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## Design Thinking Challenges

**"Design Thinking Challenges"**, were developed as an integral part of the curriculum of the project, and they serve as case studies and engage users in solving problems using Design thinking, via high interactivity levels and high levels of engagement in real-market situations and challenges. A design thinking challenge articulates the problem you are trying to solve, and helps you define a scope that is neither too narrow nor too broad. The various steps followed in the undertaking of these Design Challenges involved:

**1.** Establishment of design thinking methodology and templates for implementing tasks of the Design Thinking Challenges. The project adopted a combination of the process based on the DTRaIN training course and the UK's Design Council "Double Diamond" model. At the core of the design process there are four steps: **1. Observation (Discover), 2. Ideation (Define), 3. Prototyping (Develop), 4. Testing (Deliver).**

**2.** Identification of the Design Thinking Challenges. Having identified the challenge, the facilitators formed working groups in each partner country. Each group selected and worked on a Design Thinking Challenge, related to an agri-food product or service of their region.

**3.** Development of the Design thinking challenge. The participants of the groups worked together to apply the DT methodology for this real market situation and developed a "Design Thinking Challenge" report.

**4.** Evaluation by the Design Thinking Challenges. After which four "Serious Games" were be drafted.

**5.** Validation of Design Thinking Challenges.



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## Design thinking in Biotech: From conventional to bio-fertilizers.

***Partner responsible for the development of the Design Thinking Challenge, Learning & Development Institute of Berlin-IDI, Germany.***

*Bio-fertilizers are a type of fertilizer that contain live microorganisms, which can improve soil health and plant growth by assisting the break down process of organic matter, the release of nutrients, and increase the soil's water-holding capacity. They can help to promote healthy root growth, which can improve the plant's ability to take up nutrients and water and can be applied to the soil before planting, mixed with the seed at planting time or applied as a top dressing to the soil surface.*

**1. Design Brief**

**Description:** Creating a bio-fertilizer increasing crop production and crop quality for farmers.
**Target Users:** Farmers moving toward sustainable practices, and bio-farmers.
**Limitations:** Restriction with R&D regulations
**Risks:** Ability to get a certification, Relocation of R&D, Access to funding capital, Build production capabilities, Access to machinery and labs, Competitor products
**Metrics:** Efficiency of the bio-fertilizer when compared to competitors, adoption rate, new and repeated sales.

**2. Observation**

A series of qualitative researches were conducted with the final users (farmers in the German market). Those interviews included both observation and interviewing methods. The following points were discovered during the observation phase:

- Farmers are aware of the existence of fertilizers, and the market is oversaturated.
- Most farmers are unaware of the difference between conventional fertilizers and bio-fertilizers.
- The form (solid or liquid) in which the fertilizer is delivered to the farmers is key to farmers' processes.
- How the fertilizer is applied to the soil is crucial for farmers.
- The life span of fertilizers is also another critical factor.
- The storage conditions for fertilizers play an essential factor for farmers.

**3. Ideation**

Conventional fertilizers work by improving soil quality. The Design Thinking team decided to shift the focus from soil quality to the plant's ability to absorb nutrients from the soil. Through several brainstorming sessions with the core and the extended team (composed of experts in the industry, farmers, and other stakeholders), different concepts emerged many of which, albeit groundbreaking, had to be scrapped since they were outside the company's field of expertise.
The company then converged their thinking to the prototyping and testing of a new type of fertilizer, improving and strengthening the plant's roots rather than the soil. At this stage, the company also realized that this new concept is not in conflict with conventional fertilizers but can complement the overall effect.

**4. Prototyping**

The R&D department **developed different prototypes** for the product and quickly realized that using Fungi and bacteria is essential for soil fertility for several reasons.

