



*Conference Proceedings – Short Paper*

## Design Practice for Blue Green Infrastructure in the Context of Urban Resilience

Qian Sun<sup>1\*</sup>, John Makepeace<sup>2</sup>, Nicolas Rebolledo<sup>2</sup> and Nick de Leon<sup>2</sup>

<sup>1</sup> Senior Tutor, Service Design, Royal College of Art, Kensington Gore, London, SW7 2EU, UK

<sup>2</sup> Royal College of Art, Kensington Gore, London, SW7 2EU, UK

E-mail: [qian.sun@rca.ac.uk](mailto:qian.sun@rca.ac.uk) (Q.S.); [john.makepeace@network.rca.ac.uk](mailto:john.makepeace@network.rca.ac.uk) (J.M.); [Nicolas.Rebolledo@rca.ac.uk](mailto:Nicolas.Rebolledo@rca.ac.uk) (N.R.); [nick.leon@rca.ac.uk](mailto:nick.leon@rca.ac.uk) (N.L.)

\*Qian Sun; Tel: +44 (0)20 7590 4290

---

**Abstract:** This paper presents four projects where design practice is applied to address the challenges of engaging communities in the maintenance of Blue-Green Infrastructure (BGI). The design projects were initiated by the Royal College of Art in partnership with Enfield council, UK and Kent County Council, UK. The aim was to develop service propositions that encourage shared ownership of specific public spaces between local communities and the council in Broomfield Park in Enfield and in Sittingbourne High street in Kent. These projects demonstrate the relevance of design practice in developing urban resilience through BGI. When considering BGI as a ‘wicked problem’, design practice demonstrates its potential for fundamentally transforming the traditional way in which public services are designed and implemented.

**Keywords:** Design for Social Innovation; Service Design; Design Thinking; Blue Green Infrastructure (BGI); Wicked Problems; Urban Resilience; Public Services; Community; Shared Ownership.

---

### 1. Introduction

BEGIN (Blue Green Infrastructures through Social Innovation) is a 4-year project funded through the European Regional Development Fund (ERDF) by the Interreg Europe programme. The BEGIN project brings together 10 cities across the North Sea Region (Antwerp, Ghent, Aberdeen, London Enfield, Bradford, Kent, Dordrecht, Hamburg, Gothenburg, Bergen) with 6 leading research institutes (CIRIA, UNESCO-IHE, University of Sheffield, TUHH, Royal College of Art and Erasmus University). The overall objective of BEGIN is to demonstrate how cities can improve climate resilience with Blue Green Infrastructure (BGI) involving stakeholders in a value-based decision-

making process to overcome its current implementation barriers <sup>1</sup>. It proposes Design and Social Innovation as its core approach to BGI, in comparison to traditional planning processes that often merely inform or consult stakeholders. BEGIN considers this approach helps mobilize the problem-solving capacity of a wide range of stakeholders to facilitate climate change adaptation, and capture multiple societal values.

The Service Design team of the Royal College of Art (RCA) provides design expertise in the space of social innovation in this project. The team has rich experience in collaborating with public organisations, social entities, and businesses, through studio projects. Their practice entails an integrated approach to the design of human experiences and the socio-cultural, economic and technological systems in which the services are experienced.

However, for design practice, BGI is a new context; and for most cities, working with designers to address BGI issues is also seen as a new attempt. Therefore, at the start of BEGIN, a project was initiated by the RCA in partnership with Enfield council, UK and Kent County Council. It aims to look deeply into urban planning processes, contexts and cases with the question: How can design practices help communities build resilience against flooding by creating services that can help city planners engage communities in the development and maintenance of Blue Green Infrastructures (BGI), through reconnecting people with nature and helping them take ownership of their public spaces?

This paper reports the process, methods and outcomes of four design projects under the brief. In this study, the researchers were involved in the project through developing the design brief, monitoring the progress through regular tutorials, reviewing documents and reports, representing design outcomes to the stakeholders, and reflecting on their own experience. As such, this case study is developed combining three sets of information:

- Design practice: 12-week design projects involving 10 designers (4 teams) and 2 design managers at the RCA. In the design process, various research tasks were performed including interviews, observations, workshops and prototypes. The process was monitored and observed by the researchers.
- Design outcomes: 4 solutions/service propositions were proposed (one by each design team). Each solution addresses its individual problem redefined by the designers and proposes innovative ideas for consideration. Two reviews took place for key stakeholders to input into the process and feedback and discussions were recorded.
- Reflection: each design team delivered a report based on their critical reflection of practice.

