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## Challenge based Innovation for Humanitarian Purposes: Designing a Web-App to fight Obesity. Results of ThePort\_2018 Pier 32

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### ABSTRACT

*exploration space*<sup>1</sup> @ ACDH-AAS against *unite innovators, impact future, act today* invited for the first time people with knowledge in the Humanities to join CERN THEPort-Humanitarian Hackathon.

It aimed at prototype a modular structure enhancing the analysis and understanding of knowledge systems, connecting food and its different cultures with the [SDGs](#)<sup>2</sup>.

During THEPort2018, an interdisciplinary team addressed the Humanitarian challenge of obesity to fill a knowledge gap. Better knowledge about eating behaviour is core to acting properly, supporting behavioural changes. In addition, cultural knowledge and experience may allow to support better decision making processes.

The paper showcases the hackathon result: a design study of the OrbEat application, aiming to increase the knowledge about individuals' eating behaviour and support behavioural change in a sustainable way, against the background of nutritionists' knowledge, facilitated by neuroscientific insights (EEG).

It demonstrated how fundamental science can provide tech-enabled responses to urging Humanitarian issues, simultaneously triggering innovation.

Key Words: Citizen Innovation, Sustainable Social Innovation, Process design, Humanity centred Innovation

<sup>1</sup> [Eveline Wandl-Vogt]: [@ ACDH](https://exploration.space) [accessed: 12.10.2018]

<sup>2</sup> <https://sustainabledevelopment.un.org/?menu=1300> [accessed 03.03.2019]

## 1. Introduction and Background

### 1.1 ThePort

A hackathon can be defined as “as a problem-focused computer programming event (Topi & Tucker, 2014), as well as a contest to pitch, program, and present instances of prototype digital innovation (e.g. a prototype mobile application) (Leckart, 2012)” (Brisco & Mulligan, 2014, p.1). In recent years, however, hackathons have more generally become popular events across different disciplines and areas as design and development events. On the one hand they have emerged as “effective approaches to encouraging innovation with digital technologies in a large number of different spaces (music, open data, fashion, academia and more)” (Brisco & Mulligan, 2014). On the other hand, hackathons have also served to bringing together ad hoc groups of people from various fields with the aim to prototype ideas addressing specific global and local issues. Thus, issue-oriented hackathons, for example, are one such sub-group which “bring together ad hoc groups under the auspices of conceiving and prototyping technologies to address social conditions and concerns.” (Lodato, & DiSalvo, 2016).

In the context of ThePort, a hackathon is more specifically described as “[...] problem-solving workshops started for intensive collaborative work between software developers – more general, as in our case, it is often seen as limited time innovation focused collaborative effort.”<sup>3</sup> ThePort as a special format of hackathon is thus based on the principles of *unite innovators, impact future, act today*. “Organised by [ThePort Association](#), hosted by [CERN IdeaSquare](#) and with partners from other non-governmental organisations, a three-day problem solving workshop hackathon devoted to humanitarian, social and public interest challenges. Interdisciplinary teams of hand selected participants working together in the fields of: communication – transport – health – science – education – work – culture – data.”<sup>4</sup> Together with coaches and experts-on-call, teams work on a particular challenge for 6 weeks to prepare for the 60 hour final. At the final event taking place at CERN, teams present their prototypes to the broader public. The main aim of this initiative is to prepare conceptual innovative ideas, that can be driven forward and put into practice after the event.

### 1.2 The Challenge: Humanities and innovating for the Good

*exploration space*, a virtual and physical space for experimentation and innovation at the Austrian Academy of Sciences, Austrian Centre for Digital Humanities, was founded in 2017.<sup>11</sup> by Eveline Wandl-Vogt. Against a background of Humanities, the space aims to apply Open Innovation methods and practices in science to facilitate, design, develop and analyse knowledge partnerships and innovation networks for the purpose of the good. The research question for the described experiment was how Humanities and knowledge of Humanities could stimulate and contribute to a Humanitarian challenge.

