demeter

TITLE: Multi Actor Approach Framework

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Multi-Actor Approach Framework

1 Introduction

Technology is increasingly becoming an everyday necessity in agriculture. Novel technology can be found all over today's farms, measuring animal behaviour, air and soil humidity or counting the number of fruit flies that occupy a land parcel. At the same time, the Agri-Tech environment is saturated with digital products from a diverse landscape of technology providers, often using their own proprietary data standards and solutions. In order to develop a solution that promotes interoperability and standardisation, while at the same time delivering true business value to all stakeholders of the agri-chain – from farm to fork – a new approach to technology development had to be applied.

DEMETER follows an interactive innovation model as developed by the agricultural European Innovation Partnership (EIP-AGRI) and fosters the development of research and the uptake of innovations into operational applications and the creation of new ideas thanks to interactions between actors ("cross-fertilisation"), sharing knowledge, expertise, capabilities and a wide range of "components" (software, hardware, machinery, sensors, data sources etc). The interactive innovation model is implemented through the "multi-actor approach" (MAA). The "multi-actor approach" aims to make innovation fully demand-driven, involving various actors during the whole cycle.

Using a multi-actor approach aims to bring together the right people throughout a project. This includes people from varying backgrounds: farmers, advisors, software and hardware developers and researchers. This provides a multi-directional flow of knowledge that provides a better understanding of challenges faced by users and a clear picture of the problems that need to be addressed.

This approach changes the narrative from "designing for" to "designing with", specifically within the design and development process to ensure that all stakeholder needs are met, and the final solution is useful and usable. For DEMETER, a human-centred approach was needed that heavily emphasises multi-stakeholder involvement as there are a multitude of stakeholder groups and touch points (areas where an end user interacts with a platform), both, within the consortium and external stakeholders. To fulfil the requirements that a multi-actor approach demands from a technology innovation project like DEMETER, we are applying the framework of **Human-Centred Design (HCD)** as a concrete process to promote a human-first approach of problem solving. This enables our methods and

approaches to be more adaptable to new insights over the course of the run-time, lets us re-orientate for new directions on the fly and makes the multi-actor approach overall agile . HCD, however, resembles a standardised, yet very broad process that designers should follow during the development of solutions. It does not entail concrete methodology. Hence, concrete methods were needed in order to bring the human-centred approach to life. Thus, we decided to draw our methodology from the field of **Design Thinking** - the combination of which builds a powerful driver for the development of human-centred and demand-driven innovation.

2 Human-Centred Design

2.1 The HCD process

Human-centred design is an approach to interactive systems development that aims to make systems usable and useful by focusing on the users, their needs and requirements, and by applying human factors/ergonomics, and usability knowledge and techniques. This approach enhances effectiveness and efficiency, improves human well-being, user satisfaction, accessibility and sustainability; and counteracts possible adverse effects of use on human health, safety and performance. (*ISO 9241-210:2019(E)*)

Human-Centred Design is a creative approach to problem solving that starts with the people that products are being designed for and ends with new solutions to suits their needs.

> *"It's not 'us versus them' or even 'us on behalf of them.' For a design thinker it has to be 'us with them.'"*
> *-Tim Brown, CEO and President of IDEO*

HCD creates a deep empathy for the users that are involved in the co-design process which promotes idea generation and collaboration across stakeholder groups. It consists of three phases:

1. **Inspiration:** Through conversation and observation, the inspiration phase is about understanding the stakeholders' needs and challenges. It is important to remove any pre-conceptions at this early stage to allow a wide variety of solutions to be discovered.
2. **Ideation:** Also known as the brainstorming phase, this takes place once the initial research and findings have been formulated. Co-creation workshops are used to create potential solutions with the stakeholders. All ideas are encouraged for all stakeholders to encourage the multi-directional flow of knowledge and information.

3. **Implementation:** At this point solutions have been mapped out and implementation of a prototype can begin. This prototype will then be tested with the end users and multiple iterations can occur. This phase can also be referred to as the 'testing' phase.

