

CO-CREATING SMART CITIES OF THE FUTURE

D5.5 Usability assessment of
OrganiCity's First Open Call

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ORGANICITY

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1 Introduction

This is the first of two reports that cover a usability assessment of experimentation with the tools and datasets that have emerged as a result of OrganiCity's open call instrument. This first report covers learnings and findings of the experimentation phase as part of OrganiCity's first open call. The target of the first open call has been testing the tools and the OrganiCity facility as a whole. Our usability assessment has been supported by a combination of quantitative and qualitative methods and covers the experimenter perspective, while the performance of the tools from an internal perspective is covered by the work conducted in T4.1 and has been captured in D4.1/D4.2. As discussed during the remote review in February 2017, this deliverable has been postponed as the experimentation phase was postponed and the final reporting of the experiment teams first was completed in September 2017. Learnings from Open Call 1 have been continuously integrated in the processes that support Open Call 2. The improvement of support to experimenters is part of those learnings and chapter three will address the diverse ways we have supported experimenters which has been crucial for the full implementation of OrganiCity as a service facility.

In addition to our focus in D5.5 on the usability of the tools, experimenter support, as well as the federation and integration of urban data as part of the OrganiCity facility that is captured in chapter four, we have chosen also to present the experiments and the experiment teams in more detail in chapter two and to include an analysis of the miscellaneous ways co-creation has been understood and unfolded in the work of OrganiCity experimenters in chapter 5. Co-creation is as methodology and conceptual framework embedded in OrganiCity in all phases and levels of the project.

2 Results of OrganiCity first open call

OrganiCity's first open call has been designed for experimentation in an urban setting directed by our seven engagement principles and firmly rooted in co-creation approaches. Experimentation has taken place with Smart Cities and IoT technologies and open data sets that were available, or under development, in the three OrganiCity cluster cities London, Santander and Aarhus, as well as in multiple cities. These three cities are mature cities when it comes to smart city technologies and open data platforms, and are governed by municipalities who have an openness towards and interest in including citizens in the sustainable development of their cities.

2.1 Introduction to experiments: first open call results

OrganiCity's first open call resulted in 157 applications of which 26 experiments were funded, divided in 10 smaller (pilot) projects up to € 10.000 and 16 experiments that were funded with an amount of up to € 60.000. The first open call has been targeted at testing the OrganiCity facility, and taking new cities on board was first foreseen by the consortium for the second open call. However, four experiments have been conducted in multiple cities, including the cities of Leuven, Nicosia, Madrid, and Sevilla. Experiment teams (based on residence of experiment lead), as the figures below show, are coming from nine different European countries. An overview over the experiments, per location and the themes they address can be found at our website <http://organicity.eu/experiments>.

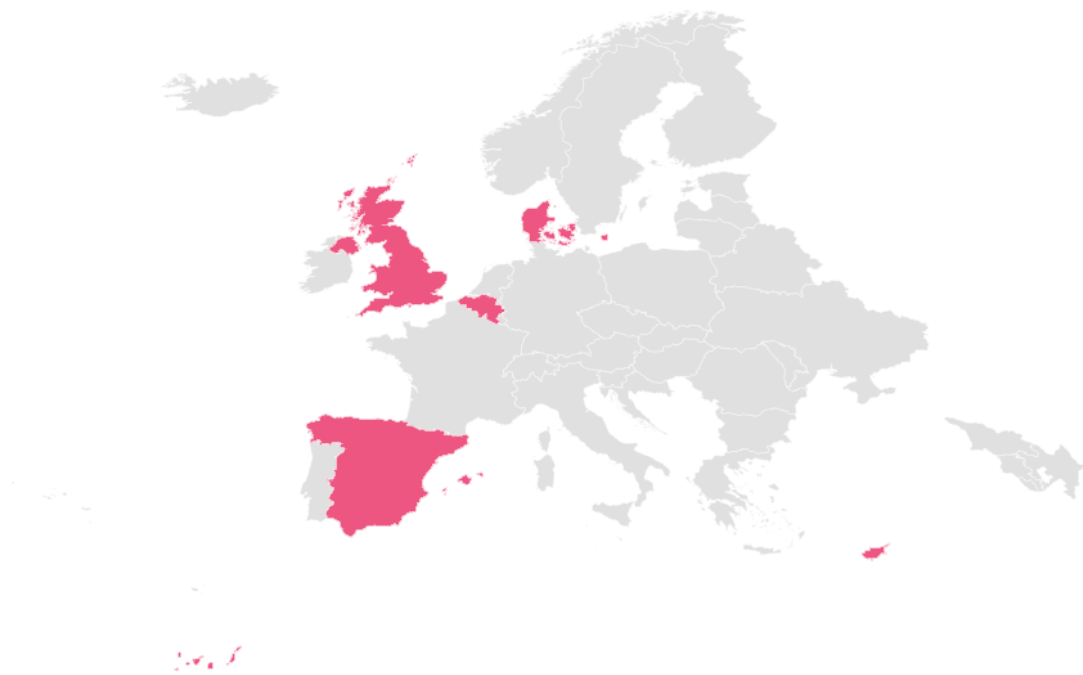


Figure 1 OrganiCity countries of experimentation: United Kingdom, Spain, Denmark, Belgium, Cyprus

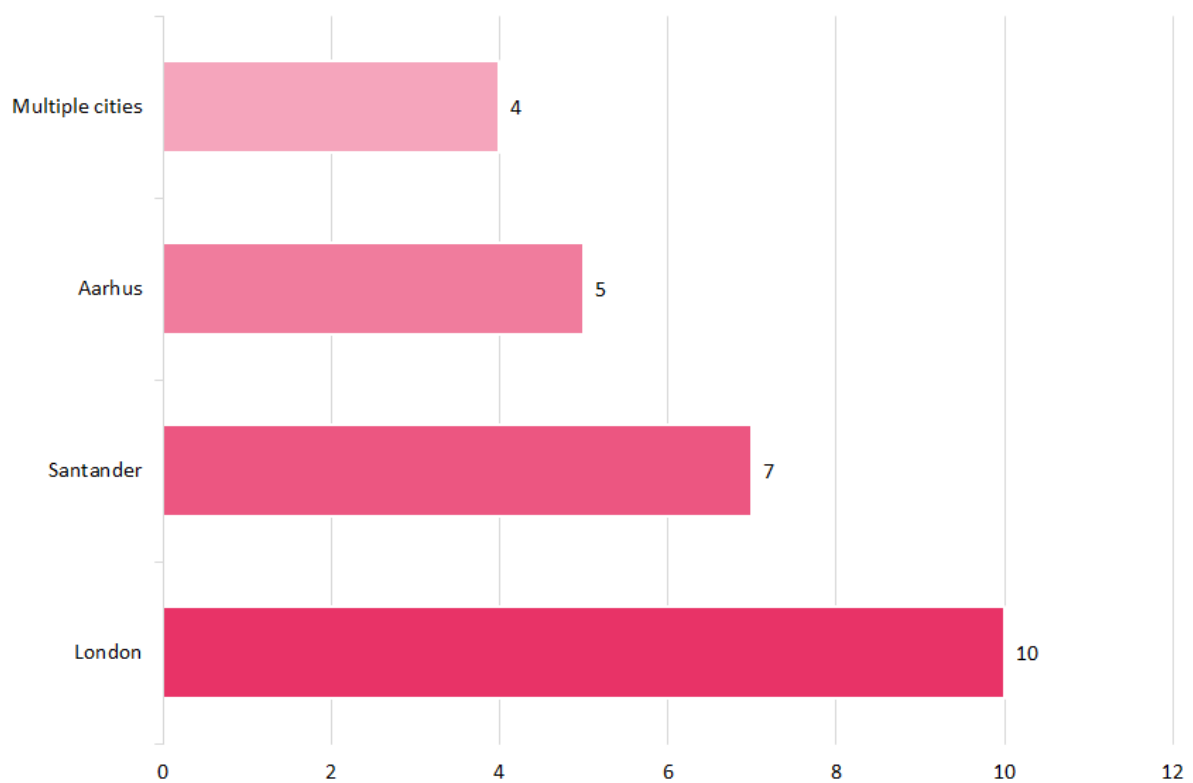


Figure 2 Number of funded experiments by place of experimentation

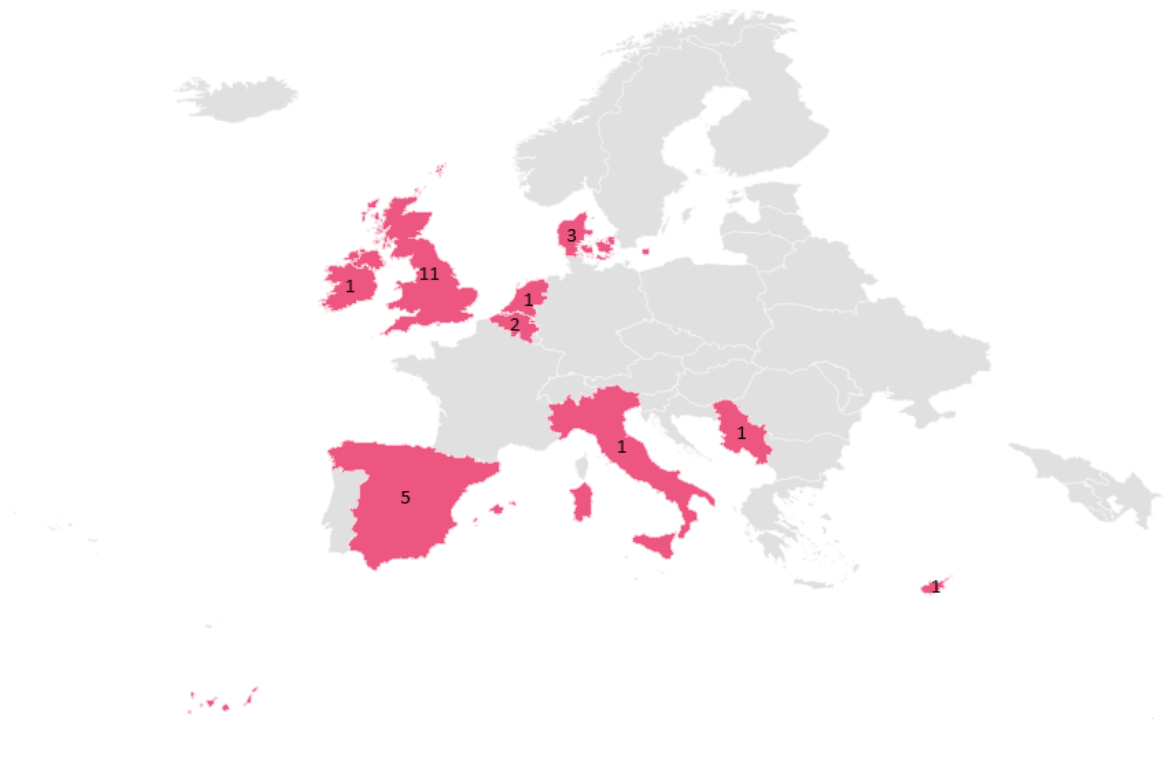


Figure 3 Countries of residence of funded experiment leads

As one of our KPIs has been to reach diversity in experimentation and our ambition to be inclusive in our approach, we have analysed affiliated organisation of the Experiment Lead, as well as gender balance.

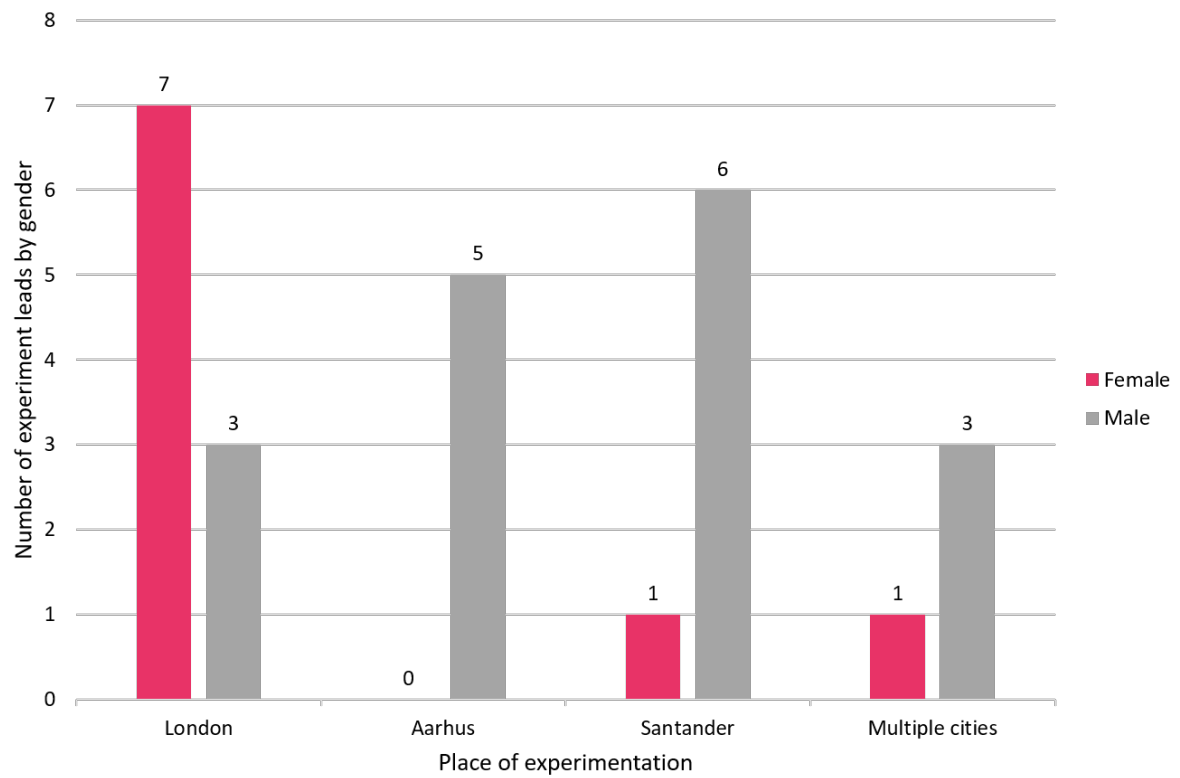


Figure 4 Gender of funded experiment leads by place of experimentation

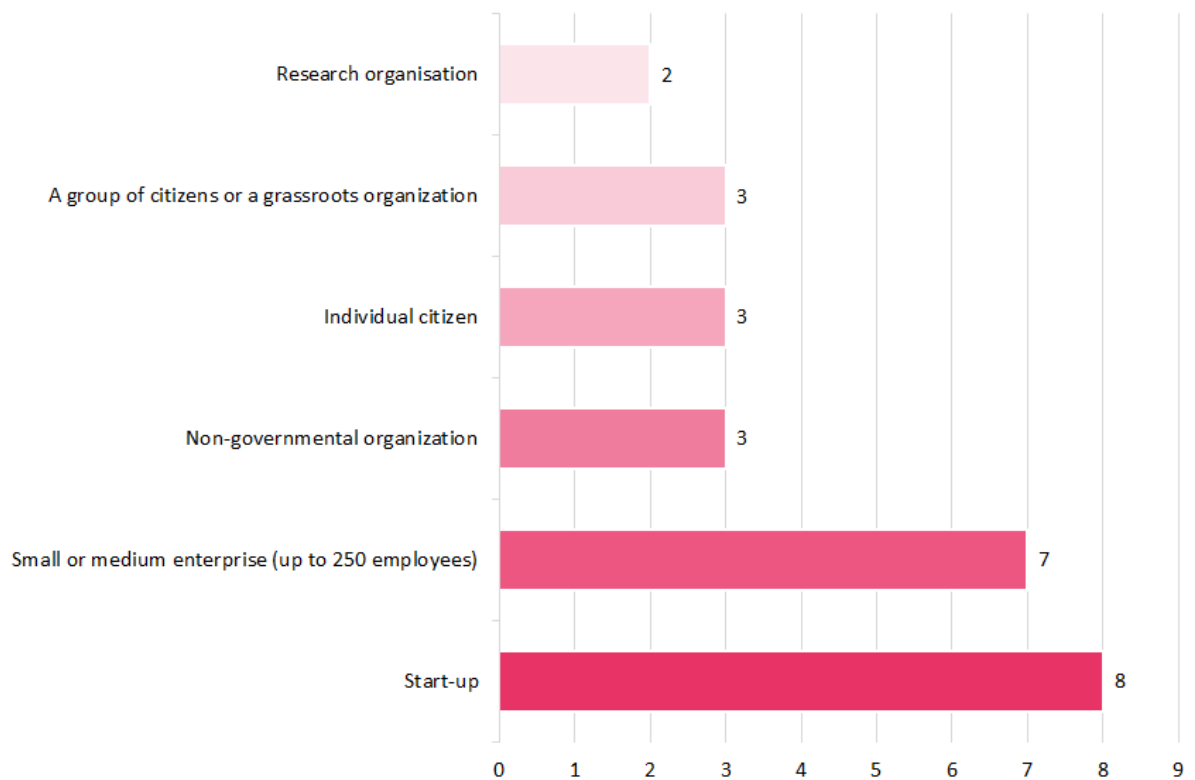


Figure 5 Experiment Leads by type of organisation

Open Call 1 was framed by the city challenges that the cluster cities had identified together with stakeholders through different design processes and focus group interviews. To allow for a bottom up approach the applicants also had received the possibility to propose their own challenges if they could argue that these were a concern for a larger group of stakeholders.

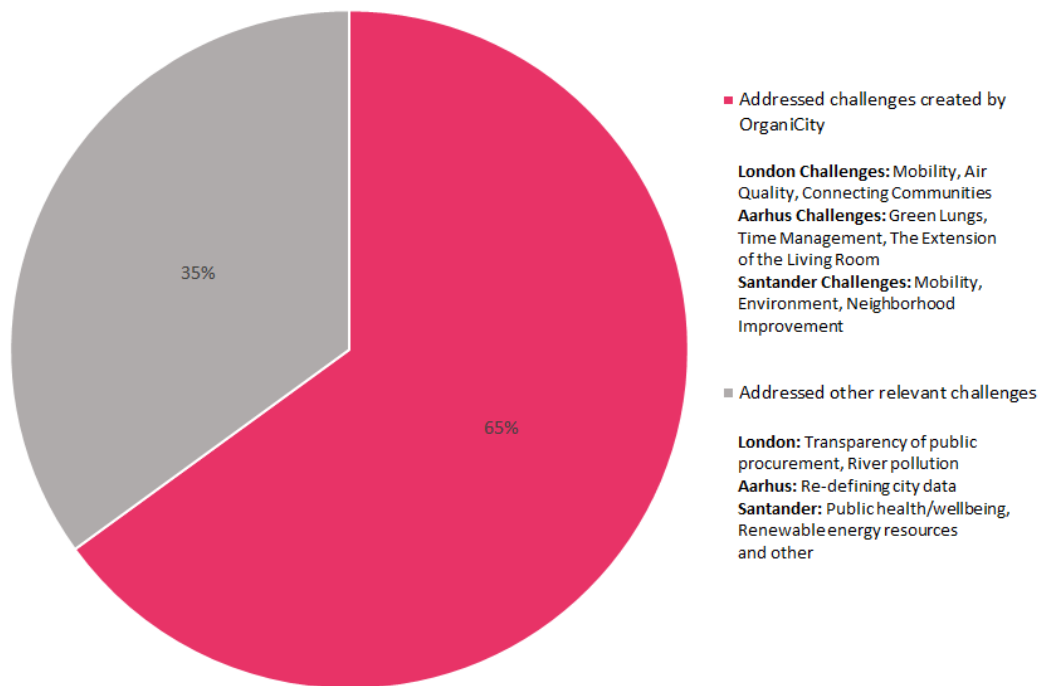


Figure 6 Distribution of percentages between funded experiments that addressed city challenges co-created by OrganiCity and other relevant challenges

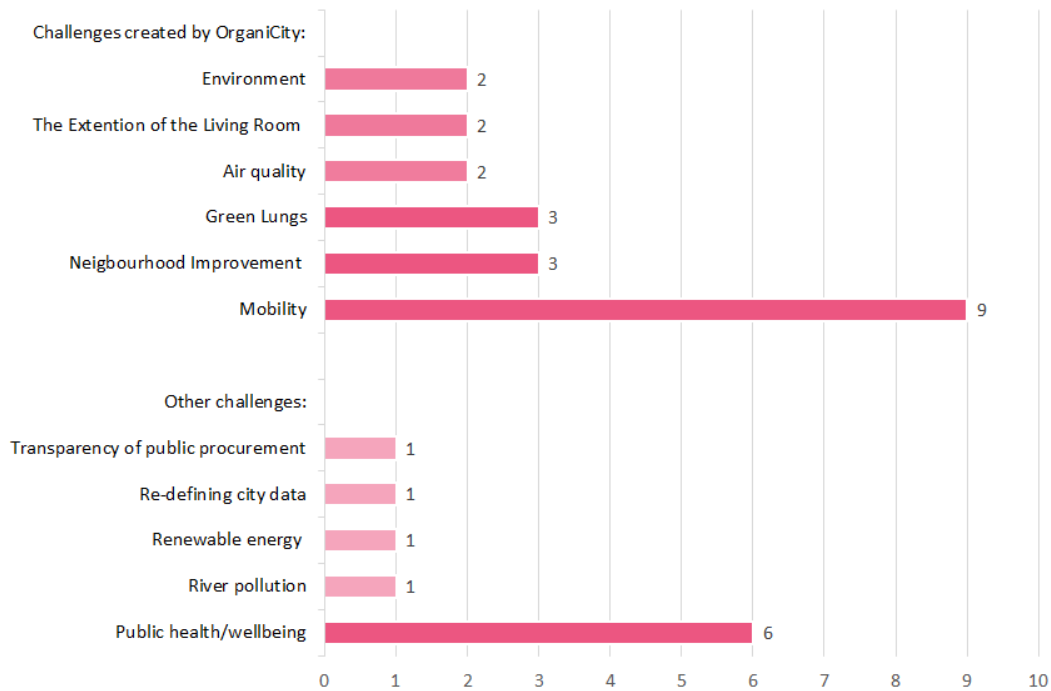


Figure 7 Some challenges addressed by funded experiments (in some cases, several challenges were addressed by one project)

2.2 The experiment teams and their work

As experimentation is at the core of OrganiCity, we feel that an introduction of who the OrganiCity teams are and what they experiment with could give insights into the diversity of challenges, themes, methods, datasets, tools and stakeholders that the OrganiCity facility can support and reach. Below follows a description of the teams and their work, which is more elaborative than the interactive description that can be found on our website.