Sustainable Development Goals (SDG) are a collection of 17 global goals set by the United Nations for addressing urgent issues like poverty, education, gender equality, energy, environment or social justice, among others (Griggs et al., 2013). Among them, one of the core goals (number 3) is to ensure healthy lives and promote well-being for all at all ages.

The Digital Humanities projects related to this challenge are *exploreAT!*<sup>5</sup> (exploring austria’s culture through the language glass) funded by the National Endowment via the Austrian Academy of Sciences under the funding scheme *Digitales kulturelles Erbe* No DH2014/22 and *ProvideDH* (progressive visual decision making in digital humanities) funded by the Austrian Science Fund (FWF).

The challenge submitted was framed as the following:

#### *“Summary*

*Food, its cultivation, preparation and consumption as well as the connected service, products and emotions are a cultural heritage. A variety of databases capture the importance and the different “flavors” of food but do not map the associated emotions. We aim at bridging this gap using augmented reality, embedded technologies and other digital means.*

#### *Goals*

*Co-design and co-develop a participatory knowledge experience by offering creative opportunities of knowledge exchange throughout society and independent of organisational boundaries. Prototype a modular structure that enhances the analysis and understanding of knowledge systems, connecting food and its different cultures with experience that is accessible for the broader public and thus contributing to the SD Knowledge Platform and SDG17.*

#### *Resources*

*Access to certain data bases, Expertise of Mentors working in the field, Life cooking and dining experience”.*

<sup>3</sup> <http://theport.ch/#about> (Frequently Asked Questions: Hackathon? Never heard) [accessed: 03.03.2019]

<sup>4</sup> <http://theport.ch/#about> (Hackathon Event) [accessed: 03.03.2019]

<sup>5</sup> [exploreAT!](http://exploreAT!) [accessed: 01.03.2019]

Based on this description, 12 people of 9 countries accepted the challenge, namely: Sophie Ashcroft, Pierre-Alexandre Fonta, Carmen Margiotta, Anna Matuszynska, Joseph-Paul Manda, Giuseppe Reale, Norwin Schnyder, Duygu Saykan. As mentor and contributor acted Amelie Dorn; as sponsor, mentor and contributor Eveline Wandl-Vogt; Josefina Espinosa and James Jennings served as Coaches.

The collaboration started during August 2018, 6 weeks before the face-to-face interaction in Geneva. The team met virtually, organised by the two coaches in weekly meetings and discussed how to address the challenge.

In October 2018, 8-10th the team met face to face in CERN IdeaSquare.

### 1.3 Collaborative Knowledge Production and Citizen Innovation

*exploration space* aims to apply Open Innovation<sup>6</sup> (OI) methods and practices in Science. One of the reasons for applying OI in research methods and practices like the ones described here is based on the shared importance of both the fields of transdisciplinary collaboration and co-design for social innovation and the collaborative construction of knowledge (Yañez-Figueroa et al., 2016). This approach to research, where communities are involved as full partners in proposing and designing solutions along with researchers, represents a challenge in modalities of interaction and as a relationship-building process (Halseth et al., 2016). With its roots in the action-research tradition of social sciences (Brydon-Miller et al., 2003), OI has recently integrated design thinking, with co-design as its more collaborative dimension (Manzini, 2015). This way, collaborative creativity can combine visual and conversational modalities for the definition and solving of problems based on design (Cross, 2011), generating different types and forms of cross-organizational knowledge and of “design knowledge” (Thoring & Müller, 2011).

Co-design offers a variety of materials, procedures and techniques for collaboratively define new projects and solutions, as well as the simultaneous exploration of possibilities and the integration of diverse points of view (Blizzard & Klotz, 2012). Authors like Manzini & Coad (2015), in this respect, consider co-design an open-ended culture with the main characteristic of involving all actors in a productive and reflexive context, which for other authors consists in a process of “constructivist enquiry” (Kimbell, 2011).

In this sense, relating OI and participatory observation, ThePort2018\_Pier32 was conducted as a co-design experiment.

