

Technological solutions for heritage-led urban regeneration

INTRODUCTION

This is the last of the three factsheets that present the diverse facets of the ROCK project. The first one referred to how co-creation contributed to heritage-led urban regeneration through the ROCK Living Labs; and the second one explained the mentoring process, or knowledge exchange, through which ROCK cities discussed

and learnt about common challenges. This third factsheet will dig deeper into one of the most distinctive elements of the project: technological solutions to boost heritage-led urban regeneration. These solutions aim at responding to several needs such as safety, climate and environmental control, mobility, cultural and creative support, or people

perception of cultural heritage. They have been tested and implemented in the urban arena by ten ROCK cities, including both Role Model cities (Lyon, Athens, Cluj-Napoca, Eindhoven, Turin, Vilnius and Liverpool) and Replicator cities (Bologna, Lisbon and Skopje).

LINKING SMART SPECIALISATION TO THE HERITAGE CITY

Today, cultural heritage is reasonably well placed within the culture policies, urban policies, social innovation practices...But technologies and emerging activities related to heritage valorisation and heritage-led urban development still need to be properly connected to the EU mainstream innovation policy, which is no other than the so-called regional (and/or national) strategies for smart specialisation (RIS3).

Only a few of the RIS3 that are now underway in Europe are explicitly considering cultural heritage. Others prioritize culture-related domains, but often with a vague content, where the contribution of heritage to an innovation-led

growth is not properly examined yet. Digitisation represents a main avenue in this regard, but also other strands deserve higher attention, from materials engineering to risk management and urban lighting for instance.

Emphasizing the technological dimension of using heritage as a driver for urban growth will lead to better positioning cultural heritage in the smart specialisation strategies that are running all over Europe. This will dramatically expand the funding opportunities for heritage-applied emerging technologies and innovations. In this attempt, empowering cities as RIS3 actors will be helpful likewise.

ROCK focuses on historic city centres as extraordinary laboratories to demonstrate how cultural heritage can be a unique and powerful engine of regeneration, sustainable development and economic growth for the whole city.

ROCK VISION

ROCK aims to support the transformation of historic city centres afflicted by physical decay, social conflicts and poor life quality into creative and sustainable districts through the shared generation of new sustainable environmental, social, economic processes.

WHAT IS ROCK



ROCK AMBITION

ROCK aims to develop an innovative, collaborative and systemic approach to promote the effective regeneration and adaptive reuse of historic city centres by implementing a repertoire of successful heritage-led regeneration initiatives related to 7 role model selected cities: **Athens, Cluj-Napoca, Eindhoven, Liverpool, Lyon, Turin and Vilnius.**

The replicability and effectiveness of the approach and of the related models in addressing the specific needs of historic city centres and in integrating site management plans with associated financing mechanisms will be tested in 3 replicator cities: **Bologna, Lisbon and Skopje.**

ROCK



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LARGE CROWD MONITORING

LBASense system, by using a network of mobile-phone detecting sensors deployed in the demonstration areas, analyses data over time and provides real-time insights on citizen's and tourists' activity and mobility patterns within a monitored area. The combination of completely passive, yet privacy friendly, sensors allows to analyze the crowd's nature, enabling end-users to access crowd analytics figures in ordinary and extraordinary conditions (i.e. festivals and events). This tool has been developed by DFRC.



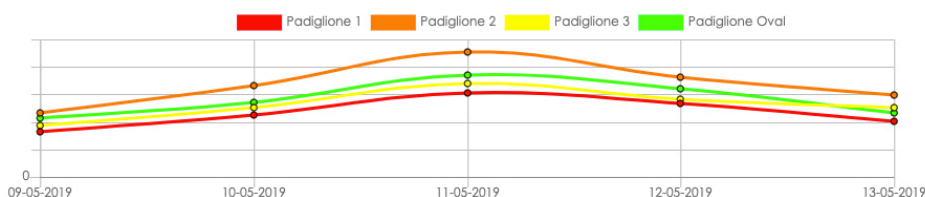
IN CLUJ LBS system was tested in Cluj starting from August 2018, on the occasion of the Untold yearly festival, the largest electronic music event held in Romania. Seven passive LBASense mobile-phone detecting sensors were deployed, covering six different areas of interest (Central Park and surrounding areas, Old Casino Building, Polyvalent Hall, Cluj Arena, Unirii Square and the Magyar Opera House). The installation of sensors across the city enabled to understand the transformation of the city during the festival (which gathered 350.000 participants), providing accurate statistical data per day and hour to the local authorities. This information allows defining smart ways of managing large-scale as well as smaller events in the city.

