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Title: Social innovation in urban spaces: shifting the human-animal bond into a nature-based solution

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Abstract:

In recent decades, the interest in social innovation and nature-based solutions (NBS) has spread in scientific articles and they are increasingly deployed for cities' strategic planning. Meanwhile the attention and the presence of animals in the cities is increasing as well as the attention in the society. In this scenario, it is worth to reflect on the opportunities linked to the promotion of the human-animal interactions as a new nature-based solution and the social innovation processes that are linked to change the sight on this topic to increase health and human well-being in the cities. The paper aims to look at the process of mobilization of the animal resource as a NBS in enhancing the quality of life of people in cities, understanding and designing the related social innovation paths, also in a perspective of replicability in diverse geographical areas and urban spaces. Through the lens of the research-action EU-project IN-HABIT in Lucca (Italy) (that aims to codify an integrated policy to enhance human-animal relationship and their possible positive outcomes to be then transferred and replicated in other cities), the hum-animal city concept and animal NBS has been co-designed with local stakeholders, as well as its translation into real practices and initiatives (within the social sectors, in the cultural and educational environment, in reshaping public spaces, in touristic sector). The paper reflects on the process focusing on some turning point and key element in the social innovation process offering some first lessons for the replicability in other geographical areas and urban settings aiming at codifying integrated policy solutions based on a new mobilization of the human-animal bond in a social perspective.

Keywords

Social innovation; nature-based solutions; human-animal interaction; participative approaches; integrated policies

1. Introduction

In recent years, the concept of social innovation is gaining the interest of different stakeholders around the world, including researchers, academic institutions and policymakers (Audretsch *et al.*, 2022; Garud *et al.*, 2013). Despite the effort of several authors (Bignetti, 2011; Bonifacio, 2014; Chatfield and Reddick, 2016; Moulaert *et al.*, 2007; Murray *et al.*, 2010; Nyseth and Hamdouch, 2019; Phills *et al.*, 2008) in trying to define the concept from diverse point of views, it is still

considered ambiguous and with a fragmented state of knowledge (Cajaiba-Santana, 2014; Dawson and Daniel, 2010). The European Commission in the last years focused on this concept, and it underlined how social innovation is meant to “empower people, and drive change” in the sense that it leads to social change that produces sustainable solutions and social inclusion (Fougère *et al.*, 2017) and becomes a relevant tool to achieve a more participative and collective thinking. Furthermore, social innovation can also represent a means to improve social capital, social and territorial development (Moulaert *et al.*, 2010) and to reshape social relations between territorial actors aimed at creating social value (Bosworth *et al.*, 2016).

In the context of social innovation, the engagement of population and stakeholders through participatory processes gained importance (Gonyo *et al.*, 2021; McConnell and Drennan, 2006; Schauppenlehner-Kloyber and Penker, 2016) and the main expected outcome from this approach to governance is to facilitate the implementation of sustainable development (Dalal-Clayton and Bass, 2002). In literature we can find proofs on how social and economic relationships are determining factors in the success of such implementations (Beer *et al.*, 2019). In this direction, success can be related to (i) power-sharing (political power, expertise, knowledge, and other power shared among stakeholders) (Hambleton, 2014; Sotarauta, 2016); (ii) building networks (Collinge and Gibney, 2010; Sotarauta and Mustikkamäki, 2012); (iii) dialogue (among leading stakeholders and other stakeholders in a given area) (Horlings and Padt, 2013); (iv) public support and funding (Horlings and Padt, 2013).

