

Digital Creativity for developing Digital Maturity Future Skills

ANNEX 4

Learning, Teaching and Training Activities: DC4DM Model and LTTA Report, Presentation of theoretical model, DCAs Cards created during Bootcamp Part 1, Co-design workshop agenda Part 1 and 2, Bootcamp agenda Part 1 and 2

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Digital Creativity
for developing
Digital Maturity
Future Skills



Erasmus+

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INTRODUCTION

This document includes the description of the evolution of the DC4DM model and the Learning Teaching Training Activities performed within the project from M1 to M13, and the results achieved.

Two main LTTA activities have been conducted as foreseen by the project:

- (C4) Co-design workshop
- (C5) Bootcamp

They both represent a short-term joint staff training activity that involved the members of the partners' organizations.

DC4DM MODEL

What is the DC4DM model

The DC4DM model integrates all the Digital Creativity skills identified as in line with Digitally Mature companies' needs and therefore relevant for training future digital talents. The model empowers Digital Creativity, which refers to the human ability to create an innovative and original digital outcome strategically exploiting emerging digital technologies. Therefore, the DC4DM identify the most relevant competencies to empower and provide an educational box with the right tools and methods to train cross-functional teams of design, engineer, business students to face the complex real-world challenges brought by digital transformation.

The DC4DM model aims to train this digital talent that will walk and guide companies through a digital transformation towards full maturity. So, what kind of talents and competencies does a digitally maturing company seek?

The DC4DM model has been developed considering the main Digitally Mature company's needs that have to i) strategically apply digital technologies to develop new business, to digitalise operation and processes ii) face complex challenges that require the knowledge of employees with different functions, that should work together also remotely on collaborative digital platform iii) face future sustainable and social challenges, planning long term strategies to be competitive even in an uncertain future.

The five key practices (Kane, 2017) for a company to achieve a Digital Maturity highlights the importance of training talents that should be able to:

- a) Collaborate in cross-functional design teams.
- b) Innovate with digitally-minded cultures, visions and experiences.
- c) Learn continuously, creating enjoyable learning environments.
- d) Scale small digital experiments into broader initiatives that have a business impact.
- e) Plan a long term vision/strategy to face the changes emerging in the digital landscape.

The Digital Creativity for Digital Maturity model (DC4DM) aims to provide the fundamental competencies needed to thrive in a continuously advancing digital landscape and reach Digital Maturity.

Indeed, the model includes all the creative and strategic competencies that each individual should develop to wisely adopt digital technologies to serve human needs in any field, considering all their implications. People should learn how to consciously and creatively shape and guide technological advancement for a more sustainable, inclusive, and just future.

For each identified needs, the model integrates the specific set of skills defined as Digital Creative Abilities (DCA) that empower people to express their creative potential and think and act in a non-predictable digital world. The model has, therefore the aim to enable and empower students in:

- acquiring competencies and mindset to understand the potentialities of digital technologies and apply them to design digital solutions with a human-centred approach;
- developing individual abilities of creative self-enhancement, and a digitally-minded culture, as well as the team ability to communicate and share knowledge with others with a different background;
- acquiring skills in future and anticipatory thinking, developing a mindset that can generate a long-term strategic vision and help companies face complex challenges by envisioning future scenarios.

Digital talents should be prepared to face the diversity of uncertain futures, anticipate possible scenarios, and take full advantage of the innovation capacity of digital technologies.

DC4DM Model Evolution

The first year of the project has been mainly dedicated to integrating the multidisciplinary knowledge of the consortium in the theoretical DC4DM model. Indeed, the model created by POLIMI in previous research has undergone several implementations involving the consortium.

The **first version** of the model has been presented at the consortium during the co-design workshop where several activities aimed at collecting most of the input to evolve and implement it.

After the workshop, the partners supported the evolution process of the model through a series of dedicated meetings, creating the second and the third final version.

- 1st review (POLIMI + UMA+ IMT): collection and analysis of all the inputs that emerged during the workshop.
- 2nd (POLIMI): reorganization of the model areas and creation of the **second version**.
- 3rd (POLIMI+UMA): presentation and feedback collection
- 4th (POLIMI): integration of feedbacks and further detailing
- 5th (all), POLIMI prepared a shared document to collect more input from partners. They were asked to work in pair (UMA+STARTUP MADEIRA; TSE+IMT)
- 6th (POLIMI) integration of feedback and reorganization of the model areas with definition of DCAs included. Creation of the **third version**.
- 7th (All): Presentation of the final version, integration of Consortium feedback during Bootcamp

First version

The first version of the model (Fig. 1) has been developed by POLIMI and arise from previous researches analysing the role of creativity and design for digital transformation. In the first 2 months of the project a literature analysis has been carried out to integrate the model to meet the needs identified in the digital maturity scenario analysis.

Within the model, the Digital Creative Abilities are structured along four main dimensions: i) **individual creativity** that includes an individual's propensity to be creative, meaning the cognitive, motivational, attitudinal, knowledge and emotional abilities fundamental for individual creative empowerment. It also includes individual knowledge ii) **team knowledge sharing**, meaning an individual's propensity to share knowledge and trust within the team that includes social and emotional abilities and dynamics to empower winning cross-functional teams iii) **Digital Intelligence**, that affect both the previous individual and team dimensions and includes the ability to acquire and apply new knowledge and skills related to

digital technologies, to improve operational efficiency and outcomes quality iv) **process**, including the ability to analyse driving forces to map possible alternative scenarios, and to solve problems/challenges strategically.

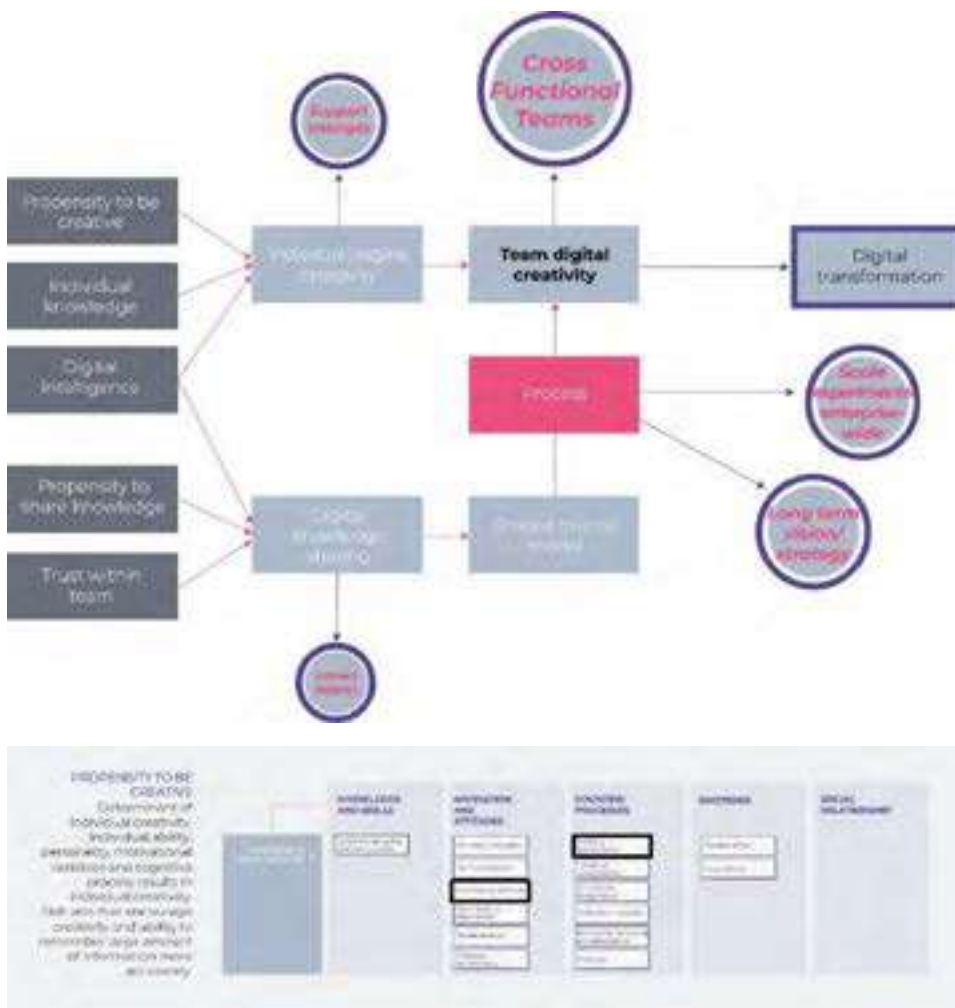


Figure 1. First version of the DC4DM model

The first version of the model has been presented and discussed in the co-design workshop (Annex I) where important consideration emerged that sparked reflections on implementing the model. The five primary reviews that have determined a turning point for the model are i) simplify the reading of information within the model, providing a sequential order of skills to be developed concerning the highlighted dimensions ii) highlight the importance of the process as a central ability that allows people to understand and strategically apply the potentialities of digital technologies and generate innovative solutions iii) integrate a dimension, currently not present, which encompasses the social, environmental and ethical responsibility skills as well as a future mindset that are relevant when developing a strategic vision of the future iv) highlight the importance of a circular and growth learning.

Based on this consideration, a new model configuration has been proposed, presented in the next section.

Second version

Due to the complexity of the model, during the 2nd part of the co-design workshop, the implementation moved on, trying to imagine a new configuration of the model (Fig. 2).

The core dimension of the model that determines the structure of the sequence is the process dimension that includes the ability to analyse driving forces to map possible alternative scenarios and strategically solve problems/challenges. The process dimension is central to the model, while the other dimensions precede and follow it. In this way, the model has been divided into three sequential phases:

- **Phase 1 – Pre-process:** this phase of the model includes the knowledge and skills that are propaedeutic to the process and that are needed by cross-functional teams to go through the process. The pre-process consists of two main dimensions: i) *individual digital creativity* and ii) *team digital knowledge sharing* that also includes the operational knowledge needed to work with digital tools and collaborative platform.
- **Phase 2 – Process:** this phase of the model includes the *process* dimensions based on a creative and design thinking process. It is a divergent and convergent process deconstructed in stages, steps, activities and thinking style, enabling a strategic application of emerging digital technologies. For each step of the design process, specific digital creative abilities intervene for improving the innovative performances of both individual and teams during the process. These DCA are the ones trained in the pre-process area.
- **Phase 3 – Post-process:** in this third phase, the team has finally reached a shared knowledge structure related to equipment and tools, task, goals, other members' skills, expertise and abilities, appropriate team interactions. The *shared mind* dimension includes the skills that allow to create a continuous learning cycle to further develop and nurture the skills they acquire, continue learning, and scale the skills to other people within the organisation. The post-process skills will help people to iterate and continue to add value to their abilities, to the organisation they are part and the system as a whole.

Finally, the model includes a *Digital Sustainability and Responsibility* dimension, which is transversal to the three phases and become therefore the pillars on which the model is based. This dimension includes the future, ethical and sustainable thinking skills relevant when designing for uncertain digital futures.



