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An Operational Framework of Methods for Designing Ethical and Sustainable Future Digital Scenarios

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ABSTRACT

Digital technologies are reshaping behaviors and human interactions as well as having great impacts on the environmental, political and economic level. In the contemporary digital scenario, it becomes paramount for people to be able to adapt and unleash their full creative potential empowering a whole new set of skills, namely Digital Creative Abilities. Within the DC4DM European project, the aim of the paper is to introduce an operational framework built as part of the methodology used to identify the most important methods and tools to enhance the DCAs related to ethics, sustainability and futures thinking. Indeed, an ad hoc methodology was implemented in order to provide a systematic overview of the existing resources that could be useful to develop the competencies to design responsibly and sustainably with digital technologies and to envision futures possibilities.

Keywords: Digital emerging technologies, Digital creative abilities, Futures thinking, Ethics, Sustainability

INTRODUCTION

The 21st Century is being characterized by the rise and wide spread of disruptive digital technologies that are modifying the way in which people act and interact with each other as well as transforming the way in which they acquire and process information (Bruno and Canina, 2019). It is undeniable that society is currently experiencing a technology revolution which is impacting almost every aspect of people's life entailing a much broader "transformation of humankind" (Schwab, 2016). Human creativity is widely acknowledged to be one of the essential abilities to ease a smooth and profitable collaboration between people and technologies (Canina and Bruno, 2021). Because of new digital challenges and since emerging technologies are being extremely impactful on the creative processes, the development of suitable and innovative educational models to train the future generation of digital creators turns out to be essential. In order to thrive in such increasingly complex and digitally enabled world, indeed, people need to gain and train a whole new set of skills to enhance creativity. Therefore, such new educational models must be aimed at enhancing students' creative skillset enabling them to recognize the viable opportunities brought by technological advancements and to conveniently exploit them (Bruno and Canina, 2019).

This is the goal of the ongoing Digital Creativity for Developing Digital Maturity Future Skills (DC4DM) European Project, a three-year project funded by the Erasmus+ Programme and coordinated by Politecnico di Milano, whose outcome is the implementation of a human-centered educational model aimed at providing students with the creative abilities to design responsibly with digital technologies and strategically apply them in any field.

In the framework of the DC4DM project, the above-mentioned creative skills are defined as Digital Creative Abilities (DCAs) and considered as key abilities to achieve the so-called Digital Maturity (DM) (Kane, 2017; Kane et al., 2017). In the unpredictable current scenario, the development of these DCAs is essential to empower the human capital to express their unique creative potential and succeed in an ever-transforming digital world (EC, 2020).

In this regard, the aim of the paper is to present an operational framework specifically created to collect and systematize useful resources to train the Digital Creative Abilities to deal responsibly with emerging technologies and to envision future possibilities.

THE *DC4DM* EDUCATIONAL MODEL

A first version of the DC4DM model encompasses three main phases called Pre-Process, Process and Post-Process and a cross-model area named Digital Responsibility and Sustainability which included the abilities related to Ethical, Sustainable and Futures Thinking that are considered essential when dealing with emerging digital technologies. The DCAs needed by cross-functional teams to face the core design process are grouped in the Pre-Process area which comprises both the individual digital creativity skills and the collective ones related to team trust and knowledge sharing (Canina and Bruno, 2021). The Process phase is based on a creative and design thinking process characterized by subsequent divergent and convergent stages, steps, activities and thinking styles. Specific DCAs intervene in each step of the process, ensuring original outputs. Such configuration is grounded on the Digital Creativity Framework (DC Framework) (De Vreede et al. 2017), which is useful to (1) outline the interconnections between the creativity factors and the design process; therefore, it is helpful also to (2) identify all the steps, activities and rationales that characterize the design process; as well as to (3) determine which actions and tools are needed to enhance the digital creativity factors that intervene in specific moments of the design process (Canina and Bruno, 2021). The Post-Process phase, learners should have acquired a shared mental model that leads them through any future project. This final phase includes the skills that allow to create continuous learning cycles to further develop and nurture the skills they acquire. Such configuration has been further revised and modified by the consortium starting from the consideration that the cross dimension named Digital Responsibility and Sustainability cannot be considered as a plus but rather as an integral part of the three model phases. As a matter of fact, when dealing or designing with digital technologies, it is essential to gain

awareness on ethical matters, pay attention to sustainability issues as well as to embrace a forward-looking attitude. Therefore, these three features - namely Ethical Thinking, Sustainable Thinking and Futures Thinking - previously mapped as part of the cross-model area, were later integrated into each phase of the model leading to the final visualization of the DC4DM educational model.

