From Smart Cities to Human Smart Cities

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Abstract

This paper argues that current technology-driven implementations of Smart Cities, although being an important step in the right direction, fall short in exploiting the most important human dimension of cities. The paper argues therefore in support of the concept of Human Smart Cities.

In a Human Smart City, people rather than technology are the true actors of the urban “smartness”. The creation of a participatory innovation ecosystem in which citizens and communities interact with public authorities and knowledge developers is key. Such collaborative interaction leads to co-designed user centered innovation services and calls for new governance models.

The urban transformation in which citizens are the main “drivers of change” through their empowerment and motivation ensures that the major city challenges can be addressed, including sustainable behavior transformations.

Furthermore, the authors argue that the city challenges can be more effectively addressed at the scale of neighborhood and they provide examples and experiences that demonstrate the viability, importance and impact of such approach.

The paper builds on the experience of implementing Human Smart Cities projects in 27 European cities located in 17 different countries. Details of the technologies, methodologies, tools and policies are illustrated with examples extracted from the project MyNeighbourhood.

1. Introduction

Cities face new challenges every day to create prosperity and ensure good quality of life to their citizens in a world increasingly adopting advanced communication infrastructures and technologies.

The emergence of the digital society creates a tension between threats to established social cohesiveness and ways/opportunities of living in community and building sustainable economies.

As cities grow, the uncertainty about the social models resulting from the digitalization of the society calls for a particularly decisive participatory action from public and private City authorities.

Cities are progressively adopting Information and Communication Technologies (ICT) to ensure that their critical infrastructures and utilities are managed more efficiently.

The City challenges and societal transformations have been recently stressed by the financial crisis contributing to a new social consciousness leading to the creation of new approaches to face and adjust to these transformations. Signs of these new approaches and new models namely citizen driven innovation, (Living Labs), focused on the co-design and co-creation of City services are emerging. The fast growth of ICT enabled services namely the pervasive computer devices and social networking are driving the environment for democracy innovation and societal transformations at all levels of our society. [1]

Although the "smartness" of a city cannot be limited to the advanced processes put in place to ensure monitoring, interaction and processing of data collected by ICT infrastructures, and this regardless of the strategic importance of such aspect. Cities are smart when they take full advantage the human capital of its citizens, create innovation ecosystems where the new dynamics of wealth and jobs creation takes place and promote new forms of participatory governance. In short, when they become Human Smart Cities.

2. Context

Due to the progressive urbanization of our societies, it is becoming increasingly difficult for the...
city authorities to be able to provide suitable services to address citizens' needs.

Over half of the human population live in cities today and this figure is estimated to increase to 70% by 2050. [2] In such scenario, the wellbeing and quality of life of citizens is impacted by challenges such as demographic shifts, gentrification, sustainable housing, mobility, environmental impact, food and water sustainability, health care support, and security and safety. Solutions for these challenges became a priority.

City administration has therefore to play a strategic and foundational role in the conceptualization, development and implementation of adequate responses to local or global societal challenges they face today. This is particularly challenging in a context of crisis and mistrust between citizens and Public Administrations.

ICT infrastructures enabled by the Internet of Things (ability to address and interact with physical objects) and Cloud (computing on demand) solutions promote a better management of critical infrastructures but also offer a yet unexploited potential for new personalized services (e.g. apps based on Open data) and novel types of dialogue between Administrations and citizens, namely though social networks (such as in the Listening and Talking to the Streets approach). [3]

Changes are happening very fast and at a significant scale in cities. Both citizens and Public Authorities are engaging in new approaches to face and adjust to these transformations.

Such new approaches are being addressed in innovative projects (such as Periphèria, CitySDK, Citadel or MyNeighbourhood) in which new governance models are experimented, engaging and empowering citizen in the co-creation process of novel city services. In doing so, these experiments and projects contribute to the materialization of the concept of Human Smart City.

Human Smart Cities use technologies as an enabler to connect and engage government and citizens, aiming to rebuild, recreate and motivate urban communities by stimulating and supporting their collaboration activities, leading to a joint increase of social wellbeing.