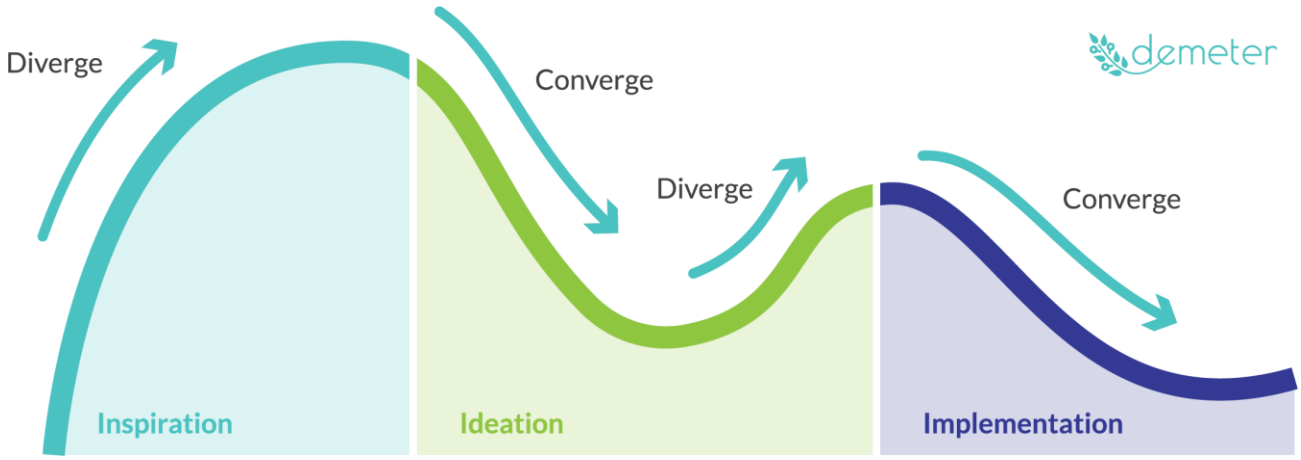

Figure 1 HCD Process

2.2 How HCD is Implemented – Design Thinking Methodology

In order to bring the Human-Centred Design Process to life, we chose to use methods from **Design Thinking**. Design Thinking is one of the most popular approaches for human-centred innovation today, both in business and science. Institutions like IDEO (Stanford, California) and the Hasso-Plattner Institute (Potsdam, Germany) are often mentioned as the founding-fathers of Design Thinking. Its origins, however, can be traced back to the 1970's, when the methods of industrial designers were first researched as possible ways to tackle the world's so called "wicked" problems.

According to Tim Brown, CEO at IDEO, Design Thinking combines business **viability**, technical **feasibility**, and a user's **desirability** – thus making it a strong approach for the development of innovation. The landscape of Design Thinking approaches is quite scattered. Frameworks vary from five to seven stage processes and from circles to double diamonds to loops (see figure 2 below).