Figure 2. Second configuration of the DC4DM model

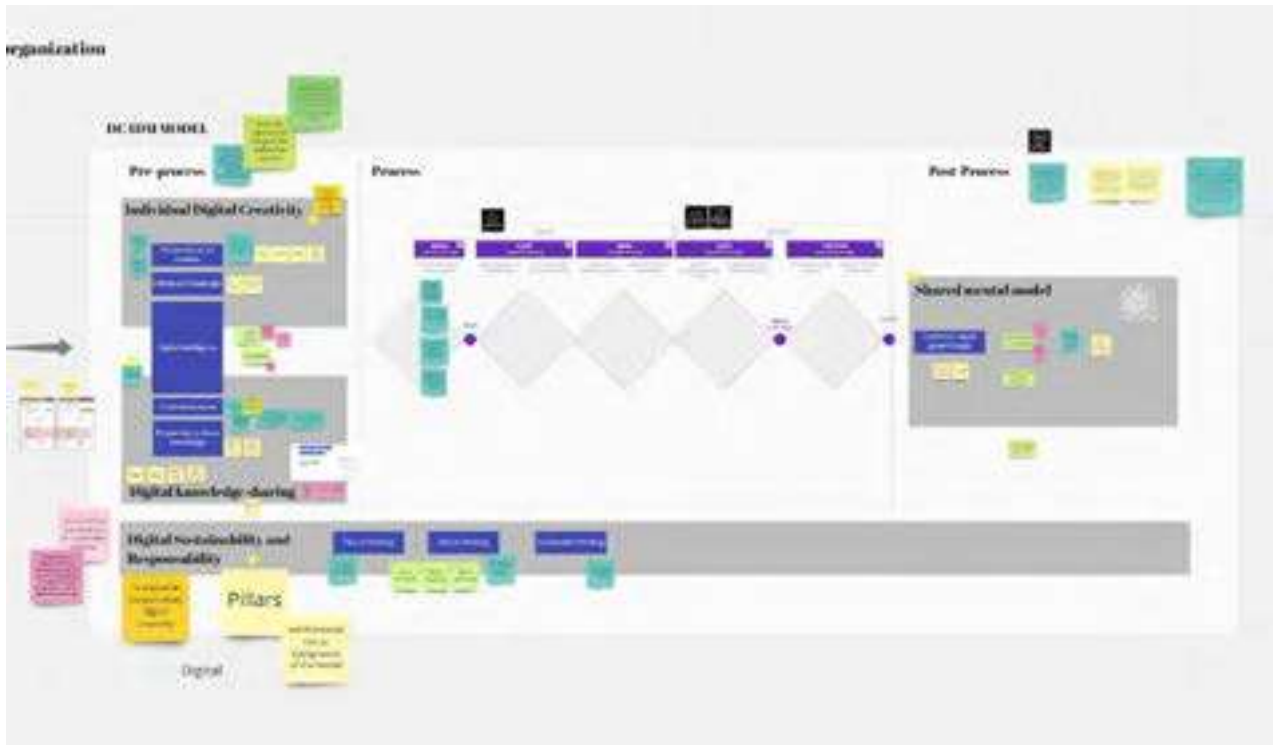


Figure 3. Result of the 3rd and 4th review by UMA and POLIMI

Third version

The third and last version (Fig. 3 and 4) has been implemented to further clarify the different phases of the model and define in details all the DCAs included in the model.

The DCAs have been renamed, integrated and transformed by analysing and comparing 4 main competence framework ¹ outlined by both companies and policy makers.

The DCAs have been clustered in 4 main dimensions: cognitive, digital, cross-functional team, strategic vision.

COGNITIVE DIMENSION		
DIGITAL CREATIVE ABILITY	DEFINITION	LEARNING OBJECTIVE
Analytical and Critical Thinking	The ability to analyse and reflect on facts and situations, making critical judgements and understanding biases.	Learners can analyse, synthesise, and evaluate information, also recognising irrelevant, preexisting patterns that affect our thinking process.
Translating knowledge and storytelling	The ability to easily convey a specific domain knowledge to people with diverse backgrounds to build a shared understanding.	Learners can communicate and share complex information and knowledge in a simple and efficient way, by using metaphor, visualisation and storytelling techniques.
Creative combination and imagination	The ability to use imagination to identify opportunities and to combine ideas, concepts and knowledge to create original and valuable discovery and possibilities.	Learners can imagine beyond the existing reality connecting and fusing existing concepts to generate novel and original ideas, products, entities and to spot opportunities for creating value.
Adopting different perspectives	The ability to observe problems and look at information from different angles, generating hypotheses and ideas from a range of diverse perspectives.	Learners can quickly re-adapt their thinking pattern to look differently to well-known ideas and information, with an open and curious attitude, helping new ideas to evolve.

¹ McKinsey&Company- Report 2021. Defining the skills citizens will need in the future world of work
 DQ Global Standards Report 2019 Common Framework for Digital Literacy, Skills and Readiness
 EU Science Hub 2019 The Digital Competence Framework 2.0
 JRC Science for Policy Report 2016 EntreComp: The Entrepreneurship Competence Framework

Humanity Problem Solving	The ability to solve the complex challenges of our century with a strategic approach that consider the environment and the humans and society needs/desires.	Learners adopt digital technologies to serve human needs. They work iteratively, continually testing assumptions and prototypes to rapidly create an effective solution to improve and adapt to changing circumstances constantly.
Self-confidence and self-awareness	The ability to believe in one's personal performance and skills, characteristics and keep developing.	Learners are aware of their individual strengths and weaknesses, believing that their ability could influence future challenges. They reflect on personal performance and seek feedback from others to continuously improve

DIGITAL DIMENSION		
DIGITAL CREATIVE ABILITY	DEFINITION	LEARNING OBJECTIVE
Ethical and sustainable thinking	The ability to understand and assess the ethical and sustainable implications of digital ideas, opportunities and projects.	Learners can act responsibly, being aware of emerging digital technology's positive or negative implications to develop responsible and ethical digital innovation.
Envisioning tech opportunities	The ability to observe digital technologies' application and understanding their potentialities in terms of social and cultural opportunities to innovate in a sustainable digital scenario.	Learners are continuously updated on technological developments, identifying opportunities to deploy new technologies, building business cases, and explaining their benefits.
Data literacy	The ability to generate, process, analyse a large amount of complex and interconnected data provides meaningful information to guide informed, optimised and contextually relevant decision-making processes.	Learners can create and/or use AI algorithms (e.g., machine learning, neural networks, deep learning) to process and recognise significant patterns that can improve decision-making and drive the formulation of new strategies informed by the capabilities of digital technologies.
Information literacy	The ability to effectively navigate, critically evaluate and synthesise information encountered online and their sources, examining reliability and credibility to discern dis-/mis-information.	Learners are aware of the reliable sources from which knowledge and information can be collected and are able to identify the relevant information and facts needed to draw a conclusion.
Digital collaboration	The ability to communicate and collaborate effectively through digital channels.	Learners can adopt the suitable digital channels and tools to communicate, share knowledge and co-create within online environment also from distance.
Healthy use of technology	The ability to understand the benefits and harms of technology on one's mental and physical health and to use technology use while prioritizing health and well-being.	Learners actively self-regulate their use of technology in a healthy way and knows which activities can restore them providing daily energy for their own benefit.

CROSS FUNCTIONAL TEAM DIMENSION		
DIGITAL CREATIVE ABILITY	DEFINITION	LEARNING OBJECTIVE
Enabling Trust	The ability to understand another's behaviour, and to be positively inclined to other's competencies, knowledge, skills, actions. Motivation, transparency and group dynamics are elements that regulates both the propensity and the perceived trust.	Learners can create a safe team environment, building psychological safety among members through reliability, honesty, and genuine concern for the needs and wishes of others. They develop a propensity to interact, engage and participate with each other improving team creative performances.
Propensity to share knowledge	The ability to share knowledge and ideas with others, fighting blocks and understanding the value and the importance of individual contributions for completing complex tasks.	Learners are willing, confident and active in sharing and incorporating their individual knowledge into team one's to solve problems and complete tasks for the related project. Members are aware that their individual knowledge results in a collective knowledge as output.
Positive mood	The ability to keep a positive attitude and to experience and display positive emotions, feelings, and expressions, including optimism, pride, enthusiasm, energy, and joy by pursuing a challenging goal.	Learners can exhibit an awareness of their own moods, identify and explain their emotions and reflect on how their feelings influence their own and others actions and decisions.
Cooperative behaviour	The ability to strive for collective goals working with others, both peers and experts, involving team members in decisions, listen to other ideas and looking for others' feedback for the	Learners create opportunities for cooperation, so that team results exceed the sum of individual contributions accepting heterogeneity and cultural differences within teams, cultivating tolerance to one another and a

	construction and co-creation of knowledge and coordinate effectively to achieve them.	sense of community, identifying themselves as a functional unit.
Empathy	The ability to be aware of, be sensitive to, and be supportive of one's own and other's feelings, needs, and concerns.	Learners are sensitive to and respect others' perspectives and emotions. They understand how different personalities feel and react in various circumstances and can regulate and respond accordingly to make them feel better.
Relationship management	The ability to skillfully manage one's relationships, online and offline, through cooperation, conflict management, and persuasion, adopting behaviours that convey a sense of comfort and appreciation.	Learners can engage effectively, communicate and negotiate with stakeholders in intercultural and interdisciplinary dialogue. Individuals cultivates tolerance to one another and teamwork towards building and growing positive communities.

STRATEGIC VISION DIMENSION		
DIGITAL CREATIVE ABILITY	DEFINITION	LEARNING OBJECTIVE
Coping with uncertainty, ambiguity and risk	The ability to operate effectively and make decisions dealing with uncertainty and ambiguity, taking risks in the hope of great achievement.	Learners can create and make decisions in situations with high uncertainty, when the information available is partial or ambiguous, and are open to change their strategy when things do not go according to plan.
Envisioning future scenario	The ability to visualize, develop and bring to life a future scenario, envision new tech applications and turning a vision into action.	Learners can analyse driving forces using future thinking to map possible alternative future scenarios, inspiring and guiding people to realize that vision
Future-oriented mindset	The ability to orient thinking and actions on the future.	Learners can imagine the future, and base on it, they make choices and decisions in terms of actions, strategy and resources deployment. They are well aware that today decision will have an impact on the imagined future.
Sustainable development	The ability to understanding the value of digital technologies to develop sustainable long-term social, cultural and economic innovation (SDG).	Learners can adopt digital technologies to enable sustainable development goal, digitalizing processes, toward an inclusive, better future for all.
Driving change and innovation	The ability to see opportunities and persevere for continuous improvement through innovation generates in others the willingness or desire to emulate it.	Learners can recognise the potential an idea has for creating value and identify suitable ways of making the most out of it, inspiring and arousing enthusiasm among team members and stakeholders.
Impacts strategic management	The ability to plan design actions to guide tech application and scenario evolution.	Learners can analyse the future implications of digital technologies on humans and define design actions to react to their evolution path.

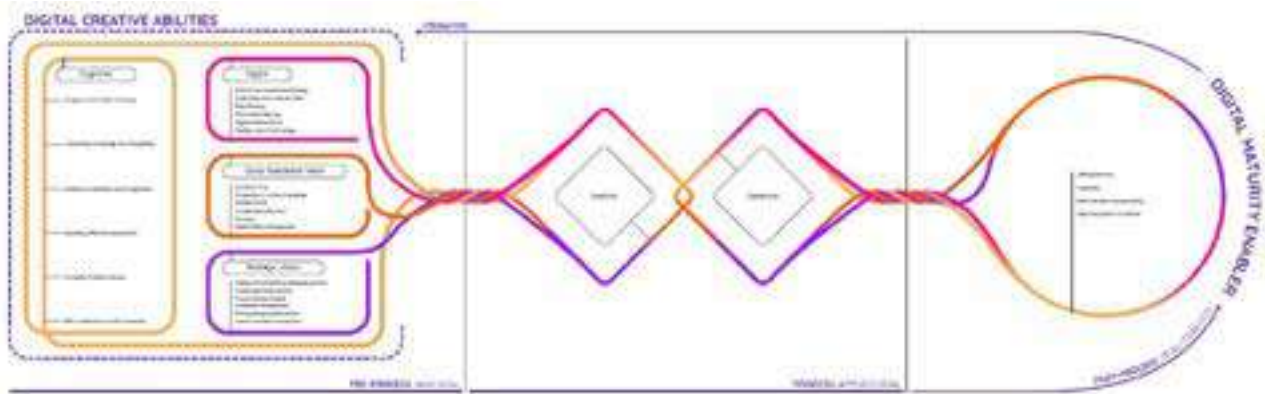


Figure 3. Third version of the model presented at Bootcamp Part 1

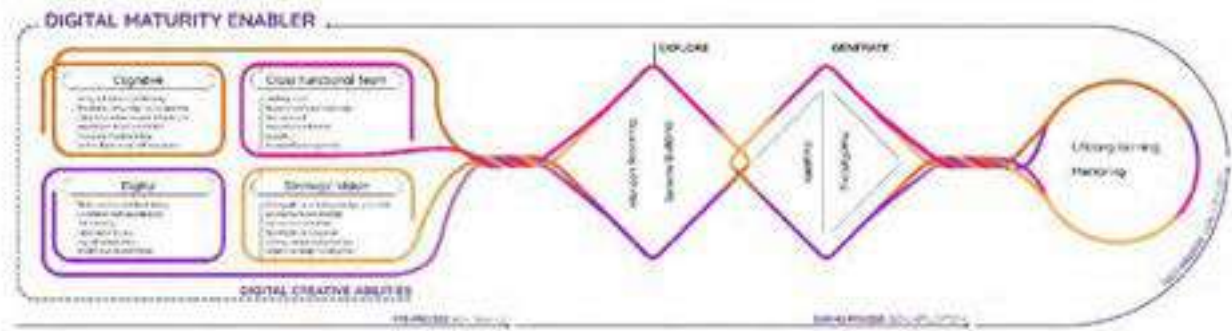


Figure 4. Final version of the model after feedback from Consortium. Presented in Bootcamp Part 2.

