Semantic Analysis of Public Spaces in Brussels, London and Turin living labs: A Taxonomy of the Interventions

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A NEW GENERATION OF PLANNING?

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PREFACE

Preface

Participation, living labs, urban commons, … It is clear the field is undergoing a drastic change. Also in politics, structures seem to be in need of a drastic change and the social media seem to offer a forum for everyone to participate in discussions on our future.

While participatory planning is widely hailed as a prerequisite for well-managed urban development and sustainability, this ideal can be difficult to implement in practice, due to the complexity of interactions between stakeholders and the difficulty of public users to realise a tangible 'hands-on' contribution. Incubators of Public Spaces aims to expand the opportunities for civic engagement in urban design through the creation of a user friendly online platform as an aid to local option generation and selection.

The Incubators Conference explored the context of the wider potential for urban living labs to deliver better, more tangible public participation in the urban environment. How can living labs introduce and induce new developments? What processes are needed to make living labs successful? Can new participatory tools trigger towards a new turn in urbanism? What new visions are needed and how can crowdsourcing engage actors and contribute to spaces? Can new technological means empower civic self-organisation and how does this impact the authority of the public power in planning? These were the questions which were given to the participants in the Incubators Conference organised in Brussels.

The result is a wide range of experiences, approaches and positions. All valuable and relevant. They form a plenitude of inspiration for the future. It will be nice to hear in the future from the reader about their new endeavours.

I want to thank the scientific committee and the reviewers; the participants and the session chairs; the staff which did a splendid job for the logistics; the European Commission and Innoviris for providing support for the Incubators Project.

Prof. dr. Johan Verbeke

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Abstract. The aim of this paper is to conceptually transfer the knowledge about the domain of urban public spaces in three case-projects, into a hierarchical and interrelated semantic structure of micro-design interventions and their mutual relationships, providing definitions of the interventions themselves. Drawing on the *Incubators of Public Spaces* JPI Urban Europe research project, the paper sets the ground for a digital design tool, to support co-creative urban design processes.

The conceptual and operational instrument adopted for this purpose is the ontology, a method of knowledge representation and management coming from Artificial Intelligence. Ontologies, as branch of AI, are helpful to set the domain for a clear, simple and user-friendly representation of concepts and their relationships.

Incubators has developed the Taxonomy of Interventions based on the experience in three 'living labs' in Brussels, London and Turin. Each living lab had the opportunity to unfold its own particular and context-based configuration that can best support the local self-organisation of places.

Keywords. Semantic analysis; urban public spaces; living labs; taxonomy of interventions; classes and instances.

Introduction: Incubators Methodology

New developments in technology from Artificial Intelligence (AI) to online web interfaces, 'dashboards' of urban performance and visualisations of development proposals, have all opened up a great potential for users of the built environment to play a more active role in interpreting and proactively shaping their built environments. These developments not only pose technological challenges – in terms of design and management of human-computer interactions – but also raise questions of how those technological challenges are bound up with the aptitudes and inclinations of different kinds of user. Hence they are raising questions about who is able to make the most use of these technological processes, and how best they may be embedded in specific participatory planning processes.

This paper reports on the latest research from the *Incubators of Public Places* research project, a JPI Urban Europe funded project, which involves developing and applying an online platform for public participation in the design and redevelopment of public spaces in local neighbourhoods in Brussels, London and Turin. In these neighbourhoods, three living labs have been established.

Incubators aims to support the self-organisation of places, enhancing the factors that motivate, encourage and enable the urban actors to reach a common understanding and to coordinate actions by reasoned argument, consensus, and cooperation rather than strategic actions only. The means to this goal are information and communication technologies to advance the co-creation capabilities of urban areas.

The aim of this paper is to conceptually transfer the knowledge about the domain of urban public spaces in the Brussels, London and Turin *Incubators* 'living labs' (Veeckman et al., 2013), into a hierarchical and interrelated semantic structure of relevant micro-design interventions and their mutual relationships, providing explicit and unambiguous definitions of the interventions for their (re)generation.