- Firstly, they help **break down organic matter**, making it more available for plants to use as a source of nutrients.
- Secondly, they **help improve soil structure** by binding sand, silt and clay particles. This makes the soil more friable and better able to support plant growth.
- Thirdly, they **produce enzymes and other compounds that help release nutrients from the soil,** making them more available for plants. Finally, they can help to protect plants from disease by competing with harmful bacteria and fungi for space and food. The company also prototyped different ways to **package**, **deliver,** and **apply** the final product.

**5. Testing**

To improve their product and the service the company continually tests the prototypes in two different ways, in a controlled environment (greenhouse) and with early adopters. The initial testing phase took place in a controlled environment in a greenhouse. Different concentrations and compositions of bio-organic fertilizer were applied to the soil, and the experts constantly monitored the different results in order to find the optimal recipe for growth by monitoring this cause-effect mechanism.


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Once a significant improvement has been observed under a controlled environment, the product was tested in the natural atmospheric conditions by early adopter farmers. This is a more reliable test for the improved capability of the product. Testing is also performed on the logistics of the product and its applicability/usability by the farmers. Currently, the product is delivered in a concentrated form. To use the product, farmers have to dilute it and apply it to the soil by irrigation, which is convenient for the farmers

## Skills for the future: The European "Green Deal" and competences in the Agri-food sector

***Partners responsible for the development of the Design Thinking Challenge, Mediterranean Agronomic Institute of Chania -MAICh, Chania, with the European Center in Training for Employment-ECTE, Rethymno and the Region of Crete, Greece***

The European Green Deal strategy (EGD), has an objective to make Europe the first climate-neutral continent in the world. In this sense, all sectors of the EU's economy will have to meet this challenge in a fair, cost-effective, and competitive way. The purpose of the "Design Challenge" was to apply the Design Thinking methodology in order to reveal specific skills and competences needed or going to be needed by agri-food companies to enable them to adopt practices and, strategies for coping with the EGD.

**1. Design Brief**

**Description:** Eight learners who attended Design Thinking training and two facilitators worked together based on the Design Thinking Methodology in order to create a readiness tool to EGD strategy for professionals for the olive oil sector of Crete.

**Target Users:** Companies engaged in the agri-food sector in Crete who wants/need to employ new sustainable business models and practices but are lacking in relevant expertise. Farmers moving towards sustainable approaches towards copying with European Green deal strategy.

**Limitations:** Restriction with EGD strategy timeframe and environmental indicators. The Design Thinking team is comprised of four to five learners who have attended or attended the DTRaIN course. The companies subject to the Design project must be established in the region of Crete.

**Expected Outcomes:** The outcome will be a list of skills and competences needed and anticipated, for the companies to respond to the Green Deal EU strategy in the agri-food sector and match the market demand. The skills will be accompanied by a small description and if possible, grouped under a competence description

**Success Metrics:** Number of identified skills corresponds to specific needs


**2. Observation/ Discovery**

**Challenge Framing & Identification of an Opportunity.** Using large paper sheets, scotch tape, markers, sticky notes and the walls of the dedicated project room, the learners, under the guidance of the facilitators, began to frame the challenge and try to identify its layout, gaps and opportunities using certain design thinking tools and methods.

During the initial "Discovery/Observation" phase two design thinking tools were employed:

A ***"Frame Your Challenge"*** tool was introduced, where the team of learners recorded and organized key challenges according to their impact on Societal, Economic, Cultural, or Other aspects.

A ***"stakeholders mapping"*** tool, was used to identify the key stakeholders directly and indirectly associated with the key challenges. The team member brainstormed who they think stakeholders are and categorized them under Society, Business, policymakers (governance), and the Academic sector.

Utilizing their early findings, the learners began to loosely clustering them using the ***"clustering method"*,** according to key topics/areas of interest. In this process of divergent and convergent thinking the team worked iteratively to produce a wide map of multiple possible themes, patterns, and connections relating to the different aspects of the design challenge. This activity showed the multiple points of interest tensions and challenges and first revealed the complex nature of the wicked problem they had to address.