ETHICAL, SUSTAINABLE & FUTURES THINKING AS DRIVERS OF CHANGE

In order to tackle the contemporary ever-emerging digital challenges, it is necessary to envision new future scenarios (Dondi et al., 2021) reflecting on the possible applications of digital technologies as well as anticipating the potential implications they might have on the societal, environmental, economic and political level (Prosser and Basra, 2019). It appears therefore clear that a traditional Design Thinking process can no longer be considered suitable for such forward-looking and innovative approach and that, in fact, it must be revised and adapted to meet the need of managing the future of digital technologies (Canina et al. 2021). In this perspective, the DC4DM educational model integrates the cross dimension encompassing the ethical, sustainable, and future thinking related DCAs. Such creative abilities are indeed essential when working and designing with digital technologies. Emerging technologies open multiple possibilities to improve the quality of human life, but at the same time, they generate new ethical issues that need to be carefully addressed (Green, 2017). If, on the one hand, technological power makes humanity evolve, on the other hand it also carries with it brand-new concerns related to sustainability in its broader sense. Sustainability, indeed, does not only pertain to environmentalism, but it also embeds the concepts of social equity and economic development. Designing, working and managing digital technologies means balancing and pondering environmental, societal and economic essential factors in the perspective of medium- or long-term futures (McGill Report, 2019). That is why, in the contemporary context, the creative abilities related to ethical, sustainable and futures thinking turn out to be essential to steer the ongoing digital transformation. Thus, Digital Maturity Enablers should not only be aware of the importance of such abilities but should also consider them as actual "drivers" of change. From this consideration, the DC4DM model groups such DCAs into the so-called Drivers, defined as clusters of creative abilities that enable learners to gain awareness on paramount topics such as Digital Ethics, Sustainability and Tech Foresight. Training the DCAs included in these Drivers would enable learners to use efficiently and responsibly emerging technologies and make them fully aware professionals (WEF, 2020). It is in this context that arises the need for an operational framework to systematize the existing resources that might be useful to provide people with the essential DCAs included in the Drivers as well as to train and enhance such skillset and make people thrive in the contemporary ongoing digital transformation.

SYSTEMATIZING EXISTING RESOURCES TO TRAIN ESSENTIAL DCAS

Training and acquiring digital creative abilities require time and resources specifically designed for the purpose. Indeed, the learning process is iterative and needs to be supported by a set of tools and methods to ease the acquisition and practice of the afore-mentioned DCAs. In this sense, valuable educational resources have already been designed and are available for learners and professionals online. However, being multiple and various, such resources are often quite hard to spot in the infinite online realm. Hence it becomes necessary to find a way to research and sort them according to specific criteria - i.e., their features and objectives - in order to navigate and choose them easily. Therefore, the effort has been channeled into outlining an operational framework to collect and systematize existing materials to teach the abilities related to ethics, sustainability and futures thinking applied to digital technologies. The aim is to provide teachers and professionals with a flexible and adaptable instrument to dive into the multitude of already-in-use tools and methods, identifying the most appropriate for a specific context without being overwhelmed by their abundance. The framework is built through a methodology divided into four main phases defined as (1) **exploration**, (2) **collection**, (3) **sorting** and (4) **framing**. The first step is about **exploring** the several options available and deepening the knowledge on the general topic. Starting with the definition of a goal, namely the collection and mapping of meaningful resources to train responsible Digital Maturity Enablers, this initial activity has no boundaries, nor does it require specific guidelines to follow. Since the aim is to gather as much information as possible, the exploration phase is open and can be performed freely. All the resources found during the research phase have been collected and made available to all team members. The second step, **collection**, allows gathering all the information by using an online collaborative platform whether the work is performed remotely or, in the case of in-presence collaboration, sharing ideas and reflections through brainstorming sessions. IDEActivity research team opted to share information using Figma as a collaborative online tool. To better organize the collected knowledge, some boards have been created and used within the team to take note of interesting articles, papers, websites and other helpful bibliographic references. Being for the exclusive use of team members, the boards do not require a particular structure. However, it is useful for researchers to define and agree on a set of codes and symbols to highlight specific features of the tools collected in the boards. Indeed, for the sake of clarity, in the DC4DM, each board is associated with a specific topic and marked by a color: Ethics – teal, Sustainability – light blue and Futures Thinking – red. Infographics are also very useful tools to draw attention to specific features such as, for instance, whether a resource is designed to be used by a group of people or individuals. The definition of such shared "alphabet" lays the groundwork for the following step: **sorting**. Pointing out the characteristics of each tool and/or method collected makes it easier for researchers to navigate through the boards and start a collective brainstorming session on the actual usefulness of the available material. Indeed, the sorting process aims

