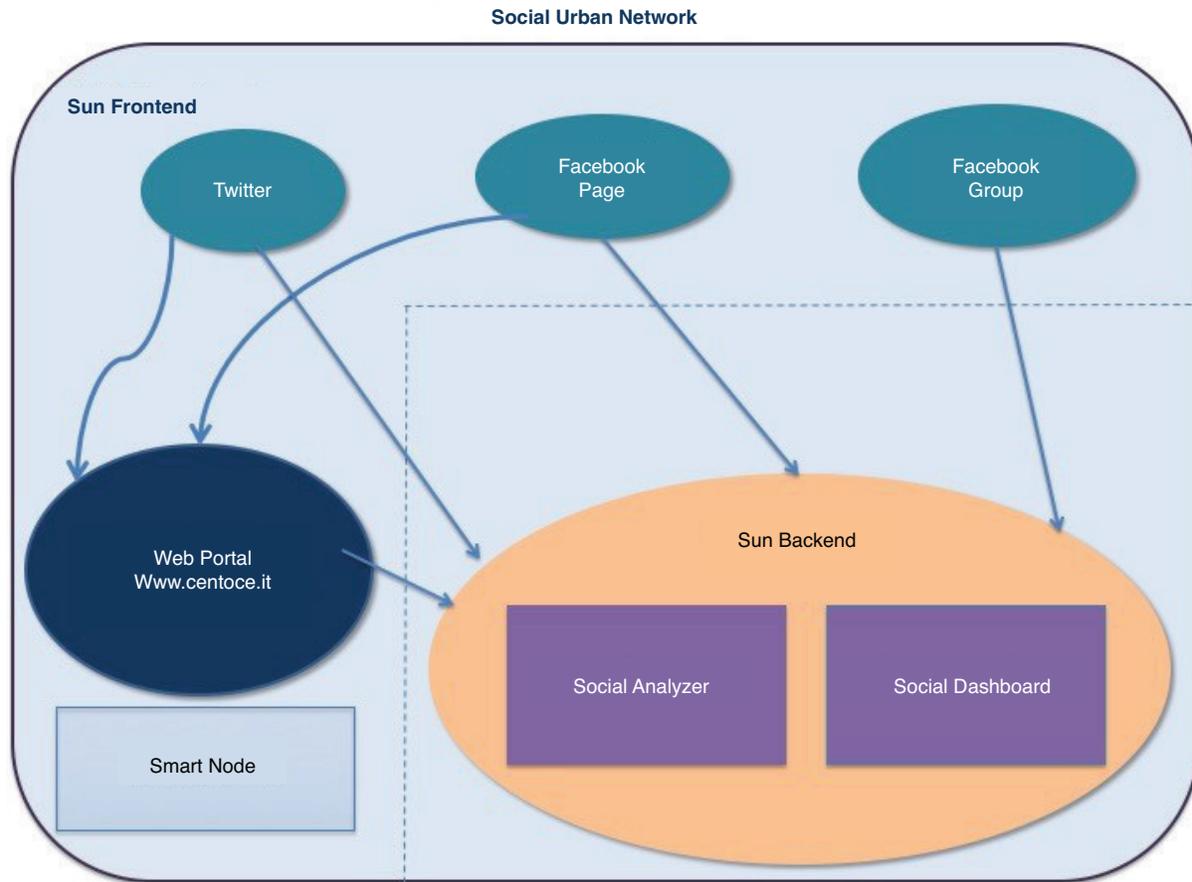
Social Urban Network

Figure 1: Centocelle SUN structure

can see the community streaming subpage of the Centoc'è webportal, advertisings of local initiatives and a short promo of the TRYBe App.

As part of our technological operations in the district, we decided to design and create the TRYBe App, a digital governance tool created to improve the model of the urban platform in the Centocelle neighborhood of Rome.

TRYBe App is made of the following elements:
- a Google Map based map where the projects are geo-located with pins,
- an asynchronous chat,
- a digital clipboard for notes,
- a progress bar,
- an helpdesk.