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***"Grid mapping":*** in order to reveal the interconnectedness of the stakeholders associated with the agri-food system, information was organized into four key areas representing the Primary/Grower & Producer level, the Secondary/Processing-level, the Supply-chain-level, and the Consumer-level. The result of this activity led to the decision of the team of learners to focus on the Primary/Grower & Producer-level of the agri-food system. More precisely, the team chose to focus on the, prominent for the region, sectors of olive oil and avocado production.

***"Creating Empathy"*:** Following the initial mapping steps and the decision to focus the area points of interest semi-structured interviews were conducted, by the team, with professionals and experts from the sector in order better put themselves in the target group's shoes. This process proved to be very insightful and challenged again many assumptions made by the team of learners during the early project stages. Most importantly, it revealed new insights on the different motivations driving their practice as well as their frustrations in keeping up with the changes in their respective markets.

**3. Interpretation & Ideation**

During this stage, all primary and secondary data collected were again posted on the wall and the team of learners began visualizing them through themes creation and pattern recognition. A ***"Roadmap to Success"*** began forming as a visual timeline that was divided into 3 key areas; the present state within the sector, the mid-point which described what skills are needed and missing from the sector that if adequately implemented would more adequately address and realize the goals of the last area visualized in the map, the milestones of Green Deal 2030.

**4. Prototyping/Development**

The report and creative work produced by the team of learners throughout the project revealed multiple opportunities for development and innovation in the sector.

- Promotion of Agrotourism
- Green Marketing (promotion of fresh and local products, healthy/quality lifestyle promotion, PDO and PGI product development)
- Food specialization
- Promotional & Digital Education
- Food Diversification
- Networking skills
- Agronomic Best Practices & Knowledge Sharing
- Business consulting & Agri-food Business specialization

One significant insight resulting from this process was the differing levels of readiness each producer seemed to have with regards to the Green Deals' directive. It was revealed that stakeholders in the Agri-food sector and across their network were very little informed about what and how they must address in their current practices in order to meet the goals of the EGD strategy. Most had little understanding of new consumer behaviors, while their main drivers were to make ends meet (i.e. their produce was critical to their livelihood).

In response, the team designed and developed a tool that was meant to help different stakeholders (Grower-level, Processing, and Supply Chain-level, Consumer-level) reflect on their own practices and realities through a set of interactive scenarios and questionnaires and assess their readiness to meet the future Green Deal policy. The tool has a dual value; from the respondent's point of view, it can enable them to identify their key strengths and weaknesses in their current practices and by doing so, to know which areas they need to be improving. From the policymaker's point of view, the data resulting from the tool could provide important intelligence in the areas they ought to be concentrating their supportive mechanisms e.g., incentives, funding, and raising awareness through training.



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## "Jutapack"- Innovation and sustainability in product packaging

***Partner responsible for the development of the Design Thinking Challenge, Centro Machiavelli, Florence, Italy.***

Eco-friendly packaging is made from a vast array of different materials, with solutions designed for every production and commercial need. Materials that can be recycled, such as paper (even high barrier films) and all mono plastic polymers, is considered to be environmentally sustainable food packaging. Among compostable packaging a suitable alternative is also PLA packaging, a biological polymer derived from corn with perfect transparency. With sustainable packaging it is possible to pack many types of products such as: organic food, products for animals, cheese, meats, gastronomy, frozen food, and many more. Today, eco-friendly packaging is the priority in different application contexts, to bring the brand closer to the needs of consumers and improve the brand's image in terms of ecology and sustainability.

**Pre-steps:** Four macro-themes on which to develop their project work were offered to the participants: 1) wine production; 2) alternative packaging solutions; 3) integrated agriculture; 4) vegetable consociation. The projects were evaluated according to different criteria an in the end alternative packaging solutions was picked as the focus of this challenge. An innovative approach to sustainable packaging gives an eco-friendly approach to the act of shopping, reducing the carbon foot print and provides several advantages:

- Use of plastic free packaging;
- Enhancement of the corporate image;
- Greater appeal of products on the market;
- Reduction of ecological impact;
- Reduction in $CO_2$ emissions.