CO-DESIGN WORKSHOP

Introduction

The main aim for the co-design workshop was to implement the DC4DM theoretical model and start collecting the educational resources (tools, courses, format) that each partner already had available that could be used to implement the model toolbox

Due to the Covid-19 situation the workshop has been conducted online and it has been divided in two part:

Part 1 was held on the 3/12/2020 (half day): the activities have been dedicated to introducing and presenting to the participants the Digital Creativity for Digital Maturity model (v1) (DC4DM) (Fig.3) and collectively sharing the educational resources.

Part 2 was held on the 21/01/2021 (full day): the activities have been dedicated mainly to debating and discussing the DC4DM model and to collecting the multidisciplinary knowledge from the consortium to evolve it.

In order to maintain a continuity between the two sessions, POLIMI, as leader of the activity, has structured a MIRO board just after the first workshop session to enable participants to start reflecting and proposing model implementations before the second session. The MIRO board has been divided into 3 main areas (Fig. 5) : i) **DC4DM Model Area** useful for understanding the different components of the model, how they are positioned and connected; ii) **DC4DM Model Implementation** in which the suggestions and comments from partners are collected; iii) **Resources Collection&Organization Area** dedicated to the gathering of resources and their organization according to the DC4DM model.

Partner have been asked to integrate their feedback and implementation in the three areas. The MIRO whiteboard has been then adopted for the collaborative work on the co-design workshop Part 2. Link to the board: https://miro.com/app/board/o9J_la4Y_il=/

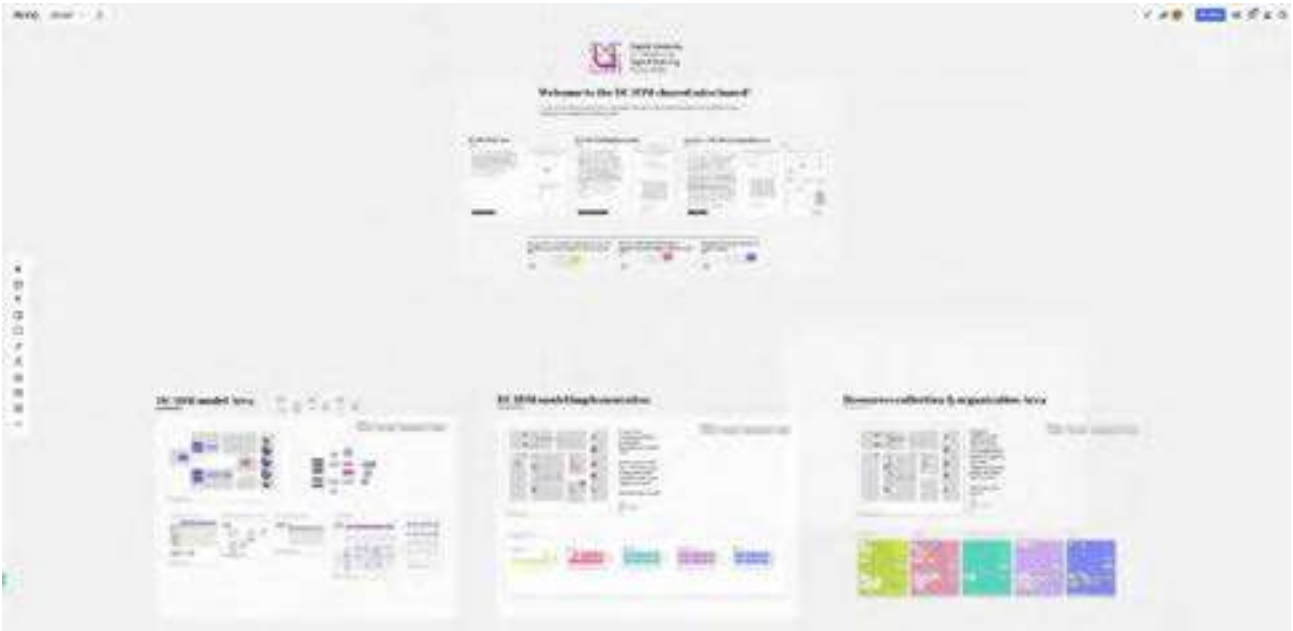


Figure 5. Organization of the MIRO board used created for the Co-design workshop

Co-design workshop Part 1

The first part of the co-design workshop has been dedicated to introducing and presenting the first version of the DC4DM model drafted by POLIMI and collectively sharing the educational resources that each partner already adopts to empower digital creativity and digital maturity future skills. This moment of resource sharing is useful to identify resources that can be applied in the students training activities of the projects (the 3 Learning labs) and that can become part of the final DC4DM action model we will develop in this project.

Digital Creativity for developing Digital Maturity future skills

Co-design workshop - 1st part
3rd December 2020
10:00 - 13:30
Invitation on Microsoft Teams

AGENDA

- 10:00 - 10:10 Welcome and introduction :
- 10:10 - 10:40 Presentation of the DC4DM model by POLIMI
- 10:40 - 12:55 Resources presentation
Each partner presents their resources based on the guidelines provided
- 10:40 - 11:05 Presentation by UMA
11:05 - 11:30 Presentation by STARTUP Madera
- 11:30 - 11:40 Coffee Break
- 11:40 - 12:05 Presentation by TSE
12:05 - 12:30 Presentation by IMT
12:30 - 12:55 Presentation by POLIMI
- 12:55 - 13:30 Discussion and next steps
Partners' viewpoints and discussion on the model and the resources collected.

Figure 6. Co-design Part 1 Agenda

To support participants in sharing the resources POLIMI provided clear instructions to the participants by sending in advanced two ppt documents:

- *Guidelines* that include:
 - a **scheme** of the *preparation* and *execution* of Learning Labs with some triggering questions aiming at stimulating about the resources to share to support that specific part of the overall activity.
 - the **type of resources** to share. These are of three types: i) Training format; ii) Teaching module and courses; iii) Tools, toolkit and methods;
 - a list of **tags** divided in clusters, to select and assign to each of the resources to share. The tag are coming from the DC4DM theoretical model that will be presented during the w.shop to link the resources to the theoretical model.
- *Presentation layout* to have a common structure for each resources (up to 3 slides for each resource):
 - the first shows the resource name, type and tags, with a short description and a picture. Also indicate whether it is an **open resource (O)** or **not (NO)**, or if **can be readapted** to be open (**RO**). This is very important to know to publish the material on the project website or for the action model use and dissemination.
 - The second and the third can be used to explain details of the resources.

Recorded sessions, resource instructions, DC4DM model presentation, partners' resources can be found at this [link](#):

Co-design workshop Part 2

The second part of the workshop have been dedicated mainly to debating and discussing the DC4DM model and to collecting the multidisciplinary knowledge from the consortium to evolve it.

The structured MIRO board, described earlier, has been adopted as a basis for the collaborative work during the session. To facilitate the active participation of all the participants, POLIMI decided to run the activities in small groups by mixing competences and organization of origin enabling also to establish more connection among the consortium.

POLIMI involved two partners UMA and IMT to design and facilitate the activities in the groups. This involvement allow the partners to deepen their knowledge about the model and to provide a useful contribution for its improvement. 3 meeting have been done to organize and prepare the session that consists of two main activities:

- Activity 1 - objectives discussion. The focus is on the three DC4DM model objectives presented to the consortium. The activity aimed to generate a free discussion to familiarise with the objectives, integrate missing part and start reflecting on the relevant skills to develop to achieve the objectives
- Activity 2 - model discussion. The focus is on the DC4DM model (v1) already presented to the consortium. The activity aimed to generate a free discussion on the completeness and clarity of the model. Participants were invited to include new skills and dimensions within the model and reorganize its structure. A series of questions have been prepared to structure the conversation

Structuring the conversation. Checklist of aspects of the model we want to discuss.

1. **Competencies.** *Do the ones we have now fulfil the objectives of the model? Are they enough? Which one stands out? Is any unnecessary?*
 - *Individual skills*
 - *Team skills*
1. **Actions.** *What needs to happen with these skills in order make them to work?*
 - *Individual actions. Individual creativity.*
 - *Team actions. Digital knowledge sharing. Share mental model. Team creativity*

2. **Process.** *What is the sequence of steps that is necessary in order to orchestrate skills and activities? What skills and what individual/team actions are more necessary in each stage?*
 - Engage
 - Clarify
 - Define
 - Ideate
 - Prototype
3. **Key practices.** *Are these key practices enough for achieving the objectives stated? Are there any others that should be added? Based on your experience, what is the priority?*
 - Cross functional teams
 - Long term vision
 - Scale experiments
 - Attract talent
 - Support change
4. **Comprehension.** *Terminology.*
5. **Visualisation** *of the model.*
6. **Application of the model.**
 - How do you see this model being used?
 - In what situation would you apply it in your work?
 - What impedes you from applying it?
 - What motivates you to apply it?

A doodle has been sent in advance to collect number and background of participants and be able to create groups. 14 participants confirmed: Marita (POLIMI), Carmen (POLIMI), Laura Anselmi (POLIMI), Gianluca (POLIMI), Diva (STARTUP MADEIRA), André (STARTUP MADEIRA), David (IMT), Andra (IMT), Valentina (UMA), Ana Cristina (UMA), Elisa (UMA), Vanda (UMA), Christophe (TSE), Fabien (TSE)

Therefore 3 main group has been formed:

> **Group 1 | Facilitator:** Valentina (UMA) | **Participants:** Marita (POLIMI), Diva (STARTUP MADEIRA), David (IMT)

> **Group 2 | Facilitator:** Andra (IMT) | **Participants:** Carmen (POLIMI), André (STARTUP MADEIRA), Fabien (TSE), Ana Cristina (UMA)

> **Group 3 | Facilitator:** Gianluca (POLIMI) | **Participants:** Elisa (UMA), Christophe (TSE), Vanda (UMA), Laura (POLIMI)

Activity 1: objectives discussion

In this section are reported the reflections emerged from the three groups in the first activity.

> Group 1

The group managed to discuss objectives 1 and 2 only.

Regarding objective 1 - In order to understand the potentialities of digital technologies and apply them to design digital solution with a human - centered approach the students/learners should be encouraged and supported in developing an open mindset, becoming curious and ready to listen. So what kind of strategies could trigger curiosity and openness? David (IMT) shared his direct experience with design thinking workshops. He suggested that students, especially if coming from different backgrounds and experiences, should be encouraged to observe real situations, environments and dynamics and reflect on the analogies they encountered. It is important that the students/learners stay away from the workshop subject and delay the connection with the problem for a later stage. Equally important is the time allocated for sharing observations and impressions. From the moment that competitiveness is important for all companies, the skills and mindsets to be trained must contribute to innovation through technologies. Despite this, digital technologies and tools shouldn't be the starting

point of a creative / design process, because innovation could lay on other aspects not directly related to the technology itself.

Regarding objective 2 - In order to work in cross-functional teams it is necessary for each individual to be open to listen and to share. The team should embrace a positive thinking approach. Diva (Start UP Madeira) shared her direct experience in running training sessions for young entrepreneurs and highlighted the fact that entrepreneurial skills can be also taken into consideration. These are about the ability of taking decisions, making change happen, being proactive, starting from creative ideas for the good of everything and everyone. Diva also shared about the project "Digital Nomad" to be implemented this year in Madeira, Ponta do Sol. From the perspective of who is going to mentor / supervise the team / cross-functional team, David (IMT) suggested that making the teams according to the skills, attitudes and background experiences of the individuals who need to be teamed up is a very good strategy to ensure the team will work well and in synergy. To do this, it would be necessary to gather, evaluate and map pre-existing knowledge and skills. Then define and possibly provide a minimum set of tools to create a common ground. Sharing case studies are also a good strategy to create common ground for discussion and action within a team.

> Group 2

The group added observation to the three objectives

Regarding objective 1 - understand the potentialities of digital technologies and apply them to design digital solutions with a human centered approach.

The discussion focused mainly on the abilities and competences necessary for students to achieve the objective and therefore that has to be included in the model. The most important aspect emerged was the relevance of data to support decision-making when designing new solutions. It is therefore important to i) understand and improve the data gathering and analysis ii) learn to translate complexity of data into value for the company iii) make data understandable and actionable. Digital technologies should be used to achieve a goal, as a means to an end. It is important therefore to start with a vision and not with technology. To form a vision company have to be connected with the right resources. Digital tech can help in connecting the dots, it can be useful to provide a shortcut to learning faster.