3. Human Smart Cities Fundaments

3.1. The impact of Social Changes

Rural communities have, traditionally, been considered to be richer in social capital in opposition to urban neighborhoods where the anonymisation of city life would include losing the interaction between people. This traditional assumption has been challenged by mixed statistical evidence showing convergence of behavioral patterns between rural and urban dwellers. [4]

With the arrival of new technologies and the growth of cities, societies have experienced a big change that is reflected in new urban issues. With the new technological trends that are emerging such as big data, open data and ubiquitous communications, all leading to a digital society, new ways of living and sharing knowledge are occurring. This transition towards a digital society is having a significant impact in the whole society.

Although the quality of life improved across many dimensions with the evolution of technology, the social cohesiveness of the small groups does not seem to have equally benefited. It is still weak and diluted and cities have lost the strength of inter-personal social interaction that used to make people feel more connected to each other. However, from a social point of view, citizens seem to be in a great need of a sense of belonging and identity, looking for further social inclusion and social integration.

3.2. From Smart Cities to Human Smart Cities

The Smart City concept has been deployed through city-wide sophisticated ICT infrastructures capable of sensing what is happening in a city - parked cars, traffic jams, hospital beds available, energy consumption, water or air quality, temperature, noise, etc.

Using Internet of Things (IoT) all relevant data can be collected providing an integrated overview of all city processes. The intensive use of models and data analytics, processed most likely in computing clouds, completes the understanding of the city as a machine and allows for acting in the real word as to adapt it to new circumstances. Cars can be directed to the available parking places, avoid congested zones, ambulances can be redirected, unnecessary consumption of energy can be rationalized, citizens can be warned regarding environmental conditions, etc.

As just described and often implemented in practice, this Smart City vision exploits a very technology-driven approach to understand and influence the way a city operates.

This is possible as many of the underlying technology systems are technically mature and can
effectively bring significant advantages in the management of city services.

The ability to collect and process significant amounts of data also fosters an integrated vision at the base of the Smart City model, highlighting the need to open departmental silos and understand the city’s dynamics and the importance of a cross-sector perspective.

A fully developed Smart City schema applies a similar logic to all the functional elements of a city – transportation networks, energy distribution, waste management, air and water quality monitoring – to allow for an integrated control of the city systems, especially when such systems are linked with the different departments of a city administration.

In addition, combining information provided by sensor networks with smartphone apps (specially viable when open access to public data is implemented) allows the personalization of city services as to fit the needs of a specific citizen according to his position, profile, and patterns of behavior.

In a context of financial crisis, severe limitations have been induced in invested resources in infrastructure and, in some cases, in the provision of urban basic services; this seems to have created a new social consciousness that is currently arising. Citizens are calling for a more effective representation and listening of urban constituencies, overcoming an eroded trust between them and the authorities. In reality, the explosion of mass participation based on Social Networks confirms a "demand from the streets" that is calling for openness, transparency and trust in the governance and political system. [5]

The described scenario justifies the need to evolve the concept of Smart Cities by refocusing it again on citizens, their needs and an open collaboration with public authorities.

The concept of the Smart City was created by the traditional ICT industry aiming to explore a new market opportunity. The technology “pushed” solutions failed to engage the citizens and the public authorities who didn’t take ownership of the “smart” services. Urban challenges are bigger and call for a more radical transformation! In our research we developed new models to engage citizens and public authorities in the co-design and co-creation of services to solve their needs. These concepts integrate a new paradigm for the City which we coined Human Smart City. [6]

The Human Smart City concept appears as an improvement of the Smart City evolving to value further the provision of a smart environment for smart living of people, with smart governance and economies, favoring innovation and the exploitation of all human capital available. Cities can only be smart if they exploit data analytics with the purpose of ensuring "smartness", not only in terms of the automation of routine functions, but also in understanding, monitoring, analyzing and planning the city, improving the quality of life of its citizens and building a trusted governance model engaging and empowering the citizens in the co-creation of solution for collective social challenges.

The Human Smart City approach is gaining increasing support from city governments across Europe as well as the Smart City research community, as it more effectively addresses key challenges such as low-carbon strategies, urban environment, sustainable mobility and social inclusion through a more balanced, holistic approach to technology.

The Human Smart City concept appears as an improvement of the Smart City concept, focusing on creating a healthier and happier environment for citizens.

