Funded by the Erasmus+ Programme of the European Union

CLEANTEX

Clean and Innovative Textiles Strategy for Circular Economy

Cleantex Bootcamp Itinerary

Industrial clean textiles bootcamp training program for intensive summer training course

ENSAIT & AEI Tèxtils

June 2022

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.

Content

I. Cleantex context 3

II. Bootcamp 3

II.i. Bootcamp methodology 4

Phase 1: Understand 5

Phase 2: Define 5

Phase 3: Sketch 6

Phase 4: Decide 6

Phase 5: Prototype 7

Phase 6: Evaluate 7

III. Results 9

IV. Suggestion of improvements 9

V. Conclusions 10

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.

I. Cleantex context

The textiles' sector is facing major challenges being the environmental demands one of the most concerning topic. As a consequence, the need to work in a more sustainable textile atmosphere nowadays is determinant as it will become a basic in the future. Companies will need to work in textile circularity and eco-design in order to tackle with some new European deals in relation to the environmental impact. To foster the innovation growth within those companies, higher education systems need to bring circular economy and eco-design knowledge to improve the current situation of textile industry in terms of environment pollution.

In this context, the objectives of the Cleantex project are, among others, to develop the necessary tools for skills enhancement targeted to higher education in relation to innovation in order to:

- To support higher education students to acquire skills in transdisciplinary innovation based on circular economy and eco-design applied to the textile sector
- To foster student cooperation multidisciplinary approach in work-based projects
- To provide knowledge, skills and competences using virtual collaboration tools
- To promote the application of good practices for the enhancement of innovative skills;
- To strengthen collaboration between HEIs from textile engineering and other disciplines with textile industry.

To do so, the CLEANTEX partners developed different didactic tools such as a MOOC (Massive Open Online Course), an E-book and finally a Bootcamp methodology. This Bootcamp is an innovative learning proposal that is an opportunity to implement virtually acquired knowledge to help a textile company to become more sustainable. This approach enables learners to use MOOCs and E-book inputs in a game-like way.

The Bootcamp methodology was tested and improved several times based on trying session, as an example with an intensive training summer courses which was held in Ljubljana, Slovenia, in July 2022. The following section details the Bootcamp methodology. It aims to guide how to implement the methodology in any sectoral context.

II. Bootcamp

The Bootcamp corresponds to a methodology that, once applied, will help a company to develop innovative ideas to incorporate in their sustainable strategy. It brings steps and tools for accompany companies' teams to identify ideas to be applied.

The Bootcamp methodology is based on the Design Sprint methodology[1][2], a path developed by Google Ventures for solving problems through designing, prototyping, and

[1] http://www.gv.com/sprint/

[2] The design sprint methodology is based on design thinking. It is known as a Google design method since its inventor worked for this company. For further detail about the design sprint methodology, please refer to https://designsprintkit.withgoogle.com/methodology/overview

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.

testing ideas with users. It is a tool for developing a hypothesis, prototyping an idea, and testing it rapidly with as little investment as possible in environment as real as possible. This process, that develops in a similar way than a Hackathon, comprises six steps for solving problems (detailed in the following sections):

- Understanding
- Defining
- Sketching
- Deciding
- Prototyping
- Validating

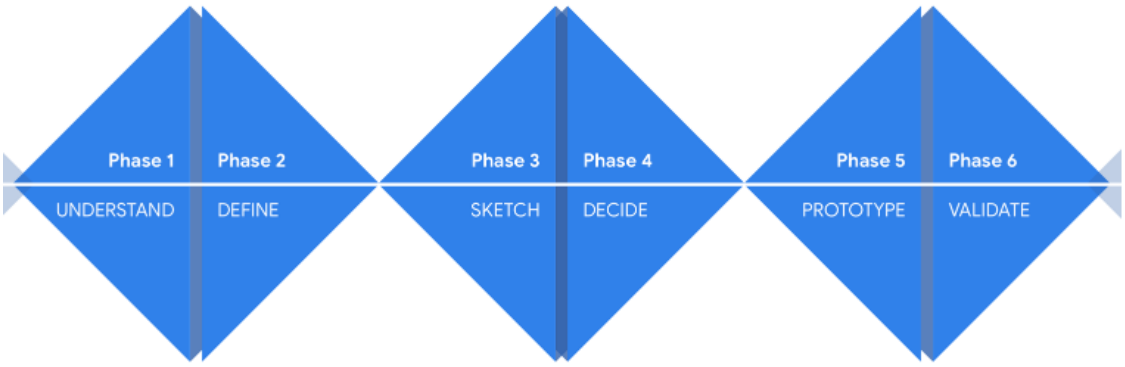

Figure 1. Phases of the Design Spring Methodology. Source: Google[3].