Regarding objective 2 - work in cross-functional teams being able to communicate and share knowledge by exploiting digital opportunities; become a digital talent with a creative and digitally-minded culture. The discussion focused mainly on the abilities and competences necessary for students to achieve the objective and therefore that has to be included in the model. Four main keywords emerged that represented four pillars for efficient teamworking:

Collaboration: it's fundamental to planning and coordinating team goals, and facilitating communication between teams

Consensus: it's important to help everyone to agree, make decisions and have the same objectives. Clarify the goals is one of the first step to work in the same directions

Understand: develop emotional intelligence to empathise and understand the team. Create the right working environment. Create artefact to have the same understanding of the team and the project.

Tangibilising: creating artefacts that allow to tangibilise ideas at different stages of the projects

Regarding objective 3 - Face future complex challenges, exploiting and understanding the opportunities and threats of digital tech, anticipate scenarios and enabling a long-term strategy.

The discussion focused mainly on the abilities and competences necessary for students to achieve the objective and therefore that has to be included in the model. Also for this objective the data driven capabilities emerged especially in the ability to translating complexity into value. Students should also be able to create future scenarios and prototype connecting different points of view and perspectives from multidisciplinary people.

> Group 3

The group decided to add observations on objectives 1 and 3. No additional comments emerged from the discussion on objective 2.

Regarding objective 1 -- Understand the potentialities of digital technologies and apply them to design digital solutions with a human centered approach.

The discussion that emerged showed that it is important to consider different points of view in order to offer a true human-centered perspective. Groups (that will participate in the project) must be constantly contaminated with external stimuli, not just relying on their own knowledge (knowledge coming from people in the team).

Another consideration that emerged concerns the widening of the human-centered dimension. The group discussed how it can be important not to look at technologies and their effect only from a human point of view. It is important to try to understand how technologies have an effect also in other contexts such as machines, nature... It is interesting to always offer new points of view to the participants.

An additional and final note was made about the importance of always considering the context in which we live. The cultural / social / economic perspective should be integrated into the reflections within the process.

Regarding objective 3 – Face future complex challenges, exploiting and understanding the opportunities and threats of digital tech, anticipate scenarios and enabling a long-term strategy.

A first round of discussion took place on the importance of trying to find a way to integrate strategic and critical thinking in every participant. This additional perspective may lead to an advantage in the management of new technological concepts.

Another point of reflection concerned the possibility of integrating different approaches within the programme, which can help participants to manage "opportunities" that come from both the present and the future. The manipulation and identification of these different categories of opportunities require different approaches, which should be provided to participants.

In addition, a key point that emerged was the importance of including the perspective of future studies, to benefit from the scenario generation tool. This would give several advantages to the participants, who could both go beyond the trends already formulated and imagine solutions not possible today. This last aspect should be accompanied by notions of storytelling and story making to be delivered to the participants. These are essential components to be able to articulate future visions and to make the target group / intermediaries / companies understand the competitive advantage that could be generated by such solutions. Finally, an additional consideration that emerged from the group focused on the need to apply a creative process within the project that generates sustainable but also responsible results.

Activity 2: model discussion

For the second activity the groups have been mixed up to create only two teams

> Group 1 | Facilitator: Valentina (UMA) | **Participants:** Marita (POLIMI), Diva (STARTUP MADEIRA), David (IMT), Christophe (TSE), Laura (POLIMI)

The conversation started with agreeing that the understanding of the provided theoretical model is not immediate. In particular, the arrows can suggest the reading direction, but don't help in understanding what is/are input/s and what is/are the output/s.

Digital Transformation is understood to be an output, therefore is not felt as needed in this model and visualization. The model should focus on skills and capabilities.

The conversation moved on trying to imagine a new configuration of the model. With 'process' at the base, the model could be made of three parts:

(1) *Pre-process*: this part of the model would focus on the individual first, then also team's dimension. That is about knowledge and skills needed to go through the process, as also operational knowledge (for instance, How to work with Miro? How to prepare the team to be more smooth during work?).

(2) *Process*: at this stage, the process is simple to be understood because as a research group we all share the experience on creative and design thinking.

(3) *Post-process*: this part of the model would focus on both the individual and team dimension, and prepare to forecast what will be next, especially in terms of unexpected results, pitfalls.

The three main parts regarding the process could be then integrated by transversal aspects, such as:

Future thinking capabilities; Emotional thinking; Sustainable thinking; Ethics and Responsibilities.

Beyond this discussion regarding how the new model configuration might be, the group agreed on the importance of defining who this model is for, who is going to use it? These questions helped to imagine that the model could be shaped a bit differently according to the user and their needs: the group then thought of a model as support of toolbox for students/learners, educators and finally businesses.

Each toolbox then might raise questions like

Model/Toolbox for businesses: how to set up the right work environment? How to prepare your employees in working collaboratively, transparently and cross-functionally? How to stay updated on technologies?

Model/Toolbox for educators: How to prepare the students to collaborate? How to collaborate with other disciplines and capabilities? How to think looking toward future? How to make sure that the learners design for companies challenges for real?

Model/Toolbox for learners: How to collaborate with the others? How to trust the others? How to be operative? How to stay creative?

David (IMT) suggested that each stage of the process should have tangible outputs so that the team is able to understand where they are at, what they have achieved step by step, and if needed to return to a certain passed phase of the process, it is easy to remember. The DT process already provide a great variety of tools and methods able to make tangible the process and stay on track.

Last part of the conversation focussed on the importance of identifying a common terminology within the research group so that it is actually possible to identify a shared vision of the model.

> Group 2 | Facilitator: Andra (IMT) | Participants: Carmen (POLIMI), Andrè (STARTUP MADEIRA), Fabien (TSE), Ana Cristina (UMA), Gianluca (POLIMI), Vanda (UMA)

Being ethical

Transparency and honesty. It depends on the individual, on the team. How can we applied people to become more honest. Thinking about companies transparency and honesty doesn't depend only on the individual but also how companies is organized. Both operational characteristic and individual.

Ethics in term of people > Sense of community

Ethics in term of process > Law/privacy

Responsability. How can be a responsible member of a digital team. allowing team to get to know each other and form relationship.

It is a big issue the fact that DM should be reflected in the skills that people have

Data-driven

Skills that take in account data:

- Being able to transmit info in a simple way
- convert info in storytelling

Adaptability/ Resilience:

Figure out how to get there considering constraints, how to manage constraints, how to respond to that.

Building the right working environment:

Everyone is responsible for creating their env. Knowing how to create dialogue. Be positive/optimism.

How should the use of this model be facilitated?