The map and two progress bars can be seen in the screenshot in Figure 2. After signing in to the App the user can add a new proposal choosing among four categories: Culture, Nature, Social and Green. Once the category has been chosen, users can fill in a form with their proposal. When the submission is accepted users can add the key actions they intend to do to develop their proposal and they can get access to the resources that the district is offering to support their project. In order to reach the final stage of their proposals users must also interact with the helpdesk via an asynchronous chat.

In the App users can also access to their "medal collection": here each user can see how many (if any) digital badges related to the TRYBe App they have earned. Digital Badges put learners in control of their credentials by enabling them to claim and display the badge on any platform. Digital Badges are portable rather than tied to one specific system (e.g., badging platform, learning management system, social media site) and they contain rich metadata that provide information about achievements such as who earned it, who issued it, the criteria required, and in many cases even the evidence and demonstrations of the relevant skills. Digital Badges are released by ENEA via the first Italian IMS Global certified platform, C-box (available at www.iqcbox.it).
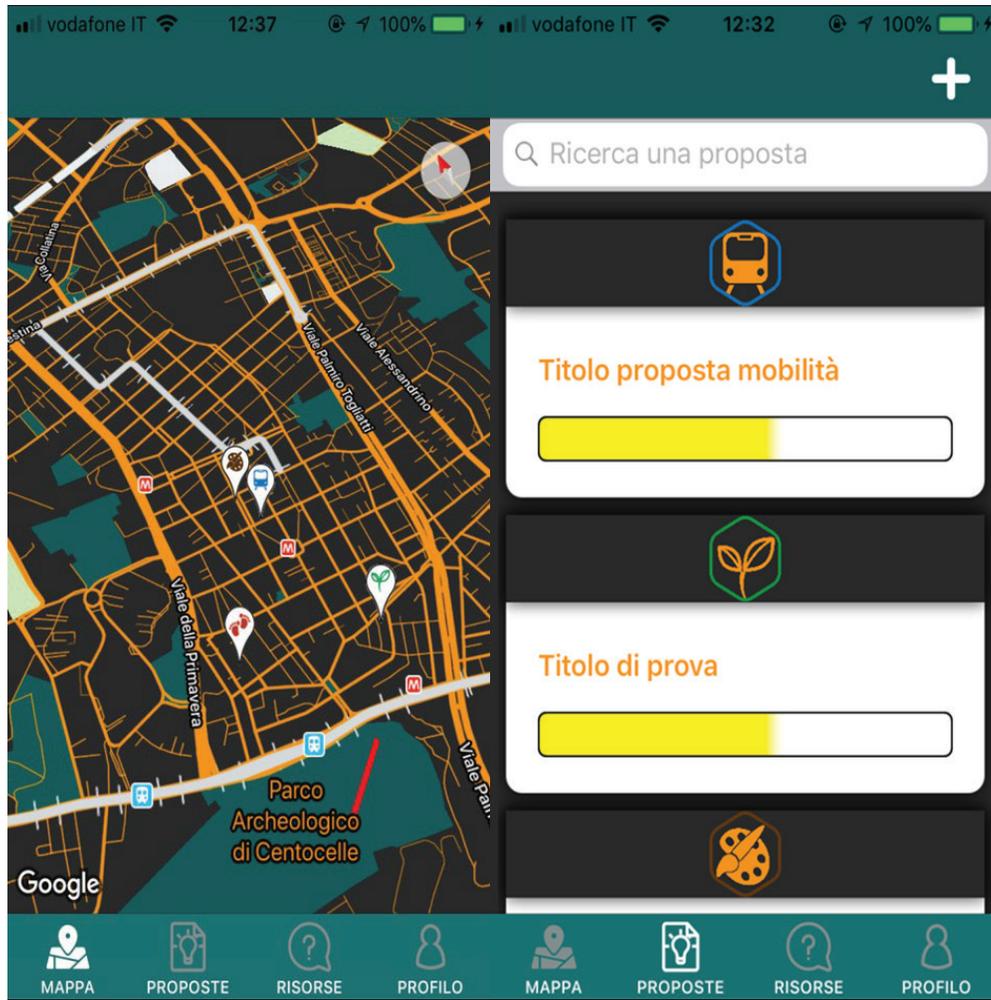
Figure 2: Screenshots of the TRYBe App

Five kinds of Digital Badges are available in the C-Box Platform:

1. Open Badge which is a participation or check-in event badge;
2. Competence Badge which represents the ensemble of knowledges, competences and abilities acquired during the participation to an event or an experience;
3. Job Description Badge;
4. Recollection Badge;
5. Soft Skills Badge.