When referring to social innovation in the urban context, in particular, cities’ strategic plannings are increasingly considering the implementation of concepts such as nature-based solutions (NBS). The term nature-based solutions represents a wide concept on which the debate among different stakeholders has been open since years. NBS as “*solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions*” (European Commission, n.d.) are an essential part of cities’ development both for creating more sustainable landscapes (Tayefi Nasrabadi, 2022) and for their contribution in improving the well-being of the population (Kabisch *et al.*, 2017). NBS are aimed, indeed, at mitigating the impacts of climate change, conserving biodiversity and improving human health and quality of life, but most of the works that can be found on the topic usually refer to “green solutions” to improve human well-being and mental health that are based on the use of plants (Van der Jagt *et al.*, 2019; Raymond *et al.*, 2017; Vujcic *et al.*, 2017). In literature we can find several works on this topic that refer to different kinds of interventions involving various sources related to nature. At the same time, while in the urban areas the presence of animals, both in families and cities (Arcari *et al.*, 2021; Hubbard and Brooks, 2021; Steele *et al.*, 2019), is growing, NBS that refers to the role of animals as NBS themselves and the enhancement of human–animal relationships as a tool to increase the quality of life in cities are still underestimated.

The human-animal relationship can be traced back to prehistory, more than 50,000 years ago (Braje, 2011), but scientific research on the topic only started and grew from the views about human-animal bonds (HABs) given originally by Konrad Lorenz (Hines, 2003). According to AVMA (The American Veterinary Medical Association), “*Human-Animal Interaction (HAI) encompasses any situation where there is interchange between human(s) and animal(s) at an individual or cultural level. These interactions are diverse and idiosyncratic, and they may be fleeting or profound. The human-animal bond (HAB) can be defined as a mutually beneficial and dynamic relationship between people and animals that is influenced by behaviors considered essential to the health and well-being of both.*

The bond includes, but is not limited to, the emotional, psychological, and physical interactions of people, animals, and the environment” (AVMA (American Veterinary Medical Association), n.d.). Even though several research report the beneficial effects of animals on human psychological well-being (Carr *et al.*, 2020; Friedmann and Son, 2009; Krause-Parello, 2008; McConnell *et al.*, 2011), further research on the topic would be needed. In this direction, the beneficial role of animals as NBS themselves and the enhancement of human–animal relationships as a potential opportunity to increase the quality of life of urban inhabitants and in cities is an interesting innovative topic to be investigated.

The relationship with animals is an evolutionary concept, depending on local culture, perceptions, organization, and it might change from place to place. In our case the mobilization of the existing animal resources as animal-NBS in the urban space might be seen as a process of social innovation. In this perspective, the local actors shift their visions, values, knowledge, routines, norms and habits, toward a path that engages them in moving from a personal and private perception of the human–animal relationship into a common one, with the idea of producing innovative solutions supportive for the quality of life of the local inhabitants - especially the most vulnerable ones - in urban spaces. The paper aims to look at the process of mobilization of the animal resource as a NBS in enhancing the quality of life of people in cities, understanding and designing the related social innovation paths. To reach our goal in investigating these innovative solutions and what would be the elements to codify a proper process, we took advantage of a research-action Eu-project “IN-HABIT” that takes place in Lucca (Italy).

2. Methodology

The case study that addresses this topic is the European project Horizon 2020 “IN-HABIT—INclusive Health and wellBeing In small and medium size ciTies”, a five-year project that involves four European cities—Cordoba (Spain), Riga (Latvia), Lucca (Italy) and Nitra (Slovakia)—and aims at increasing inclusive health and well-being through the mobilization of existing undervalued resources (culture, food, human–animal bonds and environment).

In Lucca, IN-HABIT project aims to create the first human–animal smart city in Europe, with an integrated human–animal policy able to mobilize such resources to increase local wellness for less empowered people and for all citizens.

The project works on different aspects of the human–animal relationships to co-design innovative solutions able to give value to the interaction of animals with people in urban settings (Borrelli *et al.*, 2022; Granai *et al.*, 2022). Starting from the recognition of the importance of this relationship for the well-being of citizens, a participatory process was held with the focus on possible connections between animals, people, and various urban policies – such as tourism, education, social policies, policies related to the enhancement of animals’ related economic and professional activities, and activation of responsible citizenship.

Since the processes of social innovation take into consideration the relationships among stakeholders to improve people’s quality of life by addressing societal needs (Cattacin and Zimmer, 2016), the project highlighted the need of a public-private-people integration in the process to create collective knowledge and vision sharing, hence both technical and political members of the municipality as well as various stakeholders were involved in the participatory process.