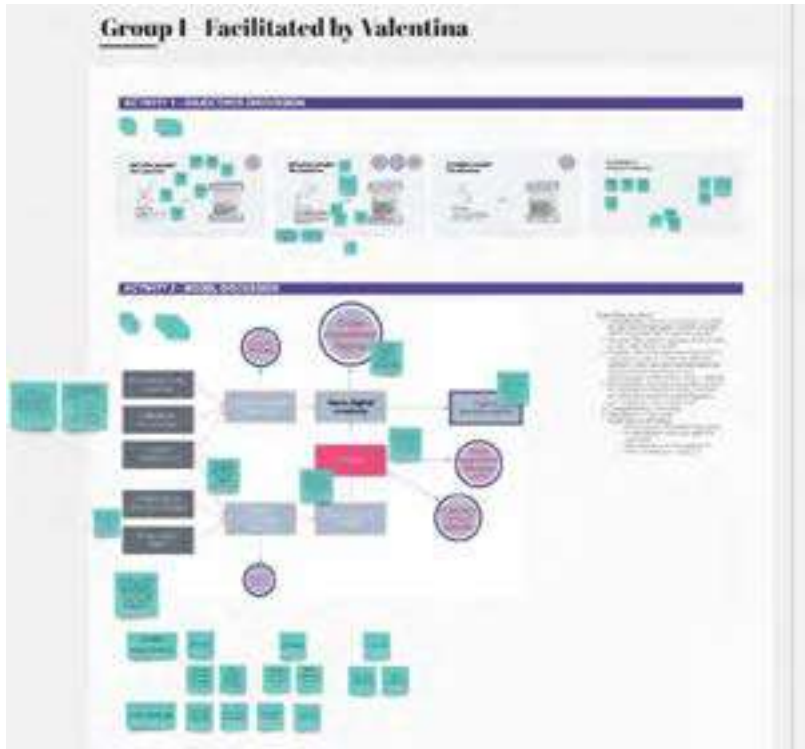


Figure 7. Results of the team work during co-design workshop Part 2 - Group 1

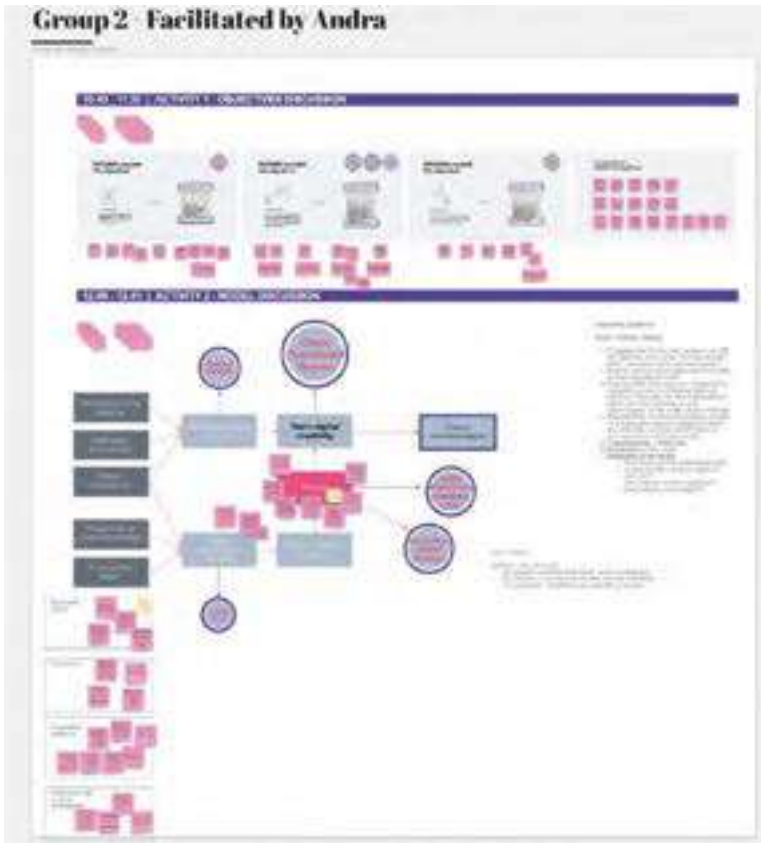


Figure 8. Results of the team work during co-design workshop Part 2 - Group 2

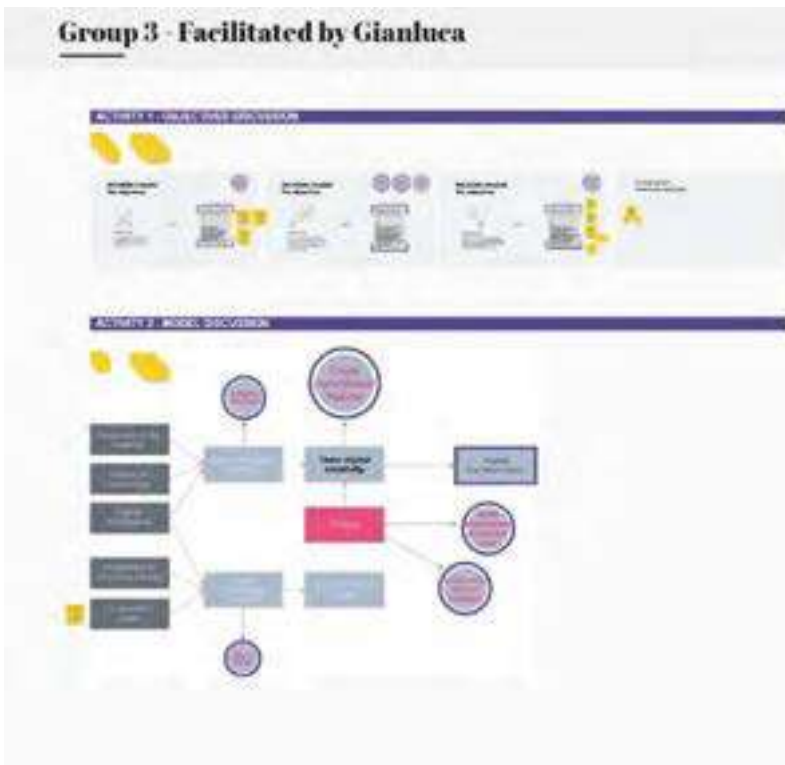


Figure 9. Results of the team work during co-design workshop Part 2 - Group 3

BOOTCAMP

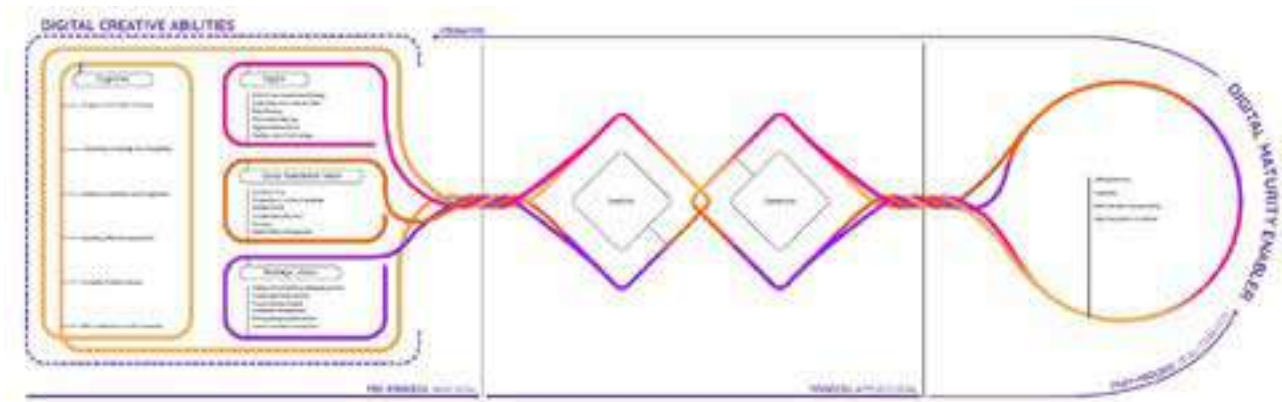
Bootcamp Part 1

Kick-off - Introduction to the DC4DM Models

The updated version of the DC4DM model (v3) Fig 3 was shown to the workgroup and it was pointed out the main focus of the first day of bootcamp: get to know and work on the **Pre-Process** phase.

During the first plenary the professor explained the participants the final DC4DM model and all the participants were divided in 4 different teams.

DC4DM MODEL



GROUPS

- COGNITIVE TEAM: Meline Monaco (TSE); Andrè Nobrega (STARTUP MADEIRA); Valentina Vezzani (UMA); Carmen Bruno (POLIMI); Eduardo Leite (UMA). Facilitator: Rosa Coppi
- DIGITAL TEAM: Christophe Gravier (TSE); Shujoy Chakraborty (UMA); Marita Canina (POLIMI) Jenny Faucheu (IMT). Facilitator: Francesco Maria D'Errico
- CROSS-FUNCTIONAL TEAM: Elisa Bertolotti (UMA); Anne-Claire Lagrand (TSE); Daniela Amandolese (POLIMI) / Mattia Italia (POLIMI); Diva Velosa Pita (STARTUP MADEIRA). Facilitator: Alessio Gauzolino
- STRATEGIC VISION TEAM: David Delafosse (IMT); Frederica Goncalves (UMA); Fabien Labarte (TSE); Gianluca Carella (POLIMI). Facilitators: Eva Monestier, Marco Pizzi

Activity 1 – DCA Cards

Objectives:

The aim of the activity is to get to know the **DC4DM model** and discover the **DCAs (*Digital Creativity Abilities*)** described in the four areas of the Pre-Process. These areas are *Cognitive, Cross-functional Team, Digital and Strategic Vision*.

Instructions:

Step 1: Participants are divided into 4 groups, one for each area of the Pre-Process. **Group A** is

associated with **COGNITIVE**, **Group B** with **DIGITAL**, **Group B** with **CROSS-FUNCTIONAL TEAM**, and **Group D** with **STRATEGIC VISION**.

Step 2: Each group has to complete the cards provided to describe each DCA. To do so, each team has to choose some images from the library provided and complete a moodboard that explains the DCAs. Moreover, participants need to find at least 3 keywords to describe each ability.

Participants: work in group / Duration: 1H / Outcome: DCA cards

GROUP COGNITIVE

DCA 1 – Creative combination and imagination



Figure 10. DCA Card & Miro

Comments:

- The group thought that the most important topic about this card is to be curious, use imagination, lateral thinking and fuse ideas to find new possibilities in creating.

DCA 2 – Translating knowledge and storytelling



Figure 11. DCA Card & Miro

Comments:

- The group while discussing about this topic found already a connection with sharing (knowledge and values) with the Empathy Ability. It is important to create a connection with others using a common vocabulary, simplifying messages and using a clear method, such as visual design, schemes or maps.

DCA 3 – Analytical and critical thinking



Figure 12. DCA Card & Miro

Comments:

- The group thought to have the analytical and critical thinking ability it is important to give importance to the right information, understanding, observing and having a reflective thinking.

DCA 4 – Adopting different perspectives



Figure 13. DCA Card & Miro

Comments:

- Speaking about this card, the group gave importance to the out of the box thinking, to being flexible and have lateral thinking and be curious to be able to adapt in every situation and to have new ideas.

DCA 5 - Humanity Problem solving



Figure 14. DCA Card & Miro

Comments:

- The group discussed a lot about this ability, and what emerged the most is that is very important to have humanity problem solving but with a sustainable thinking, prioritizing what is important and not being just human centred but also planet centred.

DCA 6 - Self-confidence and self-awareness



Figure 15. DCA Card & Miro

Comments:

- Speaking about self-confidence and self-awareness, the group agreed about the fact that it is important to practice and fail to improve our skills. So, it is very important to be motivated, perseverant and believe in ourselves.

GROUP DIGITAL

DCA 1 – Ethical and Sustainable thinking



Figure 16. DCA Card & Miro

Comments:

- **Ethical AI:** who will decide what right or wrong is? Who is defining the general laws that will be taught to AI? What rules have to be followed to make this decision?
- **Scaling sustainability:** it is difficult to have an absolute value of sustainability since it is always relative to a specific context. How it is possible to help this decision? Can the solution be found by providing a “sustainable scale” for digital activities?

DCA 2 – Envisioning tech opportunities



Figure 16. DCA Card & Miro

Comments:

- Importance of benchmarking and knowing all the technologies applied in different fields, in order to apply them in a specific context
- Importance of anticipation
- **Low hanging fruits:** easiest tasks or most obvious good investments available. Low hanging fruit can offer positive opportunities for businesses that want to quickly make progress on their goals.

DCA 3 – Data literacy



Figure 17. DCA Card & Miro

Comments:

- Definition has to be reassessed pointing out the analytical process: *“The ability to collect, generate, process ...”*

DCA 4 – Information literacy



Figure 18. DCA Card & Miro

Comments:

- Definition has to be reassessed pointing out the synthesis process: *“The ability to effectively transform data into usable information ...”*

- **KISS principle:** Keep It Simple, Stupid. The simpler the explanation and the simpler the product, the more likely it is that the output will be useful to others.

- **MAYA principle:** Most Advanced, Yet Acceptable. It is important to use technologies as advanced as possible bearing in mind that everyone has to use it. Therefore, it is crucial to design in a future-oriented vision, balancing it with the users' present. If a technology is too far away from the users' present, then the outcome will be impossible to use.

DCA 5 – Digital collaboration



Figure 19. DCA Card & Miro

Comments:

- **Definition of policies:** it is important to define policies and rights for the digital collaboration to obtain trust and guarantee.
- **Open source:** with digital collaboration all the resources have to be open source to be used in a cohesive and common way by everyone.
- Agile methodology and remote working separated. Agile methodology can be seen as the way to solve specific tasks.

DCA 6 – Healthy use of technology



Figure 20. DCA Card & Miro

Comments:

- Different perceptions of healthy: how to define the scale of health? What use of technology is seen as healthy and what is not?
- Different health impacts: each one responds in different ways to external stimuli
- Importance of coaching how to approach new technologies and how to use them in a correct and healthy way.
- COVID-19 case study à mental burnout

GROUP CROSS-FUNCTIONAL TEAM

DCA 1 – Enabling trust



Figure 21. DCA Card & Miro

Comments:

-**Key feature:** the group consider this DCA fundamental within a team, although it's a challenging objective.

-Have been identified several directions to develop this ability through different methods:

- o Group dynamics: it's important to **share**, even the own culture, to establish a dialogue within the team. The need to have the **same goal** is equally crucial. Indeed, the same objective to achieve allow trust in each other. Ecology is a theme used frequently to explain this concept.
- o Personal behaviour & features: to inspire trust within the team is crucial to have - **recognized skills, respect** the other team members, and be **transparent**.

- **Connections:** sharing concept has been immediately connected with the "propensity to share knowledge" DCA. Control has been linked with "Relationship management" DCA, for the importance to communicate confidence and to have the own tasks and duties under control.

DCA 2 – Propensity to share knowledge



Figure 22. DCA Card & Miro

Comments:

-**Ethical issues:** reflections about the knowledge, data, and information ownership and their control. Trust is essential to share knowledge.

-**Gift culture:** be generous is fundamental, and for this reason, more research on the gift culture and its feature could be interesting.

-**Continuous stream:** the information's flow in the team collective as the stream of water and is crucial as the blood flowing within the arteries.

DCA 3 - Positive mood



Figure 23. DCA Card & Miro

Comments:

- A playful team that faces problems with cohesion and positivity is crucial. Similarly, is essential to develop an emotional intelligence that allows to do not cope with adverse situations with superficiality. Indeed, the group underlines the importance to be aware of the risk, although the positive mood might lead to more ideal situations.

DCA 4 - Cooperative behaviour



Figure 24. DCA Card & Miro

Comments:

- Has been underlined the “trust” essential role within a cooperative group.

- To develop this ability is crucial to listen to the team, be tolerant of the teammates' behaviour, and be able to coordinate the activities.

DCA 5 - Empathy



Figure 25. DCA Card & Miro

Comments:

- **Understanding:** the crucial element of this ability is the capability to perceive and understand others' emotions. To enhance this ability is crucial to analyse the situations within and around the team understand the emotions.
- A climate of respect and generosity is essential.

DCA 6 - Relationship management

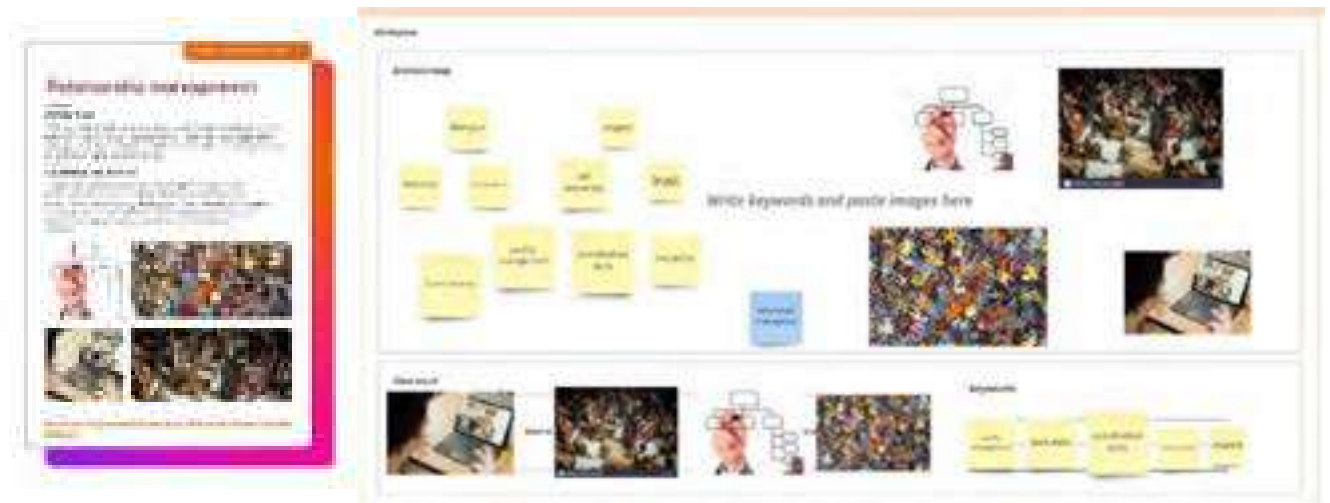


Figure 26. DCA Card & Miro

Comments:

- During the discussion it's been underlined the essential role of "respect", described as the main feature for be able to manage at best the relations within the team.
- Good communication, inclusion, coordination skills, and conflict management complete the skills and key elements to develop this ability
- The emotional intelligence allows to understand the people's behaviours and statements allowing the manager to face accordingly the situations.