In the Human Smart City, the city government supports the implementation of an ecosystem of urban innovation (Urban Living Lab as shown in Figure 1), which applies co-design and co-production of social and technological innovation services and processes, in order to solve real problems.

An illustrative and concrete example of such new approach is the development and application of the WIN methodology (Wishes, Interests and Needs) developed in Periphèria project [7], published online and in a printed book [8]) which the authors exploit in several projects and case studies. This methodology supports the process of citizen's engagement and motivation for the collaboration in the co-design and co-creation of civic solutions.

Figure 1. Urban Living Lab Innovation ecosystem.
The government agrees to be engaged and involved in citizens' initiatives on the basis of an open, transparent and reliable relationship, as shown in Figure 1. In this ecosystem, information technologies are used to solve social problems and address economic and environmental issues, focusing on the welfare and happiness of the citizens.

The emergence of a new governance framework in which citizens and government engage in listening and talking to each other is fundamental for the implementation of the the Human Smart City concept as it builds its fundamentals on a citizen-driven, smart, all-inclusive and sustainable environment.

The engagement of citizens in the idea generation is essential to build a trust environment in which community and governance co-design solutions. If citizens are actively collaborating with the city administration it increases their ability to contribute to address urban and social key issues that become a common concern.

The big challenge ahead is not to install the infrastructure or adopt new technologies but to involve the public sphere in the civic life.

It is important to point out that the implementation of the Human Smart City concept can be made through the use of frugal technology and does not always require sophisticated and complex infrastructures. This fact is relevant essentially in what concerns the scalability of the solution. Simple and creative solutions can emerge from the local communities which allow, as an example, big cities to extend their strategies and include broad metropolitan areas, or small cities to integrate new strategies. This is an important advantage for the city administration that has the potential to enable the creation of humanly smart services without having to make significant investments.

Another significant advantage of this concept, from the governance point of view, is the fact that the co-design and co-production of solutions takes out the "burden" of the city administration processes that become lighter and more transparent.

In order to evolve towards Human Smart Cities, cities administrations need to build trust with the community and test the collaboration and participation of the citizens. To do so it is important to identify the different needs of the community by establishing contact with the citizens. Most of the time the city administration only gets feedback from a small number of citizens, thus it is important to put in place strategies to "listen and talk" to all the groups of citizens.

5. The MyNeighbourhood project example

In order to illustrate the impact of the Human Smart Cities concept in practice, we are using the results we have achieved in the context of the MyNeighbourhood project, implemented in Lisbon, Milan, Aalborg and Birmingham.

5.1. MyNeighbourhood project

The MyNeighbourhood project [9], is part of the European Commission ICT PSP Research and Innovation Programme in the field of Smart Cities, aims at recreating and strengthening the social ties and interactions within the neighborhood. [10]

MyNeighbourhood aims precisely at creating new concepts of a smartness in cities that focuses on people and their well-being rather than just on ICT infrastructures and dashboards.

The project exploits the paradoxical assumption that the same ICT trends that have – in conjunction with other urban trends - helped to erode the citizens' connection to urban neighborhoods and communities also have the potential to help reinvigorating them.

A neighborhood, in most urban traditions, is an area shaped or determined by a social group that is created through bottom-up local processes. In the MyNeighbourhood project the aim is to promote qualitative and innovative solution generation and the identification of a set of opportunities that will not only influence the neighborhood but the surrounding ecosystem of the city.

Thus, MyNeighbourhood combines the Human Smart City Vision with the co-design and co-creation of solutions to answer to what was methodologically identified as WINs and uses Gamification and Design Thinking techniques. In this perspective, ICT is applied at a local level to capture user data to help recreating and motivating collaborative communities to deliver bottom up innovation. The MyNeighbourhood approach leads to more efficient use of resources within neighborhoods and provides the basis for innovative city-wide services for residents, businesses and government.