To evaluate the practical case of social innovation path occurred in Lucca, we use the five dimensions of *socially creative milieus* (André *et al.*, 2009; Landry, 2008) as an analytical concept for the development of social innovation in a collaborative project. The five dimensions answer the following questions:

- From whom are local social innovations derived?

- Who benefits from such innovations?
- How are these innovations realized?
- What are the constraints in bringing forth such innovations?
- What are the impacts of these innovations?

In the urban environment, the concept of the human–animal bond as a means of improving people’s inclusion and well-being is an innovative topic, therefore the research team of University of Pisa (Department of Veterinary Science – involved in the project) decided to organize various previous meetings with Lucca’s councilors of different departments (social policies, education, tourism, environment, public works). These meetings were aimed to introduce the councilors to the IN-HABIT project and to be able to increase awareness and to generate a common understanding around the topic and the possible features and applications. This represented a crucial moment for the definition of the possible areas for intervention in the city.

The IN-HABIT project has then been introduced to Lucca’s citizens through the organization of different workshops aimed at presenting the concept vision of the project, the main topics and a proposal for future actions and solutions to be deployed. As a result of these events, different stakeholders such as active citizens, stakeholders from different fields of interest as well as people at risk of exclusion have been engaged. Following workshops have been organized and participants were asked to share their opinions about the human–animal bond and what kind of sustainable innovative solutions could be developed to improve the quality of this interaction in the urban environment, both from an infrastructural and organizational point of view. In parallel with the external participatory process, the research team continued the dialogue with the municipality on the suitable intervention areas according to the results of the workshops. At the same time, direct meetings with each political sector of the municipality were organized to better match the coherence between the emerging innovative solutions as well as the existing policies and organization.

As a result, this first phase of the project was employed to allow the city to co-design together with its community innovative infrastructures, solutions and services for the territory.

3. Results

3.1 Agents of innovation

Looking at the process carried out in the case study, the main actor in the innovation is the research partner (University of Pisa - Department of Veterinary Science) that initiated the project. The starting idea was born with the aim of connecting the scientific and operational debate on NBS, the European discussion on smart cities and the evidence of the growing presence of the animals in the society and in the cities. The “hum-animal city” idea linked to the EU-project presented was finalized to open the discussion and to broaden the general shared vision about the animal resources in cities and their useful public interaction with humans and the quality of their life. This first idea was shared inside the research group as well as with relevant local partners for the project – Municipality of Lucca and Lucca Crea (involved in the organization of many events, the most famous being “Lucca Comics”). Some local animal associations were also involved from the beginning to share the concept and to start the initiative.

The consolidation with the EU-project partners was then useful to validate the idea in a broader group and to finalize the EU call application. At municipality level, the involvement regarded progressively the main councilors for the different political sectors involved trying to better organize and share the vision and the idea. The process followed a positive spiral although the municipal electoral process stopped the dynamic, both for the campaign period and due also to the change in the local political administration.

3.2 Recipients: who benefits from the innovations?

In the view of the project holders, the scientific and societal attention still underestimates the human-animal bonds in cities. In such a perspective city planning should be re-thought by opening a reflection on the concept and on the possible outcomes it can offer in terms of health and well-being for the future of the cities. To move forward in such a direction and to better identify the main targets of the project, a specific participatory process was designed.