GROUP STRATEGIC VISION

DCA 1 – Coping with uncertainty, ambiguity and risk



Figure 27. DCA Card & Miro

Comments:

- The team discusses a keyword chosen by one participant. The keyword is #DesignForFailure and it refers to a particular approach which considers failure as an opportunity and not an issue. A link was given as reference <https://redteamdefense.org/>
- The team also discusses the concept of #storytelling. Here the idea is that if someone is able to express himself clearly, if he has storytelling skills, by applying those communication skills in any project, he counteracts uncertainty and ambiguity. For this reason we could define an overlapping/connection with Cognitive and Cross-functional team DCAs.

DCA 2 – Envisioning future scenario

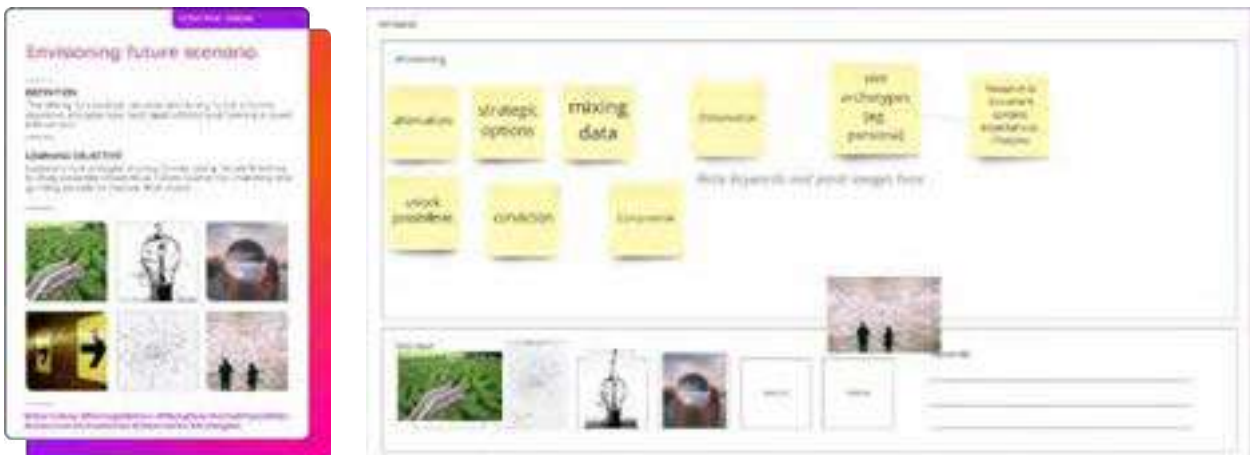


Figure 28. DCA Card & Miro

Comments:

- The team discusses a keyword chosen by one participant. The keyword is #archetypes. One of the participants from IMT Saint-Etienne explains that for many of his engineering students it is very difficult to engage in the scenario generation phase (he shares his personal experience). Most of the times they have to be forced to imagine and define possible scenarios using specific envisioning tools such as personas. Without these tools students usually feel blocked and not able to go on with the project.

DCA 5 – Driving change and innovation



Figure 31. DCA Card & Miro

Comments:

- The team discusses the keyword #leadership which in this case is linked with the concept of #enthusiasm and #positivity. The idea is that if a team member is able to drive change and innovation he/she becomes a leader and encourager in his team and he/she is able to identify and capture value as well as have a strategic perspective on problems.
- About this topic the team recognizes that in order to really drive change and innovation it is necessary to have a broader set of skills and for this reason they identify an overlapping/connection with the Cross-functional team DCAs.

DCA 6 – Impact strategic management



Figure 32. DCA Card & Miro

Comments:

- The team discusses the keyword #crowdsourcing which in this context refers to the fact that it is important to monitor the impacts of technology on society. The idea here is that it should be good to ask people what they think and feel about new emerging technologies, to understand what is their opinion on technology's benefits and harms. It is important to involve people when it comes to digital technologies.

Activity 2 – DCA Ranking

Objectives:

The aim of the activity is to define, as a consortium, which are the most fundamental DCA to address in our educational box to train Digital Maturity Enablers.

Instructions:

Step 1: In this phase each group member works **individually** to define which DCAs are considered essential for the Digital Maturity Enabler training. This allow to prioritize the DCAs and start to think about which of them can be trained singularly with specific activities and which can be combined. To do so copy the DCAs you find in your group space and paste them to create your personal ranking.

Step 2: Each team discusses **in group** to define a common rank of the fundamental DCAs related to the specific area they are working on.

General comments

This activity showed that it is impossible to give a priority ranking of DCAs, since everyone is fundamental for the training of the Digital Maturity Enabler. Moreover, the ranking would significantly differ each participant by each participant, this due to various backgrounds and the heterogeneous group.

Nonetheless, the participants adopted equally interesting and different methods to rank the DCAs: some analysed which DCAs would be needed to learn the others, identifying the key ones; some reflected on their backgrounds: what capabilities are missing in the students, what was helpful in their careers; others prioritised skills by what is really needed in concrete situations.

GROUP COGNITIVE + DIGITAL

Activity 2.1 - Participants: work alone / Duration: 10 minutes / Outcome: Personal prioritized list of DCAs

During the first part, each participant made its own ranking and the position of each ability was very different. Speaking about the Cognitive Abilities, in the first position they put Analytical and Critical Thinking (5/9); Self-confidence and self-awareness (2/9); Translating knowledge and storytelling (1/9) and Humanity Problem Solving (1/9). But at the same time, other participant put the same abilities but at the last position: Self-confidence and self-awareness (4/9); Humanity Problem Solving (3/9); Translating knowledge and storytelling (1/9) and Creative combination & imagination (1/9). Speaking about the Digital Abilities, only 8 participants made their ranking, voting Envisioning Tech Opportunities; (3/8); Ethical and Sustainable Thinking; Information Literacy and Data Literacy (2/8 each) and just one person put Information Literacy in the first position. While in the last position we can find Healthy Use of Technology (2/8); Envisioning Tech Opportunities (2/8); Information Literacy (2/8); Data Literacy (1/8) and Digital Collaboration (1/8).

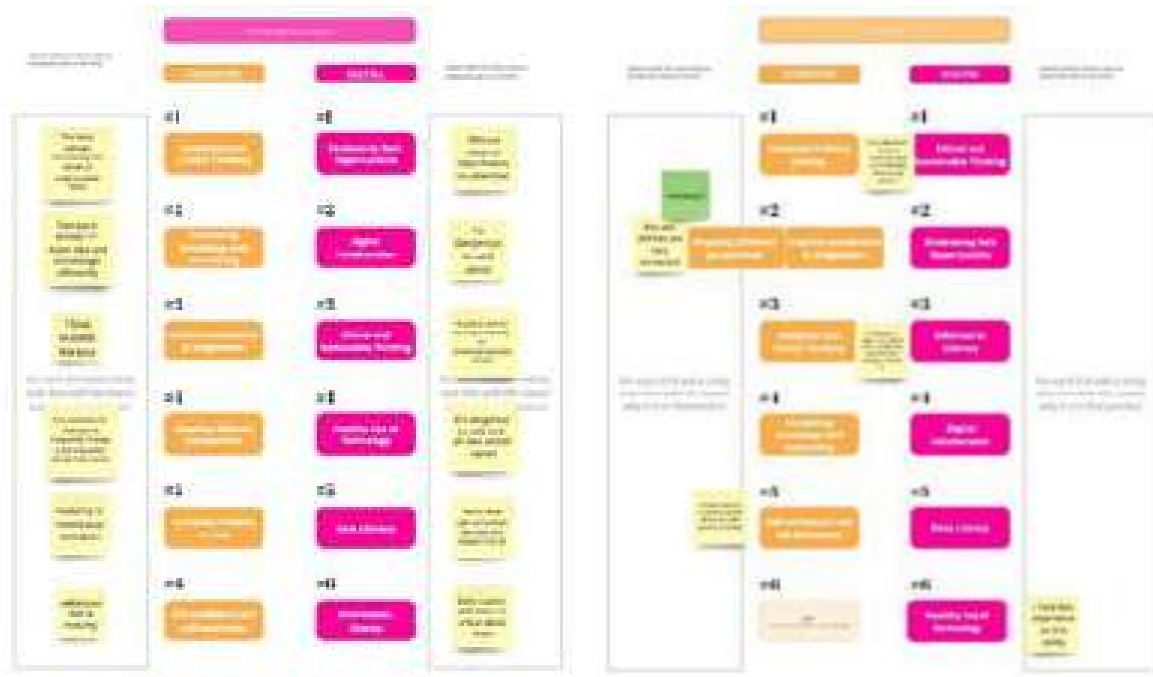


Figure 33. Miro

Activity 2.2 - Participants: work in groups / Duration: 30 minutes / Outcome: Prioritized list of DCAs

The final result of the ranking has been deeply discussed, since it was difficult to find a common interpretation for each participant. However, this activity provided interesting feedbacks: some participants pointed out how some of these DCAs were strongly connected, so that one could be seen as a consequence of the other. The activity ended with a very constructive discussion and the participants found a common solution for the ranking agreeing about the final choices they made.



Figure 34. Miro

GROUP CORSS-FUNCTIONAL TEAM + STRATEGIC VISION

Activity 2.1 - Participants: work alone / Duration: 10 minutes / Outcome: Personal prioritized list of DCAs

Below are shown the individual rankings done by the three members of Group Strategic Vision. Interestingly, all team members reasoned and worked more or less in the same way. The method used to define the DCAs rankings is based on the idea that some of them are needed in order to gain the others. Hence, the 1st, 2nd and 3rd DCAs are considered to be the essential ones in order to train the 4th, 5th and 6th. Each DCA is necessary to shape the next one, as a “production chain”. It turned out that all three members agreed more or less on the position of every DCA.

For this reason it wasn't difficult to define a group ranking. Find below the final Strategic Vision group ranking.



Figure 35. Miro

Activity 2.2 - Participants: work in groups / Duration: 30 minutes / Outcome: Prioritized list of DCAs

Comments

- Rankings about what is needed in order to have a full proficiency on the other abilities:

- o The lower need a strong proficiency on the ability above it (Fabien, Carella and David's strategy, members of strategic vision's team.)
- **Sustainability:** there is an open debate about sustainability and it's effectiveness with a cross-functional team member who suggests that might be more radical solutions.
- **Positive mood:** vision strategic and cross-functional's ranking are opposite
 - o Vision strategic team consider this ability essential while Cross-functional team underlines also counter-effects to prioritize this ability.
- Moreover, one Strategic Vision member defined and shared with others a useful method to define an order to give to DCAs. The method was based on two very simple questions:
 1. Is ...name of the DCA... important?
 2. Do we need to spend time and dedicated resources to train ...name of the DCA...?

These questions were useful to unlock the discussion on the Cross-functional team DCAs.

One member of the Cross-functional team raised some doubts on one DCA's name. She referred to Sustainable Development which she considered a too broad term.

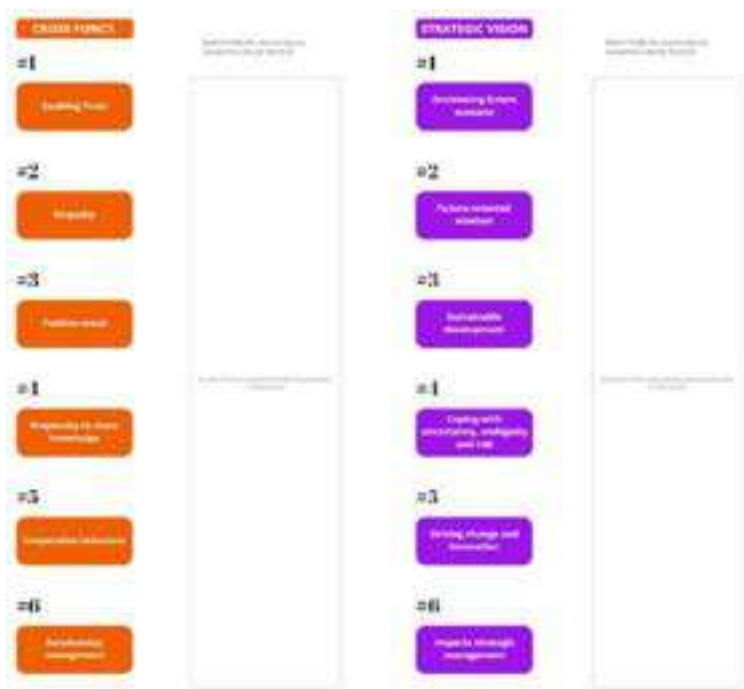


Figure 36. Miro

Activity 3 – Overlapping

Objectives:

The aim of the activity is to understand if some of the DCAs listed in each area of the Pre-Process can overlap with others from different areas. To do so, it is necessary to have clearly in mind the DCAs definitions and to discuss with the other team in order to find connections and links. Participants can take inspiration from their personal experience or reflect on associations generated by keywords or images on cards.