In the demo district of Centocelle, ENEA has designed and released only Open and Competence Badges: namely 1 Open Badge and 10 Competence Badges with the TRYBe App and 1 Open Badge and 4 Competence Badges for the college student smart lab.

Another activity developed in the framework of the Centocelle demonstrator is related to the integrated sustainability actions connecting environmental, energy and social issues. This was part of an engagement process aimed at involving citizens in the sustainable transformation of their district towards the creation of a smart community.

In particular, in Centocelle, an Urban Living-Lab (ULL) was created where urban innovation is conceived, designed, developed and evaluated as a result of a district stakeholders' active participation [15]. In fact, in order to help the promotion of healthier and more eco-sustainable life-styles, any innovation process should be open and its creative phases should be guided directly by the user. A collaborative approach based on a user-driven open innovation process is renown as Living-Lab, [16].

Actually, the Centocelle ULL puts high attention on experimentation and co-creation process, allowing the exchange of interdisciplinary knowledge among scientific communities, citizens, companies and local administration. One of the main issues discussed during the Centocelle ULL phases, was the promotion of a Circular Economy transition at urban level. According to EMF [17], Circular Economy (CE) is an emerging concept for a systemic shift from unsustainable linear models (based on take-make-dispose approach) towards circular models.

The application of CE at urban level aims to achieve the maximum value from the use of all resources, products and waste, fostering energy savings and impacts reduction [18].

As a result, implementing circular economy at urban level can enable gaining business and economic opportunities, also providing environmental and societal benefits. Therefore, a circular economy contributes to building long-term resilience and sustainability in urban area. Results of these practices have been analyzed in terms of potential energy-environmental advantages related to the adoption of circular economy approach at urban level. In particular, during the ULL phases different CE models were identified within Centocelle District, such as coworkings, community gardens, km0 practices, second-hand markets. These models are based on CE strategies, such as regeneration, sharing, optimization and closing-the-loop [17]. This research has investigated the benefits related to CE strategies adoption. As a result, several benefits have been highlighted in terms of energy saving, waste prevention and CO_2 emissions reduction.

Other relevant engagement processes have concerned the establishment of two smart educational laboratories: one for facilitators and one for college students. The laboratories act as creative spaces for the development of project and communication ideas, focused on the themes and objectives for integrated sustainability (economic, environmental and social).

Therefore, some of the facilitators' proposals focused on sharing economy, energy and environmental issues. In particular, "Recyclability" is the name of a proposal that entailed the creation of an 'urban factory of the reuse and recycle' through demo services; "Culturhub" is another proposal that focuses on a centre that can offer a range of sociocultural services through educational and formation programmes; finally "Real ideas Co-lab", aims to create an incubator of ideas for sustainable projects about district services designed by the citizens.

The accompanying activity of the facilitators also led to another important result: the creation of a neighborhood Community Cooperative, called CooperACTiva, the first community cooperative in a complex urban area. Specifically, the Cooperative is a multiplier of its experience and a new adapter of needs being defined. This new economic operator, governed by the district facilitators, aims to contribute to the struggle that public and social operators daily lead against the digital, social, economic and infrastructural divide that characterizes the suburbs of the big cities. It will do so through a social business plan that will create work for the inhabitants of the neighborhood with activities connected to sustainable integrated tourism, energy issues, culture and creativity, circular economy, collaborative digital and neighborhood services.

CooperACTiva has achieved the aim of making some citizens entrepreneurs and investors not only managers of common assets. In particular, social workers protected by Italian Law 142/2001, have shown that they are taking the path towards the social economy where shortly, energy community could be triggered.