2.2.1 OrganiCity experimentation in London

Co-creating new ways to gather and utilise subjective wellbeing data by Colour-in City

The Colour-in City team has partnered up with Lambeth Early Action Partnership (LEAP) and Lambeth Council to improve wellbeing amongst parents living in overcrowded housing in Coldharbour, Stockwell, Tulse Hill and Vassall. Co-design was used to engage citizens in exploring what and how subjective wellbeing data should be collected, as well as how to analyse and respond creatively and ethically to collated datasets. The experiment was designed to interact and demonstrate impact across two levels: at an individual level, providing conscious awareness of emotional wellbeing; at service level,

demonstrating different ways of collecting data. The experiment results support LEAP in developing a better understanding of the needs of residents, track a range of interventions against subjective wellbeing using live data, build support around the needs and aspirations of residents and help residents to improve their own wellbeing through co-producing a digital tool.

Team profile

The Colour-in City is a group of dedicated individuals who teamed up as response to OrganiCity's open call aiming at exploring 'what is a good future city, and how can we create it?' The experiment team includes service designers, data analysts, parents living in social housing and the local services that support them. Their focus is on 'colouring-in' the outlines of statistical wellbeing data to draw out individual stories, strengths and needs.

Real-time analysis of London transport network usage by mobility-impaired stakeholders by MobiliCity

The MobiliCity experiment aimed to improve accessibility for mobility-impaired users on the London Transport Network by crowd-sourcing mobile tracking data and cross-referencing with users' accessibility requirements to identify mobility 'black spots'. Specifically, the MobiliCity web app (www.mobilitycity.london), integrated with the OrganiCity platform, used sophisticated machine learning techniques to compare user journeys with optimal routes to calculate time and distance differentials. It also allowed users to provide geolocated comments on accessibility issues. Engaging citizens in this challenge could have an impact both for improving accessibility for mobility-impaired users in the longer term (when deployed at scale) and for the sustainability of OrganiCity by building long-term engagement and developing new tools.

Team profile

The experiment team is a collaboration between data scientists and programmers from the SME Spectra Analytics, a data analysis and research consultancy, and researchers and experts in urban planning, design, co-creation and transport.

Sensor network: data validation pilot by AirPublic

AirPublic worked on integrating their mobile air quality sensing prototype through the SensiNact tool. The prototypes were adapted for electric vehicles and installed on 10 Gnewt Cargo vans in London. From initial idea, the scope of the experiment was quickly expanded, with several different sensor types incorporated into the units for comparison during field tests. A data protection impact assessment was carried out, as well as co-creation activities with a variety of academic, public sector and professional stakeholders. These processes shaped the experiment, leading to additional layers of coding, swapping parts and careful consideration of data output format (as above). The stimulus driven by the experiment to co-create and

reach out and dialogue with key citizen stakeholders has been particularly useful to the on-going experimental development of AirPublic, as has being part of the OrganiCity eco-system and meeting fellow experimenters with complementary ideas and technologies. AirPublic plan to continue developing their mobile sensing offering and aim to scale up to a city or borough-wide demonstrator.

Team profile

AirPublic is a social enterprise, which formed after winning the UK Climathon in July 2015. The team consists of members, passionate in the pursuit of improving air quality, and functions with a sociocracy structure with 'circles responsible for each area of expertise. The team has a combined skill set with specialities in business, data and community engagement.

Public spend made transparent by Spend Network

Spend Network created a user-friendly insight analysis tool for London-based government, citizens and SMEs to improve procurement efficiency and competition. The team had previously developed a robust, open database on public spending and tenders (over 6m tenders and 90m rows of spend from over 370 government bodies) and, through OrganiCity, was able to create insights through linking data. Open data was linked and categorized, using London tenders and contracts published on TED, Contracts Finder and other local portals like <https://www.londontenders.org> and open spending published by local authorities. In addition, the experiment produced easy to use data visualisations on spend and tender data so that citizens can understand what is being spent and whether this offers value for money, using OrganiCity's Tinkerspace and Urban Data Observatory tools.

Team profile

Spend Network was founded in 2011, using open public data to create the first comprehensive and publicly available repository for government transaction data, a market worth in excess of £200 billion per annum. The team cares deeply about changing governmental procurement and contributing to democracy through transparency. They have 20 years of procurement knowledge and a proven track record of delivering key enabling open data analytical products.

An investigation into the positive impacts of tranquil spaces on health and mobility in London by Tranquil City

Tranquil City aimed to investigate the positive impacts of tranquil spaces on citizen's health and mobility in London using crowd-sourced data, OrganiCity's sensor network and transport data. The results demonstrated that in general the "tranquil routes" were exposed to significantly less noise and pollution compared to the "standard" routes. By understanding the benefits of tranquil spaces situated within the urban landscape, the experimenters hoped to promote the use of these spaces to city dwellers to help improve citizens' health and wellbeing and better protect, nurture and create more tranquil spaces in the

cities of the future. The project has grown through citizen engagement and it embraced an open approach to tranquillity. While accepting that green spaces are central to the perception of tranquillity within busy cities, the experiment also looked at wider opportunities for incorporating tranquillity and beauty within urban environments.

Team profile

Tranquil City is a team of engineers, senior data scientist, economist, sustainability consultant, Principal Air Quality Consultant. The experiment lead started the Tranquil City group in 2016. They are particularly interested in incorporating smart acoustic technologies to aid current urban challenges.

TrafficFlow by Magenta Srl

Magenta Srl looked at participatory traffic monitoring with IoT sensors. It resulted in an innovative, flexible and low-cost platform for road-traffic data collection and analysis. It is based on sensors equipped with video analysis software, capable of collecting meaningful statistics on the number of vehicles passing through the observed lanes, their estimated speed, and their type. The experiment was based in the London Borough of Hackney, where a network of IoT sensors will be deployed to monitor live traffic conditions. 4 sensors monitoring 13 lanes across 7 streets were installed, producing a grand total of more than 700 days of continuous traffic data which have been made open via the OrganiCity Urban Data Observatory tool. Citizens and stakeholders were invited to co-create measurement campaigns, host sensors and contribute to storytelling activities based on the data collected.

Team profile

The experiment group is formed of two SMEs, with a history of collaboration in various initiatives including EU funded schemes. Magenta Srl is a company based in Florence (IT), specialised in design and development of software for several sectors, including mobility. Founded in 2007, the company now employs 13 engineers. Magenta is active in R&D and was recently involved in digital social innovation initiatives funded by the EU/CAPS program. Magenta is listed among the success stories of the EU-funded FIWARE platform.

Resolvo Ltd, founded in 2014 in London (UK) is specialised in the design and management of European projects. Resolvo is an expert in designing and implementing communication plans for European projects and can bring expertise in web-based communication, stakeholder involvement, event organisation and participative performance organisation, monitoring and evaluation.

Reducing river pollution with technology, education and community by Helen Steer's team

Measuring water pollution in the River Lea, Helen Steer's team hoped to reduce river pollution through the use of technology, education and the community. After the initial co-creation workshops with a state school local to the River Lea, an Internet of Things enabled water sensing kit was developed and deployed to enable real time monitoring of the quality of the river Lea. The kit measures pH, conductivity, Dissolved Oxygen (DO) and Oxidation-Reduction Potential (ORP). It stores data locally, pushing a live feed out to the Urban Data Observatory every 10 seconds. In addition, the team designed a curriculum linked unit of work for Geography and Biology KS3 and GCSE on river health and the process of eutrophication, including a student-led Science investigation using the OrganiCity platform, the water sensing station and classroom-based experiments mimicking the effects we might see in the real river. These materials - including a fantastic game that shows how nutrient runoff from farmland can kill fish downstream - were extremely well-received and are available for free download by Geography or Biology teachers.

Team profile

Experiment lead is technologist, educator and award-winning author, specialised in getting new technologies into the classroom in a way that excites classes and delivers robust curriculum-linked learning. She has delivered projects and prototypes for clients such as National Geographic, National Parks and Thames Water. She was named a London Leader by the GLA for her community work in 2014. The team has skills in education, science communication, environmental science, project management, water management.

Home monitor by Projects By IF

IF proposed to measure air quality in London's buildings to improve citizens' understanding of the air quality inside their homes and workplaces. The team iterated a prototype of an indoor environment monitoring device developed earlier this year by experimenting with the OrganiCity platform. The team co-design the interface with residents to understand how to make indoor air quality information useful. By finding out how people interact, live and work with environmental monitoring devices, they intended to build something that could help improving people's understanding of indoor air quality over time. The prototype was to be developed with the privacy and security of the people that use it in mind. Building it this way would demonstrate the viability of building connected products that are useful but also secure.

Team profile

Projects By IF is a design studio that makes things that change how people think about data, privacy and security. They aim to empower people by making these things more accessible and understandable. Their recent clients include The Co-op, Google Open Research, Doteveryone and Barclays. The team is

multidisciplinary, working collaboratively across design, technology, security and privacy, user research and strategy. The team shares their work regularly through blog posts, open source code repositories and talks. IF has an excellent network of contacts from across the housing sector and technology.

The team By IF ended the project in the interim phase due to illness of the Experiment Lead.

Opening up indoor beacon data to digital navigation for vision impaired citizens by Wayfindr

Wayfindr was exploring navigational technologies, as these hold the key to a revolution in independent navigation for blind and partially sighted people. The team utilised Bluetooth beacon technologies and, through smartphones, truly opened up a world where vision impaired people are no longer held back by their sight loss. In collaboration with transport services in London, vision impaired people and developers, Wayfinding application was created and tested in the London underground network. By exploring usability of this application within the transport infrastructure the experiment stimulated the creation of navigational services for Vision Impaired citizens. This experiment also goes some way in supporting the Social Inclusion and Well-Being stats taken from the charity Action for Blind People – focused mainly on mobility.

Team profile

Wayfindr is a subsidiary of the Royal London Society for Blind People (RLSB). It is a joint venture between RLSB and Ustwo – run as a not-for-profit, ‘tech-for good’ company limited by guarantee. Since 1838 the RLSB has supported millions of people cope with being blind. Ustwo are a Digital Product Development agency- inspired by the opportunities Beacon / smart phone navigation offers to VI Citizens. London Underground/ TfL have worked collaboratively with Wayfindr to implement Beacons in Pimlico/ Euston stations.

Wear AQ by Umbrellium

Wear AQ combined wearable technology, IoT, citizen participation and machine learning to help improve Air Quality (AQ) through measurement and creating awareness. The experiment considered how school children could make sense of this complex issue and how people might combine their subjective perception and intuition with wearable technology and machine learning algorithms to investigate air quality issues. The experiment provided an experience for students to engage with wearable technology. They were able to contribute data about air quality and while going through the process, explore other ways of understanding air quality. Through the experiment, the team was able to obtain correct predictions on students’ perceptual data based on the machine learning model. In addition, the experiment has proven that there is a correlation between perceptual data to actual air quality measurements.

Team profile

Umbrellium is a team of architects, designers & creative technologists with years of proven experience in designing & deploying award-winning interactive projects. They design, engineer and fabricate both hardware and software systems in-house, as well as the infrastructures that unite the two. Umbrellium works continuously in open source community, and closely with leading figures in the Arduino, Processing and Thingspeak. The team includes an architect and designer of digital installations, wearable designer, data scientist and digital strategist.

2.2.2 OrganiCity experimentation in Santander

Santander Smart Buddy by CityMakers

Santander Smart Buddy by CityMakers aimed to improve Santander neighbourhoods while contributing to the development of the city as a 'smart' tourist destination. To achieve this, CityMakers developed a tool, which connects visitors to Santander with local citizens. Citizens were able to make recommendations to tourists and showcase venues and attractions in lesser-known parts of the city via a web application. By doing this, data was generated around places of interest and tourism habits, which was then added to the city's open data sets. Smart Buddy platform provided better services for tourists and more useful information for businesses and city planners. The objective of the platform is not to give an overview of the most famous city attractions, but rather to include venues and activities in less known parts of the city, helping to foster the vibrancy and economic development of these neighbourhoods.

Team profile

The team in this experiment combines three members of City Makers, a platform of professionals specialized in urban and social innovation which provides services and creates digital tools for the development of smart cities and two independent professionals. The team combines experience in participatory projects, technical skills and an extensive knowledge of the city of Santander and its specific context. The team executes the activities related to the web-app platform and co-design with neighbours and other relevant actors, while the back-end and web-development has been subcontracted.

Real-time information for a Seamless urban mobility by RISUM

This project addressed the problem of managing heterogeneous data in the realm of urban transport. The aim of the experiment was to provide tractable information to improve intermodal mobility. The intermodality is one of the key elements in the coordination of various modes of transport. On trips by public transport, the waiting and transfer time is the cause which most deters people from using cars. The user must perceive the trip as unique, even if it is formed of several stages and in different modes of transport. RISUM created a General Transit Feed Specification (GTFS) service to OrganiCity with real-time

and public transportation information of Santander and surroundings, integrating information from different data sources and making public transit data readily available so developers can consume the data to build applications that simplify navigating transit systems.

Team profile

The team consists of two freelance consultants working in the field of mobility, accessibility, experts in GIS. They are professionals, interested in innovative services for smart cities, but always focused on the smart citizens. The team has a realistic planning and management experience, which makes them able to provide creative solutions to everyday problems of citizens.

Commuting Santander by Fstr

Commuting Santander aimed to supply an additional solution to Santander's mobility problems, specifically directed to commuters, by co-creating a platform, using the OrganiCity facilities, that allows employees and students to carpool in their daily commute.

Prior to facilitating the carpool tool, the experiment carried out a traffic analysis and some co-creation events in order to get a better understanding of Santander mobility situation which, among other things, served to define which features will be included in the Commuting Santander app. The experiment opened different communication channels through Santander public and private institutions, which led to a significant broadening of Commuting Santander's dissemination. Furthermore, getting to know others experimenters helped to share strategies to face barriers encountered during experimentation, as well as to plan future collaborative actions that will lead to a continuation of the experiment activities.

Also, the project allowed citizens to increase their social network and save money, whilst helping mitigate urban mobility problems.

Team profile

The team consists of a software engineer, a software developer, a philosopher and a freelancer in communication, collaborating with the SME Alter Geosistemas, a Santander based company, specialized in geospatial information analysis.

Walks in the City by EUROBO Creative SLNE

Walks in the City (WalkInCT) is an experiment created with a twofold objective: keeping seniors healthy and socially active, and making cities and neighborhoods livelier by reconnecting citizens with their urban entourage. The experiment challenged seniors to go for a walk through their city and tag their favorite places along the way, create and recommend routes or even invite other walkers to join them. They were then awarded points, which could later be exchanged into badges. This way, gamification concepts were introduced to foster seniors' activity and promote social interaction. The experiment tackled the

challenge of ageing-well in the city of Santander, and at the same time it took up the mission of revitalizing and improving the neighborhoods. Moreover, by motivating seniors to visit their city and to share their favorite places, the experiment opened up a potential of a city itself to be more alive and attract additional walkers and visitors.

Team profile

EUROB Creative SLNE is an SME working with empowering individuals through innovative mobile technologies. The team consists of junior and senior professionals with technical, business, legal and marketing backgrounds.

Walkers group Santander by Dirige in2 Social

The Walkers Group Santander experiment aimed to eliminate the number of people feeling lonely in Santander and strengthen social and mental resilience among citizens. The team developed an application for citizens to record their physical exercise and organised walking social events for people to meet others whilst exercising. These habits improved citizens' mental and physical health and reduced the feeling of loneliness among the elderly citizens. The experiment evolved through research and co-creation activities.

Team profile

Dirige in2 Social is a non-profit organisation in the area of social innovation. The organisation consists of people with physical disabilities. The team has an experience and a history of involvement in research, as well as educational and entrepreneurial activities.

My city beauty by Nissatech

Throughout My City Beauty experiment, an app was created to address environmental challenges and provide a new way for active, smart citizens to engage more with the city's environment/nature, by co-creating and sharing their awareness with not-so-active citizens. In particular, the app allows smart city citizens to share the photos they take during physical activities in the nature. Application also supports the co-creation process through various features as commenting, liking (upvoting) and subscriptions. The system is built on top of the OrganiCity platform and allows citizens to co-create a better, more interactive and healthy life style under the motto: "I love My City (Beauty)".

Team profile

Nissatech is a seven-year old, innovation-driven SME that strives for becoming an East European leader in developing advanced IT solutions for real-time processing to be used in various industries and businesses. The company is well connected throughout Europe. The team consists of communication experts, software engineers and two managers.

Mapping the potential of distributed renewable energy in Santande by Nemoi

This experiment aimed to develop an interactive platform for renewable energy for Santander citizens. The developed platform preliminarily deploys a solar energy map of Santander at almost real time. An algorithm provides an estimation of the solar energy resource over the year, along with the estimated investment for the efficient (cost minimizing) combination of solar panel and battery system, given the location of the roof. Once fully operative, this platform has the potential to provide accessible and rich information to inform citizens and companies, SMEs, and ultimately communities about distributed renewable energy installations. The experiment also included an important in-parallel task, which consisted in improving the map resources and resolution in the form of a sensors network expansion. The team now plans to incorporate this sensors to the OrganiCity sensors network.

Team profile

Nemoi is a multidisciplinary group of individuals, friends since university years, all enthusiastic about technology. The team members have years of professional and research experience in computer science, physics, engineering and economics.

2.2.3 OrganiCity experimentation in Aarhus

City as a 1:1 green laboratory by Mejlgade Lab, Rum13 & Åte VR

The City as a 1:1 Green Laboratory has revolved around citizen involvement in the greening and climate adaptation of the city. The project focused on a specific neighbourhood in Aarhus, Denmark, called Nørre Stenbro. The team conducted an anthropological study with the local citizens and created and tested a tool for participatory data collection. These insights were visualized within a VR and projection system, where citizens could place green elements in a virtual model of Nørre Stenbro, and be inspired and informed by the collected data. The alterations in the virtual environment were projected in real-time on a physical model of Nørre Stenbro, where data insights were also displayed. This helped the creation to become a shared collaborative effort between the person in VR and other participants. Finally, the team tested this system with citizens from Nørre Stenbro and later in an open exhibition. The experiment resulted in a prototype, considered a proof-of-concept, which needs further development to become a final product and citizen engagement and city planning tool.