The conceptual and operational instrument adopted for this purpose is the *ontology* – in its lighter form, the *taxonomy* –, a method of knowledge representation and management coming from AI. 'Ontologies are often equated with taxonomic hierarchies of classes, class definitions, and the subsumption relation, but ontologies need not be limited to these forms' (Gruber, 1993). In that a *taxonomy* represents classes and subclasses of relations, it can be considered a 'simple ontology' (McGuinness, 2002).

This approach aims to set the ground for a digital design tool, to support the participative urban design process. In doing so, this paper addresses a common problem in participatory processes: the users' challenge in dealing and understanding the representative languages that are typical of architecture and planning. In turn, this difficulty can lead to a low quality and quantity of the users' proposals.

Micro-interventions on neighbourhood public spaces are a very common practice, possibly further to the requests of the inhabitants, the maintenance needs, and so on. Pinpointed interventions may lead to an incremental process that, in the end, produces a lack of coherence in the overall design for a place. The *Taxonomy of Interventions* offers an alternative to conventional micro-interventions, by presenting a coherent overview of the interventions of various scales and budgets that can be flexibly bespoke and implemented on demand, giving the community the capability to control its own progress and 'drive' its own place.

Incubators has developed this Taxonomy through the establishment of and the experiences from three living labs in Brussels, London and Turin. These were aimed to explore the type of micro-interventions that are aspired by the involved stakeholders. As such, each living lab had the opportunity to unfold its own particular and context-based configuration that can best support the self-organisation of places.

This paper first introduces the three case-project locations (section 1), then explains concepts relating to classes of interventions and how those are structured in taxonomies within the system (section 2); finally, we discuss how the cases are interpreted in terms of those classes (section 3).

1 Case-projects

Figure 1
a) Brussels, b) London and c) Turin case-projects

Brussels case-project: Josaphat

The Brussels living lab is located at the Josaphat site (Figure 1a). This 30ha big area is a Zone of Regional Interest, which is currently being planned to become a new sustainable neighbourhood in order to tackle the housing shortage in the Brussels Capital-Region (BCR). The Josaphat site is property of the Urban Development Corporation (SAU-MSI), which is the public operator entrusted with the operational implementation of the strategic areas in the BCR. A strategic masterplan for the Josaphat site has been approved by the Brussels Regional Government in 2014 and has since then been adapted to improve the plans. Under the motto 'Living and working in a park', it is the ambition to realise about 1600 dwellings and 9ha of urban industrial zone, with addition employment-generating activities such as local shops, a hotel and offices. By 2030, the Josaphat neighbourhood, with at least 7ha of green space, should be complete.

While the planning of the Josaphat site is further advancing the former railway marshalling yard has been cleared, leaving an open space of 24ha available for nature to take over while the site is awaiting its future development.

In parallel to the official planning process, the citizen collective of Commons Josaphat has emerged, which aims to embed the principles of the Commons at the Josaphat site. This collective has developed a co-creation process that resulted in a supported proposal for the future of the Josaphat site as an Urban Commons (Commons Josaphat, 2015).

Furthermore, other citizen collectives have been using part of the enclosed but accessible wasteland as breeding ground to develop community-initiatives. There is a mobile kitchen (Recup'Kitchen) that aims to bring people together around sustainable food, a collective neighbourhood garden (Jardin Latinis) that is –among other activities– experimenting permaculture, et cetera.

These activities have been self-organised by citizens and aim to manifest aspired values such as respecting the natural resources, creating a place for experimentation and social cohesion, and realising a commons within a convivial atmosphere (Commons Josaphat, 2016). These activities are being tolerated by the SAU-MSI that plans to launch an official call for transitory use of the site in spring 2017.

The Josaphat site, as such, forms an interesting case to experiment how the Incubator tool can support the current and future uses of Josaphat and the inclusion of the aspirations of the citizens as well as the public stakeholders.

London case-project: Pollards Hill

Pollards Hill is a suburban residential area in outer London, to the south west of the borough of Merton, at the boundary with the borough of Croydon (Figure 1b). Our case study is focused on the Pollards Hill housing estate, comprising some 14ha of land and over 846 homes. The development, which may be described as 'low rise, high density', generally compact flat-roofed housing blocks, of three storeys, comprises a mix of flats and houses with gardens (Merton Council, 2014).