The phase of adjustment and evolution of the governance and the routes of hybridization with the local government is still underway, demonstrating a certain management capacity. Further possibilities to widen the fields in which the Cooperative can operate are those of:

- assisting the accompaniment of other local and non-local cooperative forms;
- strengthening the relationship with the 5th Municipality of Rome
- training service for future social workers
- sponsorship research and self-financing management
- public and private mix services
- energy transition integration.

Finally, CooperACTiva will reinvest all its profits in projects and activities for the benefit of the neighborhoods concerned. It is the first time that this particular form of business, which offers citizens the opportunity to be active protagonists in the management of common goods to respond to their needs, is experimented in a complex urban reality like that of the outskirts of the capital. It is a collective institution and / or community enterprise for urban / local co-governance through the co-management of urban common goods and / or the provision of collaborative social-digital district services in a logic of sustainable local development.

The whole task on Centocelle community has been realized by ENEA research team on smart cities and communities; Municipality V – Roma Capitale; LUISS University - LabGov (Laboratory for the Governance of Commons) that has developed and tried out a co-city methodological protocol for the local co-governance; Transition Italia, that had lead an urban facilitation laboratory for the circular economy; Fusolab Association for the content management of the Social Urban Network centoc'è; Periagogè Association for the definition of a training methodology for a school smart lab; Art Attack srl that has developed the ICT architecture of the Social Urban Networks; Pomiager srl for the development of TryBe app.

4. Conclusions

The Centocelle project has validated the model that will allow Centocelle neighborhood to become not only a smart community but also a self-governed community.

The success of the model discussed in this article is strictly related to a deep community engagement. However, such an engagement can only be obtained for matters that are already emerging within a community, i.e. a community cannot be motivated to feel engaged in a theme which is not coming from the community itself.

Another central point of the model is that, in order to succeed at a community level, the community itself has to accept and actively promote a self-sustainable economic policy, that can be harnessed through constant participation of local associations, crowdfunding projects and other initiatives aimed at enhancing the human capital.

Finally, the model demonstrates that, when dealing with social dynamics, outcomes are often related to unpredictable factors related to human behaviors of individual citizens within the society.

A task of the project has focused its attention on developing a group of district facilitators able to promote initiatives for urban and social regeneration of the neighborhood, based on circular economy principles.

To achieve that a Living-Lab was created, an open innovation environment where transformative and regeneration processes are guided directly by users; in this way the facilitators could be directly involved reducing the distance between different roles and capacities.

Inspired by the principles of centric and polycentric community, such as the American models of "Smallest Unit neighborhood", Centocelle has developed many

organizational centers that reproduce common principles promoted by a new and innovative organization of governance as the center of interpretation of the priority needs for the community itself: the Cooperative of Community CooperACTiva that is continuously evolving.

The process carried out in the Centocelle district, has investigated the level of acceptance of an innovative technology through some surveys on families involved in its testing, highlighting:

- the desire to redesign the technology itself on the basis of knowledge of involved subjects.
- the need for energy efficiency has come second ahead of structuring a technology of integrated services.

In addition, the SUN model has received additional enhancements inputs as well as the TRYBe App. The experiment in Centocelle has highlighted that the citizens take into great consideration integrated sustainability and, in particular, energy transition, referring to the cultural conditions and adaptation in which they want to renew themselves, fixing the limits of adaptation through the lens of new social structures and in relationship of energy technology offer.

Consequently, the Centocelle project delivers an exhaustive contribution to theories and studies on governance and on energy communities focusing on:

- the importance of organizational governance considered as the space that facilitates the emersion of new sustainable projects.
- the importance of developing energy communities within an expanded framework of social capacities that are linked to other issues (not only the energy one).
- The importance of making internal and external roles, capacities, spaces converge in order to build a new knowledge process.

The gap that this study highlights is that energy transition cannot be treated as an a-priori task, but an aspect of the community that transpires after an experience of convergence between socio-technical performance and behavior.

The energy-society combination will be achieved through the perspective of energy communities, in which groups of citizens will be able to gain environmental, economic and social benefits by sharing the production and consumption of energy (prosumers) from renewable sources.

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