Team profile

The team members come from three different organisations: Mejlgade Lab, Rum13 and Åte VR. Mejlgade Lab, based in the neighbourhood Latin Quarter in Aarhus, is a voluntary NGO and urban laboratory, aiming at the creation of local and sustainable solutions to global challenges through local, community-based development.

Rum13 is an Aarhus based non-profit digital design and art organization founded in 2014. Rum 13 has six members who strive to design art and technology that engages citizens. They all have backgrounds as Digital Designers from Aarhus University, but with different expertise.

Åte VR promotes, uses, and shares knowledge on the development of virtual reality hardware and software, in collaboration with companies. Åte VR is specialised in creating computer-generated 3D visual experiences, and has for instance designed a VR application for rehabilitation for Hammel Neurocenter, Denmark.

Siidi by HOP Ubiquitous (HOPU)

Siidi invited Aarhus citizens to participate in creating, enhancing and improving existing public spaces (green zones, gardens, squares etc.), as well as abandoned spaces in the city. Citizens in the area of the Institut for X were invited to “virtually sow” the available city spaces with “virtual seeds” to ensure they evolve to the real needs, wishes and expectation from the citizens. A virtual seed is a citizen’s need, feeling and/or idea for making the city spaces better places to study, to meet, to relax, to enjoy and to create memories. For this purpose, a new product called ‘Siidi Spot’ was deployed and validated using the OrganiCity facilities, contributing to maturing and enhancing the OrganiCity tools through stakeholder involvement. Siidi Spot is a low-cost beacon connected to the Internet, which offers the identification and location of points-of-interest using IoT. Siidi Spot enabled interaction with citizens of Aarhus and informed them about the opportunity to participate in redesigning urban spaces and communicating this input to policymakers.

Team profile

HOP Ubiquitous is an innovation leader in Internet of Things (IoT) solutions, with main residence in Spain. HOP Ubiquitous was established to make a difference in the use of the Internet of Things through more human oriented products. For this purpose, HOP Ubiquitous has built on its expertise in ubiquitous/global connectivity to Internet offering innovative low power modules with M2M/IoT/LP-WAN, scalable management to facilitate large scale deployments, maintenance and monitoring, and finally ad-hoc sensors for the different markets.

City experience probe by Empati design

City Experience Probe was created as an effort towards expanding what is considered urban data to include in-situ experiences, attitudes and feelings of citizens. The team has designed, constructed and deployed prototypes of these probes into the city of Aarhus making them available for citizens to interact with in interesting ways. The experimenters talked to some of those who dared to interact with our City Experience Probes and collected data generated by all the users’ interactions with the probes. After carrying out the work on identifying what data types and sources those who create and operate our cities

use, it was concluded that a sort of divide exists: between gut feel and guesswork on one end, and longitude surveys by external consultant firms on the other. City Experience Probe proved that there is potential between these two extremes and is the first step towards a low cost, highly flexible way of ensuring that city makers on one hand have the possibility to inform their choices, and citizens on the other hand have a way to make their voices heard.

Team profile

Empati design is a start-up that designs products and services with a focus on the interaction between humans and technology. The team builds prototypes and uncovers unique insights in the critical phases of a development process.

Opportunity spaces by Space Engagers

The challenges this experiment addressed are spaces as a limited resource and the underuse of space as a widespread problem. Underused spaces in the city might be vacant sites, flat roofs, spaces left over after infrastructure planning or rarely used public spaces. Such spaces could be considered opportunities for a town or city to reinvent itself and to address social and ecological challenges. Opportunity Spaces Aarhus mapped these underused spaces and generated ideas for their reuse through crowdsourcing. The project developed a smartphone app using OrganiCity data assets and tools that allows citizens to: take geo-tagged images of spaces they find in the city that automatically link to a shared map; contribute information and observations on the spaces; and put forward ideas for re-use to an online ideas noticeboard. Citizens can view the ideas through the map or online noticeboard, add comments, rate the ideas, and offer support. The experiment therefore initiated co-creation processes on the spaces that were further developed in a workshop.

Team profile

Space Engagers is a research group and nascent campus spin-out company from University College Dublin. Space Engagers seeks to support more informed and effective decisions for social and environmental change, by engaging citizens in building awareness of local issues and generating distributed knowledge through online mapping and civic engagement platforms. Over the past four years the Space Engagers team has been working together on the EU FP7 TURAS [Transitioning towards Urban Resilience and Sustainability] project WP3, from which ReusingDublin [www.reusingdublin.ie] emerged.

Green biking routes by BioDigitalHealth

Green Bike Routes addressed air pollution in urban settings. The experiment was executed by selecting 10 citizens living and biking in Aarhus and equipping them with low-cost sensors for air quality measurements, installed on bicycles to measure concentrations along the route between work, school, shopping and so on. First, citizens followed their ordinary route and afterwards they followed a low

exposure “green” route. The “green” routes were chosen based on air pollution calculations making use of traffic data from the Open Data Aarhus platform. Concentrations between different routes were compared. It was indicated that the personal pollution exposure can be reduced when choosing a “green” route through city.

Team profile

The team behind the experiment is BioDigitalHealth (BDH), a UK SME supported by an InnovateUK innovation award in the form of an EPSRC grant integrating health sensors within an Internet of Things cloud-linked platform in 2013. BDH was an invitee to former FP7 Air Pollution Citizen Science submission and subsequently linked pollution data within BDH cloud. The team collaborates with the NGO Danish Bicycle Association.

2.2.4 OrganiCity experimentation in multiple cities

Breathable cities by Leapcraft

Santander, London and Aarhus

Leapcraft placed a range of CPH Sense environmental sensors on city buses in London, Aarhus and Santander for measuring air quality levels and emission in real-time around the city. The aim was to help smart cities plan better, improve environmental policy making and offer citizen-facing services to reduce citizens’ exposure to air pollution. An important part of developing the solution was to interview citizens of the cities and create awareness through a real-time visualization of the environmental data from each city. The core purpose of “Breathable cities” was to provide a simple scalable solution to enhance transparency, fairness and compliance with the most relevant regulations on air quality.

Team profile

Leapcraft is a new age global innovation provider working with sensors, big data and technology exploration. Leapcraft works with companies & governments to create new offerings with a breed of new tools and methods based on user centered design, rapid prototyping and advanced interaction design.

El Desmarque InstaSport by El Desmarque InstaSport

Multiple cities in Spain: Sevilla, Madrid, Valencia and A Coruña

El Desmarque InstaSport took advantage of social media feeds to detect events, which were happening in nearby areas to capture real-time feedback from followers of their social media channels. The experiment contributed to the co-creation of the OrganiCity facility by creating a new tool, which generates data insights from social media content. This tool was validated by journalists and audiences of www.eldesmarque.com.

Team profile

El Desmarque is a sport news website with a team of 70 people and headquarters in Seville. Their R&D department is always trying to find new ways of interaction between El Desmarque and their loyalty fans and readers. The experiment team includes journalists and engineers.

Public like displays by Research[x]Design

Santander, London, Aarhus and Leuven

The experiment resulted in the realization of a toolkit that allows citizens to implement public visualizations of their own. Specifically, the toolkit includes 1) an online platform that allows the citizen to select urban data and an appropriate visualization format, 2) one non-interactive and one interactive e-ink display that can be attached to a window or facade. By communicating urban data on its place of creation, i.e. the city itself, citizens have the power to become informed and engage in public debate. Such public visualization can touch upon a multitude of concerns and requirements that need to be addressed: waste management, energy consumption, changing demographics and so on.

Team profile

The team consists of researchers of the research group Research[x]Design from the Department of Architecture, University of Leuven in Belgium. This project has emerged from design-oriented research practice, including projects on visualization design, public visualization, physicalisation and media architecture.

DisPark by UCSL Lab @ CUT

Santander and Nicosia

The goal of the DisPark experiment was to exploit Internet of Things technologies in combination with the OrganiCity tools to design a prototype system that assists people with disabilities in locating available parking spots designated for their exclusive use. A multidisciplinary team along with the end users co-created the system. It is highly useful in busy urban areas, helpful for people with disabilities, as well as local authorities and planners, who can use historical data to quantify the needs for parking spaces in specific parts of the two cities.

Team profile

The team members are employed at the Ubiquitous computing and Smart Living Lab of Cyprus University of Technology (CUT). The lab has experience in participating in European projects. To execute their co-creation processes, the team interacted with the Cypriot association of people with disabilities and a similar association in Santander.

3

Support to experimenters

As previously reported in “D5.3 First Open Call Execution”, the OrganiCity project has provided a number of services in order to support experimenters – during the application phase as well as during the experimentation phase – to quickly find or receive answers to their questions. The services foreseen already in the OrganiCity proposal was an FAQ (Frequently Asked Questions) and a helpdesk. During the period leading up to the start of the experimentation phase in the first Open Call, the IRC-like (Internet Relay Chat) tool “Slack” was also adopted to allow for direct discussions amongst experimenters themselves and with the OrganiCity team. A Github was set up as a storage place for detailed technical descriptions, code examples, etc.

The admin and info mailboxes @organicity.eu have also been available together with email contact with cluster representatives. Several workshops, webinars and clinics have provided opportunities for conveying information about OrganiCity, and to allow for experimenters to meet with OrganiCity team members as well as with other experimenters.

3.1 Experimenter Handbook

All experimenters received the Experimenter Handbook as a welcome to OrganiCity. This document captured information necessary for the experimenters to use it as a reference point during the experimentation period.

The handbook contains:

- A welcome letter written by the Coordinator, to set the context. This serves as a reminder of the purpose of OrganiCity and their role as first teams testing Experimentation as a Service.
- The Experiment Agreement, the legal document signed by experimenters and OrganiCity. This was included to establish it as a relevant step through the process.
- Financial guidelines describing how reporting takes place and how much and when experimenters will receive their funding.

- Communication guidelines to advise on best practice documentation throughout the experiment and different channels and platforms to spread the word.
- Support guidelines outlining the different contact points for general issues, for cluster-specific questions, for technical assistance and across experimenters on Slack.
- A checklist with the key dates and documents that need to be submitted at each date (including links to such documents).

The document also referred to www.organicity.eu/experimenting, which was an internal online page clustering these key documents and that was updated when new procedures came in place (for instance, with the reporting questionnaires).

The Experimenter Handbook worked very well as an introduction to the process and a reference document throughout the experimentation period. In addition, given Experimentation as a Service is iterating, it is necessary to have a complementary live space where experimenters can be updated with the latest information and documents. During the second experimentation period, we recommend this space has a broader relevance in the process – it would be in line with our values to create a space that both the OrganiCity team and the experimenters can update.

3.2 Helpdesk and FAQ

The helpdesk and FAQ were setup using the Zoho Support service (the system selection process and a detailed description reported in “D5.3 First Open Call Execution”).

During the first Open Call, OrganiCitizens asked more than 400 questions through the helpdesk by emailing helpdesk@organicity.eu. Most of the questions were answered within 4 days. A person monitored the account daily and assigned each question to one of the 10 team members assigned to answer questions, each with their area of expertise, such as finance, legal issues, cluster city knowledge, etc.

The questions were typically about the application process between March and June 2016: eligibility, budget, tools functionality and available data sets, etc.

During July and August, the application evaluation took longer than originally planned, so some questions requested receiving the evaluation results.

During the experimentation phase, the questions naturally focused on the following areas:

- Requests to access the OrganiCity facility
- Questions about tools’ detailed functionality
- Requests for additional data sets

- Questions about co-creation, e.g. how to reach suitable user groups, etc.
- Questions about reporting, especially for the interim report

In the FAQ, an initial set of questions and answers was published around topics that we considered might be “expected questions”. New items that proved to be asked regularly were added.

The OrganiCity Slack was implemented when the experimenters were selected and they expressed their questions directed there.

3.3 Admin and info mailboxes

The admin@organicity.eu mailbox has been used for formal communication from the experimenters to the OrganiCity project secretariat, for submitting the signed Experiment Agreements, reports and financial statements.

The info@organicity.eu mailbox is the general mailbox for communication with the OrganiCity team. Mostly used by people other than experimenters wishing to receive information about the project.

Experimenters also received a personal email address to get directly in touch with the cluster representatives in Aarhus, London and Santander for questions related to experimenting in these cities. Due to relationships building with experimenters during our engagement phase and the subsequent contact once experimentation started (through Slack and events), the experimenters had the tendency to get in touch directly with team members who they considered would be able to support them. When they were unable to identify the right person, the cluster leads would sign-post to the person qualified to assist.

3.4 Slack

The tool *Slack* (<https://slack.com>) was adopted to allow for chat-like communication among a group of invited members. All team members of the funded experiments were invited to join the conversations at the Slack channel. By the end of the experimentation period Slack had a total of 85 experimenters and 26 OrganiCity team members. Across the experimentation period, the members had sent 7,714 public and private messages.

The default channel #general served for a variety of messages and was the best space for public announcements from the OrganiCity project. This was the easiest space for experimenters to establish conversations with all, which became an organic flow of encounters and sign-posting across relevant online articles, people and sources of information.

There were channels for #Aarhus, #London and #Santander to help experimenters share local experiences. The activity on these channels depended on the willingness of experimenters to share. These help those who were working remotely to receive advice from the locals. However, for the locals themselves, it was more natural to connect during the events and continue their conversations privately.

A general #tech channel and some tool-specific channels emerged to resolve technical questions. For this purpose, Slack was not to be the best medium. Developers are used to a forum or stackoverflow approach organised per topics, which rendered the one-thread conversation on Slack confusing to resolve. For pragmatic reasons, the technical team usually arranged email conversations or teleconferences to address the issues.

The most active channel became #learning-and-comms. This channel emerged by request from the experimenters who wanted to know more about everyone else's progress but did not know where or how to share. Given this motivation, the OrganiCity dissemination team (task 6.2) encouraged the groups to share more often by making their updates public into a weekly blogpost. This mechanism was very successful to engage across experimenters, to keep the team up to date and to give external visibility to their work.

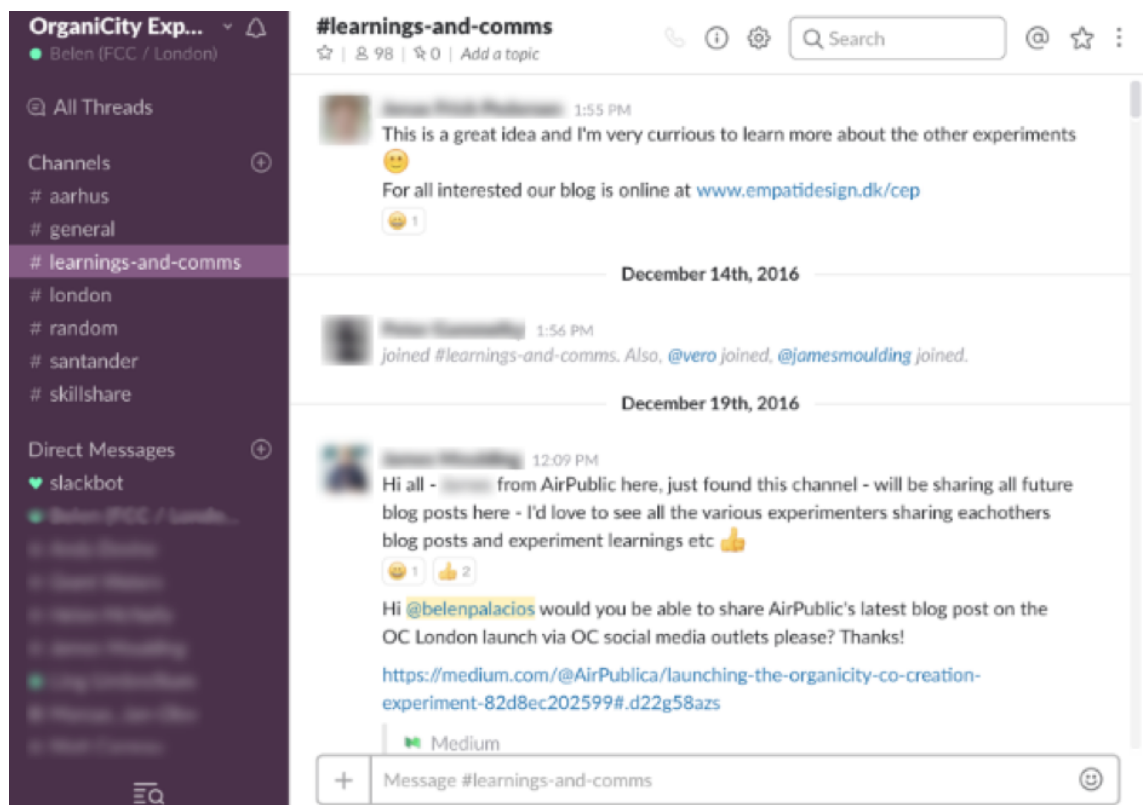


Figure 8 Screenshot from #learning-and-comms Slack channel

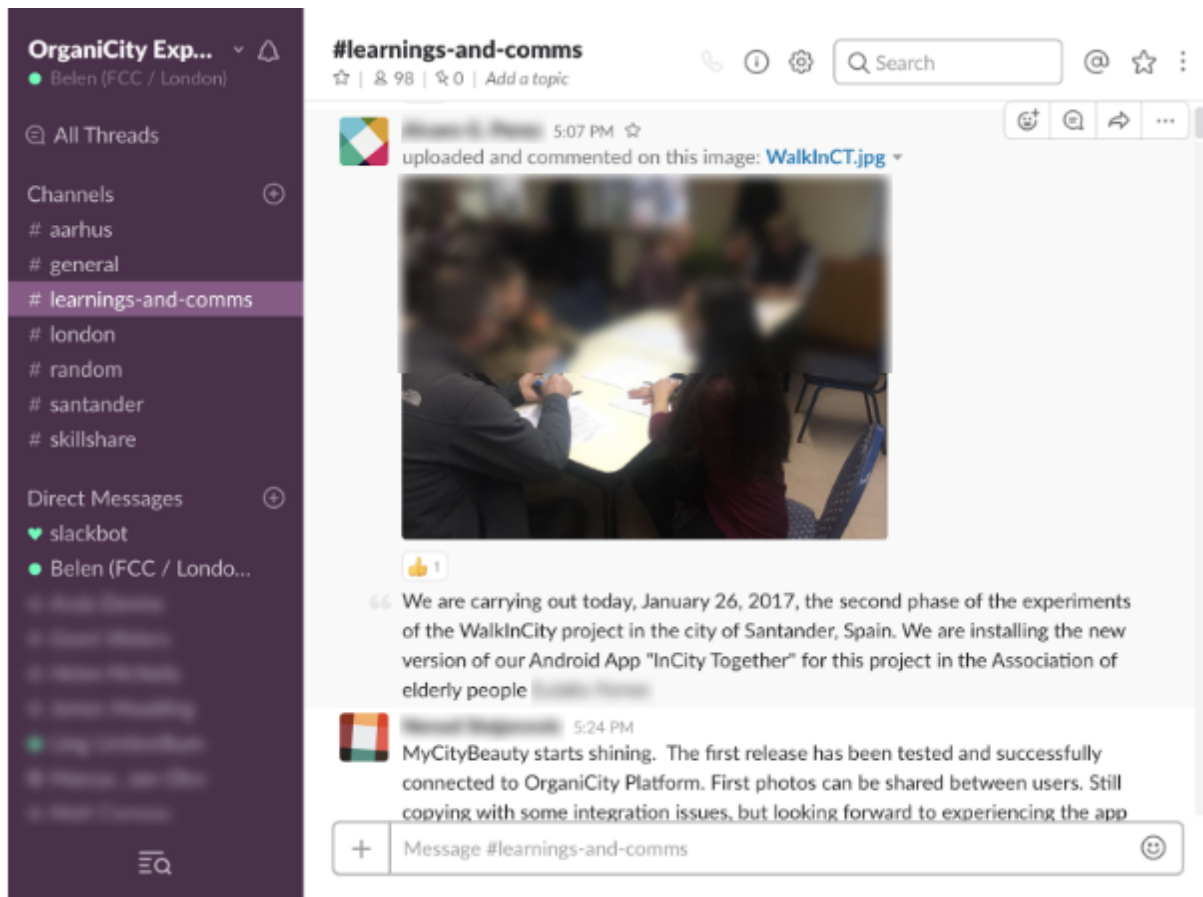


Figure 9 Screenshot from #learning-and-comms Slack channel

3.5 GitHub

In order to provide practical and concise technical support, the GitHub system was adopted during the first open call to release the technical developments performed by OrganiCity. This system is a de-facto standard tool to provide technical support and to release software code, so that experimenters are likely familiar with it. Distributed in around 20 repositories, experimenters could find the implementation of different services and tools, as well as small examples to interact with the platform. Besides, GitHub has been used to facilitate the report of bugs and proposal of technical improvements.