## 2. *Project Background*

Enfield is a London borough council, one of 32 in the United Kingdom capital of London. This project focuses on a new wetland in the grounds of Broomfield Park to manage and clean water,

---

<sup>1</sup> <https://northsearegion.eu/begin/>

increase biodiversity and bring more value to the community, as part of a collection of ongoing natural flood prevention works happening in Enfield.

Kent is a large county in the south-east of the UK. Sittingbourne high street in Kent has experienced multiple flooding incidents during heavy rain events and has had significant road and drainage maintenance in recent years causing disruption to high street users. A proposal to increase the BGI there suggested multiple small interventions along the street to achieve the same outcomes as the wetland project does in Enfield.

Most of the ongoing issues in these two contexts relate to the funding of ongoing maintenance of BGI, the damage done by surface water flooding, the disconnect between where flooding happens and where it can be prevented with BGI, as well as relational issues between different groups of the public and the local authorities based on mismatched expectations of what they should contribute and receive from the park and the high street.

### *3. The Design Brief*

Prior to the design projects, a number of site-visits took place (see Figure 1 below), as well as interviews with the BGI planning team, 'Friends of Broomfield Park', local community groups and relevant charities. A design brief was developed as a document of communication between the designers and the council. The goal was defined as 'to help cities tackle flooding challenges by enabling communities to become active shareholders in the co-production of BGI'.

Four teams of MA students on the service Design MA at the RCA responded to the brief. The students in most teams were typically multidisciplinary with backgrounds including engineering, communication design, business and policy.

**Figure 1.** (a) Members of the ‘Friends of Broomfield Park’ show the RCA Design Manager vandalism in the park during a site visit to develop the brief.