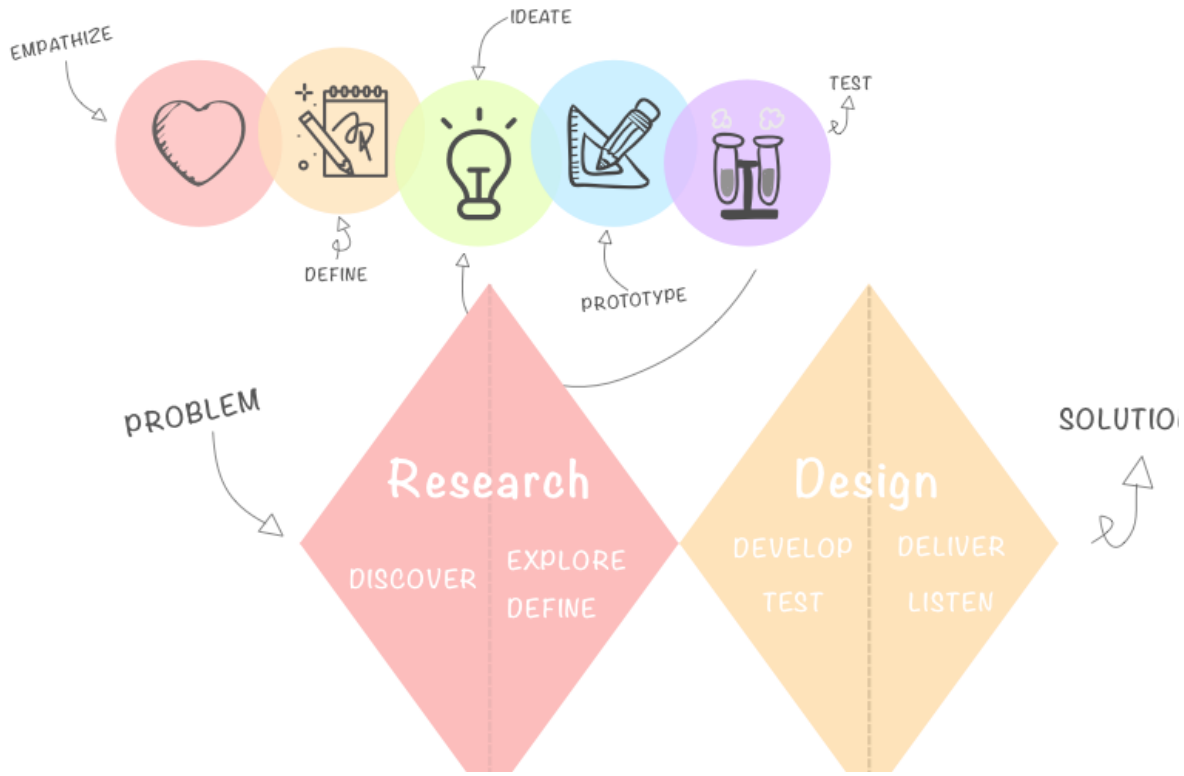

Figure 2 Design Thinking Frameworks

One of the things that they all have in common, though, is that they follow an iterative, problem-focused human-first approach. Given Design Thinking's popularity, practitioners produced a vast portfolio of methodology for human-centred problem solving.

3 HCD for DEMETER - A Remote Approach

3.1 The Challenges

Using the three HCD stages – Inspiration, Ideation, Implementation – the first year of the project was, for the most part, dedicated to developing a common project vision and getting a deep understanding of the end-users of the DEMETER technology: farmers, advisors and technology providers. However, empathizing and co-creating with people that are located all over Europe presented a challenge for the consortium. The global COVID-19 pandemic and the concomitant travel restrictions made clear that the way we carried out our activities, like interviews and co-creation workshops, had to be rethought.

We therefore looked at the latest collaboration and communication tools and amended our methods to the newly presented remote environments. *Mural,* a digital whiteboard and online collaboration platform, was introduced to the consortium as the go-to tool for joint workshops. In the image below (Figure 3) there is an example of a workshop facilitated through Mural.

Figure 3 Interactive Workshop hosted on Mural

In addition, Zoom was used as the main tool for face-to-face real-time communication. One feature that came in specifically handy was the ability to send participants of the workshops into breakout rooms. Thus, a large group of workshop participants could be broken down into smaller groups, which made facilitation much easier.

3.2 The Activities

To achieve a high level of co-creation throughout the project, we carried out a number of activities. At the beginning of any project, building empathy with the target group is crucial for success. Hence, DEMETER started with the Inspiration phase of the HCD process. In the first step, a Vision Scenario was co-created together with pilot farms and technical developers that are part of the project consortium. This Vision Scenario described the overall goal of DEMETER and described the several target groups that the project is aiming at and served as a guideline for the entire consortium to focus their activities.

Secondly, an exhaustive Stakeholder Landscape Analysis was conducted, to find out which parties have an interest in the outcome of the DEMETER project and how strongly and actively these parties need to be involved in the progress of the project.

Thirdly, needs and concerns were elaborated for each of these stakeholders, in order to better understand the respective stakeholder groups.

Next, a KPI workshop was undertaken to define how success is measured across all stakeholders within DEMETER.

Lastly, use cases were developed in collaboration with farmers all over Europe.

Therefore, interviews were conducted in order to get first-hand testimonials about farmers' and technology providers' experience with contemporary problems on the field. All of the activities are introduced and briefly described in the following sections.

3.3 The Vision Scenario

In order to empathize with all stakeholders, it is important to have a common vision of what we are trying to achieve. Consequently, a vision scenario workshop was developed.