The housing estate, built during the 1960s and 1970s, was originally imagined as a model for contemporary social housing. The physical form is characterised by a series of housing blocks in a distinctive rectilinear 'Greek key' layout. With this zigzagging configuration, there is a series of interlocking 'closes' and 'courtyards', the closes being vehicular service areas, giving access to parking and garages, and the fronts of the houses, while the courtyards are green spaces at the backs of the houses. The housing blocks are bordered all round by green spaces and service roads. There is a community/youth centre and library and children's play area nearby.

An interesting feature of this interlocking format is that each house is generally associated with one close at the front, and one courtyard at the back, but each close features houses associated with different courtyards, while each courtyard is associated with houses belonging to different closes. This has the operational consequence, when it comes to resident participation, that those participating in the (re)design of courtyards come from different postal addresses.

Originally, a council housing development, part of this estate, was transferred to Moat housing association in 1998 (Merton Council, 2014). Moat are currently the principal actors involved in the overall management, regeneration and refurbishment of the estate, including managing processes involving and affecting both private and social housing.

Following consultation with residents and in collaboration with the Council in 2014-15, Moat has developed a regeneration strategy including a master plan and £20m investment for providing 1000 new and refurbished houses and flats, including some new buildings and also some demolitions, to create some new spaces shaped by those new buildings and demolitions. As well as providing upgrades to the fabric of buildings, this also allows scope for introducing new features in the landscaped areas. These interventions are intended to address some of the problems of the existing estate, and improve its image and identity and how it functions. The improvements include making the estate more legible and accessible by creating new routes across the estate, by introducing different character areas and greater sense of enclosure within the landscape and by making better use of the available external space.

Turin case-project: Mirafiori Sud

The site selected for the Turin case-project is Quartiere Mirafiori Sud (Figure 1c). Built since the mid-Sixties in the southern outskirts of the city (Ges.Ca.L., 1966), it consists in a social housing neighbourhood of high-rise apartment buildings. Slabs and towers from eight up to eleven floors high cover an area of more than 40ha, for a total of about 2.700 dwellings and 6.000 inhabitants.

Originally conceived to provide housing to the workers of the neighbouring FIAT automobile plants, Mirafiori Sud is undergoing today a period of major transition. Following the socio-economic shifts that affected the entire city in the last few decades, the neighbourhood went through a process of urban decay from which it has begun to recover only in recent years.

In some ways overlooked by the wave of urban regeneration and redevelopment projects that crossed the city of Turin since the mid-Nineties (Città di Torino, 2005), Mirafiori Sud has suffered from decreased number of residents, declined real estate values, downsized public and private services.

Thanks to the resources that the recently funded ‘AxTO project’ will allocate to the area (Città di Torino, 2016a), things are expected to change. Of the 44 actions to be implemented over the next 3 years in the fields of Public space, Housing, Jobs and Innovation, Education and Culture, Community and Participation, some of them are expected to positively impact on Quartiere Mirafiori Sud (Città di Torino, 2016b). From physical interventions – e.g. the emergency maintenance of roads and sidewalks, renovation of open spaces, emergency maintenance of the covered marketplace – to social innovation – e.g. active citizenship initiatives – a wide range of actions is going to support the regeneration.

Within this framework, the *Incubators* project aims to provide an innovative governance tool for the future of the neighbourhood. Through design workshops and other living labbing activities, it seeks to engage local stakeholders in the definition of collaboration and self-organisation scenarios for the rehabilitation of public spaces and buildings.

In this regard, the application of the 'Regulation on collaboration between citizens and the City for the care, shared management and regeneration of urban commons' (Città di Torino, 2016c) to one of the underused or abandoned assets that exist in the area seems a foreseeable outcome of the Turin case-project.

2 The *Taxonomy of interventions* as analysis and design tool

The *Incubators* system includes a tool for designing of specifying interventions in the urban fabric (for example, adding anything from a bench to a whole park; or in principle, moving existing elements around) and an online platform which allows public users to access information about the site, and to remotely and interactively make proposals for such interventions.