After the project approvals, a stakeholder map was prepared to facilitate the involvement of the different categories in the project. To stimulate the participation a public platform (the so called "IN-HUB") was organized, although in times of covid-19 pandemic's limitations. Progressively different actors have been involved - like local NGOs active in both the animal as well as the social sector. Stakeholders were, and still are, indeed, the key protagonists in innovation processes and their engagement is relevant to translate an innovative idea into a successful innovation. In the attempt to involve the whole community in the urban processes warranting the consideration of the contribution and the competencies of each stakeholder, the IN-HABIT project case chose to create public-private-people partnerships (PPPPs) involving active citizens and stakeholders of the city of Lucca. This methodology allows the active involvement of different socio-economic actors and public institutions. At the same time, the PPPP become the place to share information across different sectors (Xue *et al.*, 2021) to solve defined shared problems. This choice aimed to empower citizens who can share their awareness of their territory (Marana *et al.*, 2018), hence becoming co-designers, co-producers and co-evaluators (Boniotti, 2021). During the meetings carried out with the PPPP scheme the co-design of the possible solutions was facilitated, as well as the choice of priority groups to be addressed with the possible actions. The result was that elderly - and vulnerable people (people with disabilities, autism, young people in need, schools) - were considered as priority targets for the project.

3.3 Realization of the innovations

The innovative solutions regarded both the re-design of public spaces devoted to improving the human-animal relationships, and, by this way, also the social dialogue among diverse social groups. Regarding the re-design of public spaces, in the first phase of the project, a period was dedicated to the so-called "Animal Lines". They were conceived as a path that would link the old city center (the city's ancient walls and the under-utilized surrounding green areas) with Lucca's suburbs and peri-urban (the Serchio park on a one side, and the ancient Nottolini water conduct on the other side). The participative process within the community helped in gathering information, needs and ideas about what to implement inside the areas, what materials to use to create an accessible place and how to make the areas comfortable for both people and their companion animals and typology of suitable activities to run in these spaces. Along the path, where simple interventions will be implemented to adapt the existing cycle paths or pedestrian paths to become more pet-friendly, there have been built different areas ("relational areas") accessible to people and their companion animals. These spaces aimed to foster and facilitate the human-animal relationship and, consequently, social relations and inclusion of the most fragile subjects. The areas have already been inaugurated and they are open and well frequented by interactive people.

The co-design of these infrastructural interventions was then followed by another participatory phase aimed at opening a discussion among stakeholders about possible solutions - as services based on the human-animal interaction - to be implemented in the city and ways of developing them.

From the first discussions of the various stakeholders involved in the process, several innovative ideas emerged and provided a clear definition of the needs of the territory (Figure 1).

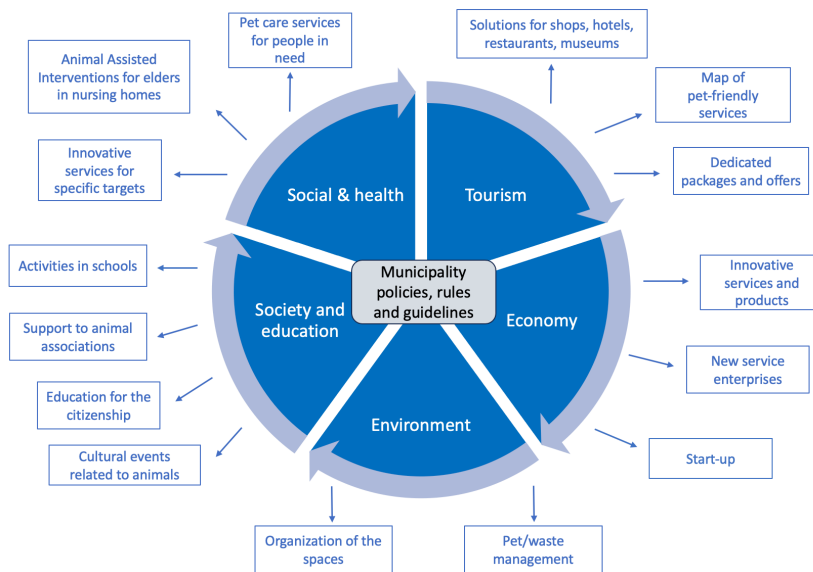


Figure 1. Areas and proposal of interventions (elaboration from the authors).