A hackathon has been, traditionally, an event at which a lot of people come together to write or improve computer programs4. Nowadays, hackathons have proved to be a good methodology to solve challenges in another areas, not just in the computer science field. Other similar projects have implemented hackathons in the textile field, specifically regarding the sustainability topic, with good results5. The students have had the opportunity to know a real case and have provided ideas out of the box for the participant companies. This is why the Cleantex project aims to use the idea of a hackathon but in the Bootcamp context. The Design Spring Methodology fits in the description, allowing the students to put a step in the reality and be motivated by being part of it.

II.i.Bootcamp methodology

The Bootcamp is a five-day process in which the Design Sprint Methodology is implemented. It is designed for working with groups up to 5 or 6 people. Each day is reserved for each phase proposed by the Design Spring Methodology. For an optimal benefit, the group

[3] https://designsprintkit.withgoogle.com/methodology/overview
[4] https://dictionary.cambridge.org/dictionary/english/hackathon
[5] https://hackathon.destexproject.eu/

should mix complementary-skilled people. The group is then asked to act as a consultant team facing a specific company challenge related with sustainability.

Phase 1: Understand

In the first session, the company problem is presented as a brief with some previously prepared documents that help to contextualise. For sustainable problems, it is recommended to deliver:

- Company's brochure describing the company business, its products, as well as glimpses about the factory work
- A complete manufacturing diagrams
- Data from sales department
- Data from environmental evaluation of the different manufacturing processes such as CO_2 report or life cycle assessment

Based on the previous mentioned set of documents, the group is asked to understand what the problem is about and what are the challenges during this sprint week. The first aim is, then, to create a common and shared knowledge basis and to prioritize the identified problems.

At the end of the understanding phase, the team goes to the next phase. Those phases are complementary; they should take at least half a day to well establish the problem perimeter and well define the goals and the success metrics.

Phase 2: Define

The objective of this phase is to define a clear target according to the desired outcomes.

In this defining moment, many different tools can be provided to the team to help them to gather and classify information:

- Mind map
- How might we statement
- Clustering (based on similarity) – the use of colored notes could help
- Clustering (based on positive and negative element)
- Vote

The moderator is responsible to decide which resource will use to facilitate the analysis of the content and the interaction within the group.

Multidisciplinary is an asset since the problems can be very diverse, covering business, user, competitor, technological or even environmental angles.

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.

Phase 3: Sketch

During this day learners will work on sketching. The sketching appears to convert the identified challenges into opportunities for sustainable design and business. As it has been forecasted, the sketching phase is a three-hour activity dedicated to brainstorming. The team should generate individual ideas to be shared with the whole team before to be articulated. For a three-hours session, six ideas could be expected as output.

The starting point is to look for inspiration. As the Bootcamp is part of the Cleantex learning proposal, we recommend using the MOOCs knowledges and the E-book for such a phase. Learners should have been in touch with those materials previously, but they can use it during this phase as a consultive resource to work into more consistent proposals or to find the inspiration to elaborate one.

Based on its own inspiration, each participant generates ideas for consideration. From there, the team will narrow down ideas as group to a single, well-articulated Solution Sketch per person.

To boost idea generation, a couple of tools can be used:

- Comparable problems
  The comparable problem concept is to help the participants to generate ideas based on similar problems that industries have encountered. Solutions could be found from others and could simply need to be presented in a new context or combined with new ideas. These examples could be found in the E-Book.
- Companies' visits
  To go deeper in the review of comparable problems, real companies visit is an excellent option to know more about the implementation of the solutions: what were the barriers, what are the benefits, other aspects to take into account regarding the solution design, and so on.
- The How might we (HMW) statement
  The HMW statement aims to transform a problem into design opportunities. It should help the participants to frame the problem, to extract the insights and the pitfalls to reframe them positively.
- The circular strategies scanner
  The circular strategies scanner is a tool which provides a taxonomy of circular strategies. It helps to generate circularity-related ideas and to map them through the existing initiatives. By this way, it enables to identify the circularity axis that could be improved.