The MyNeighbourhood solution integrates new digital technologies and methodologies, such as social gaming principles (gamification), with the Living Lab methodology to help creating and strengthening existing ties and resolve communal issues in the real life of the neighbourhood. The solution is rooted in an open MyNeighbourhood Platform that combines the data and functionality of existing "City Transformation Apps" with new tools that connect
people locally, both on and offline. It uses gamification techniques to encourage people to get involved with their own neighborhoods and engage their family and friends to do the same. Building upon the six recognized levels of social innovation (the six levels, from "The Open Book of Social Innovation" [11], are: 1. Prompts, inspirations and diagnoses; 2. Proposals and ideas; 3. Prototyping and pilots; 4. Sustaining; 5. Scaling and diffusion; 6. Systemic change.), the MyNeighbourhood Living Lab approach is using new technologies and ontologies to develop local innovation environments that help to rebuild, empower and scale neighborhoods value in a manner that reconnects people, recreate communities and, ultimately, makes cities smarter.

Through the use of the MyNeighbourhood Platform, the neighbors co-create their own solutions for their own WINs. The Platform is a key piece of the Urban Living Lab innovation ecosystem where the user driven innovation, participation, collaboration and co-design of services and gamified process - in order to get behavior transformation – is expected to lead to sustainable and scalable solutions.

Also for city government, the Platform induces a much more open and transparent approach. Through the platform the City Government can easily implement measures as participatory budget, citizen data mapping, well-being services, participatory decision taking, complaints management... These methodologies will bring the city to a huge process which aims, in the end, to innovating democracy, listening and talking to the citizens.

The ultimate aim of MyNeighbourhood is to create a momentum and dynamics leading multiple urban neighbors across Europe to use the MyNeighbourhood Platform to reconnect with one another, share new ideas, create new ways of interacting and help to make their lives "smarter".

5.2. Methodology and tools

The MyNeighbourhood project proposes to build a socio-technical system whereby existing communities can interact in a synergic way, in order to: Strengthen and widen a sense of belonging from a single community to the neighborhood; Assure mutual interdependency characterized by a multiplicity of urban dimensions (social, economic, environmental...); Redirect the singularisation mechanism that is typical of contemporary urban societies towards a highly connected one. [12]

In fact, individuals are nowadays more and more focused on personal utility and satisfaction, which demolishes the relevance of common, social, collective values (social capital) able to develop reciprocity and solidarity mechanisms, which we consider at the base of the neighborhood’s life and conception.

The solution deployment in MyNeighbourhood is based upon three key phases:

- Phase I: Rebuilding Neighborhoods;
- Phase II: Empowering Neighborhoods;
- Phase III: Scaling up Neighborhood Value.

The first phase is characterized by the use the Living Lab methodology to deploy and promote a MyNeighbourhood website that builds upon and improves existing City Information Apps by enabling local residents to connect with each other and share resources – user data such as time, assets & knowledge, ICT tools/ apps - to improve their own neighborhoods. The work with pilot cities aims at ‘kick starting’ the site in the targeted subject areas: health, environment, participation, transport. One of the goals of this phase is to embed a gamification layer in the MyNeighbourhood site that motivates users to keep returning to the site, do more for their neighborhood and engage their friends to set up a new MyNeighbourhood site in their own neighborhood.

In a second phase, Empowering Neighborhoods, the MyNeighbourhood portal is used to feed a resident query or need into a ‘Neighborhood Advisor System’. The aim is to establish a database that will understand the request and map it against potential outcomes – ranging from a relevant existing app through to direct contact with others in the neighborhood who can help or potential crowdsourcing options to create new solutions. In this phase it is important to include a feedback loop into each solution to draw the user back into gamification.

The third phase, Scaling Neighborhood Value, aims at ensuring that the MyNeighbourhood Platform offers a quick and easy one-stop portal for people to add local content, ideas applications and needs about their own neighborhood – thereby facilitating a viral effect. The goal is to make ideas and apps widely and openly available – whether newly created or already existing – through on- and offline channels and tactics such as developer competitions and to aggregate and navigate needs at the neighborhood, city and EU level to provide scalable intelligence at all three of these levels.

The government and public administration is challenged by the need to improve the quality of the services provided to the citizens. This is a big challenge, because it clashes with the inertia of bureaucratic structures and requires higher flexibility of the structure and a positive attitude towards innovation. It is important to include all the actors of
the cities (and therefore of the neighborhood) in the co-creation of consistent and coherent solutions, by stimulating citizens’ creativity. This process needs to be supported by proper tools that support the various phases of implementation, from the early ideas for service scenarios and for a service structure. Therefore a handbook was created to provide tools, developed by designers or adapted from other disciplines. In order to create this handbook two activities suggestive and supportive examples of existing engagement tools and approaches used in living lab environments as well as co-design methods were collected. Forty seven cases have been collected, analyzed and synthetically described in a table while twenty of them have been described in detail in dedicated cards as in the figure below.