Within the *Incubators* system, the *Taxonomy of Interventions* groups the main typologies of interventions in the design of public open places. To its definition, the review of a wide body of published research has contributed to identify common uses or characteristics of open places.

In the Taxonomy, each *Class* is composed by single interventions (*Instances* in the broader definition of a generic ontology), directly related to the elementary component in open space design (Figure 2). To the extent that urban design can attempt to be a single unitary process, the paper focuses on the contribution of the *classes* and *instances* of intervention to transform open spaces into high-quality public places.

A good understanding of urban design methodologies and advanced software tools is needed to deal with the multiple factors that influence open space. The breakdown of spaces in Classes and Instances is functional to the development of the *Incubators* software tool.

From a general point of view, a *taxonomy* can be organized starting from different directions: therefore, top-down, middle-out and bottom-up methodologies of knowledge engineering are identified. Another important issue is the type of sources used to extract knowledge (ontological learning), i.e. from texts, thesaurus, databases, case studies, and so on (Roussey et al., 2011).

The *top-down* development process (Sowa, 1995) starts, in general, with the definition of the general concepts in the domain, and proceeds with the specification of the concepts. This approach is wholly justified in the context of very theoretical and philosophical fields for which there is a consensus about the most general categories.

In the *bottom-up* approach, the specification of an object is in terms of indivisible units and their interactions that constitute the fullest possible description of the object (descriptive aspect), and allows derivation of all other properties of the object (explanatory aspect) (Van der Vet & Mars, 1998). The bottom-up development process starts with the definition of the most specific classes, the leaves of the hierarchy, with subsequent grouping of these classes into more general concepts. This approach helps to provide ontologies with a very high level of detail. The main drawbacks of the bottom-up methodology are the unsuitability for the task of merging already conceived ontologies into the current one and the risk of inconsistencies.

The trade-off solution between the top-down and bottom-up approaches is the *middle-out* initially proposed by Uschold and Gruninger (1996): starting with the most important concepts, and then defining higher-level concepts and lower-level concepts. Thus, the higher-level categories will naturally arise and are more likely to be stable than with the top-down approach. Furthermore, by specializing the basic concepts with new concepts of finer granularity, the middle-out approach strikes a better balance in terms of the level of detail compared with the bottom-up approach, since it arises only as necessary.

In fact, the middle-out approach is probably the nearest to the method we used to compile the taxonomy covered in this paper. In the writing of the ontology, we firstly

defined the more salient instances, starting from the analysis of each case study, and with the support of the scientific literature reference and the analysis of selected best practices. After identifying the instances, we generalized and specialized the superclasses and subclasses respectively (when existing). E.g. the instance 'Paving' is organized in the superclass 'Landscape design interventions', and can be specialized in 'Concrete Paving', 'Stone Paving', 'Gravel Paving', and 'Decking'.

Following the analysis of other case studies, further Classes and Instances can be added, implementing the taxonomy.