3.6 Technical documentation

Along with GitHub, *docs.organicity.eu* was a web page dedicated to technical documentation, deployed to provide a detailed user-friendly description of the OrganiCity technical environment. This web page first presented an overall view of the facility and then a dedicated section of the different services and tools.

Furthermore, explicit practical examples on the usability of OrganiCity were provided by means of “How To” tutorials, so that experimenters only had to adapt these tutorials to their corresponding development frameworks.

During the first open call, the technical documentation was improved and extended based on the requests and feedback from the experimenters.

3.7 Workshops, webinars and clinics

3.7.1 Online events

The first teams of experimenters joined the OrganiCity team on the 13th September 2016 via teleconference. OrganiCity’s coordinator welcomed the experimenters, each team introduced their ideas and they received a brief explanation on how to use the Experimenter Handbook for reference during the experimentation period. The session finished with a Q&A.

Following this session, the experimenters joined the initial report webinar, which gave them an overview of the financial and legal documents to be submitted and allowed the teams to clarify questions. This session was particularly valuable for those teams which have never interacted with European Commission and required guidance. The information was additionally captured in a written document which commented the reporting templates.

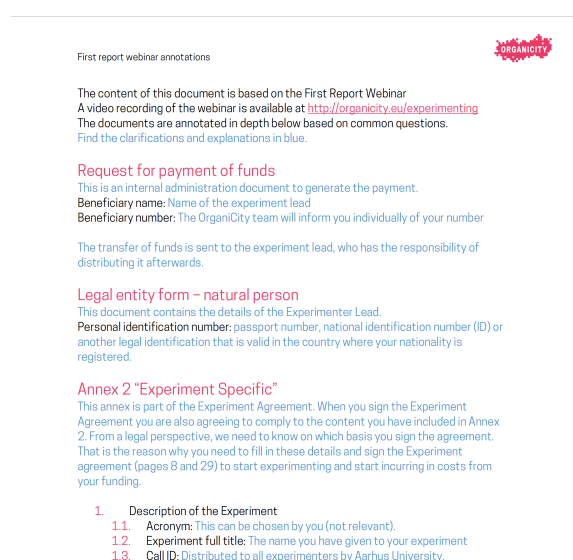


Figure 10 Detail of the annotations from the First Report Webinar for experimenters

On the 5th of October 2016, the technical team hosted a webinar presenting the OrganiCity Facility and each of the tools and services. The experimenters could attend the specific slots for the tools they were using. This webinar was recorded and made available to experimenters through YouTube.



Figure 11 Screenshot of Technical Webinar playlist on Youtube

3.7.2 London events

The 11 teams experimenting in London met and charted their journeys. They shared their experiences, requested support in specific areas from the OrganiCity team (such as communications) and built connections across that have lasted beyond their experiments.



Figure 12 London experimenters share their journey

This meetup was followed by a launch event where the different teams presented their ideas to an external audience of smart city enthusiasts.



Figure 13 Helen McNally presents Spend Network during the Launch event.

The synergies created during this event and through the interaction on Slack continued in private conversations across the different teams. In parallel, Future Cities Catapult was able to support them with space provision during their experiments. Tranquil City hosted an engagement workshop, whilst AirPublic and TrafficFlow collaborated in a joined event sharing the results of their experiment, given they both explored air quality in relation to traffic.



Figure 14 John Cant from AirPublic discussing the challenges in prototyping the air quality sensor

The experimenters in London showcased the result of their experiments during the launch of the 2017 OrganiCity Open Call. This combined showcase and clinic event attracted a large audience who found different opportunities to satisfy their needs: they were introduced to the open call, had the opportunity to discuss the experience of previous experimenters, could attend a demonstration of the technical environment and could have a one-to-one session with the OrganiCity team to solve their doubts. The outcome was twofold, a celebration of the effort of the experimenters and an opportunity to extend the audience interested in participating in our open call.



Figure 15 First clinic in London with Experimenters showcase

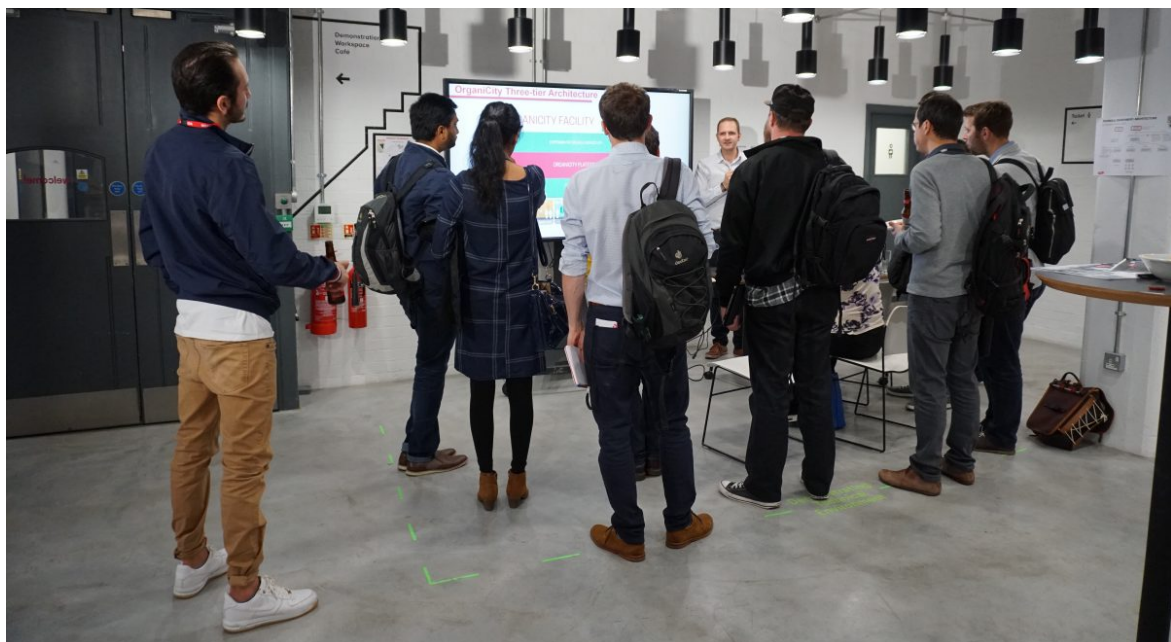


Figure 16 Demonstrator area in the first clinic in London

3.7.3 Santander events

In Santander, some experimenters were local, others were coming from different countries and among the last ones, some of them were able to communicate in Spanish and even one of them had a local person to facilitate the development of the activities. This mixture has given rise to a rich and interesting amount of experiences. Each experimenter team was helped according to its needs of time and type of support. This has provided an assorted group of lessons learned about how to carry out experiment in the scope of the city.

One of the first events related with the experiments was the one related to SmartBuddy by CityMakers, in which the kick-off meeting was held in the Santander City Council premises supported by the Mayor and the Councillor of neighbourhoods. The Councillor called all the representatives of neighbour associations in Santander a great success. The aim and the plan of the project was explained. At the end of the sessions, those people interested in contributing gave their contact data to the experimenters' team. Being able to communicate in Spanish in that session was very effective.



Figure 17 The SmartBuddy kick-off meeting was held at Santander City Council premises and was attended by our Mayor, Gema Igual, and, the Councillor of neighbourhoods, Carmen Ruiz.



Figure 18 The event was attended by an important amount of people interested in the experiment.



Figure 19 At the end of the session a lot of people were keen on contributing and gave their contact data.

Regarding to the Commuting Santander experiment carried out by Fstr, the company partnered with a local person for easing communication. They were helped to start with their initial contacts in the city i.e. the main Hospital. Besides, City Council supported them to organize their workshops. One of them was carried out in 'Enclave Pronillo', that is usually used for events related with Smart City and technology.



Figure 20 Gloria Pereira, the local partner of Fstr explaining the objectives and plan of their experiment in an event holded in 'Enclave Pronillo'.

Also, was very pleasant to have foreign experimenters in the city. One of them was Research[X]Design. Several meetings at street level were carried out with shop owner of one of the most crowded street of Santander. There was the opportunity of talking about their concerns and needs and they told us they were excited about any initiative focused on them. In this particular case, there was no option to organize a joined session in which the experimenters could tell their experiment. A previous session was held with the shops associations representative in order to make a proper selection of shops and each owner was met individually because there were time restrictions for experimenters and owners.



Figure 21 Sandy Claes and her colleague, talking with one of the shops' owners. They received the support they needed in order for the language not to be an obstacle.



Figure 22 Another meeting of Research[x]Design with 'Le Gabban' shop owner. In this case, as she was able to communicate in English, there was no need to give support.

Things were very easy with the Walkers Group Santander experiment carried out by the local NGO Dirige in2 Social. They had a broad range of interests and wanted to meet several municipality departments, mainly those related to social care and IT. As they were Spanish there was no impediment to maintain direct contact with the municipality workers but, in any case, taking into account the restrictions of time for carrying out the experiment, they were helped in their meetings.



Figure 23 Meeting of Dirige In2 Social with representatives of the Santander municipality school. As this school organize IT courses of unemployed people it was found interesting to find synergies.



Figure 24 Meeting of Dirige In2 Social with the Councillor of Personal Autonomy, Roberto del Pozo and the manager of its municipal service



Figure 25 A joined event between personal autonomy department with Santander municipality school, at their premises was held. We also counted on the support from Ignacio and Carmen, researchers from University of Cantabria

Finally, there were other interesting events related to experiments that were carried out. One of the most insightful was the one held as part of the introduction of the second open call. The organized workshop gave us the opportunity to put into contact experimenters that was funded in the 1st open call with those interested in joining the OrganiCity movement.



Figure 26 During the workshop organized before the 2nd open call attendants were divided in groups assuring in each one there were at least one of the experimenters funded in the 1st open call.

3.7.4 Aarhus events

A few teams, experimenting in Aarhus, were based in Aarhus, but others had their main location in other European countries and travelled to Aarhus specifically for the experimentation. For the latter, OrganiCity team's efforts to facilitate local connections (both with various stakeholders and between the local and nonlocal experimenters) were crucial to the success of events within the projects. The Aarhus team of OrganiCity has worked hard on building an ecosystem around the experiments which was mutually beneficial for experiment teams and local communities. The Aarhus team also established a close dialogue with the experimenter and followed some of their workshops and events.

For instance, HOP Ubiquitous, based in Spain, first visited Aarhus for a kick-off meeting between OrganiCity team, composed by several profiles from Aarhus University and Aarhus City Hall. OrganiCity team supported HOP Ubiquitous with space provision at DOKK1 and Institute for (X) during their events. This allowed the Spanish team to deploy smart spots in Aarhus that invited to "virtually sense" needs,

feelings and/or ideas for making the city spaces better places, interact with local citizens and set up banners to inform about the interaction points.



Figure 27 Andrea and Mati from HOP Ubiquitous set up their experiment at DOKK 1

As participants and observers, representatives of OrganiCity took part in events by Mejlgade Lab, Rum13 and Åte VR and Space Engagers among others.



Figure 28 Visualising future greening and using rainwater at the workshop by Mejlgade Lab, Rum13 and Åte VR



Figure 29 Mapping opportunity spaces at the workshop by Space Engagers

The experimenters shared their experiences with OrganiCity and showcased their projects during the community building, networking and information events for the Second Open Call applicants. One of such

events was held jointly with SpilBar and Aarhus Data Drinks (part of Open Data Aarhus). Here, various stakeholders were invited to learn more about open data, smart city experimentation, and the opportunities it creates for digital experiences. The special role was given to one of the Aarhus experimenters, who presented their project in detail.



Figure 30 Empati team's experimentation process is being unfolded at SpilBar and Aarhus Data Drinks meet OrganiCity event

The other arrangement was twofold - a clinic and experiment showcase event. After OrganiCity team introduced city challenges of Aarhus along with a suite of available technical tools and open datasets, the teams that have already experimented with OrganiCity presented their projects and learnings. Potential applicants welcomed an opportunity to discuss reflections about ideation, experimentation execution, tools and practicalities of the application process both with OrganiCity team and First Open Call experimenters.

The experimenters, based outside of Aarhus, were willing to share their experiences with the potential applicants, too. For instance, Research[x] Design, who at the time of the clinics continued developing and evaluating toolkits that have been created during OrganiCity experimentation period and therefore could not join us online, recorded a video presentation of their project on their own initiative. We ended up not

using this presentation because of the technical constraints, but this example is illustrative of experimenters' willingness to share the information and commitment to OrganiCity events.



Figure 31 Jonatan Marcussen talks about his team's experience as OrganiCity experimenter at Second Open Call clinics and showcase event



Figure 32 Jonas Frich Pedersen talks about his team's experience as OrganiCity experimenter at Second Open Call clinics and showcase event

3.8 Learnings for the second open call

Learnings from active engagements with the experiment teams and from feedback through support channels were many and have been identified, prioritised and implemented in the preparation for the second open call in a continuous process. Here we wish to mention a few that are related to (1) the support of experimenters, (2) the value of reporting mechanisms and different payment rates and (3) capacity building and the engagement of ecosystems supporting experimentation.

With regard to (1) the support setup, our conclusion is that support channels have been sufficient and of good quality. We made a few adjustments in our preparation for the second open call and chose to strengthen our close dialogue and handholding approach through a mentorship programme and added an online open forum that allowed experimenters to help each other, in addition to communication between us as consortium and the experiment teams. (2) We choose in the preparations for experimentation in the second open call to work with sharper deadlines for reporting as many teams faced problems delivering all necessary documents in time, which caused us delays. We have had many reflections on the workload involved for experiment teams to submit reports and to document their work, as well as whether it would be necessary for all experiments – also the shorter ones-- to implement a process where payment was executed in three phases: prefinancing (50%), interim (35%) and final (15%) and link these payments to our approval of financial statements and progress reports. The willingness from experimenters to share their experiences, progress and work has been overwhelmingly positive. It was even sometimes hard to follow up on all the information that was pushed to us in writing, videorecordings, interviews, pictures, etc. Expectation management has been necessary and due to limited resources, we have been unable to follow all experiments in detail. To streamline communication with experimenters, we choose to introduce a mentorship scheme in our second open call, on which we will report in D5.6.

The different payment rates connected to reporting proved to be a very important tool for us to monitor progress and to flag any ethics and privacy issues that might turn up. In one case, the framework for experimentation with minors had changed in the everyday practice of experimentation and the necessary consent forms had not all been collected. The experiment team's progress report made us aware of this issue, and after investigation by our legal expert we could send the team a warning without further implications. As improvisation and adjustments are part of the nature of experimentation, the payment rates and reporting are touch points to monitor these important issues and to assess whether work is done in accordance to the Experiment Agreement and our Ethics and privacy regulatory framework and design.

(3) Managing the OrganiCity facility where experimentation is core is about capacity building and engaging local communities. It is about mutual learnings that can emerge from matchmaking between groups and individuals with complementary expertise around experimentation. In our processes, this is expressed by our online open forum where we build communities of experimenters who can help each other with many different issues, about evoking the interest of local communities to work with experiment teams, especially those without links to the site of experimentation and about creating awareness among various stakeholders about what experimentation can bring to a city and how it should be implemented.

4 Usability assessment: testing the facility

4.1 Approaches and methods

The objective of this first round of experimentation is the assessment of the OrganiCity platform from both a utility and usability perspectives. This was done using three sources of data that will be analysed in triangulation. First, a survey was distributed to experimenters among their reporting requirements. Second, in-depth interviews were conducted with selected experiment leads or experiment groups. In order to gain more detailed insights about the usability of the platform as well as the experimenters' overall experimentation experience, interviews were found to be suitable for their flexibility and varying degree of formality. Third, trace data was extracted from our support channels in the form of text (i.e. conversations in Slack), and analysed to identify common challenges and issues facing experimenters during the first experimentation period. The data collected through these different channels is very rich and not solely captures in this report, but targeted at discussions on sustainability of the facility and academic publications that are under preparation and foreseen. The following table provides an overview of experiment evaluation methods as well as a timeline.

Date	Data collection/analysis method	Objective
November	Interim reporting instructions along with the usability survey	To obtain high-level, collective insight on the platform utility, overall experience of EaaS and co-creation.
	Sample data extracted from Slack	To develop initial coding manual
January	Preliminary analysis of survey results	To modify interview guide and select interviewees
February	Extract complete conversations from Slack	To expand and refine coding manual shared among researchers
March	Conducting interviews and field studies	To inform final reporting requirements

April- May	Transcriptions and data analysis	To gain in-depth insights on the overall EaaS, specific tools/assets, and co-creation
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Table 1 Timeline and experiment evaluation methods

4.1.1 Survey

The survey was administered through an online semi-structured questionnaire assessing three main components: OrganiCity's Experimentation as a Service platform, the experimenters' co-creation strategy and activities, and their overall experimentation experience. Questionnaires are suitable for wider scale of data collection about respondents' perceptions and attitudes, especially when questions and constructs are predetermined. This method constitutes a convenient data collection instrument when the flexibility of posed questions is not of key importance, and resources (especially time and financial) are scarce.

Most of the experiments took longer than expected to set up and proceed with their experimentation. Thus, the submitted interim reports provided us with crucial insights on the earlier phase of experimentation and its associated challenges. But this also meant that the experimenters' responses to the tools and data assets evaluation reflected challenges they faced prior to or during the early phases of their learning curves for using the tools/data assets; rather than those they faced later in the process. The latter types of challenges were then tackled in the interviews.

4.1.2 Interviews

We conducted in-depth semi-structured interviews with experiment leads or experiment groups. The interviews focused on evaluating OrganiCity facility from the experimenters' point of view in a naturalistic setting, and is regarded as an ex-post evaluation of the designed platform (Pries-Heje et al, 2008). In-depth interviews provide more flexibility in terms of formalization and real-time adjustment to context. Most importantly, the course of in-depth interviews is defined in relation to the objectives of the evaluation but can be redefined on the go.

Our interview manual was designed in four modules, addressed based on the experiment specifics. The first module provided the experimenters with the opportunity to describe their experience of the platform and EaaS, while asked to initially state their experiment objectives (practical and pragmatic). This module also included questions specific to the tools coordinated with the tool owners within the consortium. The second module covered co-creation activities and experiences, with the experimenters' end-users and collaborating parties. The third module covered issues related to communications, support, and ethics and privacy issues. The fourth and last module was optional, covering sustainability questions addressed to experimenters who have been previously flagged to have potential for sustaining their solutions. A team

of four interviewers coordinated and conducted the interviews using this manual, while setting up meetings and sharing insights during the process. Each interviewer was responsible to read the experimenter's interim report and any other documentation provided to make sure the interview guide allowed them to make best use of the interview time.

Overall, 14 interviews have been conducted with experimenters of different types, experimenting in different single and multiple cities. Interviews were conducted in-person or through other telecommunications (phone call, Skype, etc.). Most interviews were conducted in English. Interviews were then transcribed by each interviewer. The first level of analysis was to create a contact summary sheet (Miles and Huberman, 1994) based on each transcript. Insights from those sheets were used to inform the wireframes and updated UX outlined in section 5.3. The interviews not only provide data for this report but also for planned academic papers.

4.1.3 Field studies

We have followed the experiments through several engagements and participants observations where the consortium participated as observers in parts of the experimentation, for example the co-creation workshops to understand better the work conducted by the experiment teams and the challenges faced. The teams appreciated the close follow up and engagements by the consortium.

4.1.4 Text analysis of Slack channel

Collecting textual data from our support channel Slack brings in a crucial temporal dimension, which is capturing challenges or problems experimenters face right when they happen. Thus, unlike surveys and interviews, this data is assumed to hold very detailed experiences captured in a timely manner. In addition, the data is provided with minimum influence from a questionnaire structure, question phrasing or an interviewer. Text analysis of Slack conversations was conducted by means of qualitative content analysis with the help of the tool NVivo.