In the direction of social innovation actions, the IN-HABIT project in Lucca put in place various activities involving different sectors. The process aims to change the common perception about the human-animal relationship, from a private to a wider and more public one. This can regard many areas of the city intervention, from the social sector to the educational one, from the professional sector to the touristic and to the economic sector. In such a perspective the human-animal relationship might become a transversal area of interest for an integrated urban hum-animal policy. The idea of looking at the animals from a personal individual private way to a city asset became the first step to better mobilize the animal resources present in the city in a new common and public perspective and to generate innovative solutions for the local quality of life. In such a perspective also educational training for mindset change and to support businesses ideas were organized. Among the single solutions, a strong process of learning exchange and procedure re-design has been installed to re-frame the possible valorization of human-animal interactions for elders, and in such a direction two nursing homes for elders in the city of Lucca were involved.

Relating to the social sector, indeed, Animal Assisted Interventions (AAI)¹ in nursing homes have been implemented to enhance the well-being of elderly individuals (Bernabei *et al.*, 2013; Berry *et al.*, 2012; Pope *et al.*, 2016). To organize these activities a process of co-production has been put in place by the Municipality of Lucca in collaboration with the University of Pisa. This methodology starts from the concept introduced in the health sector that named 'co-production' the process in which individual citizens and groups are involved in the user-generated knowledge in public service (Verschuere *et al.*, 2012). In healthcare, the concept of co-production is receiving increasing attention to improve the quality of care, and it is defined as *"the interdependent work of users and professionals who are creating, designing, producing, delivering, assessing, and evaluating the relationships and actions that contribute to the health of individuals and populations"* (Batalden, 2018). Three associations, appropriately trained and experts in the field of AAI, participated in the co-production after applying to a call opened by the Municipality of Lucca as well as educators and directors of the two nursing homes. Starting from March to June 2023 different meetings were held to co-plan the project, as well as some visits to the nursing homes to better analyze the context and to help in the organization of the best possible setting for the activities. From all these meetings it was created a unique project for the organization of the interventions in the two nursing homes

¹ Animal Assisted Interventions (AAI), generally referred to the term "Pet Therapy", include a wide range of projects aimed at improving the health and welfare of people with the help of "pets" (companion animals). (Ministero della Salute, 2015)

from the three associations. In September 2023, the project started in both the nursing homes, and it will last until (approximately) May 2024 with fifteen meetings for each of the six groups of elders (three groups per nursing home, grouped together by the educators based on their health, behavioral and mental characteristics) for a total of ninety meetings.

A second social service has been co-designed with other NGOs and the Municipality to support people in temporary needs in the management of their companion animals to reduce anxiety as well as to prevent animals' abandonment in case of temporary limits of the animal's owner (i.e. hospitalization, temporary disabilities in case of isolated person).

Educational sector has been involved too and educational activities are going to be planned with primary and secondary schools for educational purposes and interaction facilities. A card game has been designed and deployed to make the educational experience gamified.

In parallel, some touristic services are under discussion with hotel managers and other economic activities (restaurant, animal shops and animal services, museum, touristic guides).

3.4 Constraints

Looking at this innovative process in Lucca, the crucial part can maybe be related to the initial stage of the project, when most of the effort was spent in co-creating a new shared vision on animals. In the urban scenario, nowadays, animals are increasingly seen as actors to be managed or protected by specific rules, norms, and actions as part of their citizenship. Meanwhile a shift in the national constitution assigned new rights to animals in general. Animals in the cities might be considered as new citizens and from this point of view, by the way of a process of agency, they can be included also in newly designed and integrated policies. At the same time the interest in terms of positive personal interaction in a public -social and educational- perspective regarding the potential of the human-animal bond is growing and new projects/solutions, although mainly isolated, are under discussion and testing.

To share the idea of animals as NBS and as a common pool of resources supportive for the health and the quality of life of local inhabitants was at the same time a new but demanding task with all the public and private parts involved. When talking about the definition of innovative solutions at a territorial level, the involvement of the municipality is essential to create a dialog among institutional sectors and political technical staff and to consolidate and to widespread the new concept.