In the very beginning, consortium partners as well as pilot farms that are taking part in the DEMETER project, were asked to lay out their expectations from the project. This initial exploration into DEMETER relates to the **Inspiration** phase of HCD**.** Therefore, a small survey was sent out, that contained four open questions regarding

1) their goals with the project
2) their expectations from a prospective DEMETER platform
3) the target group of such a platform
4) the goals that the platform helps them to achieve

3.4 Stakeholder Landscape Analysis

A stakeholder is anyone that has an interest or impact on the project. As DEMETER is a large project spanning multiple countries across Europe it is important to fully understand each stakeholder and stakeholder group that is involved. Firstly, a stakeholder mapping exercise was carried out to define the stakeholders. Following this each stakeholder was mapped on a power interest matrix to determine their impact on the project. As example of the power-interest matrix that was completed as part of a workshop can be seen to the right (Figure 3). This was a collaborative workshop including representatives of all stakeholder groups within DEMETER. It resulted in a better understanding of who the stakeholders are and what impact they would have on the overall project.

Figure 4 Power Interest Matrix

3.5 Needs and Concerns

Once all key stakeholders had been identified, further workshops were delivered to understand the needs and concerns from each group. This helps to further empathise with them and to obtain a better understanding of what is required from the DEMETER platform to solve these needs.

Therefore, workshop participants brainstormed needs and concerns that the identified stakeholder groups might have in regard to the DEMETER project as well as to smart agri-tech in general. Given the multitude of stakeholder groups that were identified in the previous step, a systematic approach for further elaboration of the needs and concerns of each of these groups was needed. The first stakeholder group that was looked at in detail were the farmers - DEMETER's main stakeholder group. Therefore, a survey was sent out to 50 farmers involved in the DEMETER project, where they ranked all of the identified needs and concerns to give them a priority. This survey also helped us to further segregate the stakeholder group of farmers into several sub-categories (e.g., olive, dairy, arable crops, wine, etc.). Needs and concerns for additional stakeholder groups will be elaborated and ranked in the future project runtime.

3.6 KPI Development

To achieve a better understanding of goals and key performance indicators (KPIs) for pilot participants, a virtual co-design workshop was delivered. The workshop consisted of 3 exercises to create **SMART** KPIs to help pilots measure their success. The acronym SMART was first introduced in an article entitled "There's a S.M.A.R.T way to write management goals and Objectives" (G. Doran et. Al , 1981) and can be described as follows:

Specific: What needs to be achieved? And by who?
Measurable: How will this be measured?
Attainable: Can the KPI be fulfilled with the tools that you have?
Realistic: Can this KPI actually be achieved?
Timely: What is the timeline of this?

3.7 Building Use Cases

As DEMETER is concerned with the development of technology for farmers, HCD efforts had to be directed more and more at guiding the development efforts in the project. In order to make sure that the developed technology will be useful for potential users, use cases had to be built. We needed to get a deeper understanding about the problems that DEMETER's stakeholder groups brought to the project face, in order to improve their farming practices. The foundation for this was laid at the very beginning of the project with the Vision Scenario, however, it became clear that

a deeper understanding was necessary. Hence, we interviewed farmers as well as technology providers that are engaged in the DEMETER project. These interviews helped us to get a deeper understanding about the specific problems that farms face today, ranging from dairy to olives to arable crops. The use cases will comprise a vital part of the elaboration of concrete technology requirements for the ongoing development efforts in DEMETER.

4 Next Steps

While the activities of the first year yielded a lot of interesting and indispensable insights about DEMETER's target groups and other stakeholders, the second year makes the connection between humans and technology. Hence, in the second year of DEMETER's project runtime, the focus of the MAA lies on the platform development efforts. Stakeholder needs and concerns will be translated into tangible requirements for the DEMETER technology - all in close collaboration with DEMETER's stakeholders. For this, we will utilize the three phases of the HCD process (Inspiration, Ideation, Implementation) to constantly refine project outcomes and always keep the user in the loop. Further testing and continuous feedback from the end users help to create software that is not just designed *for* the end user but designed *with* the end user to provide solutions that are ready to be adopted at a larger scale.

All of the above-described steps and methods will be elaborated in more detail in future publications.

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