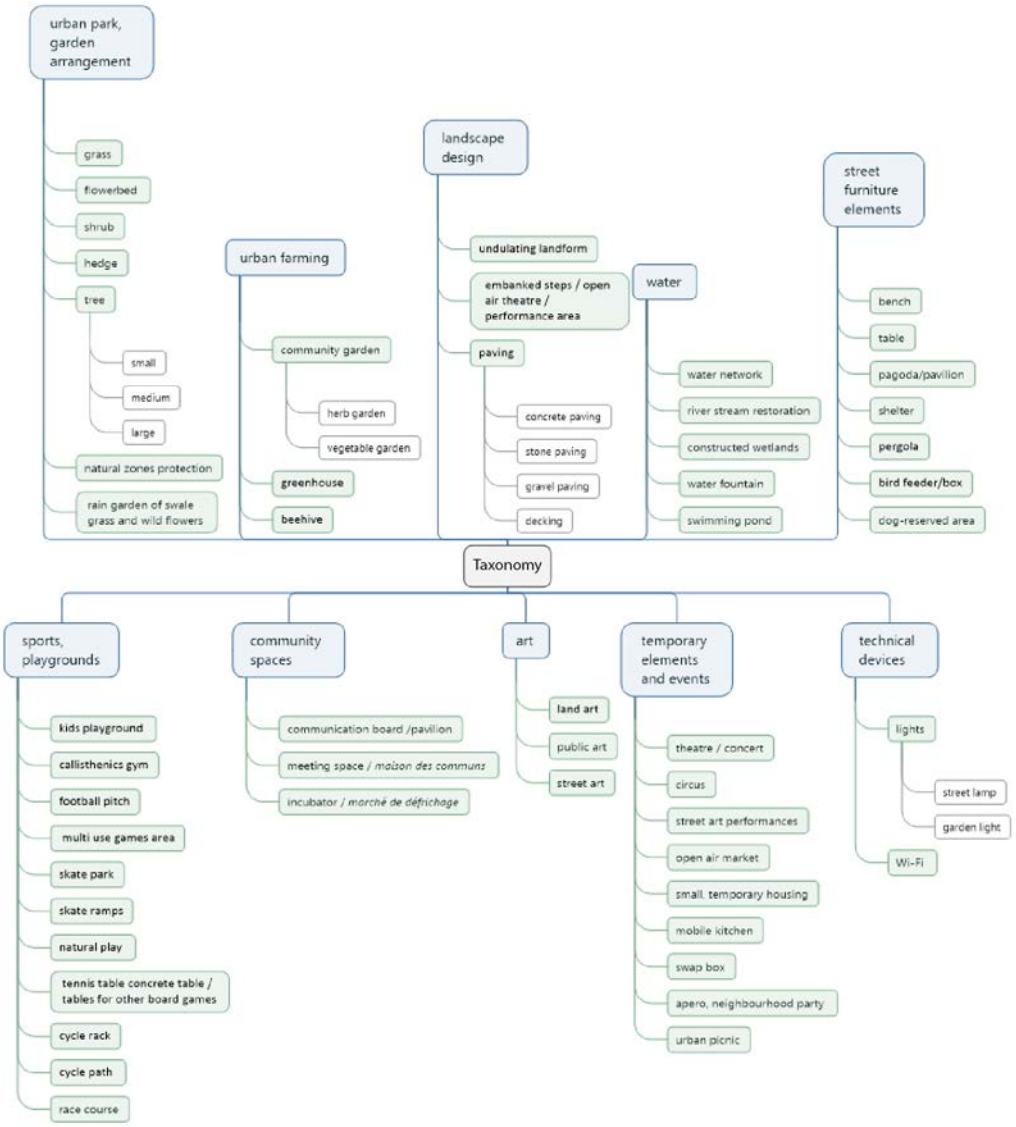

Figure 2
Taxonomy of Interventions (blue: Classes; green/white: Instances)

3 Interpretation of the case-projects through the Classes

The first step in the case-studies analysis involved the assessment of the consistency of the Classes that make up the Taxonomy: thanks to the direct experience of places, the presence of each Instance has been ascertained and their recurrence interpreted as an index of the complexity – therefore in some way of the quality – of the related Class, and of the case as a whole.

The idea is to employ a simplified quantitative analysis method to verify the quality of an open public space, identifying strengths and weaknesses. The goal is to define a clear and intelligible framework to work on with the inhabitants; this kind of scheme allows stressing and selecting some features of the existing open space, where to positively focus the co-creation activities.

Josaphat: current status and project

In agreement with the public owner of the site (SAU-MSI), it has been decided to focus on a small part of the to-be developed Josaphat site. For this, an area of around 3ha has been chosen which is situated to one of the few access points to the site. This part of the terrain will first be developed and is most linked to the surrounding neighborhoods. Currently this part of the Josaphat site is already claimed through mainly informal uses that will be integrated in the official organized temporary use of the site.

The SAU-MSI has, in interaction with the involved governments, developed a framework for the type of interventions that are desired. Crucial aspect in this is the need of the proposed activities to be transitory; interventions should be able to be integrated in the plans that are being developed or have to be able to move to other places in order to guarantee their continuation (Table 1).