To face such cultural shifts a social process involving both the institutional parties (technical and administrative staff, councilors) and the citizens was organized, by the way of face-to-face meetings as well as focus groups and participatory exercises. In this direction, indeed, different moments of discussion involving several stakeholders (public, private and people) representing the different points of view in the territory were necessary to open a possibility to shift the view of the presence of animals in the city from an only private-personal link to a public affair. To achieve this, internal (into the administration) and external (with external stakeholders - economic sector, professionals, citizens, NGOs operating in different sectors, citizens, schools, diverse related service-) dialogue and communication effort was and still is needed. Several meetings (both general and more sectorial ones) were organized initially to involve councilors with the topic, as well as to obtain their political engagement along a shared process, and the alignment of possible solutions with existing policies and the possible intersections among areas of interests.

Participation, a large involvement of many diverse stakeholders, the difficulty in translating the common interest about the animals (increasing in the society) into a new narrative more linked to their citizenship, to the agency implication, as well as the opportunity to mobilize the animal resources into a public good supported by well integrated policies were and still are the main efforts in the innovation process.

3.5 Impacts evaluated

The main outcomes of the social innovation process in the Lucca case can be read under diverse circumstances. Regarding the process itself, the organization of new public spaces in the city, the outcome related to the innovative soft solutions co-designed and co-deployed along the process, and from the view of the research process itself.

The social innovation process was affected and delayed since the beginning due to the pandemic situation that affected the planned activities. Thus, the process needed to define the new collective knowledge among stakeholders and to shift the common perception related to the presence of the animal in the city as a public object became more difficult. This generated more reiterative attempts to involve the different sectors of the public administration in the new idea. Although there was still a partial achievement to move forward on the idea of valorizing animals in the city as a new resource for human health and well-being in diverse circumstances.

The co-design of new public spaces involved since the beginning both the Municipality and the stakeholders to select the public areas to devote to the Animal Lines, as well as to design the new spaces according with the aim of a better interaction among humans and animals and between humans and animals separately. Following the administrative rules and the city plans, besides the issues related to the inflation rate and the lack of building material on the market, the areas were inaugurated according to the plan and are well in use with a positive evaluation from the users themselves. They declare a unique environment to manage their pets (some come also from long distances to the areas) as well as they rate positively the social exchange related to the use of the area.

Regarding the soft solutions they were and are under qualitative and quantitative scientific evaluation. As regards the solutions designed for the elders in the nursing homes (Animal Assisted Interventions) both the impact of the interactions on animals and on elders are going to be evaluated. In November 2023 a focus group was organized to monitor and to co-evaluate with the actors involved the process and the qualitative results of the project of AAI in nursing homes and their effectiveness in the social innovation field. The meeting, held in Italian, lasted one hour and a half, three people from University of Pisa moderated the process and eight people participated (n=1 educator from one nursing home, n=2 educators from the other one, n=5 persons representing the three associations that carry out the activities) and it was audio recorded and analyzed by the researchers. The aim of the focus group was to investigate:

- what is working in the realization of the project and what isn't;
- if this activities conflict with the daily routine and how;
- what is the impact perceived on the elders both by educators and by the associations.

In this case different elements enter the game, like specific knowledge, responsibility sharing among institutions and new private actors, the definition of a new commitment of NGOs and private citizens into the innovative hum-animal perspective, the opportunity to redesign roles and procedures in the provision of effective opportunities for the elder's quality of life in the nursing homes.

The focus group has highlighted different positive aspects both in the organizational part and in the impact perceived on the people. The findings of the focus group session could be regrouped in two clusters. The first cluster includes the organizational aspects: the proper preparation of the setting and of the groups to involve has been crucial to the good result of the activities. Regarding the involvement of nursing homes' staff in this type of activities, it has been found that, apart from the educators, the rest of the staff of the two structures was little involved. They often asked the elderly about the activities, but they never actively participated, also for reasons of "permanent" commitments to be carried out during the day and, therefore, a lack of time. As for the participation of managers, in one nursing home the director inquires and asks about it, in the other often the director comes during the activities to watch how these are carried out.