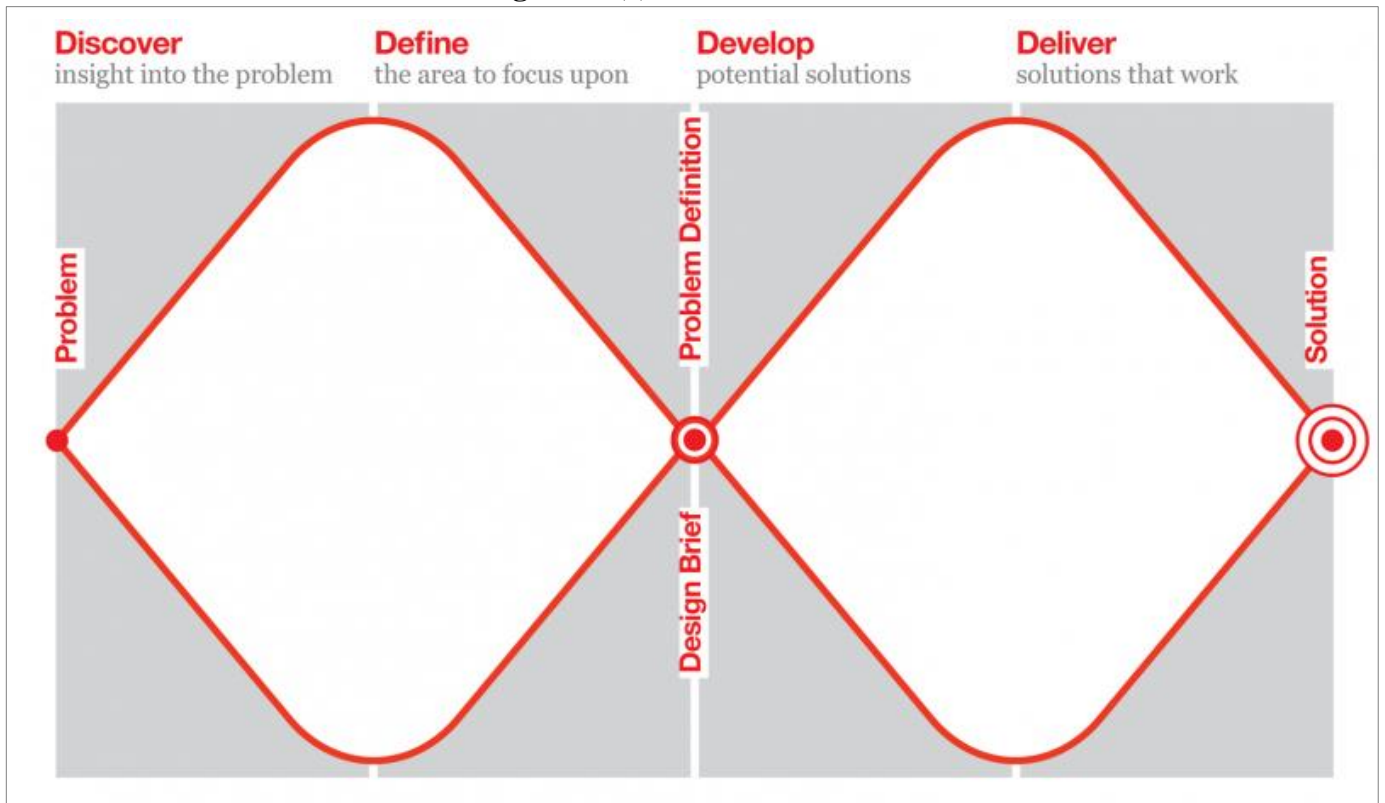
(b) Source: RCA Design Management Team

#### *4. The Design Process*

The design teams followed the Design Council’s double diamond process<sup>2</sup> (see Figure 2 below), including four stages of activities: discover, define, develop, and deliver, as shown in the following figure. The process is iterative combining both divergent and convergent thinking. It starts with a discover stage aiming to identify user needs through behaviour-led design research to understand the problem and its context. This leads to the next stage of activities aligning and interpreting the user needs into the wider objectives of the organisations and society. Designers then iterate and prototype these design-led solutions to test their relevance. The design is finalised and launched involving final testing approval and evaluation. This process becomes synonymous to a human-centred approach to wicked problems.

---

<sup>2</sup> <http://webarchive.nationalarchives.gov.uk/20080821071133/http://www.designcouncil.org.uk/en/About-Design/managingdesign/The-Study-of-the-Design-Process/>

**Figure 2. (a) Double Diamond**

(b) Source: <https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond>

### 5. Design Solutions

Each team proposed a design solution to the problems they had redefined themselves. The four design solutions are:

**Fig 3. (a) Park Frog title image**

(b) Source: <https://begin-socialinnovation.com/work/>

Park Frog, (see Figure 3 above for the brand image) which uses a digital pet caring game to encourage younger generations of people to contribute to and take ownership of public parks in order to avoid the worsening cycle of youth disengagement with parks, nature and citizenship. Developed in Enfield.

**Fig 4. (a) Open Park title image**



(b) Source: <https://begin-socialinnovation.com/work/>

Open Park, (see Figure 4 above for the brand image) which uses design tools to create new types of partnerships between authorities and the public. Fostering stronger engagement with the public and creating a collaborative design process to support shared ownership. Turning a closed and rigid process into an open, inclusive and resilient one. Developed in Enfield.

**Fig 5.** (a) Compass title image



(b) Source: <https://begin-socialinnovation.com/work/>

Compass, (see Figure 5 above for the brand image) which uses an online platform and multiple types of engagement materials to help the public understand the way taxes are spent in a transparent and honest way. Helping the public to understand each scheme in the area and the decision making process behind it. In this case helping the public understand the role of climate change in flooding, what the risks are, why BGI (Blue-Green Infrastructure) is necessary and how they can contribute. Developed in Kent.