Class	Status	Project
urban park and garden arrangement	*	***
urban farming	*	**
landscape design	0	**
water	0	*
street furniture elements	*	***
sports, playgrounds	0	**
community spaces	**	***
art	*	***
temporary elements, events	***	***
technical devices	0	0
Key: 0 = absence; * = low presence; ** = medium presence; *** = high presence		

Table 1
Brussels case-study: Classes survey

Participants' contributions in the Brussels case

At the Brussels case, an action research methodology has been used. Through active participation in and contribution to the ongoing creation of temporary uses, different workshops have been organised to bring out the needs and aspiration of the civic actors that are involved. An interactive postcard exhibition invited people to appropriate already existing ideas and to propose new interventions. A round table meeting asked citizens to express the projects they see possibly developing and resulted in a framework of five main values (Bollier, 2016) that are proposed to be taken into account. Furthermore, the list of interventions that is developed for the temporary use of the Josaphat site was further informed by a series of loose interviews and everyday discussion on-site. Currently (March 2017) a listing of the aspired micro-interventions is being discussed with the local partner Bral (Stadsbeweging voor Brussel, Citizens Action Brussels).

Pollards Hill: current status and project

Improved pedestrian connectivity across and through the site is one of the key objectives of the regeneration proposals at Pollards Hill.

A new route that is shared between pedestrians and residents getting to their property by car is introduced around Donnelly Green serving primarily the new buildings. This route is connected back through to the existing parking Closes where existing blocks are demolished.

Elsewhere the pedestrian paths are upgraded with new surfaces and lighting. The narrow and concealed paths to existing bin stores are stopped up and alternative, more open and overlooked, routes created. Clearly defined paths will connect the residential areas to key destinations such as bus stops on South Lodge Avenue, play facilities and the existing Community Centre and Library (Figure 3).

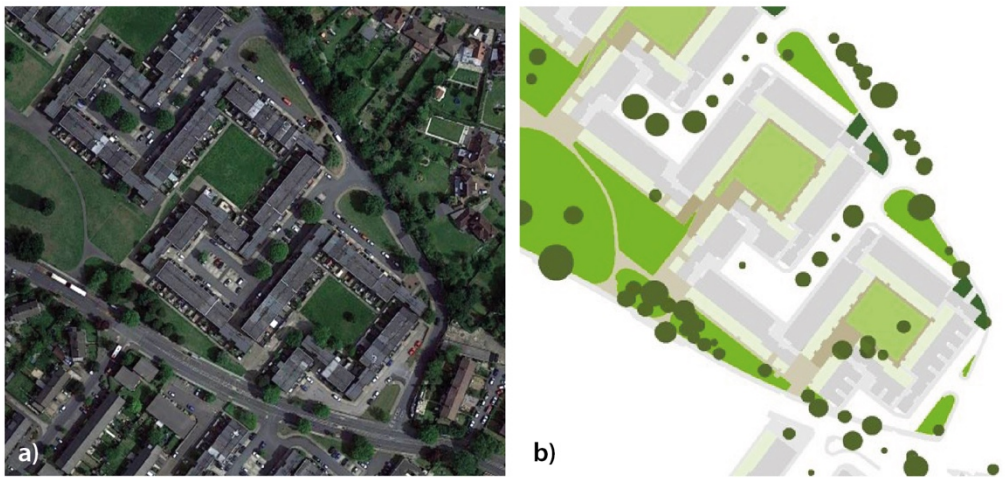

Figure 3
Pollards Hill: a) status and b) project

The landscape design for the Courtyards introduces new activities and visual amenity to the courtyard gardens, and reduces the scale of the space by dividing into smaller spaces with different uses. It improves sense of ownership and strengthens visual connection between courtyards and back gardens.

Each Courtyard is proposed (1) to have its own planting and material palette to create individual character; (2) to enhance gardenesque feel and style and reduce scale by introducing tree planting to the existing embankments where gradients allow; (3) to retain but reduce the size of the open lawn area, and (4) clearer ownership of garden space to create a village green character for the surrounding Closes.