**1. Design Brief**

**Description:** The goal of the design project is to reduce the waste of plastics through a reduction in the use of bags in supermarkets.

**Target Users:** Companies engaged in the agro-food sector that want/need to use new models and sustainable business practices, but lack relevant expertise.

**Limitations and Risks:** *Large-scale production with derived sustainable costs and revenues and the procurement of materials. Remember to bring it for use;*

**Expected Outcomes:** Address of over-packaging, reduction of food waste, promotion of sustainability, reduction of costs

**2. Observation**

**In order to tackle this wicked problem three main questions had to be addresses**: What are the needs of the end users, what are their expectations in relation to the product and what challenges and costumer pain points need to be addressed in this context? Through this discovery phase it was decided that a sustainable, durable, reusable, economical and stylish packaging bag would address these questions and the over packaging problem at large given that the product could overcome the hurdles of large-scale production. This innovative take on packaging will be made of recycled materials and agricultural waste such as jute, in order to create a product as well as a service that will benefit all stakeholders involved.

**3. Ideation**

The concept that formed through the ideation process in order to tackle the problem of over-packaging was that of a reusable, durable, attractive and technologically innovative medium-sized envelope, made of jute, with technological aspects integrated on it. A QR code will be placed on the envelope indicating the products available in each selected store (fruit and vegetables in bulk) at any given time making the user interact with the distributor facilitating the shopping experience. In conjunction through the use of an app the weighted produce and its price will be registered on a "shopping list" which would generate a code in a section designated as "closed expenses" to be scanned during checkout. All this will allow the end user to:

- Eliminate the use of plastic bags or packaging in various materials.
- Limit spending (€) by already knowing the prices that could be compared.
- Limit food waste itself (perhaps with recipe suggestions).
- Evolve and improve the buying experience.
- Speed up (and then reduce) the average time spent in a store or department.



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**4. Prototyping and Testing**


A high quality prototype that consists of a:

- Jute envelope with printed QR code.
- An app developed for systems interaction.

The APP will contain:

- QR code scanning.
- Store list.
- List of products and images with price/kg.
- Possibility to create shopping list.

The test period will be 30 days with an initial production of bags of 500 pieces. Then they will be delivered to a single branch of the supermarket CARREFOUR (selected depending on the location and feasibility) in Florence with a large catchment area and high turnover. The product will be available in store with first supply of food inside (e.g. 4 apples) at the price € 5,00.

Consideration will be given to:

- Individual sales of the complete product - bag + apples (sensitivity and eco-sustainability).
- Reuse (store entries with empty envelope).
- Sample questionnaires at exit for evaluation of effectiveness.

The QR code will also be useful as an anti-theft device and for counting reuses thanks to user scans.


## "CircularBlade"- Repurposing wind turbine blades for the Agri-food sector

***Partner responsible for the development of the Design Thinking Challenge, University of Valladolid-UVa, Valladolid, Spain***

The objective of the design project is to promote the recycling of materials form the blades of wind turbines in a circular economy environment and applying information technologies for this purpose. The target group is focused on the companies in the agri-food sector that want/need to use new sustainable business models and practices and that may demand compounds such as fiberglass, carbon fiber and other products or by-products obtained in the recycling process. Currently there is no such industry at the local level that allows the recycling of wind turbine blades, and there are no tools that facilitate the flow of information between wind turbine owners and potential customers of recycled materials and products.

**1. Design Brief**

**Description:** The creation of an information sharing platform that will promote the recycling of the materials derived from discarded wind turbine blades and their repurposing into products that could address the needs of the agri-food sector.