**Fig 6.** (a) Community Garden Club title image



(b) Source: <https://begin-socialinnovation.com/work/>

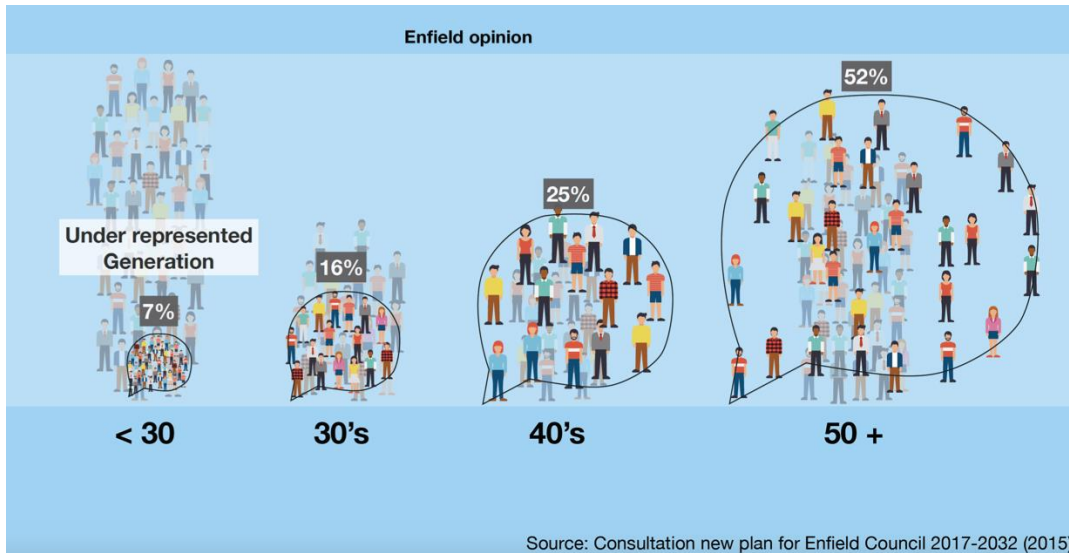
Community Garden Club, (see Figure 6 above for the brand image) which uses the enthusiasm of children and the format of a school gardening club this service connects children and parents to nature through gardening, enriching their education and creating opportunities for local authorities to set tasks that help maintain public space. Developed in Kent.

### 6. *The Value of Design in BGI*

The design projects demonstrate that the value of design practice in BGI is multiple and is potentially relevant to other public sector issues beyond BGI.

First, as design practice is problem oriented in nature, the designers invent and envision new and possible futures in which problems are solved or mitigated through the redesign of practice. Park Frog is a good example. The team found that the presence of young people in the park was perceived as a negative and associated with occasional anti-social behaviour resulting in the decline in engagement of young people with park decision making (see Figure 7 for team infographic below). This decline would eventually result in the park meeting this future generations needs even less and ultimately fostering further disengagement. They redefined the problem in a way that subverted council current practice, seeking solutions that can forge new engagement between young people and the park without the council as a visible facilitator. The problem was thus turned it into a design opportunity where mobile and digital gaming interventions were introduced to encourage young people to go out into public spaces and enjoy those spaces so that later they might engage in co-ownership and decisions making. The concept was seen as highly positive by the council.

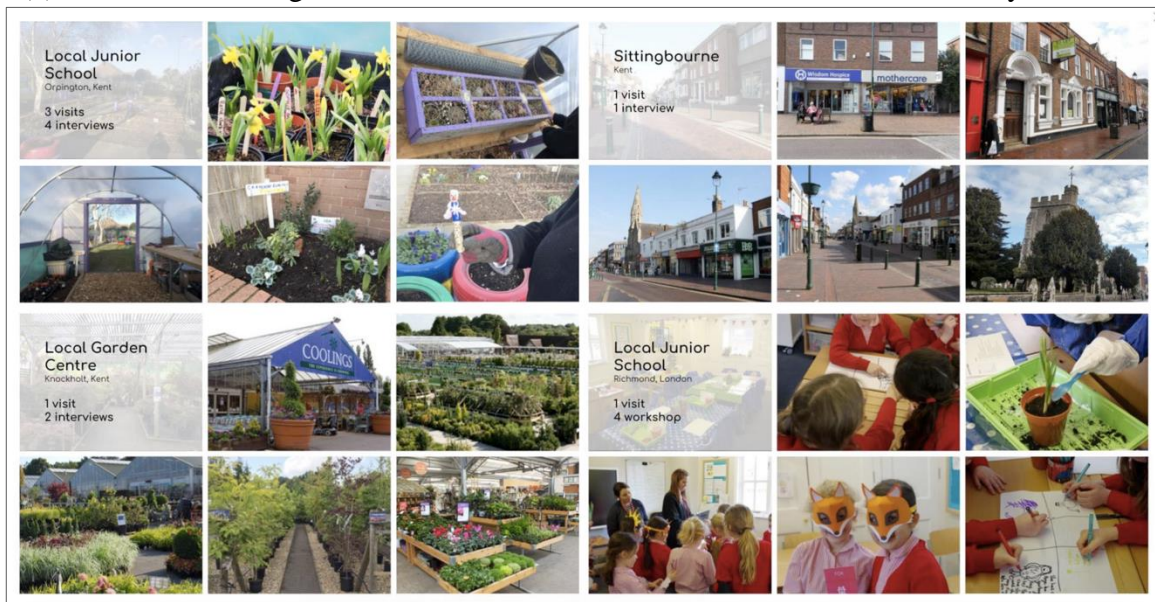
**Fig 7.** (a) Visualisation by Park Frog Design team of the disparity between populations of different age groups in the Enfield area and their respective engagement in consultation decision making. Demonstrating the under representation of the ‘under 30’s’.