Class	Status	Project
urban park and garden arrangement	*	***
urban farming	**0**	**0**
landscape design	*	***
water	**0**	*
street furniture elements	*	**
sports, playgrounds	*	***
community spaces	*	**
art	**0**	*
temporary elements, events	**0**	**0**
technical devices	*	**
Key: 0 = absence; * = low presence; ** = medium presence; *** = high presence		

Table 2
London case-study: Classes survey

Participants' contributions in the London case

A central part of the London case study is a multi-faceted deployment of the technology to facilitate the micro-interventions. The process is on-going in parallel with a more traditional public consultation process, facilitated by the onsite Landscape Architects. The aim is to explore if using these ontologies allows the public at large to achieve a suitable level of design thinking.

A core consideration is the ability of the public to interact sufficiently with the provided tools. As such, a 'consultation house' is being set up as a central hub of the intervention. The house will allow the public the ability to drop in and have a say in the consultation during the active period. It will include a computer running the *Incubators* system, linked to an online version where users can design, submit and vote on interventions.

The integration of a 3D visualisation as part of the system provides a key differentiator between the other case studies, it also opens the opportunity for more innovative design techniques. As such, the aim is to explore the use of the *Microsoft HoloLens*, in co-ordination with the Turin group, for aiding the participative urban design process (Figure 4).

The London case-project comes at the end of the wider *Incubators* project and thus is still open to developments once the public consultation takes place, early summer, 2017.

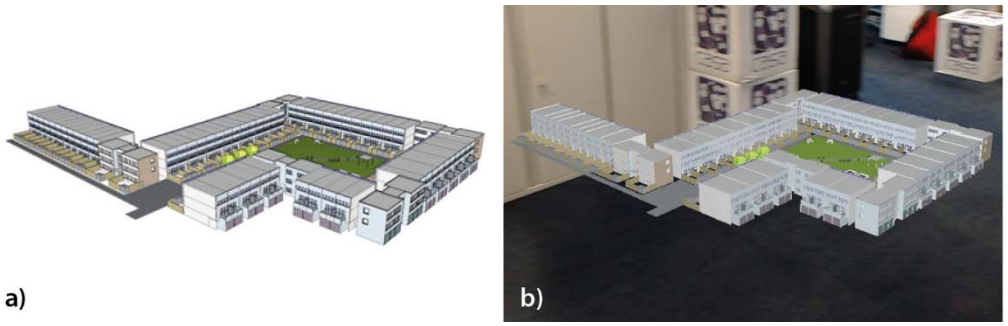

Figure 4
Pollards Hill 3D model: a) in Trimble SketchUp and b) in Microsoft HoloLens

Mirafiori Sud: current status and project

As a result of several site surveys and stakeholder interviews, the Emilio Pugno Garden (Figure 1c and 5a) has been identified as the most suitable place to test the Incubators methodology in Quartiere Mirafiori Sud.

Located in a central position with respect to the investigated area, it represents a focal point for the neighbourhood's life. In fact, despite the lack of a definite shape and a strong sense-of-place, it is widely regarded as the main 'piazza' of the neighbourhood.

In and around the square different uses take place. Of the four sides of the site, two are bordered by buildings: on the northern side, stands a three-floor service building, with some shops and public offices; on the western side, a seven-floor apartment building. The eastern side is dominated by the church and churchyard. Along the southern side runs a public road. At the centre, there are a green area with kid playgrounds, a small skating rink and a car parking.

With regard to the Taxonomy that has been defined, the Turin case-project appears quantitatively diverse: although to varying degrees across the Classes, a high number of Instances is present. The main problem is that such quantitative diversity is not directly related to quality. At present, many of the Instances that are part of the square are not deemed satisfactory by the interviewed residents and users. This is reflected in their underuse, or misuse.