Following the work carried out on the cases, coherent guidelines have been developed for citizens and municipalities as main actors of the pilots’ work in MyNeighbourhood Project.

5.2.1. Context analysis phase. The context analysis phase consisted in the identification of the stakeholders, the existing projects and all the factors that are considered to have influence in the social context and in the solution creation. The field work consisted of interviews, guerrilla observation and post-it sessions that created a link favoring the listening and the talking amongst the main actors, including citizens, professionals, experts and volunteers.

The data collection during this phase resulted in the identification of WINs of the citizens and also the needs of the local associations and the municipalities.

5.2.2. Co-design phase. During the co-design phase the data collected in the previous phase was used to co-create solutions and services to address the neighborhood needs. Several workshops and meetings were held to share ideas and co-design services together with the local stakeholders and citizens. Some tools, such as Blueprints, Stakeholder maps and Journey maps, were used to facilitate the interaction and to progress quicker and obtain results.

5.2.3. Implementation Phase. During the application phase of the project the solutions are being applied to each pilot, in order to observe how the proposed concepts and their implementation fits to the real needs and how people are using products, services and technologies proposed as a result of the co-design process. The aim of this phase was to provide useful feedback from the users that could be used to optimize the services and the Platform.

The three stage methodology instantiation pathway for the implementation phase includes the plan, implementation and reporting.

In stage 1 the representatives of the four participant Cities, supported by the respective innovation ecosystem (Universities and technical developers), have been requested to prepare a Service Implementation Plan. In stage 2 the pilot implementation was worked by each pilot team and the detailed operation was discussed and shared between all partners in the collaborative workgroup set.
up for that purpose: that is the co-designed implementation processes converging to a common model. In stage 3 the pilot’s teams reported their individual experiences learning from each other and co-creating a common methodology. This involved weekly virtual meetings and face-to-face meetings every 2 months.

5.3. The MyNeighbourhood Pilots

The four city pilots have different issues and specific characteristics: the work developed in the Mouraria (Lisbon) [14] neighborhood, came up with services more oriented to the social inclusion and local economy issues; in Ladyhood (Birmingham) the challenges addressed were mostly related to transportation and mobility; in Quarto Oggiaro (Milan) the needs identification revealed issues related to maintenance of public areas and elderly people social integration; in Nørresundby (Aalborg) the solutions created concerned health care and social inclusion of people with disabilities. [15]

The choice of these four places enabled the creation of a set of different solutions that can be replicable in other neighborhoods:

- Aalborg has 3 services: Voluntary Help; Accessible City; Cultural Assistance;
- Birmingham has 2 services: Women on Wheels; Travel Buddies;
- Lisbon has 2 families of services: Ó Vizinho; Made in Mouraria;
- Milan has 2 services: Quarto Food Club; Quarto Gardening.

Each family of services may include many services, typically dozens and being open to expand to others services of the same sort.

5.4. The MyN Platform

The goal for MyNeighbourhood platform [16] is to implement the technical solution that meet the goals and services envisioned from the MyNeighbourhood Vision and Concept and from the work done in the living labs and co-design activities within the pilots.

The MyNeighbourhood platform provides technological solutions to help recreate a lost sense of neighborhood that is rooted in the local place, were people share the same interests and needs. As such, the platform intends to provide the means of identifying, searching and managing the needs of the individuals within the context of the neighborhood. This also entails the sharing of knowledge and expertise across the neighborhood.

The MyNeighbourhood platform combines web technologies, existing products, social networks, semantic technology and gamification to ensure the engagement of the citizen and the effective response to their wishes, interests and needs.

The platform architecture takes into consideration the bottom-up design process derived from the co-design activities, enhancing the human focus. The design of the platform is based on user-centered methods, and includes a set of tools and principles that will be reflected in the system and in the user interface. The conceptual model, based in a user-centered design and needs and interests of the user is has a crucial role in the success of the platform, since it makes products usable and understandable for an easy use of the platform.