(b) Source: <https://begin-socialinnovation.com/park-frog>

Secondly, designs interactive process ensures all relevant and affected actors are involved in the process which further increases the value of the solutions by increasing their relevance to the different experiences, resources, competencies and expertise of the stakeholders and context. At each stage of the projects, all the teams have engaged with a large number of stakeholders (see Figure 8 below), including park and highstreet users, urban planners, Public coordinators, local authorities, 'Friends of Parks' groups, local schools, local charities, and local businesses. Community Garden Club is a good example. Within a short span of time, the team had intense involvement with schools, the council and other local stakeholders like commercial garden centres. They had delivered 6 site visits, 4 workshops (7-8 people each), and 7 in-depth interviews. As such, this project explored the potential for a new relationship model between these people that could help sustainably build a club that would help children connect to nature. When the design project ended, the club had sufficient buy-in from all parties involved.

**Fig 8.** (a) Collection of images of various research methods conducted with a variety of stakeholders.

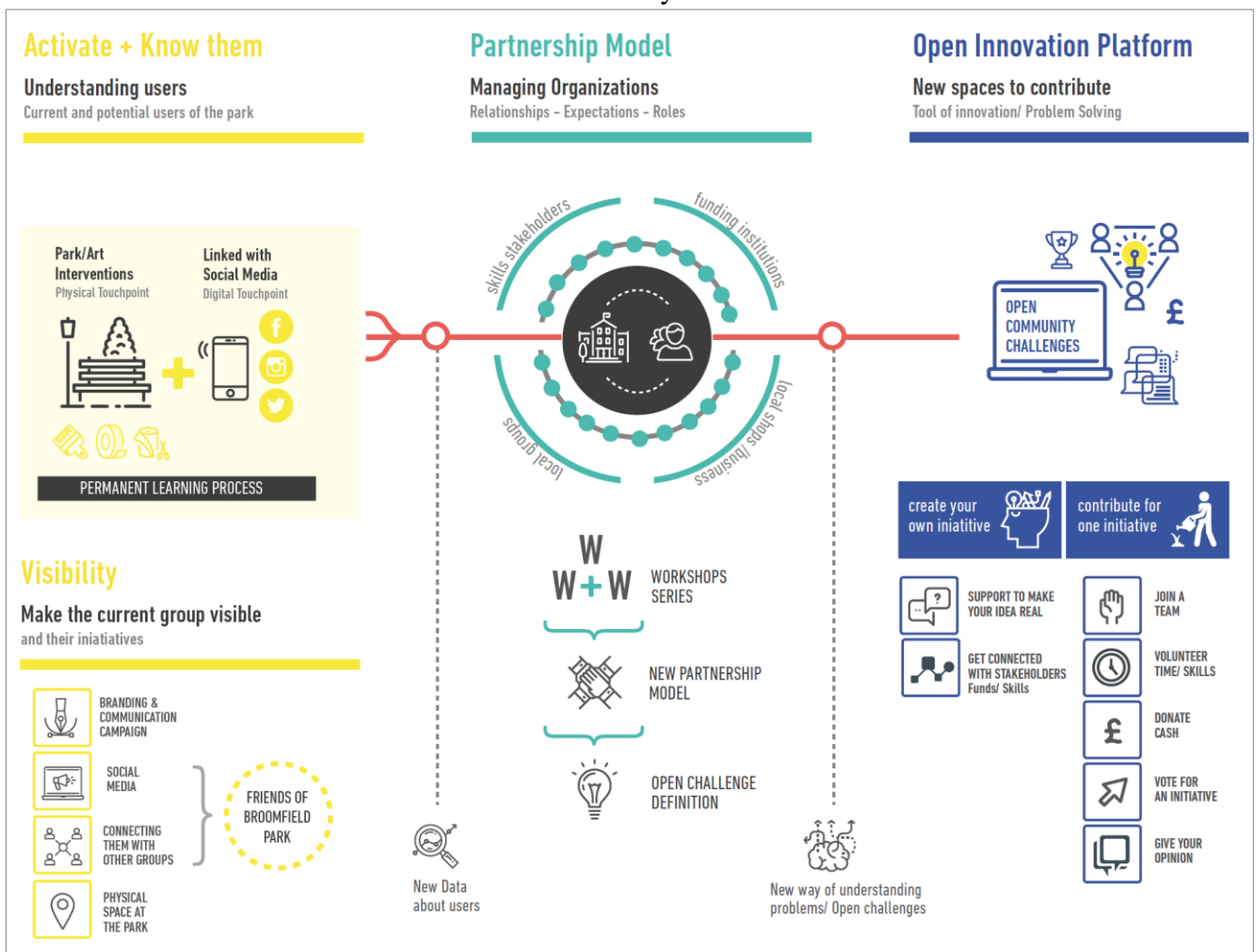


(b)Source: <https://begin-socialinnovation.com/little-gardening-club>



Thirdly, the approach tends to explore systemic problems. Many of the BGI implementation barriers, like in many other public sector services, are difficult to overcome because they are systemic and embedded within organisational cultures, practices and processes. Design practice proved its relevance in addressing systemic problems. In the Open Park project, the designers started with recognizing the systemic nature of parks. In order to build a foundation of resilience, a holistic understanding of local authority systems and their basis in the community were essential in order to be: reflective, resourceful, inclusive and integrative. As a result, they proposed a new type of model (see Figure 9 below for graphic of the new model) that could enable any public engagement or co-ownership related activities and facilitate a more resilient community around the park. As such, their proposal turns a closed and rigid process into an open, inclusive and resilient one.

**Fig 9.** (a) New service model proposition to transform the relationships that manage decision making and ownership of the park into an open, dynamic and resourceful system that is integrate into the local authority.