The second cluster relates to the perceived impacts on the elders participating in the activities: the educators of the two nursing homes reported a high participation and several benefits noticed in the elderly people participating in the activities with dogs. The benefits perceived by educators and associations are reported in Table 1.

Table 1. Impacts on elders given by the interactions with dogs

Mobility aspects	<ul style="list-style-type: none"> • improvement of mobility skills for willingness to participate in activities and to interact with dogs
Psychological aspects	<ul style="list-style-type: none"> • memory's improvement (the days in which they have activities and the names of the dogs) • calm level improved as sessions progressed • maintenance of the attention due to willingness of carrying out the activity with the dog
Social aspects	<ul style="list-style-type: none"> • indirect benefit in seeing other elderly people having interactions with dogs • better interaction between older people and with educators and other practitioners • improvement in the expression of emotions • improvement of conflict reactions

The activities have various impacts in different fields, improving the quality of life of elderly people involved both in the mobility, psychological and social aspects. The presence of the animal, indeed, acts as a catalyst for the participation in activities in which normally, both for physical problems and for lack of will, the elders would refuse to participate. In general, educators have found a positive effect on the elderly given by the activities with animals that is extended even later. An expectation is created while waiting for the return of the animals and the memory is activated (in persons with more advanced cognitive abilities) to remember on which days and which groups perform the activities, as well as the names of the dogs. The level of calm achieved has always improved going forward with the sessions, as well as the maintenance of attention thanks to the desire to participate in the activity with the dog.

The benefits in the social aspect generate an advantage in the relationships, both in terms of increased interactions between elders and in the interactions with educators and the other operators. From the point of view of the emotional sphere, the activities with the animals involved the elderly to the point that even those who, even if stimulated, remained quite rigid and absent, expressed both with the body and the emotions to interact with the animal. The conflictual reactions, which are often generated within the groups, are nullified during the activities thanks to the presence of the dog and the desire to interact with him. These reactions do not disappear completely in the rest of the days but show up in a less explosive way. Lastly, even elderly people who, by personal choice, have not interacted much with dogs, have however benefited in seeing the others having interactions.

Finally, from the research point of view, some first remarks might regard the strong commitment for researchers involved in the action in supporting and coordinating a prolonged living lab affected by many interferences. In the Lucca case it was clear from the beginning that a transition process should be facilitated from the existing perspective regarding the human-animal bonds to the new suggested one looking at the public perspective of the new resource mobilization. In this case, on the one side the innovation needed cannot be produced outside an intense and continued interaction among many - and in a growing number - diverse actors. The process is based on the knowledge-creation metaphor of learning (Hakkarainen *et al.*, 2004; Paavola *et al.*, 2004) that should facilitate the organization of a positive spiral of knowledge bringing tacit and explicit knowledge into the center

of a reiterated dialogue among participants (Nonaka and Takeuchi, 1995) to facilitate an expanding learning process (Engeström, 1987) and to generate a new diverse context in which the innovation can root, consolidate and expand in different directions. In such a process the new idea became an hybrid artifact and around it diverse actors, mediated by the researchers, are able to generate the new knowledge and the new solutions that are needed in order to mobilize the new resources into a new opportunity. It's clear that such a process is strongly engaging and it shifts the way of doing research in a new dimension. It's also true that outside this process the innovation cannot take place, especially when it is a disruptive one.

4. Discussion and conclusions

In the context of social innovation, NBS are always seen and tested as suitable solutions able to enhance the quality of life for people living in urban areas, but the mobilization of the animal resource in this direction ("animal-NBS") demands the organization of a proper process able to involve most of the public-private-people actors. The transition paths emerging from this social innovation process are demanding to reshape common visions and actions toward an innovation of meanings about what we consider with regards to the animal living around ourselves.