Classes	Status	Project
urban park and garden arrangement	**	***
urban farming	**0**	**0**
landscape design	*	**
water	*	*
street furniture elements	**	***
sports, playgrounds	*	**
community spaces	**0**	**0**
art	**0**	*
temporary elements, events	*	*
technical devices	*	*
Key: 0 = absence; * = low presence; ** = medium presence; *** = high presence		

Table 3
Turin case-study: Classes survey

Within the framework of the aforementioned 'AxTO project', the City of Turin has drafted a regeneration project that aims at an overall improvement of the square (Figure 5b). The project is based on the installation of new street furniture (including tables, benches, deck chairs, cycle racks, garden pergolas) and on the provision of sport and recreation facilities (football goals, skate rails and ramps, concrete table tennis tables, play surfaces, garden chess boards). Bookcrossing points and murals are also envisaged.

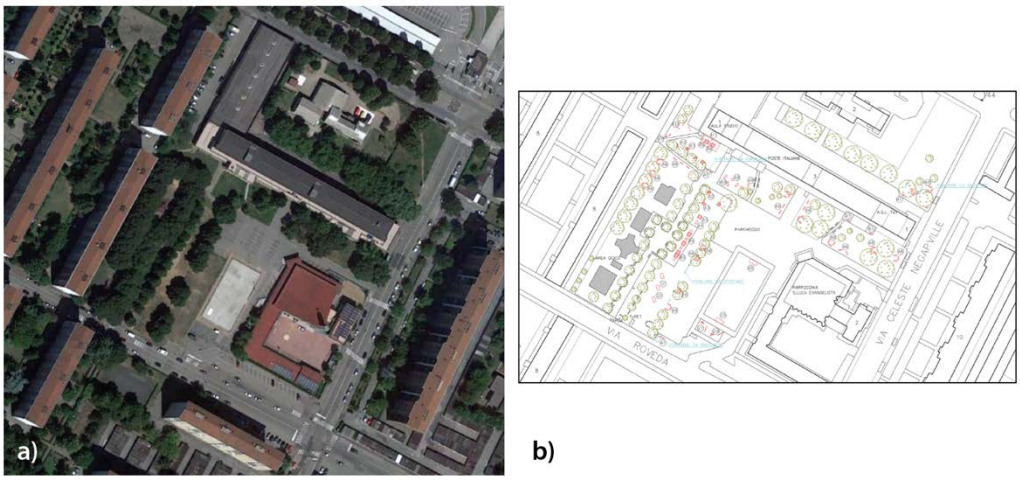

Figure 5
Turin case study: a) status and b) project

Participants' contributions in the Turin case

Based on the knowledge gained, a participatory process has been designed for the Turin case. The Classes and Instances were employed to define some pictorial 'option cards' with the possible interventions. The local community was involved in three design workshops with the goal to verify both the evaluation of the existing situation, and the adherence of the proposed project to the needs of the inhabitants.

From a methodology point of view, it is worth noting that participants contributed to the co-creative process not only by adopting the proposed intervention cards, but also proposing new ones. This allowed a refinement of the Taxonomy, with the introduction of further instances.

From the design point of view, the relevance of the selected space for the Mirafiori Sud community has been confirmed: the amount of cards played on the Emilio Pugno Garden outnumbers those played on any other area.

With respect to the 'AxTO project', no particular issues seem to arise. Participants' contributions and suggested interventions mainly overlap, or at least do not contrast, with the City of Turin plans.

Two main differences can be mentioned. On the one side, the importance given to the skating rink. This paved area is seen as a potential gathering place, where different kinds of outdoor activities could take place (e.g. school/theatre performances, sport events). On the other side, the importance given to the bordering service building. All interviewees and participants stressed the need to repurpose its vacant premises in community spaces (e.g. party rooms, multipurpose halls).

Conclusions

The process is still ongoing; if replicated the use of the *Taxonomy of Interventions* allows easily comparing and evaluating different solutions. The experiences with the Incubators methodology in the Brussels, London and Turin cases are promising. It seems the taxonomy triggers discussions and helps explicating ideas.

Taxonomies and, in general, Ontologies, set the domain for a clear, sharable and reusable representations of concepts and their relationships. At any rate, they represent a knowledge base valid for a context and accepted by a group or a community, who could possibly reuse and adapt it for diverse design aims.

Acknowledgements

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