**Target Users:** Companies engaged in the agri-food sector that want/need to use new models and sustainable business practices, but lack relevant expertise.



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**Expected Outcomes:** Address the issue of the discarded turbine blades filling landfills, repurposing of waste, promotion of sustainable production, promotion of materials and functional manufactured products at lower costs.

**2. Observe and propose**

An initial brainstorming session was conducted to establish the focal points of the project. The team, together with the facilitator, worked to define the potential end users, their limits and a series of questions necessary to establish the target groups and objectives of the project. Throughout the brainstorming sessions, the importance of the use of renewable energies in production and manufacturing companies in the agri-food sector was raised. Weighing its advantages and disadvantages, wind generated energy constitutes a green alternative to conventional power sources which, although bound to geographic and climatic parameters, offers sustainable clean energy.

One of the greatest challenges facing the wind power industry is the recycling of the large volume of waste that is generated when the turbine blades reach the end of their lifetime. In Spain alone, it is estimated to be more than 6,000 tons per year of fiberglass, carbon fiber and polyparaphenylene terephthalamide (kevlar), among others, that end up pilling up hectares upon hectares of landfills. The volume of discarded material is so great that it provides a breeding ground for the potential establishment of a new synergistic circular economy among the stakeholders of the agri-food and wind power industries, for the repurposing of such waste. In order to clarify objectives of the project and facilitate the focus of the team, the following question was raised and addressed:

**What needs of end users can be addressed through the repurposing of turbine blades?**

- Access to materials or manufactured products obtained from the recycling process of wind turbine blades, e.g.:
- Insulation boards for refrigeration chambers, greenhouses, enclosure covers, slabs, ...
- Seedbeds for vertical vegetable gardens.

Crates for product transport, baskets, pallets, trolleys, …

**3. Ideation**

During the initial phase of ideation, it became obvious that the stakeholder's groups that represent the supply (wind power industry) and potential demand (agri-food sector) had to be clearly defined and mapped so that an articulated layout of the two sectors, as well as their subjacent, potential points of intercourse, might be created.

This process made obvious that in order for the project to be successful, a connective tool is needed that would join these otherwise disjointed sectors through an information sharing network. Through this network, the needs of both sectors will be rapidly conveyed and the demand for products derived from the recycled blades will be quickly translated into action creating thus a new synergistic, conjoined market that further promotes sustainability between sustainable energy production and sustainable agriculture. Having this system in place allows planning between customer demand and the available raw material, in order to adjust costs and pricing policy in relation to demand and production capacity.

Therefore, the Design Thinking Challenge team centered its focus in the creation of such a platform that would be able to facilitate this process. This will require a computer system that allows the registration of the different parties that will participate in the circular economy process, i.e., the owners of the wind turbines and the potential end users of the recycled materials and products. This system will be able to record when the useful life of the wind turbine blades is fulfilled, as well as the amount on offer of each type of recyclable material in an appropriate manner. On the other hand, the system will allow end users to enter the future needs of these materials and the quantities required. In addition, an expert system will be integrated to optimize the allocation of resources in such a way as to minimize both waiting and transport times and costs, thus covering the entire demand in an optimal way.



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**4. Prototyping and testing**

A high-fidelity prototype will be developed consisting of two clearly differentiated but complementary computer systems:

1. It will be necessary to deploy a server that supports both the storage and management of the data and the expert system.
2. It will be necessary to develop a progressive web application (PWA) that allows and facilitates the introduction and edition of the required information, as well as its query. In addition, this PWA will be able to send different types of alerts/notifications when certain events occur, which can be configured by the user. Likewise, the user interface of this PWA must be user-friendly and easy to use.

## Lead partner

Region of Crete (GR)

## Partners

European Center in Training for Employment (GR)

University of Valladolid

Centro Machiavelli S.r. l.

LDI UG (DE)

SQLEARN (GR)

Mediterranean Agronomic Institute of Chania (GR)



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