As we have seen from the results, social innovation processes might start from many diverse actors, and among them by university centers. In that case, the research path should be mediated by an active involvement of the researchers into the process of change. The continued mediation among diverse public and private actors is then crucial to organize a path of social innovation and to progressively systematize the achievements. In this direction, participative approaches and well-designed methods might support the organization and the positive outcomes in such processes. Accordingly, the process of facilitation is pivotal to put the focus on the perspective in which humans can benefit from the positive outcomes of their relationship with animals. In the studied case, the process facilitated the co-design of innovative solutions to be introduced in the territory of Lucca, both from an infrastructural point of view and for the social innovation interventions to be implemented in the city.

The preparatory phases, even if time consuming, emerged as crucial to accommodate local stakeholders in an innovative perspective – in our case the idea of animal-NBS as a common good - in the urban context. Another achievement regards the idea that vision and knowledge shifts might happen when a cluster of diverse pilot initiatives contributes to create and to consolidate the new reality as progressively emerging from the social innovation path. The pilot initiatives emerging during the social innovation process can generate new evidence and offer food for a reflexive exercise in the public and private actors involved, so consolidating the process along the time.

In our path such evidence comes from the evaluation of the impact of some first animal-NBS. The AAI project in nursing homes, indeed, showed how the emerging positive outcomes can be linked to diverse aspects like: a strong and open co-design, co-deployment and co-management phase where new actors start copying in a diverse perspective and with innovative procedures; the opportunity to introduce in existing well formalized (social/health) environments (the nursing homes for elders) transforming solutions although under a well-established and formalized process able to mediate breaking innovation with existing and consolidate responsibility and procedures.

The social innovation processes might mobilize existing resources in the provision of new common goods in the urban environments so generating new opportunities for less empowered and more fragile people in the urban context, like the elders. The first evidence show us how also small initiatives (like AAI) might strongly affect in a positive direction (new expectations, higher social interaction, a renovated expectation behind the daily routines) the everyday life of fragile citizens.

This is also emerging from the feedback coming from the users of the new public spaces (Animal Lines) which declare a sense of usefulness both in the management of their pets, in the new daily

routine organized around them, but also in the social interaction that they may experience in the new space among and with other people frequenting the areas.

Besides some positive elements, along the process many constraints emerged like the need of a continuous and well-organized support to the social innovation process itself and the opportunity to mediate and to facilitate the knowledge shift although the emerging resistances and the effort to co-produce in a collective way the new knowledge needed to give support and to do not interrupt the process.

In conclusion, in a perspective of replicability, a process of social innovation towards the mobilization of unexpected resources – as the animal one in our case – above the participation of citizens and public entities, is based on the active engagement of the technical staff and the capability to install a positive spiral from the hybrid starting idea, by mobilizing many local public and private stakeholders, and moving along a process able to move in the between a radical and transforming idea and the existing rules, procedures and responsibility, giving evidences, and so increasing and attracting the interest of the political realm and the organization of new rules and institutional attitudes.

This outcome is not an easy task to be achieved, and it is highly demanding in terms of collective knowledge creation, but a strong facilitation process could ensure to reach negotiation, vision sharing, public-private-people integration, definition of converging paths and translation of the old practices into new ones. When this occurs, an alignment between the public sector, private sector and the people can emerge, although towards many efforts and potential risks of failure. As the case of IN-HABIT in Lucca is trying to demonstrate, in small-medium size cities a smart transformation can lead to unexpected solutions and can be based on existing under-valorized resources like animals. As in the case of the animal-NBS they might involve many sectors of the administrative life in an urban environment (education, environment, social/health sector, public spaces, transportation, cultural events, and economic activities). The social innovation process might start from little pilot and initiatives before leading to the design of more integrated policies and institutions able to stabilize the innovation into a new path where a “pet urban integrated policy” might offer new opportunities for many diverse targets.

The IN-HABIT project, through participation, implementation, and new services, aims to develop the effectiveness of solutions based on a new relationship between people and animals to codify them in an integrated policy to be managed in the future and transferred to other cities interested in replicating the experience of Lucca.

The impact of such social innovation processes is not only based on the process itself but also in giving back a sense of new expectation and perspectives in many actors, from the more fragile ones to the citizens and public actors active in the urban contexts and willing to find new solutions to face emerging challenges.

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