### 1.4. Human centred and Humanity centred approach

From a systemic perspective, human-centred co-design can represent a variety of visual methods, procedures and techniques for collaboratively defining new projects in complex circumstances, as well as the simultaneous exploration of scenarios, user-centred and participatory approaches and the integration of many possible points of view and perspectives to a given situation (Blizzard & Klotz, 2012). This way, a discussable, transferrable, and accumulable knowledge was dynamically generated in the session around the concept of a web-app to fight obesity, taking into account the notions of human-centred co-design, in detailed stages and techniques like the described by Naranjo-Bock (2012):

- 1- Self-reflection of research methods, focusing on research goals and questions, who the audience is and what tools they can use, and the stage of the project;
- 2- Running co-design activities onsite, with techniques and “placements” like collages, context mapping, storyboards, inspiration cards, modelling, paper prototyping or games; and finally,
- 3- Pilot testing and results, where the data obtained is generally visual and tangible, accompanied by the important debrief of the results of each co-design step or process.

In a wider context of knowledge management (KM), developing and strengthening knowledge ecosystems, and connecting to different knowledge communities is a major goal of global but also local societies. The acquisition, transmission and fostering of knowledge is at the heart of humans’ advancement and also directly connected to the UN’s Sustainable Development Goals (SDGs) and related Knowledge Development Goals (Brandner & Cummings, 2018). In this and our given context of the ThePort Humanitarian Hackathon, multidisciplinary and cross-

<sup>6</sup> [http://openinnovation.gv.at/wp-content/uploads/2015/08/OI\\_Barrierefrei\\_Englisch.pdf](http://openinnovation.gv.at/wp-content/uploads/2015/08/OI_Barrierefrei_Englisch.pdf) [accessed: 03.03.2019]

organisational collaborations (SDG 17) are key in enabling persons across various actor groups to put their shared visions into practice and co-create together for a better society.

In relation to these goals and initiatives, *exploration space* seeks to draw on human centred approaches for the benefit of moving towards humanity centred approaches and design, focusing to further society via technology in order to enable a better life.

## 2. The result of Pier32: OrbEat

### 2.1. The Humanitarian Challenge: Obesity

Obesity is a humanitarian challenge and it has become a systemic problem for our society increasing by 600% over the past 40 years and reaching a total number of 650 million people. Key facts according to the WHO<sup>7</sup> are the following: (i) worldwide obesity has nearly tripled since 1975; (ii) in 2016, more than 1.9 billion adults, 18 years and older, were overweight; (iii) out of these, over 650 million were obese; (iv) 39% of adults aged 18 years and over were overweight in 2016, and 13% were obese; (v) most of the world's population live in countries where overweight and obesity kills more people than underweight; (vi) 41 million children under the age of 5 were overweight or obese in 2016; (vii) over 340 million children and adolescents aged 5-19 were overweight or obese in 2016; (viii) obesity is preventable.

### 2.2 Humanities and the added value of Cultural knowledge to fight obesity

Culture is a fundamental aspect of our lives that shapes and impacts on the way we live together. The word itself has a complex history and diverse range of meanings. In the literature of cultural studies, the culture as we understand it today can be understood as a way of life, arts and artistic activity or a process of development (cf. Longhurst et al., 2008). In the context of ThePort2018 Humanitarian Hackathon and the OrbEat app, we understand food as a tangible and intangible cultural heritage, as a framework of individual behaviour and societal norms. It is product, service and emotion. Food is thus different across various regions on earth and has a significant environmental impact. In this light cultural knowledge is key in tackling obesity, also to reconcile society with their cultural food heritage, return to local, seasonal foods and their consumption, and raise awareness about personal food behaviours.

### 2.3 The Human centred approach: A Web-App for Selen. Tools and results

The result<sup>8</sup> of our interaction as the Pier32 group at ThePort32 Humanitarian Hackathon was presented on Sunday 7 October 2018 at the Globe CERN, Geneva, Switzerland.