Instructions:

Step 1: Team DIGITAL and team COGNITIVE gather in a private room. So do team STRATEGIC VISION and team CROSS-FUNCTIONAL TEAM. Each pair discusses about their own DCAs and if it is possible to find any connection between two or more DCAs, also from different areas. To facilitate this process, the DCAs cards will be placed in a common board, so that every participant can find links thanks to the keywords or the images.

Step 2: The pairs of teams are switched. Now, by looking at the connections made in the first step of the activity, each group can find connections between DCAs from every Pre-Process area.

Activity 3 - Participants: work in groups / Duration: 30 minutes each pair of groups / Outcome: Connections between DCAs

GROUP COGNITIVE + DIGITAL

During the first part of Activity 3, the participants found the connections between the abilities of 2 different areas. In this case we can see Christophe that used a very useful method: starting from a main ability he linked other cards that can be related.



GROUP COGNITIVE + STRATEGIC VISION

During this teams match, we can see that the topic Humanity problem solving + Ethical and sustainable thinking + sustainable development + Envisioning tech opportunities was very discussed. Infact it was underlined how envisioning can solve problems but always thinking about a sustainable development because we can't be just human-centred but we need to think also about environment.



GROUP CROSS-FUNCTIONAL TEAL + STRATEGIC VISION





Explanation

How do you know the quality of the information you are using?



Explanation

How do you know the quality of the information you are using?



Explanation

How do you know the quality of the information you are using?



Explanation

How do you know the quality of the information you are using?



Explanation

How do you know the quality of the information you are using?



Explanation

How do you know the quality of the information you are using?



GROUP CROSS-FUNCTIONAL TEAM + DIGITAL



Participant name

Engaging in prior knowledge

What do you know about...?

Acquiring new knowledge

What do you learn...

Assessing your understanding

What do you think...

Explanation

How do you explain...?

Open system

Open system

Open system

Participant name

Engaging in prior knowledge

What do you know about...?

Acquiring new knowledge

What do you learn...

Assessing your understanding

What do you think...

Explanation

How do you explain...?

Open system

Open system

Open system

Open system

Participant name

Engaging in prior knowledge

What do you know about...?

Acquiring new knowledge

What do you learn...

Explanation

How do you explain...?

Open system

List of cluster

Below you can find a list with all the clusters of DCAs made during the activity:

COGNITIVE DIGITAL CROSS-FUNCTIONAL TEAM STRATEGIC VISION

1. *DIGITAL COLLABORATION + POSITIVE MOOD + ENABLING TRUST + PROPENSITY TO SHARE KNOWLEDGE + COOPERATIVE BEHAVIOR* = digital collaboration requires at least all four DCAs

2. *COPING WITH UNCERTAINTY, AMBIGUITY AND RISK + ENVISIONING TECH OPPORTUNITIES + ENABLING TRUST + FUTURE-ORIENTED MINDSET* = taking risks / about leadership

3. *DRIVING CHANGE AND INNOVATION + SELF-CONFIDENCE AND SELF-AWARENESS + TRANSLATING KNOWLEDGE AND STORYTELLING* = share vision

4. *TRANSLATING KNOWLEDGE AND STORYTELLING + DIGITAL COLLABORATION* linked with *COOPERATIVE BEHAVIOR* = work with others skills

5. *POSITIVE MOOD + SELF-CONFIDENCE AND SELF-AWARENESS + HEALTHY USE OF TECHNOLOGY + FUTURE-ORIENTED MINDSET* = focus on myself/my behavior

6. *DATA LITERACY + DRIVING CHANGE AND INNOVATION + PROPENSITY TO SHARE KNOWLEDGE + ETHICAL AND SUSTAINABLE THINKING*

7. *SELF-CONFIDENCE AND SELF-AWARENESS + ENABLING TRUST* = I'm more confident when I feel trusted

8. *HEALTHY USE OF TECHNOLOGY + EMPATHY*

9. *ENABLING TRUST + DIGITAL COLLABORATION* = If I trust people I am more prone to collaborate in a team

10. *PROPENSITY TO SHARE KNOWLEDGE + SUSTAINABLE DEVELOPMENT + ENVISIONING TECH OPPORTUNITIES* = The possibility of achieving a sustainable future relies on the ability of groups and individuals to share knowledge and information from different fields. This mix could generate new opportunities for innovation and technology.

11. *PROPENSITY TO SHARE KNOWLEDGE + SUSTAINABLE DEVELOPMENT + DATA LITERACY* = protect, enhance and develop human and material resources / To achieve a sustainable future, it is important to share knowledge, which can be generated by analyzing data or vice versa. Knowing how to manage it is therefore important and enabling.

12. *PROPENSITY TO SHARE KNOWLEDGE* + *SUSTAINABLE DEVELOPMENT* + *ETHICAL AND SUSTAINABLE THINKING*

13. *HUMANITY PROBLEM SOLVING* + *SUSTAINABLE DEVELOPMENT* + *ETHICAL AND SUSTAINABLE THINKING*

14. *COPING WITH UNCERTAINTY, AMBIGUITY AND RISK* + *SELF-CONFIDENCE AND SELF-AWARENESS* = to take risks and take into account that something will go different from planned, the individual (and then the team) must be aware of his/their skills and limitations - Fail but fail fast is an important element that build the self-confidence as the experience of the team.

15. *IMPACT STRATEGIC MANAGEMENT* + *SUSTAINABLE DEVELOPMENT* + *FUTURE-ORIENTED MINDSET* = true sustainable development is about foresighting the impact and the next steps

16. *ENVISIONING FUTURE SCENARIO* + *CREATIVE COMBINATION AND IMAGINATION* + *TRANSLATING KNOWLEDGE AND STORYTELLING* = creativity and imagination are required to envision the future. the way these future scenarios are told and described should take into consideration the fact that everyone must be able to understand and imagine the same thing.

17. *HUMANITY PROBLEM SOLVING* + *ETHICAL AND SUSTAINABLE THINKING* + *SUSTAINABLE DEVELOPMENT* + *ENVISIONING TECH OPPORTUNITIES*

18. *DRIVING CHANGE AND INNOVATION* + *SELF-CONFIDENCE AND SELF-AWARENESS* + *FUTURE-ORIENTED MINDSET* = driving change require always thinking a step forward and also inspire and motivating others

19. *COPING WITH UNCERTAINTY, AMBIGUITY AND RISK* + *HUMANITY PROBLEM SOLVING* + *ENVISIONING FUTURE SCENARIO* = envision future human, social and environmental needs/ scenarios to provide solution today that can anticipate and meet them. Working with future scenarios require coping with uncertainty.

20. *HUMANITY PROBLEM SOLVING* + *FUTURE-ORIENTED MINDSET* + *ENVISIONING FUTURE SCENARIO* = Human problem solving should always be faced with future orientated mindset

21. *ANALYTICAL AND CRITICAL THINKING* + *HUMANITY PROBLEM SOLVING* / *COPING WITH UNCERTAINTY, AMBIGUITY AND RISK* = problem solving can only be done from a critical perspective, problem solving involves thinking in an uncertain world

22. *HUMANITY PROBLEM SOLVING* + *SUSTAINABLE DEVELOPMENT* + *FUTURE-ORIENTED MINDSET* = Common objective of training people to imagine a future: 1/ radically different 2/ focused on human needs 3/ sustainable (in a broad sense, c.f. UN SDGs) ; envisioning a future that is not an improved version of the present but something completely different

23. *ENVISIONING FUTURE SCENARIO* + *CREATIVE COMBINATION AND IMAGINATION* = I think they are strongly connected and one can benefit from the other so they should be considered together (or at least very close)

24. *ANALYTICAL AND CRITICAL THINKING* + *COPING WITH UNCERTAINTY, AMBIGUITY AND RISK* = analytic and critical thinking is an important skill for risk/uncertainty management. We can devise exercises to address both objectives at the same time

25. *ADOPTING DIFFERENT PERSPECTIVES* - *SUSTAINABLE DEVELOPMENT* + *IMPACT STRATEGIC MANAGEMENT*

General comments

This activity has pointed out many connections between DCAs both from the same Pre-Process area and from different ones. Moreover, three main methods for selecting overlaps can be identified: the first one implies that each DCA is at the same level of the others to which it is connected; the second one instead, groups different DCAs in a cluster of competencies that are needed to carry out one specific activity; the third one suggests that one specific DCA comprises other different propaedeutic DCAs.

Participants worked mostly individually. They preferred to work by themselves before sharing with others the overlapping they found. Some of them found it difficult to find overlapping since they have not been working with other team's DCAs.

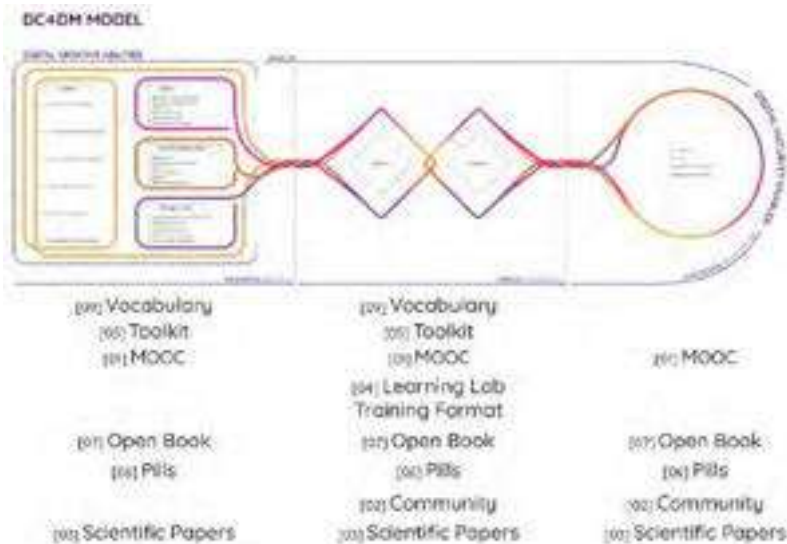
Conclusion & Suggestions

It can be useful to have a common vocabulary to better understand the card, mostly during the first reading.

Bootcamp Part 2

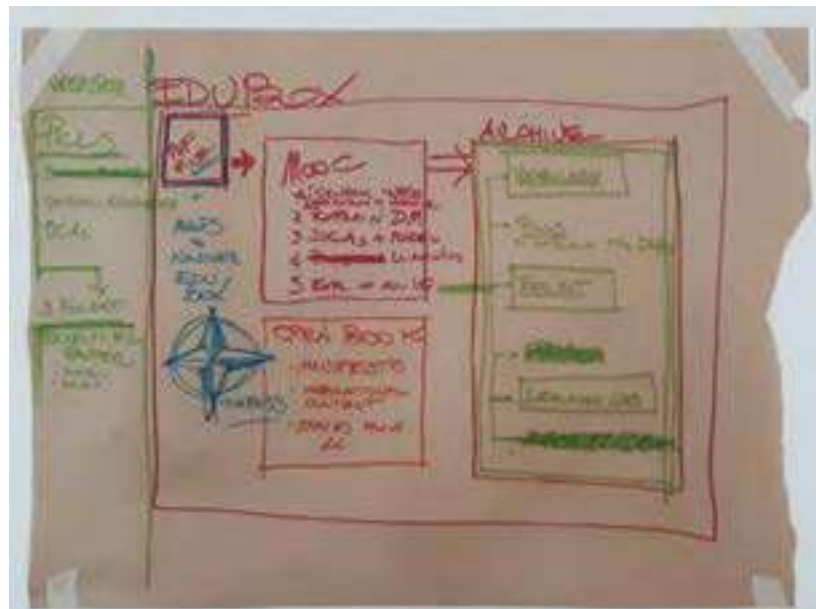
DAY 1 – Building a shared vision of all the DC4DM Intellectual Output

The work team was provided with a visualization of all the IOs to be developed along the project. This visualization meant to show the existing interconnections among the IOs according to the original project description (fig.1) and how they might be of support and integration along the DC4DM model (fig.2).