The analysis took place in two phases: pilot phase and full analysis phase which was also completed in iterations. In the pilot phase, a sample of the data - conversations of 70 messages from one Slack channel - was extracted and used to develop the first coding manual. In the analysis phase, two researchers coded the full dataset of conversations independently, using the initial code. Conflicting and new codes emerged from this step, a meeting was setup and the coding manual was revised. Researchers re-coded the dataset using the updated manual.

4.2 Tools Used

Within the technical environment two types of services can be distinguished. The first type corresponds to the services to manage the experimentation and manipulate data sets. Within this group we can highlight the Experimenter Portal, Urban Data Observatory (UDO) and the EaaS APIs. The latter served as the interface for the experimenters to interact with Organicity. During the first open call, all the experiments have made use of both the Experimenter Portal and EaaS APIs, and most of them have also indicated that they have used the UDO for data visualization.

On the other hand, on top of the EaaS APIs, a set of tools were developed to simplify the development of experimenters. The tentative usage of these tools was indicated by the experimenters at the beginning of the experimentation of the Open Call. Once the experiments were finalized we compared the intended exploitation of the tools with their actual use. Figure 33 depicts such comparison drawing some interesting conclusions.

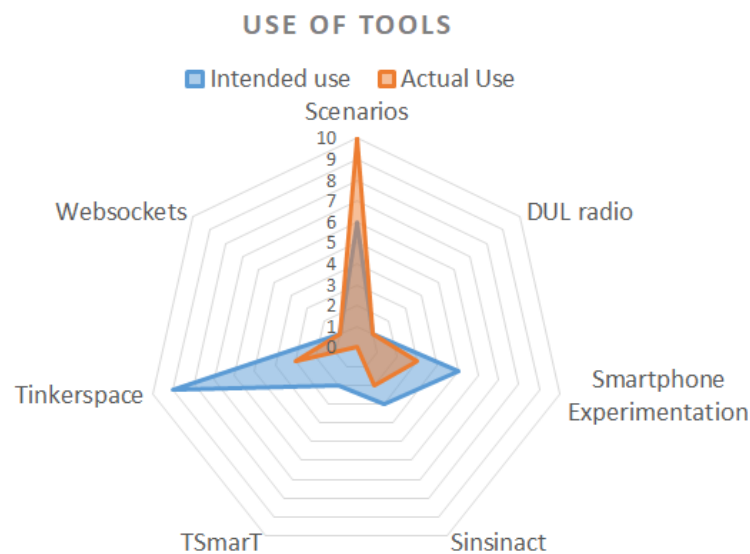


Figure 33 Use of tools during the first open call. Comparison of tools intended to be used and actual use of the tools. Axis indicate the number of experiments using the tool

In general, we can observe that the use of the tools has been significantly lower than the expected one at the beginning of the experimentations. Indeed, for all tools but Scenarios the actual use has been less than expected. In turn, unlike the other tools, the scenarios tool does not require technical skills but can be solely used with a graphical interface. The scenario tool has three entry points: 1) the webpage, 2) the codebase, 3) a REST api

In light of the results, we have worked hard on improving communication around the tools, and many of the tools have been further developed through the experimentation phase. This means that interaction with the tools is likely to increase in the second experimentation phase. In the communication, we highlight not only the functionalities of the tools but also the technical requirements for each. Furthermore, we can also infer that the profile of experimenters during the first Open Call is not highly technical, making accurate documentation and description of the tools even more necessary. A few experiment teams have in their feedback indicated that they were surprised that the technology was more complicated than they had expected.

4.3 Datasets federated and integrated

In this section, we will distinguish between two different types of data assets: the ones federated by OrganiCity sites and those created by the experiments, itself another special federated site. During the first open call, the different sites have incremented the assets federated up to a total of 9600 assets from 4 sites. In turn, these federated assets are divided in 51 types or categories, what shows the heterogeneity of the information.

As for the assets created by the experiments, they are divided in 58 types, some of them coinciding with types of federated assets, attending the different application scope of experiments. In this sense, Figure 34 depicts the distribution of the number of assets created by experiments belonging to different types. As can be observed, in most of the cases assets of a particular type is below 60, which indicates the high diversity of the experiments running in the platform.

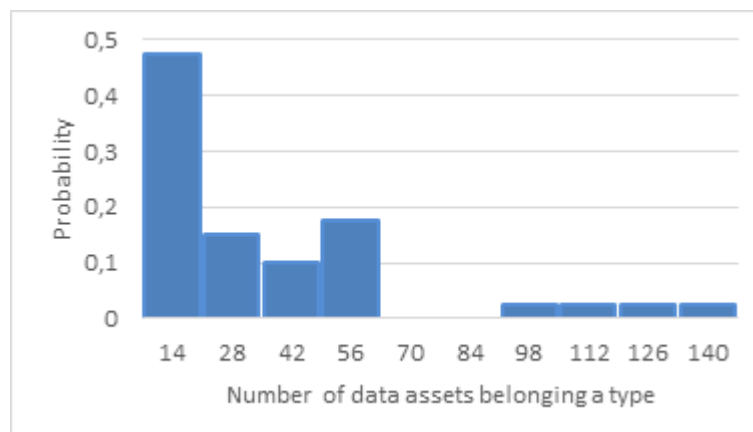


Figure 34 Probability distribution of types of data assets created by experiments

Furthermore, we have observed a quite high variance on the number of data assets created by experiments, Figure 35 illustrates the distribution of assets created by the experiments. We can see that most of the experiments generate below 100 new data assets, while in very few cases, they have generated around 1000. It is worth highlighting that, in order to keep control of the facility during the first open call, we limited the number of assets by experiment to 1000.

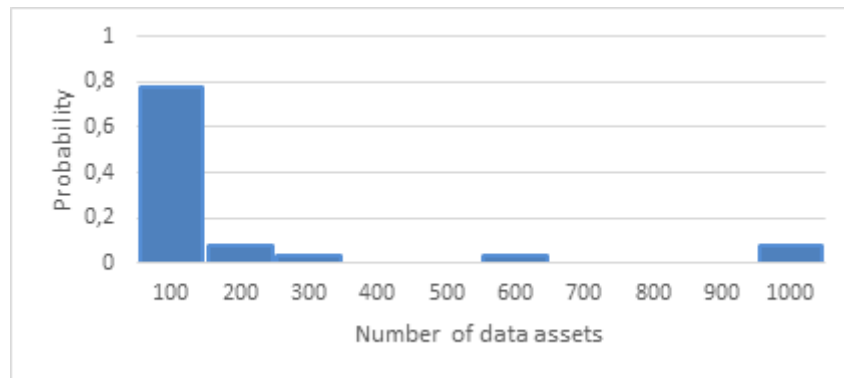


Figure 35 Probability distribution of the number of data assets created by experiments

4.4 User Experience

As mentioned previously, user experience was analysed based on a survey included in the experimenters' interim reports, interviews and field studies. The survey worked as an early instrument to gauge the experimenters' initial experiences with the different tools in their early phases of experimentation. For each tool, the experimenter lead was asked to rate the respective tool - when used - on 4-point scale (Strongly agree to Strongly disagree), in addition to a Not Applicable choice. The table below presents the statements and abbreviations used in the subsequent results.

Statement	Abbreviation
Finding information and documentation for using the tool was easy	Finding info. & doc.
The tool documentation provides valuable examples of how to use it	Examples in doc.
Information for experimenters was instructive and easy to follow	Instructions
Learning to use the tool was easy for me	Learning
If I had a problem with the tool, I could easily find the support I needed	Support
The tool's terminology is easy to comprehend (e.g. naming of a function)	Terminology

My expectations regarding the functionality, of the tool, before using it were met	Expectations
The functionalities and features provided by the tool are of high value and importance to my experiment	Value to experiment

Table 2 Tools' rating statements in interim surveys

The individual interviews picked up on issues identified in the interim reports. Thus, the following section first displays high level results for the tools from the survey, and then related in-depth issues raised during the interviews.

4.4.1 Results from survey and interviews

The structured questions included in the survey focused on obtaining high level impressions of the tools. The following analysis includes all 24 completed experimenters' reports. The majority of the experimenters thought most valuable components of the facility were the ones allowing them to access data: Urban Data Observatory and the APIs. In addition, the scenarios tool was essentially valuable for co-creation and Smartphone experimentation for sensing, respectively.

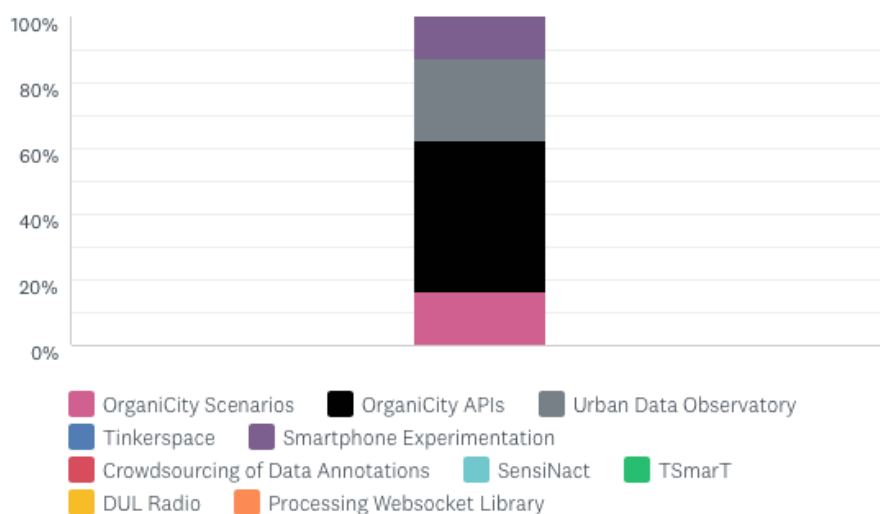


Figure 36 Tool use

Overall, the experimenter portal is positively rated, especially with regards to finding information and documentation, instructions, its terminology and the level of support provided. Two areas of improvement noted were adding more examples in the tool's documentation, and managing expectations in the introductory technical webinar.

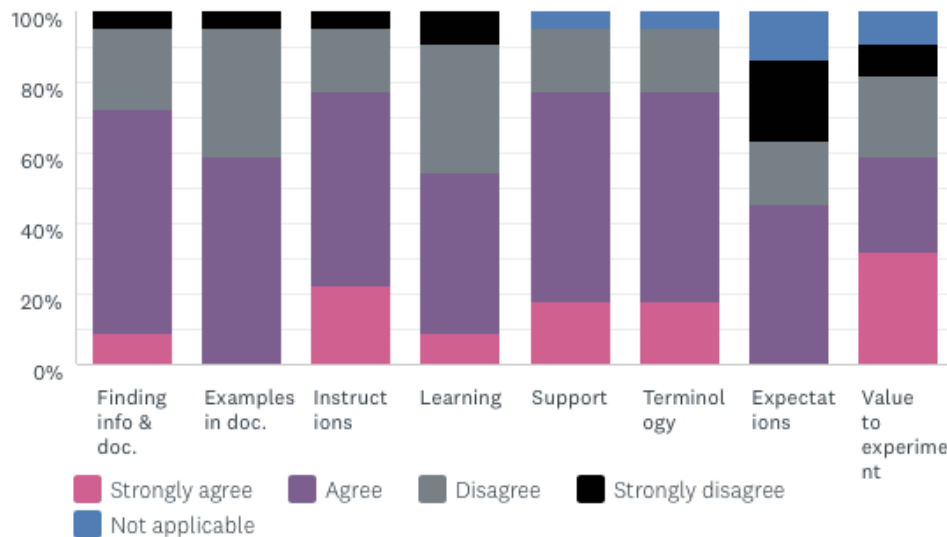


Figure 37 Interim survey - Experimenter Portal

Almost half of the experimenters used the scenarios tool for or during their co-creation. Their overall impression from this tool is very positive, indicating that it is intuitive and easy to use. Whether they had problems or not, they could find the support they needed easily. It is worthy to note that even though the overall impression of the scenarios tool is positive, only half of the respondents thought that the tool is of high value to their experiment.

Investigating this more during the individual interviews, we realized the various uses of the scenarios tool for co-creation, but also as a documentation of narratives collected by experimenters. The level of details and follow-up throughout the co-creation process was key to some experimenters. When one experimenter was asked about her expectations, it was clear she had visualized a different tool.

"I see it as something in between the experimenter portal and scenarios. So that people that are interested have more freedom. Because the scenarios imply it to be quite narrative and much less concrete. So maybe the experimenter portal, which is really just like a measurement tool, would give people more insight into the whole creation process."
 (Sandy Claes, Public Like Displays)

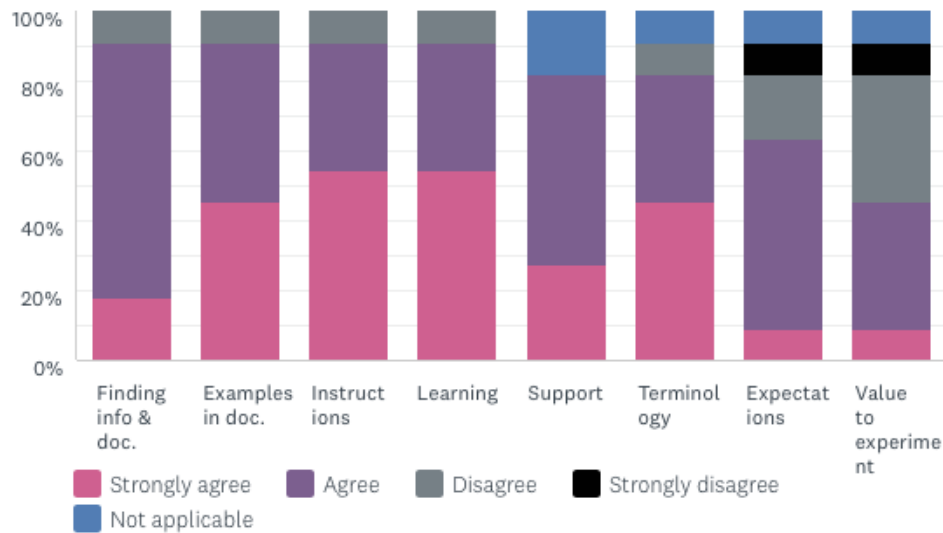


Figure 38 Interim survey - Scenarios tool

Another limitation that affected experimenters' perception of the scenarios tool's value to their experiment was the level of engagement they achieved. They expected that there would be a group of respondents ready for their questions, rather than seeing it as a tool through which they could interact with their respective citizens.

"I think the feedback we got from it was very minimal, and I think the amount of people who are interacting with it is a big limitation. This is a great tool; I like the idea of putting out questions. But I think what it needed was a little push; maybe to Twitter, maybe to Facebook...to get people interacting with it." (Grant Waters, TranquilCity)

The APIs are used by 60% of the experimenters. Overall, a positive feedback is provided through the eight statements to be rated. Finding information and instructions of use, APIs' terminology and the value of APIs in experimentation are quite high on the scale. While some experimenters thought it was straightforward right away, others understood the evolving nature of the OrganiCity EaaS. In both cases, there is high praise to the support received by the experimenters from the OrganiCity team.

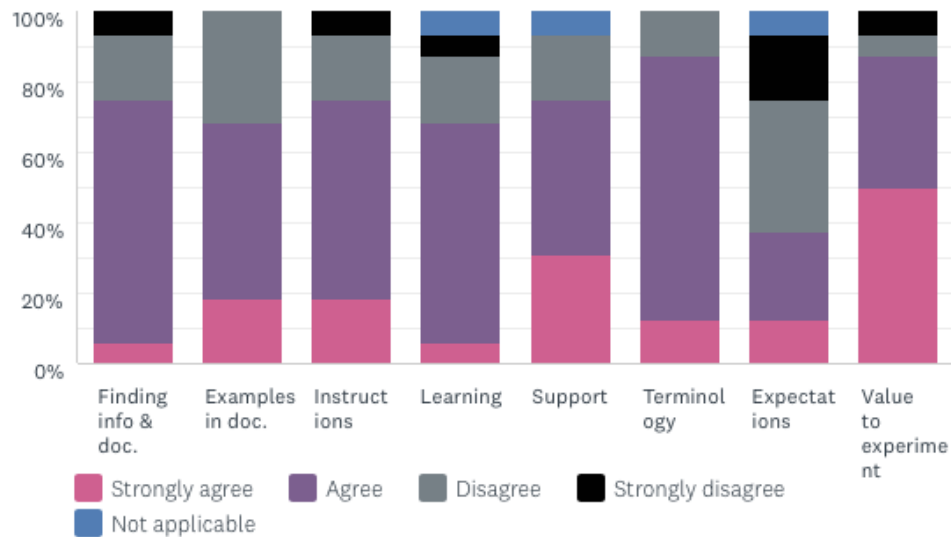


Figure 39 Interim survey - OrganiCity APIs

"The API was pretty straightforward I think. Again, it might be something we explicitly talked about. But from what I remember going through it to find Github, access the data points to start with...that seemed very extensive. I think the best thing about it was the Slack interaction. Because if we had a question, we got a response pretty quickly with those things. I think it's one of our main positive points. So I think the documentation, specifically that of the API, were great." (Grant Waters, TranquilCity)

It was evident the platform and APIs were evolving, and co-created, during experimentation. The close collaboration between OrganiCity technical work packages and the experimenters has especially made a smooth journey of experimentation.

"I think once it got going, it did improve from release. I think since then it [the platform] has been changing quite a bit so it's probably quite difficult to keep up with the documentation. It's not something we've been actively looking at because we've been engaged directly with the developers. So we haven't necessarily been going back to the documentation because it's been kind of an evolving thing." (Marcus Ong, MobiliCity)

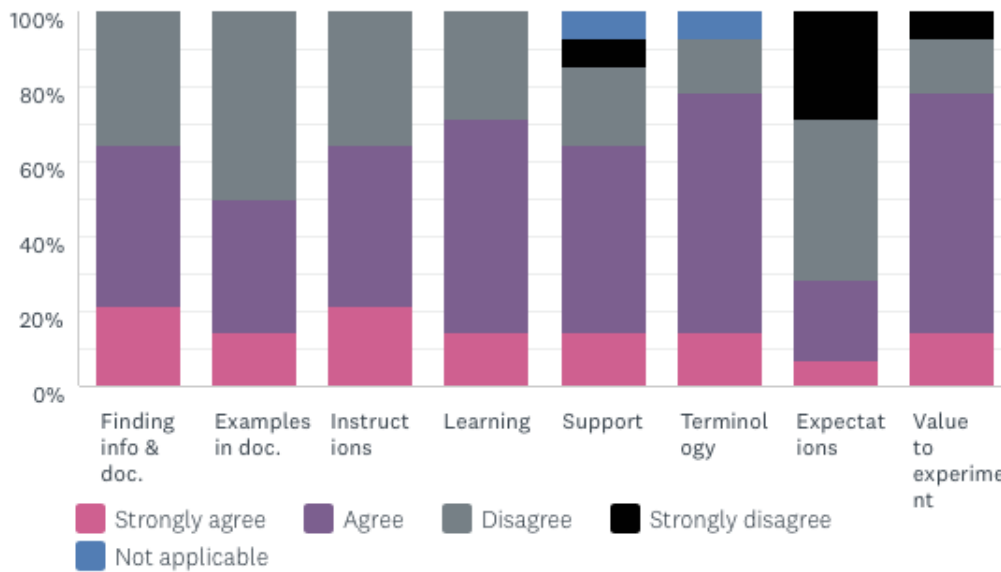


Figure 40 Interim survey - Urban Data Observatory (UDO)

During interviews, more details on the expectations related to the data APIs and the Urban Data Observatory emerged, and a few experimenters expected that the latter is a GUI for the contents accessible by the APIs.

“...we expected the observatory to be the front-end of [APIs], but we noticed that in the APIs or the assets, there is more data available. So yeah this is something we discovered along the way. So, I think eventually, once we knew that was okay.” (Sandy Claes, Public Like Displays)

“When we started using it I was checking asset publication, to publish our data with location data that is geo-encoded. It’s detected (the location, given by Google maps). We could also query data in space and time. But we didn’t find the form on the UI or the UDO. Also when I found the datasets on the map, I couldn’t see the data itself - only the ID, or the variables of the data. When we published our dataset and I was checking it on the UDO and saw it like that, I thought I didn’t publish it correctly but on the discovery API it’s there and correct.” (Javier Padilla, El Desmarque)

As for the Smartphone Experimentation tool, the overall impression is also positive. The support received by the experimenters is especially praised. As one Smartphone Experimentation user puts it in the interim report: “[Positive experience:] the support by the partners was very efficient” (Nenad Stojanovic, MyCityBeauty). The expectations are addressed by rewriting the tools descriptions in the second open call in order to clarify the functionalities provided by each tool.