IN TURIN In 2018, the Municipality of Turin installed LBASense sensors in different locations of the city with the objective of monitoring the number of visitors attending specific places and events. As of today, data from nine City's Museums and art galleries are constantly collected and analysed. Furthermore, in 2019 several sensors were deployed during important temporary events, such as the International Book Fair and the Week of Contemporary Art in November. As a result, it was possible to statistically analyse both the number and movement of visitors from one location to another, to identify recurrent patterns (duration of the visit, locations attracting the same typology of visitors, mobility within the city) and support the local police in the management of safety and security urban policies.



Salone Internazionale del Libro, Turin

VISITOR COUNT ⓘ



PEOPLE FLOW ANALYTICS

The tool developed by Eindhoven university translates raw GPS data of people's mobile devices into activity-travel diaries. As it (not clear what is meant as it) has a participatory nature, it can help to understand the behavior and opinions of citizens. It can be used during outdoor events or on a normal day to understand: which exact routes and transport mode people take; how long their trips and activities take; at which spots they spend more/less time, and what their opinions on certain locations are.

IN EINDHOVEN People Flow Analytics was tested during the Dutch Design Week event in 2017. Visitors were anonymously tracked during their visit in order to understand which exhibition locations were the most visited (Lichtplein and Strijp-S), at which exhibition locations visitors spent the most time (Design Academy), which routes were taken the most, which transport mode was used the most (walking), and which locations triggered positive/negative feelings of visitors. The results were useful to several actors, i.e. event organisers could have feedback on the representativeness and perception of each exhibition location; municipality could make suggestions for the use of different locations and transport modes.

IN LISBON GPS trackers will be used in Lisbon in order to better understand the way people interact with the artistic interventions made in several spaces of the Marvila area. It will be measured during the opening of the Interpretive Centre, "Traça", a ROCK activity developed around the local cultural heritage, where also a participatory mapping experience will be carried out.

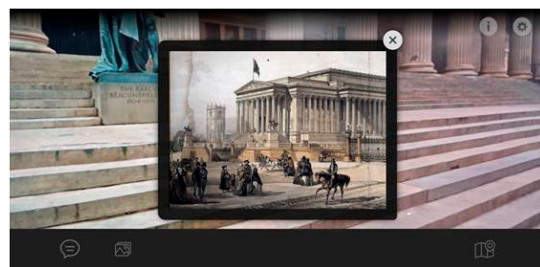
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AUGMENTED REALITY TECHNOLOGY

The tool developed by Virtualware consists of a multi-platform app for smartphones and tablets based on Augmented Reality (AR) technology, which allows the viewing of historical pictures in situ, engraved pieces, maps, short videos and 3D reconstructions of cultural heritage sites.

IN LIVERPOOL

In 2019, Liverpool worked with Virtualware Labs in development of a single digital content management system for immersive application delivery at St Georges Hall (Liverpool). The resulting AR prototype features geo-localised point recognition to enhance user's perception of the venues historical context, unique features and place in City cultural heritage. The interactive graphical content management system enables stakeholders to refresh preferred assets and user generated content swiftly, enhancing replicability and reflecting citizen preferences. The user interface design has been selected to maximize inclusion of disabled citizens at the sites via its accessible4all status.



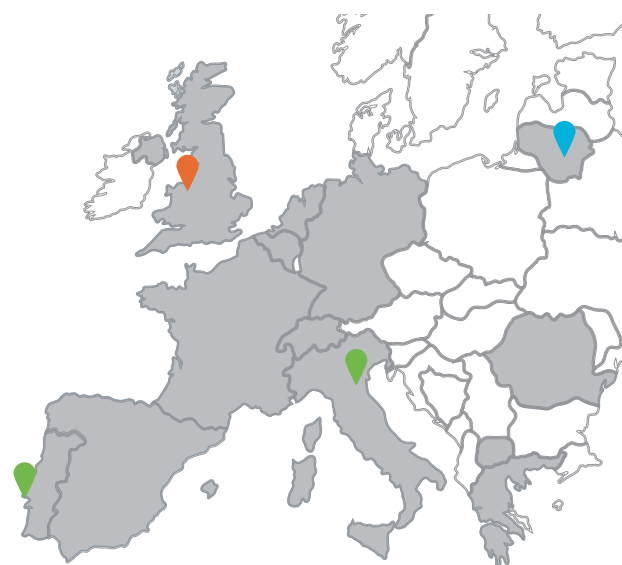
St Georges Plaza, Liverpool

CREATIVE GREEN TOOLS

This software platform, developed by Julie's Bicycle, is a suite of free carbon calculators developed to understand the environmental impacts of cultural buildings, offices, outdoor events, tours and productions. Environmental impacts are visualized in a variety of carbon footprint graphs, allowing users to compare their environmental performance between activities (such as city festivals), buildings, against industry averages and against previous years. Users are also able to compare their environmental performance against Julie's Bicycle benchmarks, which compare an organisation's environmental performance against industry averages.