These two visualizations allowed the facilitators to start a conversation among the work team about how all the IOs should be part of a whole strategy of communication regarding the DC4DM model, its contents and utility.

The participants were provided with post-it notes where they were asked to write down their understanding about the function and vision for each IO. Also, they were asked to think how each IO can support the DC4DM model and the learning process. Particularly important was the perspective of the person/team who had been working directly on one of the IOs. The facilitators helped in building a shared understanding of each IO and the interconnections by collecting and mapping the suggestions from the participants (fig.3) and then parallelly sketching out a new scheme (fig.4)



Finally, the group agreed on the structure visualized in figure 5 where:

-The **EduBox** will be a digital container where one will learn about the DC4DM through **MOOC, Open Book, Vocabulary, Toolkit, Learning Lab format**. In order to navigate the EduBox contents, a visual index and short introduction will be provided too. The EduBox will be available through the DC4DM website as a digital pack to download for free through registration.

- **Scientific papers and Pills** will be available through the DC4DM website too as support material to learn about digital maturity and understand the importance of moving toward new approaches both in education and business to foster innovation through digital technologies. The Pills, in particular, will serve also the Edu Box because these short videos by experts can represent an input for critical conversations in both a training and business context. Also, Pills will tell something about the DCAs and highlight the importance of preparing the learners to develop these specific abilities to achieve a digital maturity orientation.

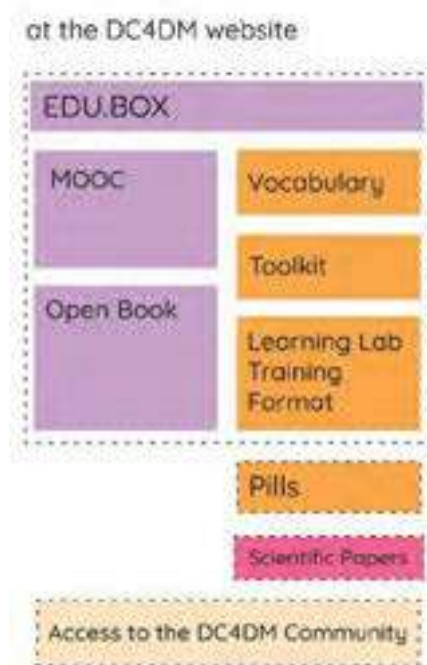
In detail:

- **MOOC** (provided through the EduBOX) will have the function to inform the learner / teacher about the fundamental elements of the DC4DM model and how to make good use of both process and tools. MOOC will be organized into 5 themes: (1) The DC4DM project and how to navigate the provided materials; (2) Introduction to Digital Maturity; (3) The DCAs and the DC4DM model; (4) The Learning Labs, how they work and how they benefit the learning process; (5) An overview on all the IOs and how to make good use of them.
- **Open Book** (provided through the EduBOX) will be a short publication to inspire and encourage the learner / teacher to embrace the DC4DM ethos and methodology. Like a DC4DM manifesto, the Open Book will be written in a simple language so that everyone can actually access the contents and meanings. Maps and simple visualizations will allow the reader to understand better the complexity of certain topics regarding digital maturity, as also navigate the articulation of all the tools and methods provided by the DC4DM model.
- **Set of tools:** Vocabulary, Toolkit, Learning Lab Format.

(i) **Vocabulary** will provide the basic glossary to navigate the Digital Maturity theme and the DC4DM methodology, that is tools and methods. It will also include a set of case studies to inspire about successful application of digital technologies in various business and practice sectors.

(ii) **Toolkit** will contain all tools and methods to be used along the DC4DM process and that will allow the learners to achieve digital maturity.

(iii) **Learning Lab Format** will provide all basic information, instructions and tips to organize and run a DC4DM LLab. This format would leave some flexibility to the trainer/teacher to structure the Lab according to the availability of time and resources. TSE proposed to provide two options for Learning Lab Format: one as basic and standard that could fit anyone's possibilities and needs; a second one tailored on specific parameters regarding the specificity of the local needs and resources. TSE proposed to develop an algorithm able to allow the LLab organizer to design and prepare a personalized event /training session.



Finally, the participants agreed on the importance of providing outputs that can be understood by a wide audience from different backgrounds and levels of expertise. While the Scientific Papers will be of interest of a more academic type of audience, the other IOs must be using an accessible language and be visually consistent in the way they communicate the different types of contents.

Kick-off – Introduction & Debrief activity 3

The updated visualization of the DC4DM model (Fig. 4) was shown to the workgroup and the facilitators introduced the methods that partners used to perform the clustering activity (Activity 3) during the meeting in July. The two main methods were: i) DCAs prioritization (one DCA is more important and the others are needed to achieve it) and ii) by topics (i.e. sustainability). The participants discussed about which method would be more effective to be applied in further clustering activities. The first method was discarded because it implied that some DCAs are more important than others. Therefore, the consortium opted for the second method (topic-based cluster).

DAY 2 – Activity 1 – Recap and refinement of cluster

Starting from the results of July, the facilitators had developed a definition for each cluster based on the notes and comments that participants had written on Miro. The definitions were read out loud and the clusters were divided between the participants: each person/couple had to deeply analyse each cluster and give it a title. Moreover, starting from the title, the participants had to add any more relevant DCA, or remove those that they considered out of the topic. The aim of this first part was to reduce the number of clusters.



As a matter of fact, the participants defined seven main clusters:

- Cluster #1 Sustainable Future
 - o DCAs: Humanity problem solving, Sustainable development, Ethical and sustainable thinking, Healthy use of technology
- Cluster #2: Horizon scanning / 360° view of the world
 - o DCAs: Data literacy, Information literacy, Adopting different perspectives, Creative combination and imagination, Analytical and critical thinking.
- Cluster #3: Tech foresight

- o DCAs: Envisioning tech opportunities, Envisioning future scenario, Impact strategic management, Adopting different perspectives, Future oriented mindset
- Cluster #4: Individual awareness
 - o DCAs: Self-confidence and self awareness, Analytical and critical thinking, ethical and sustainable thinking, Future-oriented mindset, healthy use of technology, envisioning future scenario, coping with uncertainty, ambiguity and risk
- Cluster #5: Team emotional bonding / Work with others
 - o DCAs: Propensity to share knowledge, Cooperative behaviour, Empathy, Self-confidence and self-awareness, Enabling trust
- Cluster #6: Share vision
 - o DCAs: Driving change and innovation, Translating knowledge and storytelling, Coping with uncertainty, ambiguity and risk, Adopting different perspectives, Enabling trust, Cooperative behaviour
- Cluster #7: Digital collaboration
 - o DCAs: Positive mood, Enabling trust, Propensity to share knowledge, Cooperative behaviour

After having defined these clusters, participants reasoned and discussed together in order to include all the DCAs in the process of cluster-making. From this activity, further modifications were made to the clusters, from which derived six final clusters. Moreover, instead of clusters, a new definition came up for the groups of DCAs: DRIVER.

A DRIVER is a cluster of DCAs that enable the learner to become aware of the following topics applied to digital technologies: Sustainability, Sense-giving, Tech foresight, Ethics, Collaboration and Complexity.

The following list presents the six DRIVERS with the respective DCAs:

- o Driver #1: Sustainability
 - o DCAs: “Humanity Problem Solving”, “Impact Strategic Management”, “Ethical and sustainable thinking”, “Sustainable development”, “Healthy use of technology” e “Positive Mood”
- o Driver #2: Sense-giving
 - o DCAs: “Data Literacy”, “Information Literacy”, “Adopting different perspectives”, “Create combination and imagination” e “Analytical and critical thinking”
- o Driver #3: Tech Foresight
 - o DCAs: “Envisioning tech opportunities”, “Envisioning future scenario”, “Impact strategic management”, “Adopting different perspectives” e “Future oriented mindset”
- o Driver #4: Ethics
 - o DCAs: Empathy”, “Relationship management”, “Ethical and sustainable thinking”, “Future-oriented mindset” e “Healthy use of technology”
- o Driver #5: Collaboration
 - o DCAs: “Self-confidence and self-awareness”, “Digital collaboration” “Cooperative behaviour”, “Propensity to share knowledge”, “Translating knowledge and storytelling” e “Enabling trust”
- o Driver #6: Complexity

DCAs: “Driving change and innovation”, “Translating knowledge and storytelling”, “Coping with uncertainty, ambiguity and risk”, “Adopting different perspectives”, “Cooperative behaviour” e “Analytical and critical thinking”.

DAY 2 – Activity 2 – Tools analysis and link to the Drivers

Before the bootcamp, each partner shared some tools and methods within the project group. The second activity of the day of bootcamp was aimed to link the resources provided by partners (tool, methods, activities, ...) with each Driver.

Each participant was given a small deck of cards, which summarised the resources, and had to associate each tool to a Driver or a specific DCA.

Due to the fact that the time was running short and the resources provided by the partners were many, this activity turned out being unfinished and chaotic.

DAY 3 – Activity 1 – Drivers' learning objective definition

To better address the last activity performed the previous day, it seemed necessary to define a learning objective for each Driver. Therefore, each participant was given a Driver and had to analyse its DCAs in order to define a set of core objectives that allow to gain awareness in the specific topic. In order to define the drivers' learning objective, participants started from the learning objectives of the single DCAs that compose the driver. Below the list of drivers and their respective Learning objective is presented.

- Driver #1: Sustainability
- Learning obj: Learners are able to design the future through/with digital technology aiming at improving and guaranteeing the well-being of the planet and its communities, among which the human ones. Learners see and think from the perspective of other organisms (beyond humans), balancing resources from environmental, economic, technological, socio-cultural-political level.

- Driver #2: Sense-giving
- Learning obj: Learners are able to create or extract knowledge from an overwhelming amount of digital contents, select reliable sources, possibly from different domains, are able to process, analyze, interpret information in order to build a 360° view of the world and allow them to think outside the box to define the design objective.

- Driver #3: Tech Foresight
- Learning obj: Digital maturity enabler should learn: how to be continuously updated on technological development; how to understand the feasible and viable opportunities from different angles that they could open in the future as well as their implications; how to envision new scenario of application out of them.

- Driver #4: Ethics
- Learning obj: Learners are able to identify and understand ethical challenges and implications of digital innovation, to drive digital strategy, to adopt an ethical attitude/behaviour during the design and implementation process.

- Driver #5: Collaboration
- Learning obj: On an individual level, learners are able to understand the dynamics of collaboration especially in a digital context, are able to recognize their own abilities and potentials, to develop the mindset to share knowledge and build trust.

- Driver #6: Complexity
- Learning obj: Learners know how to cope with the complexity of digital challenges, the unexpected turn of events, the dialogue with different stakeholders, the difference between the vision and digital possibilities in reality.



DAY 3 – Activity 2 – Screening and selection of partners' resources for each driver

The following activity of the day 2 retrieved the tools proposed by the partners.

Starting from the activity 2 of the previous day and reading the learning objectives of each Driver, all the partners were required to select the best tools to achieve all the objectives proposed and place them in one or more parts of the DC4DM model.

At the end of the day each Driver was divided between the partners, who have become responsible of the development of the resources / toolkit.

The information related to the drivers, the selected tools and the division of the partners are reported at the following link: https://polimi365-my.sharepoint.com/:w:/r/personal/10031267_polimi_it/_layouts/15/Doc.aspx?sourcedoc=%7B1913A266-2935-49AE-B339-769750CD98D8%7D&file=DRIVERS.docx&action=default&mobileredirect=true

General comments

-During the first activity it was highlighted that it would be useful to introduce a self-assessment tool for students to assess their strengths and weaknesses. This would help educators to choose which Drivers (and DCAs) to focus on and for students to be aware of their level of abilities. Moreover, it seemed necessary to apply a similar tool at the end of the educational process, in order to understand if the desirable objective has been reached.

-Participants discussed a lot on the difference between the term METHOD and TOOL. Indeed, there was a lack of agreement on the meaning of the two words. The consortium defined together that a method is a set of theoretical guidelines while a tool is a specific practical resource. For instance, the Pitch is considered a method while the Business Model Canvas is a tool.