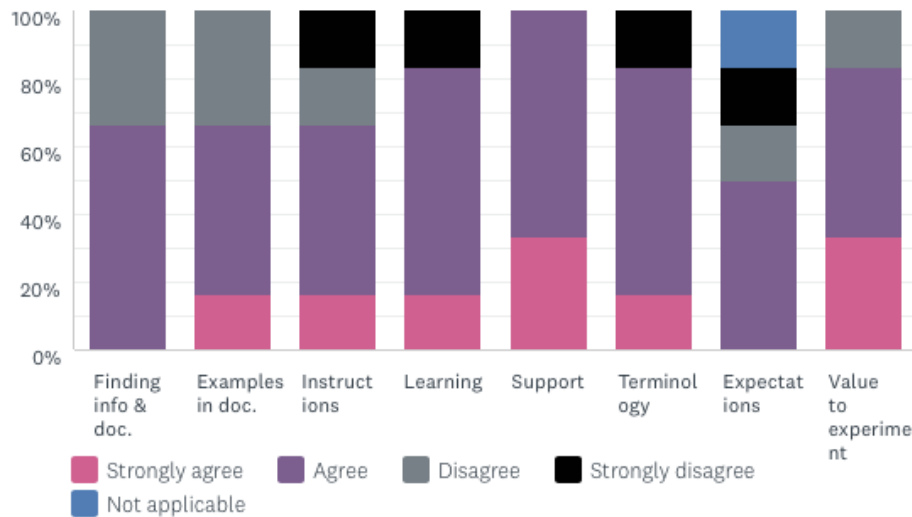


Figure 41 Interim survey - Smartphone Experimentation

4.4.2 Technical environment assessment

Based on the experience of experimenters with the technical environment, a team of UX experts revised the different tools together with the technical team. Given the environment analysed is already in use by experimenters, the analysis could not isolate content and usability – therefore the first-hand assessment of the tools in action was identifying usability issues and functionalities towards communication during the second open call.

The main needs identified were:

- A central space to access all tools and guide users
- Clarifying the functionalities performed by each tool
- Unified experience across the different tools and services
- Easy to search documentation

The key recommendations were trying to bring consistency to the experience through: a shared navigation bar, shared landing page styles, prominent call to actions through the journey, same components and behaviours (disabled/enabled buttons, links, mouse-over, etc) and prominent notifications after actions.

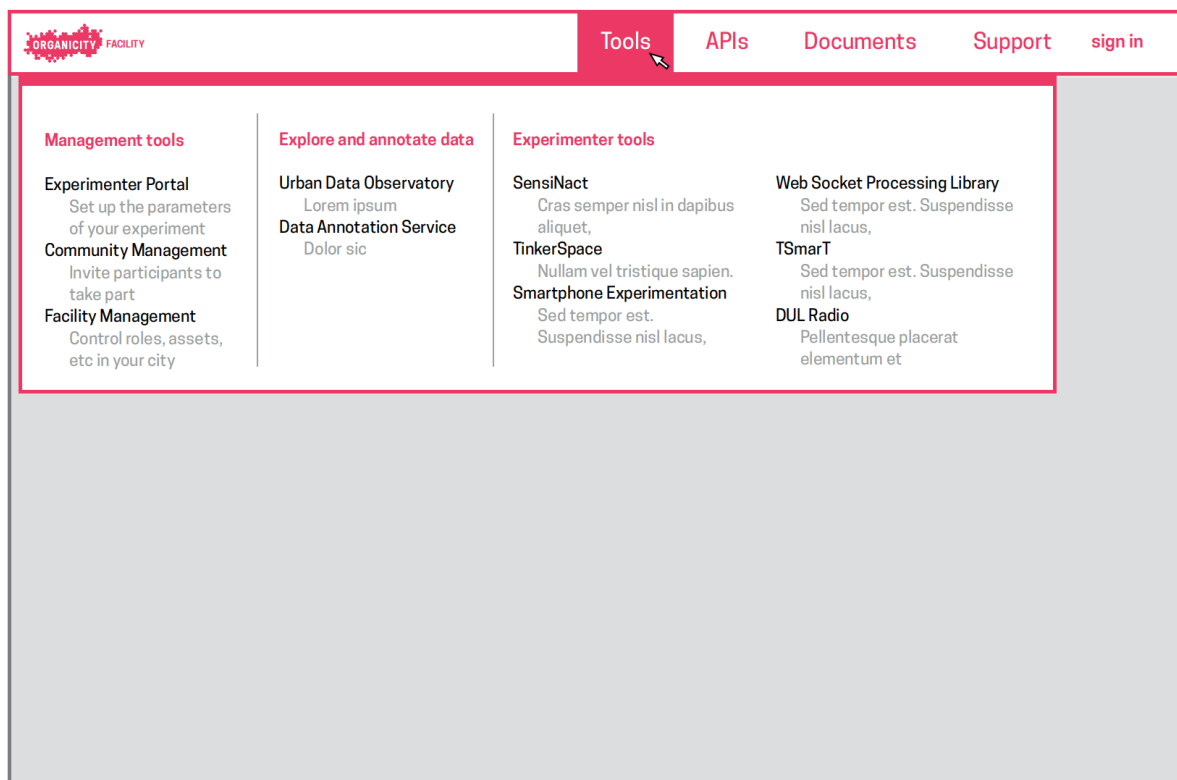


Figure 42 Proposed navigation with mega-drop down and content dependant on user permissions

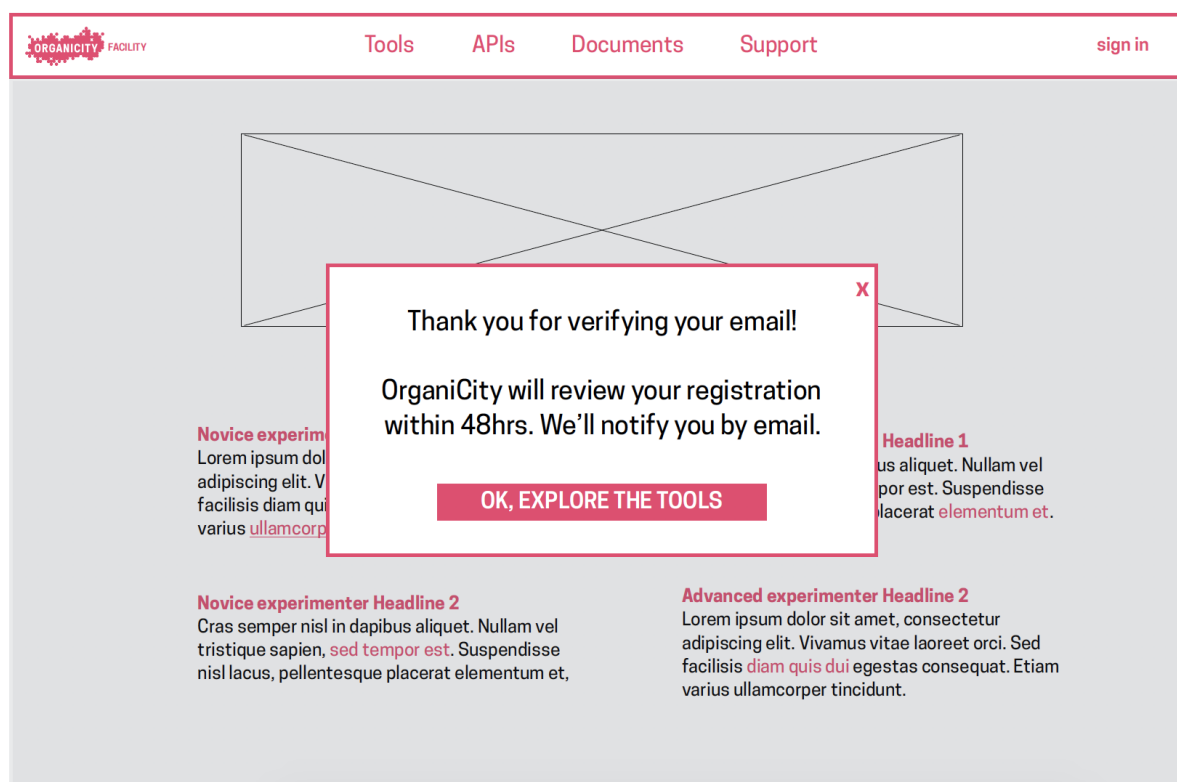


Figure 43 Proposed call to action style notifying users and guiding towards next steps during registration

ORGANICITY FACILITY

Tools APIs Documents Support

JS

Name* Pre-filled

Last name* Pre-filled

We will use the following information to facilitate the running and participation in experiments.

Date of birth* dd/mm/yyyy [Why we need this.](#)

Gender* ☐ Male ☐ Female ☐ Other [Why we need this.](#)

Location* City Country

Interests* Par [i](#)

Parks

Parking

Parakeets

Apartments

Departures

SUBMIT

Figure 44 Proposed components and behaviors example: fill in with taxonomy, information button, mandatory fields, guide of information to be filled, disabled/enabled button.

We identified the Experimenter Portal as the first stepping stone to build experiments and, therefore, built a series of recommendations based on the user flow through this particular management tool. Ideally, the other tools would then mirror the elements, flow and navigation into a consistent experience.

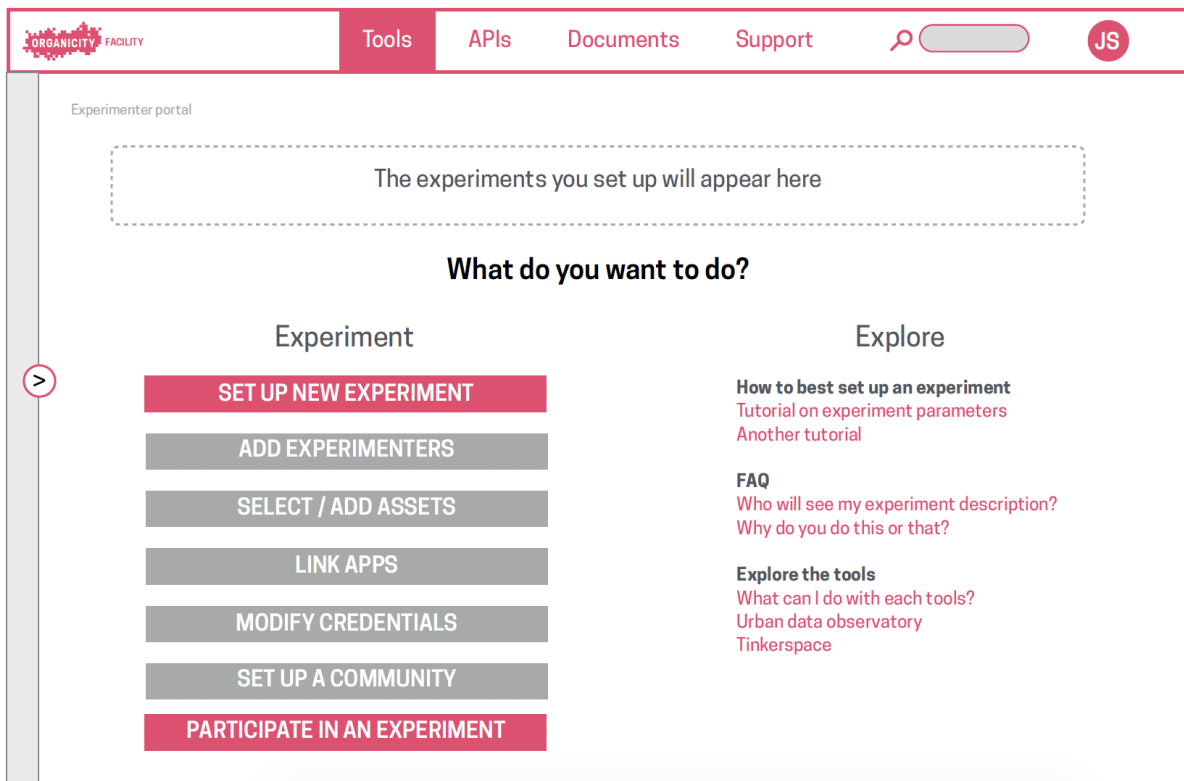


Figure 45 Proposed landing page for Experimenter Portal including call to actions in the journey and contextual information based on potential help needed at each step

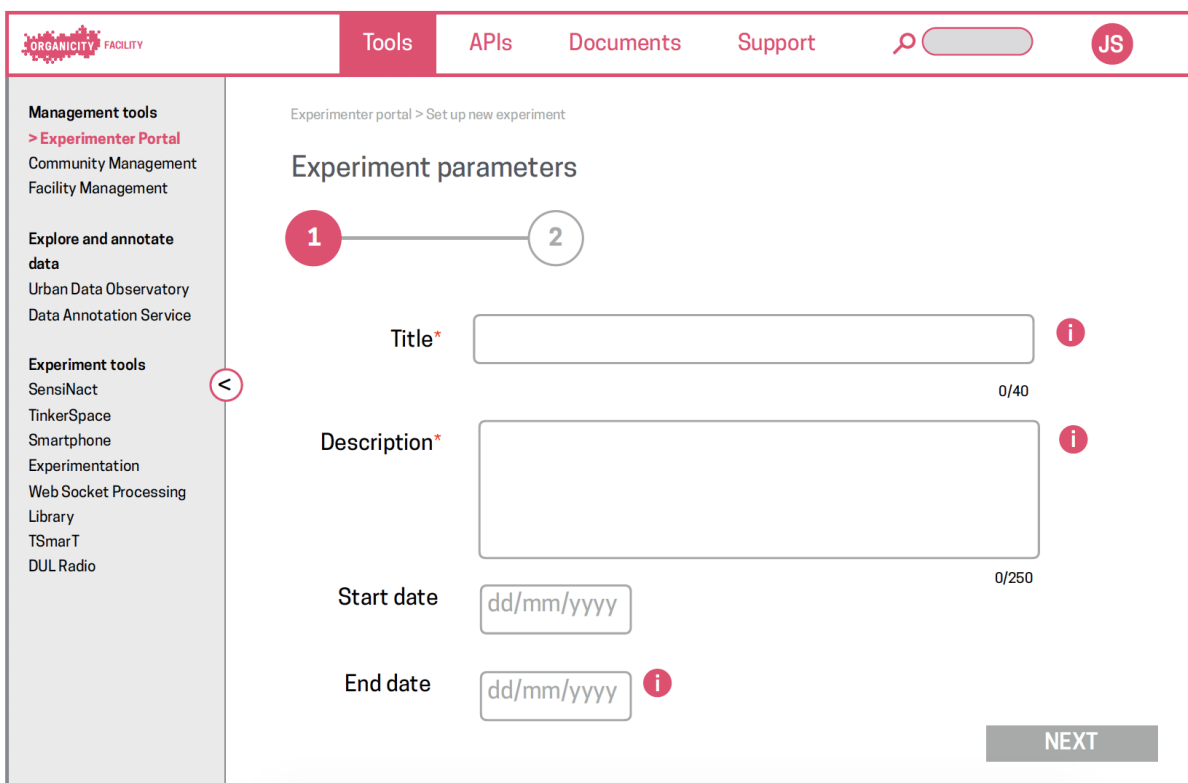


Figure 46 Proposed common navigation and flow across tools: indication of number of steps, constant back/next buttons

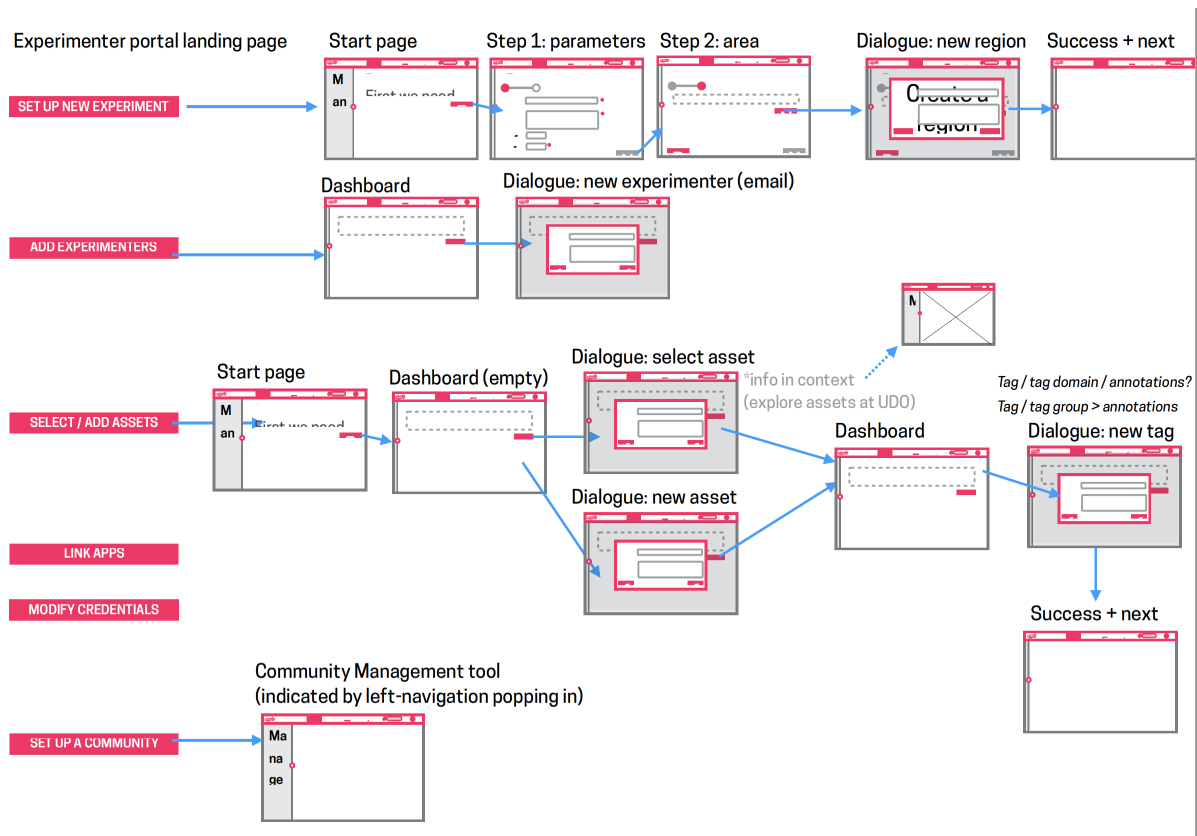


Figure 47 Proposed user journey for Experimenter Portal

Some recommendations were possible to implement before the 2017-2018 experimentation period, where the tools needed to be stable for a second round of user testing. In particular, the family of tools devoted to the experimentation management were re-design according to some the UX guidelines. It included both Experiments and Participants portals, as well as Communities.

One of the main modifications was the addition of a common mega-dropdown navigation bar along all the experimentation management services, as depicted in Figure 48. It includes access to the different tools and services, documentation and support.

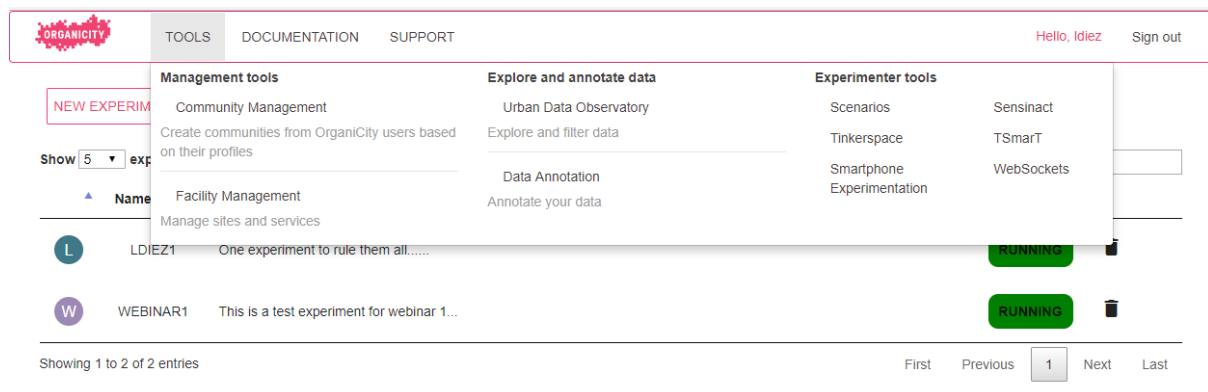


Figure 48 Common mega-dropdown implemented in experimentation management services

Another improvement was the addition of information buttons, as shown in Figure 49, to guide the experiments at each step. This feature have been added in the different stages of the creation of experiments as well as in main views.