In the Product Discovery activity (this process describes a set of system requirements and features that address the project goals and responds to the identified services and needs, captured from the field work), that was the base of the creation of the Platform architecture, we envision product solutions from the business intentions and the project vision. This activity will drive the development of the platform. The Product discovery is not just about the solution. This activity will lead the stakeholders to spend the required time understanding more than just what to build: the solution context, business and product strategy, customer segments, product usages, regulatory constraints, legacy product and architecture, users and user goals and how the product will touch the lives of its users.

![Figure 3. System component model](image-url)
6. From experiments to a strategy.

The MyNeighbourhood project and others like Periphèria [17] support the view that Human Smart Cities are a viable concept with a clear impact on the citizen's perception of the "smartness" of his city.

In order to exchange experiences and adopt similar practices, a Human Smart Cities Manifesto was publicly announced and signed in Rome on the 30th May 2013, during the Forum PA Conference, with the aim to address the main challenges that cities, all around the world, are facing today. As stated above, the new challenges call for a transformational change in the way we work, live, and play by applying optimization processes to the usage of public resources. If urban policies adequately consider citizens and their innovation capacity as their most valuable resource, technological and social innovation could be an important contribution to achieve those goals. The cities involved in this process want to reach out to citizens and enterprises in order to join them in an attempt to co-create and implement suitable strategies for each city.

In October 2013, in Bologna, the Human Smart Cities Network was launched having initially 70 cities expressing their interest in membership (including 27 cities, in 16 countries where Alfamicro lead Human Smart Cities projects) as shown in Figure 4.

![Human Smart Cities European Network](image)

**Figure 4. Human Smart Cities European Network.**

On the 12th and 13th March 2014, in Lisbon, the conference "Human Smart Cities - the future of cities today" took place. [18] Both events are significant steps on the emerging World embracing of Human Smart Cities as an evolution from the technically pushed Smart Cities.

The authors argue that this network and best practice sharing mechanisms should be further strengthened.

Entities ranging from Associations of cities (such as Eurocities, Covenant of Mayors) or public entities engaged in the support to the "smartisation" of Cities (such as the European Commission and the World Bank) can play an important role in this process. Awarding recognition mechanisms such as the establishment of a prize are important to consolidate the process that may bring better quality of life and happiness to the citizens in our cities.

7. Conclusions

The Human Smart Cities concept proposes the use of technologies as enablers to connect and engage government and citizens, aiming to rebuild, recreate and motivate urban communities, stimulating and supporting their collaboration activities leading to a joint increase of social wellbeing.

Human Smart Cities call for new governance models in which Public Authorities "hear and speak" with citizens; policies and supporting services make the city government more transparent, participatory, efficient and a mirror of the citizens’ will.

Human Smart Cities empower citizens to co-design and co-create solutions for their Wishes, Interests and Needs, recreating a new sense of belonging and identity, leading to a better and happier society.

The Human Smart City aims to ease the interaction with the city administration: it makes it easier for citizens and business to transmit priorities and needs to city administration; it reduces the need for time consuming face-to-face interactions with city administration and removes the need for bureaucratic processes by facilitating greater neighbor-to-neighbor exchanges within a neighborhood context.

The MyNeighbourhood project can be seen as a powerful test bed for the demonstration of a Human Smart Cities vision and methodologies. The project is based on the premise that neighborhoods represent a heretofore untapped, yet powerful, catalyst for human smart city change. MyNeighbourhood aims to transform the city governance by engaging citizens in an open, transparent and trusted dialog, enhancing and easing the interaction with the city administration: this makes it easier for citizens and business to transmit priorities and needs to city administration, reduces the need for time consuming face-to-face interactions with city administration and removes the burden of
bureaucratic processes by facilitating greater neighbor-to-neighbor exchanges.

The authors believe that the process of deploying Smart Cities needs to be influenced by the logic exposed in this paper, highlighting the central role of citizens. The authors believe that the power of the Human Smart Cities concept and its proven impact on society deserves that some strategic mechanism are created or reinforced at international level to celebrate achievements, share best practices, provide role models and network like-minded city administrations engaged in the promotion of Human Smart Cities.

10. References