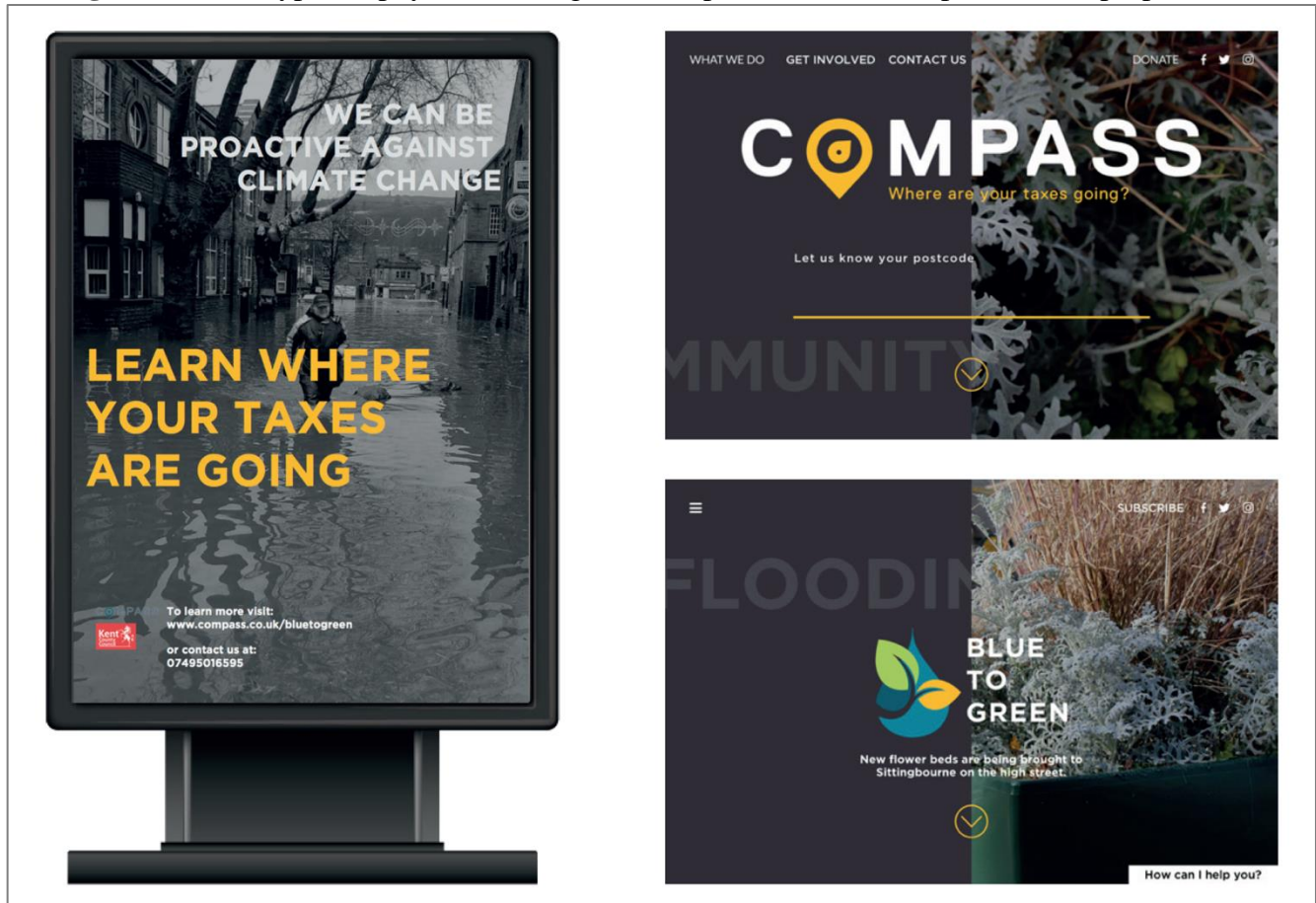


(b) Source: <https://begin-socialinnovation.com/open-park>

Fourthly, the design tools become heuristic devices that stimulate the development of iterative process and make the possible futures concrete and tangible. In this aspect, all four projects have used prototyping and visual aids in their co-creation processes etc. Compass for example, was highly relevant in this context. They developed a mix of physical campaigns and an online platform (see Figure 10 below for prototypes) to mediate communications between councils and the public. They

prototyped the idea as a live website which allowed them to engage the users in the iterative process of design.

**Fig 10.** (a) Prototypes of physical and digital touchpoints for the Compass service proposition.



(b) Source: <https://begin-socialinnovation.com/compass>

### 7. Relevance to Urban Resilience

The involvement of citizens, communities and businesses in city strategy is considered crucial to the success of any resilience initiatives and services. In recognising that simply consulting citizens is insufficient and ineffective in achieving sustainability, there is a need for a more integrated and inclusive approach to designing and managing urban resilience. These design projects demonstrate the integrity of design practice in this context and more importantly, they suggest that our understanding of resilience should expand to include broader aspects of resilience gained through the intended innovation processes for implementing BGI:

- Resilient spaces - Improved capacity of the infrastructure of public environments to withstand climate change;
- Resilience through better decision making - The improved decision making capacity of municipalities resulting from better community involvement;
- Resilience through more resources - The increased capacity and resource derived from enlarged and better engaged communities;

- Resilience through more active/dynamic communities - Improved capacity to enlist and organise social capital drawn from newly empowered communities with improved social cohesion.

## **Acknowledgments**

This project is funded by the European Regional Development Fund (ERDF) by the Interreg Europe programme. We would like to thank all those involved in the development of the design projects for their support and expertise:

### **Councils:**

Kent County Council: Bronwyn Buntine, Louise Smith

Enfield Council: Graham Campbell

### **Designers:**

Open Park: Natalia Carrasco, Bianca Benvenuto, Daniela Soto Espinoza, Karen Rozenbaum

Park Frog: Nicole Zheng, Wen Han Yap

Compass: Breana Russel, Francesca Schiboni Grimaldi, Rhea Belani

Community Garden Club: Judith Buhman

### **Other Organisations:**

Friends of Broomfield Park

Friends of Firs Farm Park

Thames21

Ideas Test

Sittingbourne in Bloom

## **Conflicts of Interest**

The authors declare no conflict of interest.

© 2018 by the authors; licensee MDPI and IFoU, this article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license.