ORGANICITY TOOLS DOCUMENTATION SUPPORT Hello, Idiez Sign out

Home

Main Experimenter ID (Experiment Owner): 86d7edce-5092-44c0-bed8-da4beaa3fbc6
Current Experimenter ID: 86d7edce-5092-44c0-bed8-da4beaa3fbc6
Experiment ID: 59528c2874f29fb81fc85da0

Name*
Idiez1

Description*
One experiment to rule them all...

☒ I want to share my assets: true ⓘ
☒ I want my experiment to be public: true ⓘ

RESET UPDATE

Figure 49 Example of information buttons at different stages of experiment management

Apart from the aforementioned modifications, a breadcrumb top navigation has been included to simplify the usage of the management services, since users were finding difficult to navigate the depth of levels inside each tool.

ORGANICITY TOOLS DOCUMENTATION SUPPORT

Home > Idiez1 > Assets

Create a new asset ⓘ

View mode
tree

Object	
id	urn:oc:entity:experimente
location	Object
type	geo:json
value	Object
coordinates	Array

Figure 50 Example of the page navigation

Furthermore, the style of the management services has been modified, including the forms.

Given each tool was developed independently to then be joined through the standards of OrganiCity, it would have been very resource consuming to implement these behaviours across all tools in such a short timeframe between experimentation periods. In particular, given the technical team had to focus on

implementing functionalities needed towards the second experimentation period. The team decided to implement the UX guidelines in balance with the functional feedback provided by experimenters, which in some cases resulted in simplifications or removal of some the features of the management services.

As a reflexion on the process, it is recommended that UX capabilities and testing are embedded in technical teams from the start of the project in order to build a bridge between what is technically possible and user-friendly through consistent digital experiences.

4.5 Recommendations for improvements and next steps

From a broad service perspective, we realized the experimenters' need of more homogenous support across the different aspects of experimentation (e.g. technical, legal, privacy, etc.). For that reason, we recommend providing each experiment with a mentorship opportunity by assigning a mentor to – among others – act as a contact point when the experimenters wonder about issues. Even though it might be resource consuming, it is expected to enhance the overall service experience, shorten the times to solve issues faced by experimenters, and create more awareness about the experiments which, in turn, eases the consortium's co-creation with experimenters.

As for the technical environment, the first Open Call has drawn a number of relevant conclusions at different levels. Firstly, being experimentation an orthogonal process that can potentially involve people with very different skills, it is important that the technical environment provides incremental complexity, so that experimenter do not pay for what they do not use.

In this sense, special attention was paid to the experimentation management tools, since they are the entry point for experimenters. As it has been commented before, this set of tools were refactored following an UX evaluation and feedback from the experimenters, giving rise to a simpler environment, yet providing functionalities to set up a basic experimentation. These functionalities embrace, among others, the creation and editions of data assets, definition of communities and experiment metrics, or basic annotations without the need of technical skills. Taking this set of tools as a starting point, experimenters can later exploit the potential of the different services and APIs, so as to fulfil the experiment requirements and needs.

From this first experimentation iteration, we have received useful feedback about the APIs, UDO and how they work together, as has been detailed in previous sections. The feedback related to the Udo was twofold: the relation with the APIs, and what they can expect from the UDO data representation. On the

one hand, the integration of the APIs was completed at the beginning of the experimentation, which was completed with the help of the experimenters. On the other side, however, most of the experimenters' comments were related to functional requirements. In this sense, the idea that data assets are context information and how it is represented was not clear for the experimenters.

In order to clarify these questions and avoid future inconveniences to the experimenters, the technical documentation includes a clearer description of the UDO, along with how it makes use of the different services. Likewise, the technical documentation also makes emphasis on the concept on context information, which will be reinforced in webinars only devoted to data in Organicity.

Apart from that, although it is not actual context information, historical data support has been added to Organicity, since it was one common requirement from experimenters, both functional and representation wise. Furthermore, also as a response to experimenters suggestions, data privacy support has been improved and integrated in the UDO, so that experimenters can decide whether the assets they create are public (visible through the UDO for anyone) or only accessible by their services and visible in the UDO only for them.

Another relevant aspect is the exploitation of the co-creation tools. After the first Open Call we have observed that the tools have not been used as much as expected. In this regard, we have to put more emphasis on the promotion of the tools highlighting how experimenters can leverage them to simplify the experimentation, for instance by showing practical examples and improving the technical documentation. Besides, it is evenly important to clarify the features of the tools in order to avoid misunderstandings and frustration from the experimenters. With an eye to the second Open Call, the technical documentation was greatly improved and the functionalities provided by the tools clearly stated. Furthermore, it is planned to organise a set of dedicated webinars that will cover the tools separately so that experimenters can have a very clear idea of how they can be exploited.

Lastly, by studying the outcome of the experimentation in terms of data sets created, we observed that many experimenters define their own types of data. Although it is reasonable given the heterogeneity of the experiments, in many cases different types were used to rather similar types. This misalignment of the types can have an impact in the future usage of the data since it makes the data search more complex and also the development of services based on such data. Although it is extremely difficult to coordinate how the data is defined in every experiment, more clear documentation with practical examples may help. In this sense, the improvement of the technical documentation has included a set of practical definition of data assets that can be, in many cases, reused by the experimenters. All in all, giving the lack of a widely adopted data model for urban data, Organicity does not impose any practical restriction to the definition of data assets.

5 Co-creation



Figure 51 The “Co-creation point” of Siidi experiment by HOP Ubiquitous, Aarhus

5.1 Co-creation as experimentation practice

Co-creation is at the heart of OrganiCity and integrated as approach in all phases of the project. Here we will primarily look at how co-creation has been developed by the experiment teams. Co-creation has been part of the evaluation criteria for OrganiCity applications and the OrganiCity consortium has written and published several blogposts about co-creation as inspirational material for the experiment teams:

- Cocreation and why we need it <http://organicity.eu/blog/co-creation-and-why-we-need-it/>
- Citizens as cocreators of urban infrastructures <https://organicity.eu/citizens-as-co-creators-of-urban-infrastructure-from-capturing-data-to-building-matter/>
- Participatory forms in OrganiCity <http://organicity.eu/blog/participatory-forms-in-organicity/>; <http://organicity.eu/blog/citizens-as-co-creators-of-urban-infrastructure-from-capturing-data-to-building-matter/>

The experiment teams have had various experiences with co-creation. We will present here two case studies to demonstrate and analyse the value of co-creation methods for urban experimentation.

5.1.1 Case study 1. Colour-in City

Colour-in City was exploring how new, co-creative relationships between citizens, public services and communities can be catalysed through a combination of digital technology, data tracking and human-centred service design.

The experiment team includes service designers, data analysts, parents living in social housing and the local services that support them. Their focus was on ‘colouring-in’ the outlines of statistical wellbeing data to draw out individual stories, strengths and needs. The aim was to equip and empower citizens to become both producers and active users of their own data. The digital tool, developed for this in the projects, is called Squeezebot chat bot.

Design process and impact goals

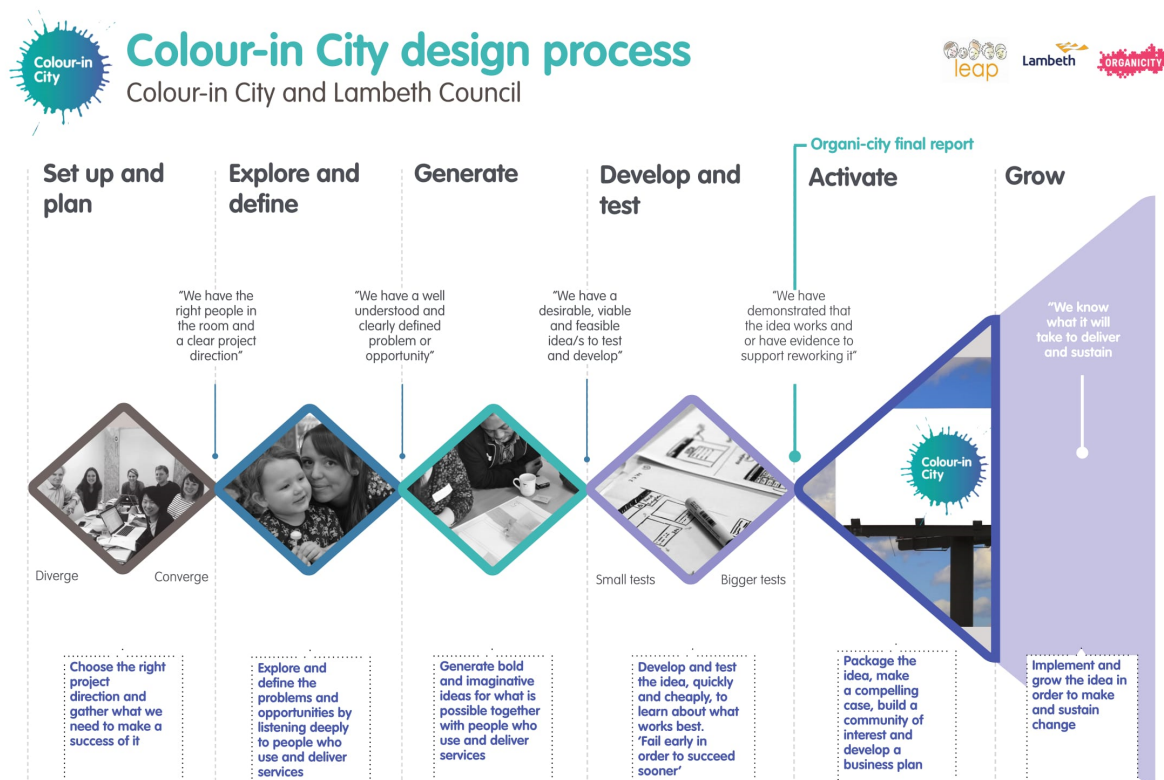


Figure 52 The design process of Colour-in City experiment

Colour-in-City used co-design to engage citizens in exploring what and how subjective wellbeing data should be collected, and how to analyse and respond creatively and ethically to collated datasets. The experiment was designed to interact and demonstrate impact across two levels:

1. At an individual level, providing conscious awareness of emotional wellbeing



Figure 53 Understanding needs: Data Art event by Colour-in City

In their final report, Colour-in City write:

“Our aims included exploring how we might:

- *replace existing ‘customer satisfaction’ evaluations with more emotional, impartial data tracking the range of factors and drivers affecting subjective wellbeing in real-time*
- *support parents’ conscious awareness of their emotional wellbeing to help them make empowered, healthy choices*
- *use meaningful, accessible data to activate community-led, group responses, at scale.*

First findings are that co-design can:

- *increase individuals’ awareness of factors affecting their wellbeing (for some, simply noticing is motivation to take action)*
- *connect citizens to support each other, through linking people to share and respond to questions and comments on a private Facebook group*
- *give citizens a direct way of communicating with and commenting on local services.*

Co-design means we are constantly feeding in parents’ experiences with the prototype, their response to it and ideas for improvement, into its development. This has been invaluable in shaping something that works for individuals as well as services.”

2. At service level, demonstrating different ways of collecting data



Figure 54 Data as real people, not just numbers: Data Art event by Colour-in City

"We knew some subjective wellbeing data sets were already available at national and local levels, but that the scale of this data collection was limited and less likely to be used by local service providers.

Through the experiment, we tested alternative ways of collecting emotional data using new digital technology. We experimented with collecting, analysing and visualising different types of structured (ie emojis, numerical scales) and unstructured data (ie free text, images) to identify and communicate hidden drivers or factors of individuals' wellbeing.

We are now able to demonstrate how emphatic (emotional or subjective) data can be used in understanding people's strengths and needs. Though we've not been able to carry out thorough analysis of unstructured data due to time constraints, we have proof of concept that we can convert unstructured data to structured datasets that can be easily analysed.

From the perspective of our service provider partners, this co-designed, open and accessible approach to using digital technology bridges labour and communication gaps they had in the delivery and evaluation of services."

Co-creation activities

To achieve the above goals, Colour-in City arranged, executed and learned from the following main co-creation activities with stakeholders - local service providers - and parents, living in overcrowded homes:

1. Designing with parents' workshop

"Goal: Parents want to join our co-design and learning journey, direction for what parents want from a digital tool"

Who and what: 10 parents engaged in co-designing a digital tool to support families living in overcrowded homes

Motivation generated: through building relationships and rapport with parents, listening to their experiences, valuing their ideas, equipping them with knowledge, confidence and inspiration to become co-designers"

2. Service-side stakeholder workshop

"Goal: Service providers across the system engage with the process, trust in it and in us. We better understand the system.

Who and what: 8 local service providers (from the council, children's centres, social care, LEAP etc) engaged in co-designing a digital tool to support families living in overcrowded homes

Motivation generated: through sharing the ethnography of two parents living in overcrowded homes, giving space to connect with the lived experience of people they support"

3. Chatbot beta launch 1 and launch 2

"Goal: The digital champion group, our co-designers, engage with Squeezobot, understand how to use it, are motivated to test it. We get feedback on usability, branding, tone, relevance

Who and what: 39 parents engaged in testing the Squeezobot tool and providing feedback and ideas around usability, language, tone, 'practical application' and branding

Motivation generated: Parents see their input matters as we encourage and take notes on their feedback and make changes shortly after based on this. Branding and communication of the chatbot designed to meet the co-design principles"

4. Celebration and scenario workshop

"Goal: Parents involved feel proud of what they have achieved. LEAP feels satisfied with the result. We 'end' the project concretely whilst providing opportunities to stay involved

Who and what: 8 parents and 3 LEAP colleagues celebrating the journey of Squeezobot

Motivation generated: creating a relaxed, 'party' atmosphere by decorating the room and tables and having party snacks. Celebrating involvement from parents with awards and through sharing parents' experiences in a video. Listening, noting, valuing, thanking parents for their feedback"



Figure 55 Parents are generating ideas at the Colour-in City workshop



Figure 58 Parents are pitching their ideas at the Colour-in City workshop

Co-creation tools to bridge the soft skills around technology

Colour-in City used prototypes, storyboards, idea builders and design blueprints to enable parents and partners to define their problems and imagine possible digital solutions. Importantly, they emphasized the value of OrganiCity Scenarios as a co-creation tool as

“a useful open source tool which could stimulate and generate ideas and solutions before taking it into a digital product. This is an example of support that bridges the technical and human sides of these kind of conversations.”

Squeezebot + Overcrowded housing storyboard

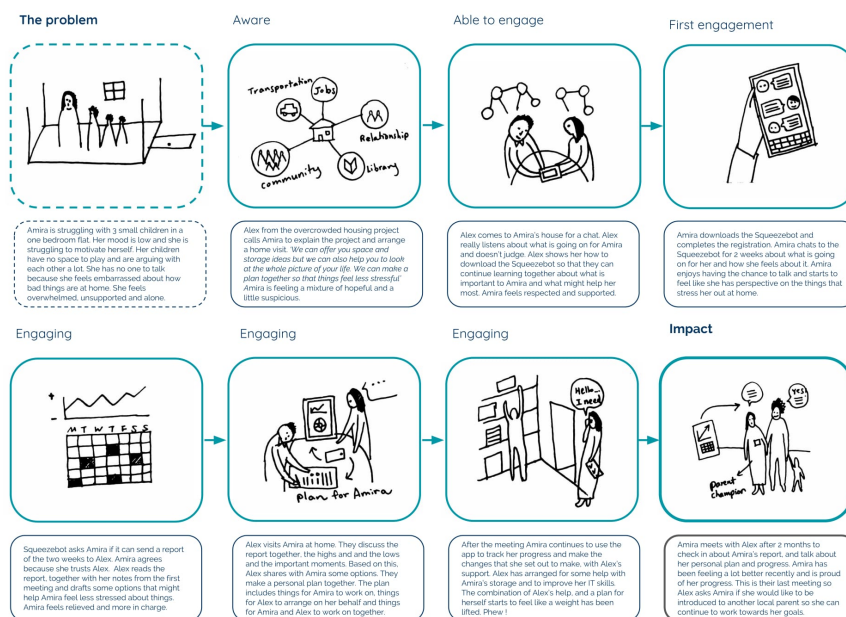


Figure 59 A storyboard on overcrowded housing as a co-creation tool for the Squeezebot

UNDERSTANDING ANXIETY AND STRESS IN OVERCROWDED HOMES IDEAS INGREDIENTS

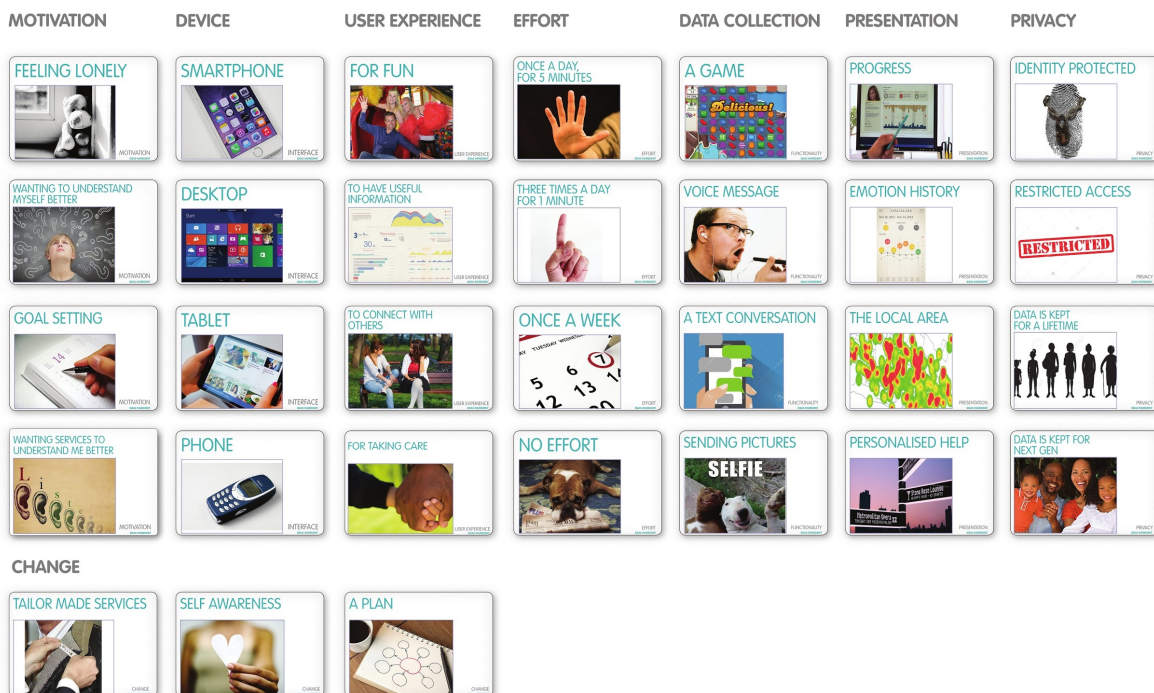


Figure 60 Understanding anxiety and stress in overcrowded homes. “Ingredient cards” as a co-creation tool

Learnings from the co-creation

Through the experiment, Colour-in City learned that co-creation requires commitment and groundwork, but it is worth the results:

“Real experimental co-design with digital tools and data requires a lot of groundwork, especially if you are working with marginalised groups. Many of our parents were low income, single parents, had limited access to digital technology, were time poor and/or living complex lives. In this way they were ‘extreme users’.”

“We made the decision to keep our process very user-centred, which made for rich and deep insights about how to make the chatbot interaction meaningful and engaging. Our parent testing group were more flexible than service provider stakeholders, able to attend co-design workshops and give feedback, meaning we could test and iterate quickly. Our partner LEAP were very trusting and gave us free range to develop a digital tool that met user needs as a priority, feeding in at key moments. They actively helped us arrange workshops, engage with parents, facilitate discussions etc.”