Phase 4: Decide

On the deciding phase day, it is time for the team to finalize the concept to be selected as solution. The team should find consensus on a single proposal to help the company the best in their path to improve its sustainability challenge.

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.

The deciding phase is an opportunity to take a step back from the proposed ideas. It is time to debate and to highlight the strengths and weaknesses of the proposed ideas. For such a task, it is recommended to implement a SWOT analysis (strengths, weaknesses, opportunities, and threats) as a helping decision tool. Team members should realize the SWOT for each remaining idea and take time to compare the results with the company limitations. Finally based on debate and consensus, each group have to agree on which one their best solutions for the company.

Phase 5: Prototype

At this stage, the objective is to design the features of a realistic solution for the company to become more sustainable. The expected prototype is not necessarily a physical prototype but should enable to validate the identified strategy, so it can be a conceptual prototype.

Since the prototype can be immaterial items, it is recommended to provide the teams with the strategy map, which is a list of questions to be answered to help participants to reflect and consider different aspects such as desirability ones, as feasibility, and the consequences on the whole value chain.

The second part of the day, which can be distributed as the moderators consider, will be dedicated for the groups to prepare their proposal conclusions and the exposition of their whole process in the next journey, for the final evaluation.

Phase 6: Evaluate

The evaluation phase is finally an opportunity to present the proposed strategy to others. It is a moment to gather feedback and reviews based on the conceptual prototype and strategy map. The presentation consists in 10 minutes pitches to be presented in front of a multidisciplinary jury. The jury is composed by teachers, experts on the matter, and, if possible, someone of the company the challenge is about.

This jury should have guidelines in order to evaluate with a common criterionOn the first day, the UL teams, as host, started with a presentation about Slovenia, the city of Ljubljana and its higher education and scientific research institution: its university. All staff members were also presented.

Then, after introducing the Summer School agenda, students were splitted into five groups with five people per group. In terms of membership, each group was integrated by students from the three universities participating in the Cleantex Summer School. A simple ice breaker activity, that consisted in finding a group name, was proposed to help to create interactivity between group members. Finally, a presentation about the eco-design principles and how to identify the environmental hotspots was represented.

As host, the UL team managed to organise some visits to Slovenian textile companies. They are TEKSTINA d.o.o., AquafilSLO , and AquafilSLO, and that activities gave a big opportunity for the participants as they could see through their own eyes not only a real

case how a textile company works, but their sustainability compromises, challenges and proposals. That represented a high quality added value to the Bootcamp implementation as students could use those experiences to be more realistic, original, and professional on their proposals.

As mentioned in the theoretical part, previous to the Bootcamp, the students had to watch and examine themselves on the Cleantex MOOC.

The Cleantex MOOC enable interested people to train in circular economy and eco-design in textile industry. It is made of 7 modules for 21 learning units. As detailed in Table 2, it covers topics such as the fibers, the processing, the waste management or even the business in a circular economy context:

Table 2. Learning unit topics

Module	Topics
Introduction to circular economy	Unit 1.1 – Circular Economy – Causes and context of current challenges Unit 1.2 – The sustainable Development Goals and the European Green Deal Unit 1.3 – Circular Economy in textile sector
Eco-design for circular economy	Unit 2.1 – Eco-design highlights Unit 2.2 – Methodologies and tools Unit 2.3 – Case studies
Sustainable fibre/material resourcing	Unit 3.1 – Natural fibres Unit 3.2 – Human-made fibers with low environmental impact Unit 3.3 – Environmental impact of sourcing fibres worldwide
Waste management and recycling	Unit 4.1 – Introduction to waste management Unit 4.2 – Textile and clothing waste Unit 4.3 – Technologies for textile recycling
Sustainable yarn, fabric and garment/assemble production	Unit 5.1 – Yarn and non-woven fabric production in circular economy Unit 5.2 – Knitting and weaving processes in circular economy Unit 5.3 – Garment assembly production in circular economy
Sustainable chemical process and textile care	Unit 6.1 – Sustainable substances and wastewater treatments Unit 6.2 – Sustainable pre-treatment, dyeing and printing Unit 6.3 – Sustainable functional finishing and textile care
Business and quality management	Unit 7.1 – The base of circularity Unit 7.2 – Features of design for longevity Unit 7.3 – Avoid obsolescence and overproduction by reducing time to market

During the Bootcamp and in the brainstorming activity, the students had the Cleantex E-book with real examples of implementation of circular strategies and eco-design in textile companies.