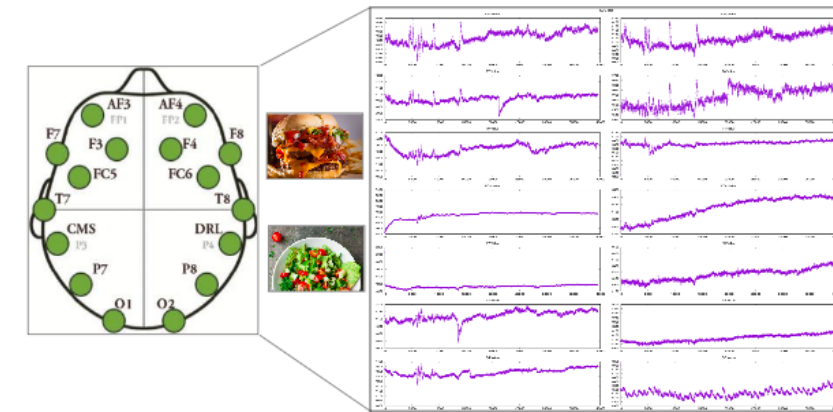
The concrete result and was a paper prototype for a web app (see Figure 1) developed following a human centred approach. The app prototype aimed to provide the following functions: working with the concept of personas. During the Hackathon the group chose the persona of Selen, a female adult, single, living in the UK with Turkish roots, who was actively looking to lose weight. Based on this profile a journey map through the app was developed. The OrbEat app starts with a short questionnaires, determining the user's personal eating habit. Based on the results, the app suggests recipes, lists ingredients of recipes and the option to buy them online at the nearest supermarkets. Users can then provide feedback on the recipes suggested. Finally, the user has the option to gain scientific insights on their individual eating behaviour by means of an OrbEat EEG scan at a local community group.

During the hackathon, the Pier32 group tested the use of EEG in relation to food responses and whether relevant results could be obtained. A total of 8 persons were tested using an Emotiv Epoc EEG headset<sup>9</sup>.

<sup>7</sup> <https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight> [accessed 03.03.2019]

<sup>8</sup> Ashcroft, S. et al. (2018): ThePort2018. Challenge accepted: Pier\_32: OrbEat. DOI:10.13140/RG.2.2.33702.98888. [accessed: 03.03.2019]

<sup>9</sup> <https://www.emotiv.com/epoc/> [accessed 03.03.2019]



[Figure 1] EEG measurements of unhealthy vs healthy images CC-BY 4.0 Giuseppe Reale et al.

As a first step, the resting state of each individual person was captured. Then, subjects were exposed to pictures of unhealthy food, a neutral picture, and finally a picture of healthy food. Results showed differences in activities (power spectra), however, more data and further measurements are needed for reliable interpretation of results.

By integrating EEG measurements in the OrbEat app, a more personalised understanding of eating behaviours is to be obtained. Ultimately, OrbEat aims to be a platform that helps users build a better image of their behaviour with food by raising awareness about food healthy behaviours and enabling them to switch their food patterns to be more healthy. It aims to support the cultural goal of improving our understanding of the food emotional relationship on the one hand, and personal goal of getting a better individual picture of one's relationship with food and guide along the nutritional journey.

### 3. Conclusions: What makes OrbEat unique?

Concluding, the developed OrbEat app is unique in that it combines both EEG scientific measurements as well as societal, cultural knowledge in tackling obesity, against a background of nutritional knowledge, something that has not been addressed at the same time before. In addition, our approach also directly connects to the UN's Sustainable Development Goals for improving a sustainable development on a social and ecological basis. As a follow up of the initiative described in this paper, the endeavour is continued as case-studies in the context of projects such as LODES (Global working group on Linked Open Data Repositories in the framework of OECD), ProvideDH (Progressive Visual Decision Making in Digital Humanities) and a non-research prototype development.

*exploration space* serves as a non-profit interaction platform for connecting actors and foster fighting obesity.

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