IN BOLOGNA

Julie's Bicycle has developed a sustainability survey for event managers in Bologna that collects data on current practices and initiatives so as to understand opportunities and barriers for implementing good environmental management in Bologna city festivals. The data collected will be inputted into the newly developed 'Beyond Carbon' Creative Green Tool, which collects qualitative data relating to practices and attitudes. Bologna will be a pilot city and this data will be used to generate an automated report which visualizes responses in an accessible PDF; it will be testing a new self-certification model developed by Julie's Bicycle with support from the ROCK project.



IN LISBON

Julie's Bicycle commissioned an environmental audit for Marvila Library to provide utilities data as well as insights on how the building could work more efficiently. The utilities data will be entered into the Creative Green Tools to provide a carbon footprint and analysis of performance over time. Audits and Creative Green analysis will be commissioned for Skopje and Bologna.

VIDEO NEUROANALYTICS

This new technology has been developed by Vilnius Gediminas Technical University in the framework of ROCK. In short, it entails the installation of cameras around the city that register people's facial expressions and assess their affective attitudes, emotional and psychological states.

IN VILNIUS

One of the applications of the tool in the city of Vilnius has been the development of the Vilnius happiness index, which can be tracked live at <https://api.vilnius.lt/happiness-index>. Its aim goes beyond the usage of technology for its own sake, as it is used as a means to improve the lives of its residents. The index is also one of the three criteria (together with life expectancy and travel time) used to measure the achievement of the new strategic direction of the city that Vilnius has developed for the upcoming ten years.

THE CULTURE OF LIGHT

The tool deals with the universal value of light as a language to discover places and a tool of social inclusion. Innovative sensors enable a dialogue with people via app and smart mobile, guaranteeing equal access to cultural heritage.



IN SKOPJE

Skopje Light Art District (SkLAD) has been established as the first Skopje festival of light with strong support from the city of Lyon. After the success of the first edition (October 2018), the second (May 2019) gathered more than 20 light artist, promoting an inspiring artistic urban experience for more than 5000 visitors. Light artists mapped the territory of the historic district in Skopje and designed site specific and context sensitive light art interventions, using sensors of movement and scanners of emotional condition of visitor that were translated in colours and shapes of light. The response was highly positive with strong impact on visibility of previously hidden and underused public spaces in Skopje Old Bazaar, as it improved the image of citizens of the area and increased their endorsement of cultural heritage. Ultimately, the festivals showcased the potential of innovative use of technology and arts in public spaces in promotion of urban values and safety in public spaces.



Skopje Light Art District, Skopje

INDOOR MICROCLIMATE MONITORING

The indoor microclimate monitoring is a predictive tool developed by the University of Bologna to know the environment character and the user behaviour that allow to set solution to guarantee (or to improve) the indoor microclimatic parameter, especially in heritage buildings.

IN BOLOGNA The ROCK project foresees the monitoring of the indoor microclimate of the University Library of Bologna. Inside the main hall and the library archive, eight probes have been installed, including two in the archive, which measure the temperature and relative humidity of the air, the illuminance and CO2 values (for the detection of presences). The monitoring has been in progress since December 2018, the first results show, for the main room, a stable microclimate without daily fluctuations due to foreign climate or the presence of people. The trend of variables during the period of decommissioning of the plants (spring and summer) follows the external ones, including day-night cycles. The comparison between the relative humidity values of the archive (range 50%-60%) without the plant and the classroom (30%-60%) show the role of heating plants.

MORE ROCK TOOLS

These are just some of the tools for the transformation and regeneration of heritage cities developed within the scope of the ROCK project. In order to have a complete overview, find below additional technological solutions provided by ROCK partners:

TOOL	PURPOSE	DEVELOPER
ROCK Interoperable Platform	Networking & Mentoring	Corvallis
Outdoor Multi-Parameter Tool	Environment & Climate	Acciona
Outdoor Thermal Comfort	Environment & Climate	University of Bologna

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