STAKEHOLDER MAP

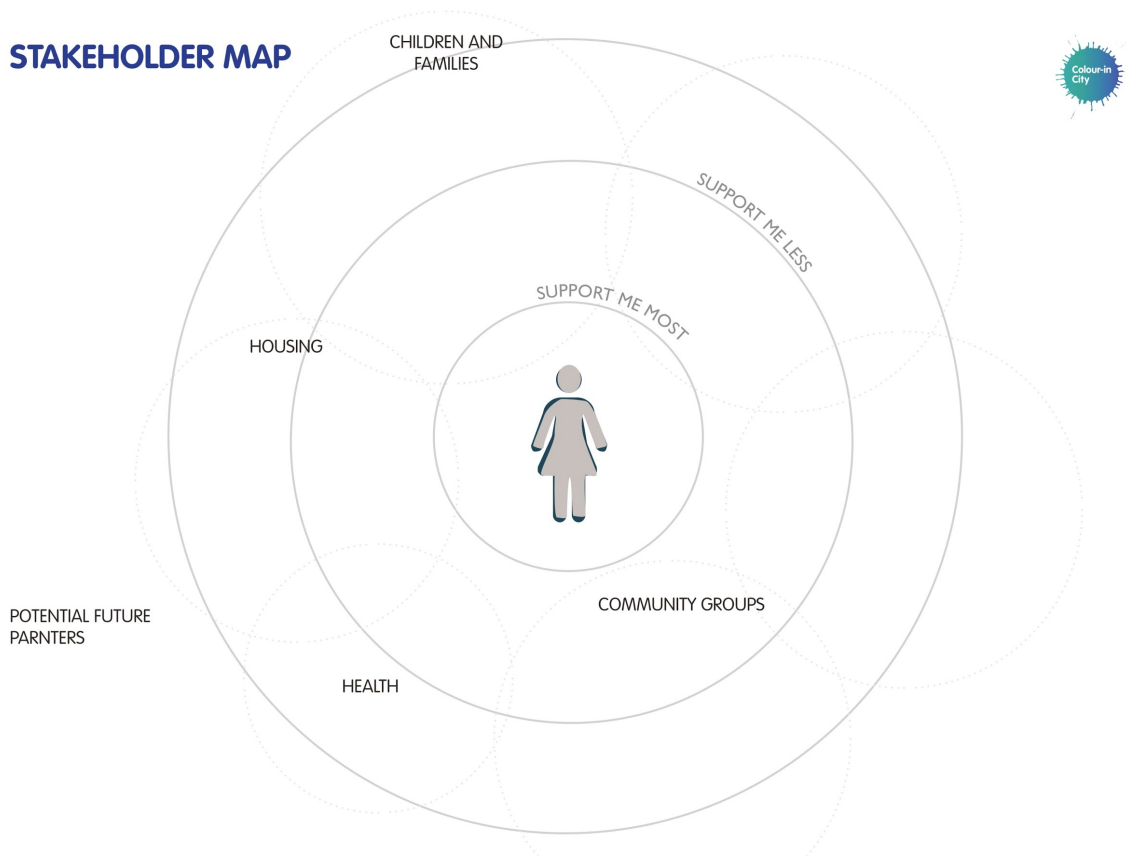


Figure 61 Colour-in City stakeholder map

All in all, Colour-in City have demonstrated that using digital technology to engage citizens in their own wellbeing, in that of their community, and in dialogue with public services, could have an impact at a large scale. In particular, the team suggested that there is a huge potential of citizens as co-designers in creating the communities and good cities of the future.

5.1.2 Case study 2. El Desmarque InstaSport

InstaSport is an experiment conducted by El Desmarque, a Spanish SME specialized in sports journalism, that utilizes social media feeds to detect co-occurring events and get real-time feedback about sporting events. InstaSport was one of the rolling call experiments experimenting across different cities within Spain; primarily in Madrid and Sevilla, but also in Valencia and A Coruña.

The experimentation team included El Desmarque's CEO, CTO, and an online community manager. The team also extends to include a network of professional sports journalists with whom El Desmarque is working.

Objectives and impact goals

At the outset of the experiment, the team behind InstaSport had a focused objective, before they had interacted with their intended audience. As they put it in their final report: *“In the early stage of this project we aimed to build a database with assets containing location, weather information and other data from sport events happening in several cities where El Desmarque has an edition.”*

They had initially expected the impact to be on the citizens whose homes are close to or around sports events, who would be interested to get real-time information on their surroundings. The journalists covering such events were also considered primary beneficiaries of the extracted information. While this was largely achieved, as will be detailed later, the process of co-creation is one they had not anticipated. The team also realized that other segments of audience would be interested in the information, not just the ones living around the game location.

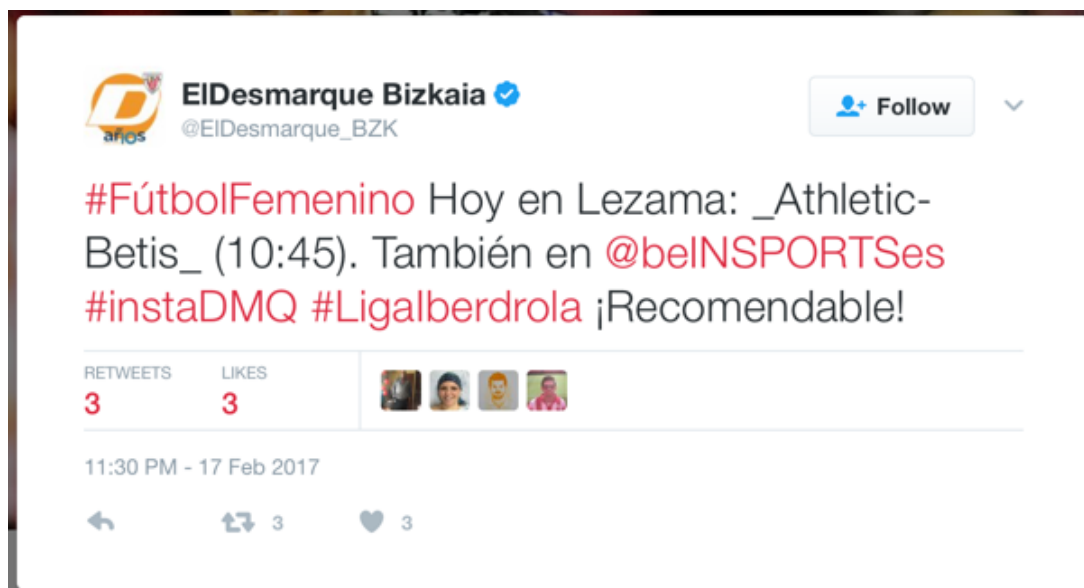


Figure 62 Example tweet using #InstaDMQ

As a result of their experimentation, El Desmarque developed a tool to extract relevant information from tweets. The tool has two versions, one that operates on the hashtag #InstaDMQ and another that operates on #NewsDMQ. #InstaDMQ is used to report on near real-time sporting events, and #NewsDMQ is used to report on news or events otherwise. The former is used more and the experimenters have focused more on it.

Co-creation activities and learnings

InstaSport’s co-creation activities can be described in two different streams: with their audience and sports fans, and with sports journalists.

Co-creating with online followers

Co-creation activities with the audience were all virtual ones, which presents an interesting case of engaging fans and followers online. The first interaction with their fans was through an initial set of tweets asking their fans to send feedback on specific sports events, also in the form of tweets. In the following tweet the team explains why they are using the #InstaDMQ hashtag (Translates to: “Why are we tweeting with the hashtag #instadm? Join ElDesmarque InstaSport, our project for @Organicity_eu! <http://dsmrq.es/InstaSport>)



Figure 63 El Desmarque tweet explaining the use of #InstaDMQ

Since they did not impose a rigid structure on the tweet, the team thought the followers were not engaged enough because there were not enough incentives for them.

“While we got some tweets from our readers, we have come to a conclusion: it’s hard to make people tweet about sport events if they don’t get an incentive. We thought that co-creation was a good incentive by itself. That’s why we published an article describing the benefits of co-creation for Smart cities

(<http://www.eldesmarque.com/promociones/158769-eldesmarque-intasport-organicity-ciudades-mejores>) and we distributed it through our social media accounts in Twitter and Facebook. The article received a very decent amount of traffic (around 10.000 hits). And the tweet with the link to that article reached more than 110.000 people in just two days.”
(InstaSport, Final report)

The team then tried to boost participation by tweeting from their official accounts, to which the followers responded to better. Even though the volume of data is not big, the team thinks the solution in place designed to detect words and patterns through Natural Language Processing was the more prominent outcome of the experiment.

Co-creating with journalists

The network of journalists has proven to be crucial in the experiment's co-creation efforts. Sports journalists seem to influence the fans' response online. Raising the journalists' awareness of the experiment and OrganiCity and asking them to tweet about them has shown to make this process easier for the team. In a personal interview with Javier, the experiment lead, he stated the following:

"There are cities where the experiment is working really fine and very smooth... we are getting tweets and feedback fine. Other cities are dead. But we are working on it with our partners across the country...and the journalists are definitely making it easier."



Figure 64 Javier Padilla explains OrganiCity and InstaSport to all the journalists of El Desmarque attending the December conference in Sevilla.

Co-creating with internal stakeholders

Since El Desmarque has a local presence in several cities, the team tried to utilize the edition managers to influence the fans engagement on a more localized level. The team describes this co-creation in their final report as follows:

“Since the beginning of this project we’ve been in touch with our stakeholders through email, WhatsApp, Slack, etcétera. Every week we opened a new email thread with the managers of every edition to get some insights about how this project was evolving. After we had a roadmap, we started celebrating meetings every week in Seville. Those meetings were attended by people from both Tech and Contents staff.”



Figure 65 Audience Director, Álvaro Ramírez (on the left), Carlos Tur, Social Media Director, Javier Padilla, Experiment Lead, Tomás García, Chief Technical Officer, and other members of El Desmarque.

Learning from the co-creation

Eldesmarque team has learned a lot, and tried to channel these learnings to their respective audience, from their OrganiCity experience. *“Before El Desmarque InstaSport we thought that sensors and data were only available to governments and institutions. Now we know that we can have a huge amount of data that can be used towards the creation of new apps for our readers.”* (InstaSport, Final report) Even though they had engaged many times with their readers before OrganiCity (e.g. to endorse some advertising campaigns), they acknowledge how “active” co-creation can be challenging, especially for different purposes and with

different content than they are experienced with. *“But as we’ve guessed more ‘evangelization’ job must be done in order to get the people engaged with these types of initiatives.”* (InstaSport, Final report)

5.2 Analysis of Co-creation

Co-creation as a strategy where diverse stakeholders collaborate and produce a mutually beneficial product/service together was a crucial element of OrganiCity experimentation.

While the teams had different prior experience with co-creation methods (from rich to no experience), they all learnt to treat the expertise of multiple stakeholders as valuable throughout the whole process of project/product/service development. Authorities, businesses, academics, journalists and, importantly, citizens were involved continuously in the projects under OrganiCity’s umbrella.

In some cases, at the early stages of the experimentation, an involvement from the OrganiCity team was necessary, for example, to connect experimenters with local stakeholders. However, all in all, the design of OrganiCity and commitment of the experimenters allowed them to engage diverse groups in contributing to the development of smart city technology/prototypes, production of data or similar that effectively and ethically related to stakeholder needs with a high level of autonomy.

Experiment teams hosted regular co-creation workshops, sessions and other activities/events, using a wide range of tools. Among these were interviews, surveys, mappings, observations, narrative design and other participatory design techniques. Experimental tools were sometimes used, such as virtual reality headsets that allowed citizens to see realistically enough how their visions of the city space would look like if implemented. These methods served various goals: from getting ideation processes started to elicit granular level attitudes and perceptions; from user testing to actual making of the product/service; from educating people about data to participatory data collection.

From OrganiCity tools, Scenarios was considered to be the most valuable for co-creation. Among the reasons is that this tool does not require technical skills and effectively supports creative thinking, especially when it comes to working with citizens. Urban Data Observatory, where data is being displayed on interactive maps, was also named as a tool that was easy to use for participants and present information.

At times, co-creation was challenging. Teams had to tackle distrust, low engagement, homogeneity, varying level of digital literacy of participants, high dependency on certain groups of stakeholders, legal and privacy protection issues. But after all, co-creation results were worth the effort.

In the documentation of their projects, experimenters highlighted that dialogues with stakeholders have given them useful and constructive critical input, helped with deciding on priorities and shaping future thinking, validated or debunked an accuracy of data gathered with information technology and quantitative methods, provided with insights about potential use cases of their products/services. Some teams noted that the more stakeholders could see that their input mattered and shaped the experimentation, the more willing they were to be further involved into co-creation activities, which led to the best mutually beneficial outcome of their OrganiCity projects.

As a consequence of such a strong focus on co-creation, many experiments resulted in building smart city technology/prototypes/services, producing data or similar that do not only take the needs of users into account, but also have accessibility and authentic engagement built into them. In addition, co-creation processes have opened up a number of partnership and development opportunities for experiment teams.

6 Conclusion

The above descriptions show our holistic and integrated approach to systematic experimentation. Experimentation with OrganiCity's facility is at the core of our project and as the above descriptions illustrate experimentation conducted by the teams has been extremely rich, including many achievements and of course also failures. In this way experimentation with all aspects of the OrganiCity facility has generated important learnings and have generated significant building stones for supporting the sustainability of the facility. Engagement with the tools has been less intensive than we had hoped for and expected which was due to several reasons (1) the tools and services had not achieved full maturity at the beginning of the experimentation phase (2) communication of how to use the tools and services had not been elaborative and targeted enough, which we later on improved (3) Expectation from the experiment teams that the technology environment was easy to access and work with without a high level of digital skills was a barrier. Some of the teams expressed that they were surprised over the degree of technical skills needed, which of course also was related to the degree of maturity of the tools. (4) Misunderstandings of what the tools and services were for and what they could be used for was partly related to the fact that our communication could have been more extensive and targeted. We have tried to improve this in the preparations of the next open call and expect to see a higher integration of the experiments and the OrganiCity facility. The feedback from the experiment teams leading to the possibility to also support historical datasets and the improvement of data privacy support contributes as well to the integration.

We think that OrganiCity has been highly successful so far in communicating the importance of cocreation practices and methodologies in experimentation with urban data and smart cities technologies. Our investment in facilitating matchmaking between teams with technology skills with people and organisations with an experience in cocreation, codesign and civic participation has led to good results. We have also learned ourselves from the different ways the teams have included citizens and other stakeholders in the design and execution of their experiments and aim for further disseminating these learnings in coming publications.

Annexes

Individual semi-structured interviews with experiment leads: Interview guide

The primary purpose of interviewing the experiment leads (ELs) is to gather qualitative and rich data about their experience with OrganiCity's EaaS. This is a guide for interviewers across the consortium who will conduct the interviews. The questions are meant to enable a discussion and help ELs elicit their experience with the platform and the overall service. Interviews should last between 60-90 minutes.

This guide is designed in modules, in order to best fit the types of experiments we are investigating. Conditional modules and questions will only be asked in the event of interviewing EG where these aspects apply. Questions preceded by underlined "IR" indicate that the interviewer needs to refer to the experiment's interim reports to contextualize the discussion. In addition, questions 7a and 7b work in an AND/OR fashion (i.e. some experiments use data only, some generate only, and some do both).

Before conducting the interview, please make sure to go over:

- The experimenter's Annex 2 and Interim Report
- Data Protection Impact Assessment (if available)
- Any blogs, public communications of their experiment or any material provided by the experimenter (in the Dropbox folder)
- The list of specific tool questions and adjust the guide accordingly

Beginning of interview

Thank you for taking the time to take this interview, we know you are busy finalizing your experiment, reports and completing your dissemination activities. I went through your interim report, so feel free to build on issues you raised in there. We will be speaking [English], I hope you are comfortable with that. I will start recording the interview now; please tell me if you want me to stop recording at any time during the interview.

START RECORDING

Introduction

1. Can you tell me about how you became involved with OrganiCity?

Hints

Factors & motivations

2. What problem does your experiment (or its solution) address?

*Value proposition &
target segment*

2.1. Who would be the primary beneficiary from such a solution?

2.2. How do you solve it through your experimentation?

Platform utility & usability (Tools)

Hints

3. If you would consider your experimentation using the OrganiCity facility as a journey, how would you describe it? You can also show me a demo or a walkthrough if you wish...

*Important tools and
service touch
points*

4. IR: What made you choose that tool specifically?

*Most valuable or
negatively rated*

4.1. What were your expectations regarding this tool?

4.2. What did you encounter when you started using it?

*Focus on
constructive
suggestions*

5. [Follow-up; select tool-specific questions]

6. Did you think about a specific tool or feature that is missing or can be added to the facility?

6.1. Do you know if it exists?

6.2. If exists – who built it? If not – how would it look like?

Conditional: APIs

Hints

7. IR: Did you find the API documentation sufficient or would you have preferred better examples and descriptions?

*Relate to specific
API (e.g. Asset
discovery or
federation API)*

8. Would you prefer to have more elaborated API usage descriptions? Would it be easier to have it in a tutorial format?

*As opposed to
common Java-doc
style*

9. How do you experience the use of OrganiCity APIs in your project?

*Pain points &
opportunities*

9.1. What were the main challenges you faced when using the APIs?

9.2. How can we improve them?

Platform utility & usability (Datasets)

Hints

7a. IR: We understand that you use the following datasets [...]

*E.g. through UDO,
APIs or other open
data portals)*

7a.1. How do you access or collect the data?

7a.2. What makes these sources/channels better for your experiment needs?

7b. IR: We understand that you are generating the following dataset [...]

*One-time upload,
through an API*

7b.1. How are you integrating this asset into the OC facility?

Federation API

7b.2. How was the process of integrating it/streaming it to the OC facility?

7b.3. How does that influence your decision to maintain providing/availing this dataset after experimentation?

8. Can you give me examples of key data processing or analysis activities you did during your experiment? This applies to data you use or generate...

*E.g. Aggregations,
Statistical analysis,
machine learning,
data mining, NLP,
deep learning*

8.1. What tools, methods or techniques did you use?

8.2. Did/do you use any advanced analytical techniques?

8.3. How much did these activities consume from your experimentation time & resources?

Estimate

9. Tell me more about the outcome of these data analysis activities

*E.g. decision
making, service or
feature design, in
co-creation*

9.1. How does the output of this analysis look like? Again, you can show me or illustrate if you wish...

9.2. How do you (or others) then use this output?

10. What were the main challenges you encountered during data processing and analysis?

Did you overcome these challenges? How?

Focusing on potential solutions that may work for others

Co-creation

11. What was your first impression or the first thing that came to your mind when you came across co-creation as a central component of OrganiCity?

Relate to concrete examples

12. IR: Can you please tell me about how you came to organize these activities?

Read examples from their reports

12.1. Did you encounter any challenges?

12.2. How do you think it could have been done better?

13. Do you recall a situation where the technical work within the facility influenced or was influenced by the co-creation with your communities?

Explore clusters differences, and role of scenarios tool

Communications, Ethics & Privacy

14. Conditional – Multiple or non-cluster city experiments: How can we improve our coordination and/or support with regards to your activities outside cluster cities?

OC going global

Starting from your application process to the open call...

15. Can you mention examples of how you came to realize any (new) E&P issues during your experimentation?

Refer to E&P impact assessment & IR

Conditional: Sustainability

16. Would OrganiCity be important or not important to sustaining and scaling your solution moving forward?

Hints

Affordances

16.1. Why?

16.2. What factors would determine use of the facility.

17. What are the main elements you see as delivering your product or service?

*Business model
components*

18. What insights or changes has the experimentation phase brought to these elements?

*Role of
experimentation*

19. Who are the partners involved in your experiment and the solution beyond? in terms of their resources and capabilities...

Value network

20. Can you talk about what you see as the various challenges to sustaining and scaling your solution, in terms of technical, contextual, industry, governmental issues?

Perceived factors

21. Can you talk about what you see as the various opportunities or potential answers to sustaining and scaling your solution?

Elicit knowledge

Is there something that I missed or did not ask about?

Is there anything else you would like to add or mention?

Thank you very much for your time and sharing your experience!

STOP RECORDING

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