When applying the Design Sprint methodology, each phase was given a short presentation. The aim was to clarify its objective and the useful and available tools to

achieve it. During the phase's implementation, the groups were regularly visited and questioned to ensure that all understood and were able to move forward.

Finally, in the allocated time, the groups were asked to propose two strategies as expected outputs. These two strategies are supposed to meet the virtual company, Samertex, needs and to facilitate its transition towards circularity.

III. Results

Following the Design Sprint Methodology, participants have had to come up with two sustainable strategies for the company through coworking in groups of four or five.

In terms of selected strategies, all the groups went for replacing the raw material with a recycled one, which can be explained by two reasons. From one part, participants got inspired from their visit to Aquafil, a specialised company in producing recycled nylon. From another part, the polyamide swimsuit LCA we provided drew their attention to the fact that the most important environmental impact was due to the raw material (in terms of Global Warming Potential). As a second strategy, ideas varied between reducing wastes, digital printing, dope dyeing and personalization.

Participants received certificates for successful participation in the CLEANTEX Summer School, which was confirmed by the Senate of the Faculty of Natural Sciences and Engineering of the University of Ljubljana and awarded with 4 ECTS credits.

IV. Suggestion of improvements

Although the results of the Bootcamp were highly positive, we suggest the following modifications based in our experience:

- We proceeded to some real-time adjustments in terms of planned activities to cope with some updates. For example, at the beginning, three strategies were expected as a result, but only two were possible at the end. Also, some activities were removed in an attempt to compress their content and to be in time.
- Later, we also realized that participants had some difficulties to select their best strategies. In the sketching phase, they had 6 strategies to generate among which 2 would be retained. This selection, made during the deciding phase, was not easy and we suggest to use the impact/feasibility matrix as an help-decision tool.
- It would have been better if we relied on a real case study instead of considering an invented one. Some points are discussable, for example mentioning the beach accessories (towels, *pareos,* and sunglasses) among the list of the products developed by the company was confusing for readers. A real case will always make it easier to identify the key points to develop afterwards a real solution. Indeed, one of the groups was going to eco-design the accessories which is irrelevant.

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.

V.Conclusions

Face to the textile sector's challenges, sustainability became essential to enable the whole sector to reduce its environmental footprint. Thus, circularity and eco-design should be largely disseminated and properly considered by companies. In this context, a challenge is to bring these knowledges to higher education systems to help to improve the current situation of textile industry. In this context, the Cleantex project has developed tools to strengthen these skills. One of these tools is a Bootcamp: a five days-based methodology that helps to solve problems.

The Bootcamp methodology is based on the Design Sprint Methodology and is broken down into 6 phases: from understanding the problem to generating and selecting ideas to evaluating solutions. The methodology is here applied in sustainable development context: how to support a company towards more circularity? As a first approach, the Bootcamp required the creation of Samertex, a virtual textile company, but it is applicable to a real case study.

The Bootcamp was tested during the Cleantex Summer School, held in Ljubljana: 22 students with complementary skills were gathered around this case study. They were accompanied by 9 mentors and had the opportunity to visit companies. Driven by a common goal to learn and enhance their skillset, the students were particularly involved in the exercise and succeeded in creating an inspiring working environment. Their investment in such a long activity was impressive.

Mentors were there to explain the objective and the activities and to answer students' inquiries according to their field of competencies.

In order to support the week schedule, visits to companies were organized, and it was an opportunity to witness how the industrial life looks like.

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.

Funded by the Erasmus+ Programme of the European Union

ERASMUS +
KA2 – Cooperation for innovation and the exchange of good practices
LT01 Education Exchanges Support Foundation
Grant Agreement: 2020-1-LT01-KA203-077874-E10170577

Project duration:

October 2020 – January 2023

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

© 2020-2022 CLEANTEX Consortium Partners. All rights reserved. All trademarks and other rights on third party products mentioned in this document are acknowledged and owned by the respective holders.

PARTNERS

www.cleantexproject.eu

CLEANTEX project (CLEAN AND INNOVATIVE TEXTILES STRATEGY FOR CIRCULAR ECONOMY; project reference number2020-1-LT01-KA203-077874) is funded by the Erasmus+ programme of the European Union.