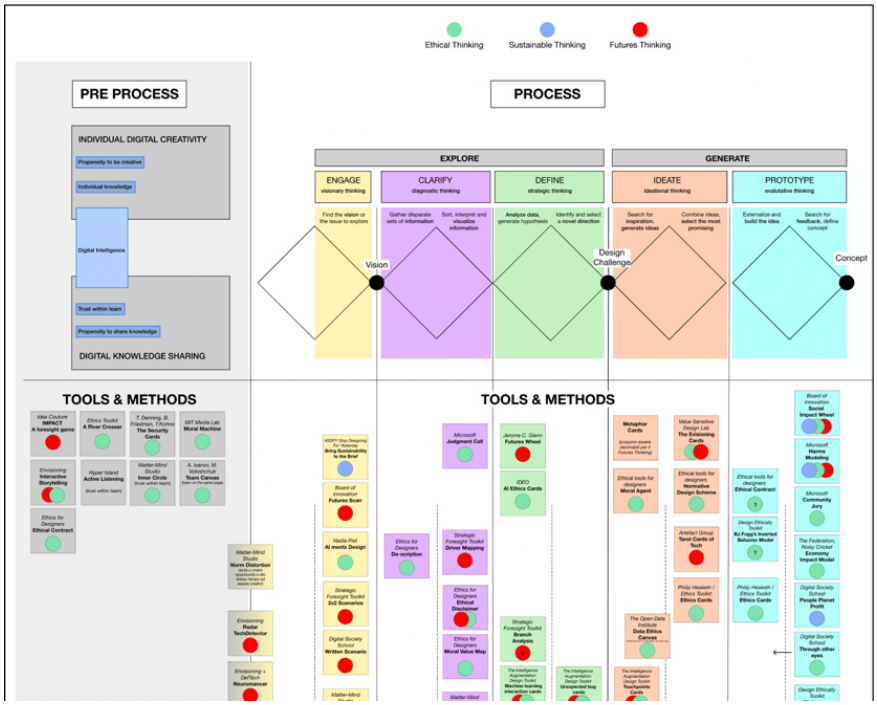

Figure 1: Mapping the resources on the DC4DM model (2021) - Note: for readability, only a portion of the model and the related resources is shown.

at determining which are the most appropriate and successful resources to train specific DCAs. To do so, it is essential to define some criteria that help carefully analyze all the material collected previously. Such criteria can be determined according to contexts, processes or necessities. In the framework for the DC4DM project, they include, but are not limited to:

- driver addressed: is the resource useful to train the DCAs encompassed in the Ethics/Sustainability/Tech Foresight driver?
- general purpose: is the resource aimed at energizing a team? Or does it facilitate brainstorming? Etc.
- type of resource: is it a tool/serious game/methodology/MOOC…?.
- time: how long does it take to make use of a resource?
- target: is the resource designed for groups or individuals?
- process phase: in which part of the model is applicable

Analyzing the material through such "lenses", eases the process of discarding or saving assets. As a matter of fact, after a careful look, some resources have turned out to be overlapping, repetitive or irrelevant. If, on the one hand, the exploration phase corresponds to a divergent moment focused on quantitative research, on the other hand, the collection and sorting phases entail a qualitative approach aimed at identifying and selecting only the most applicable materials. Once the resources have been analyzed and filtered, it comes the moment of **framing** all the collected knowledge and translating it into a clear and shareable outcome. Considering the general purpose of each

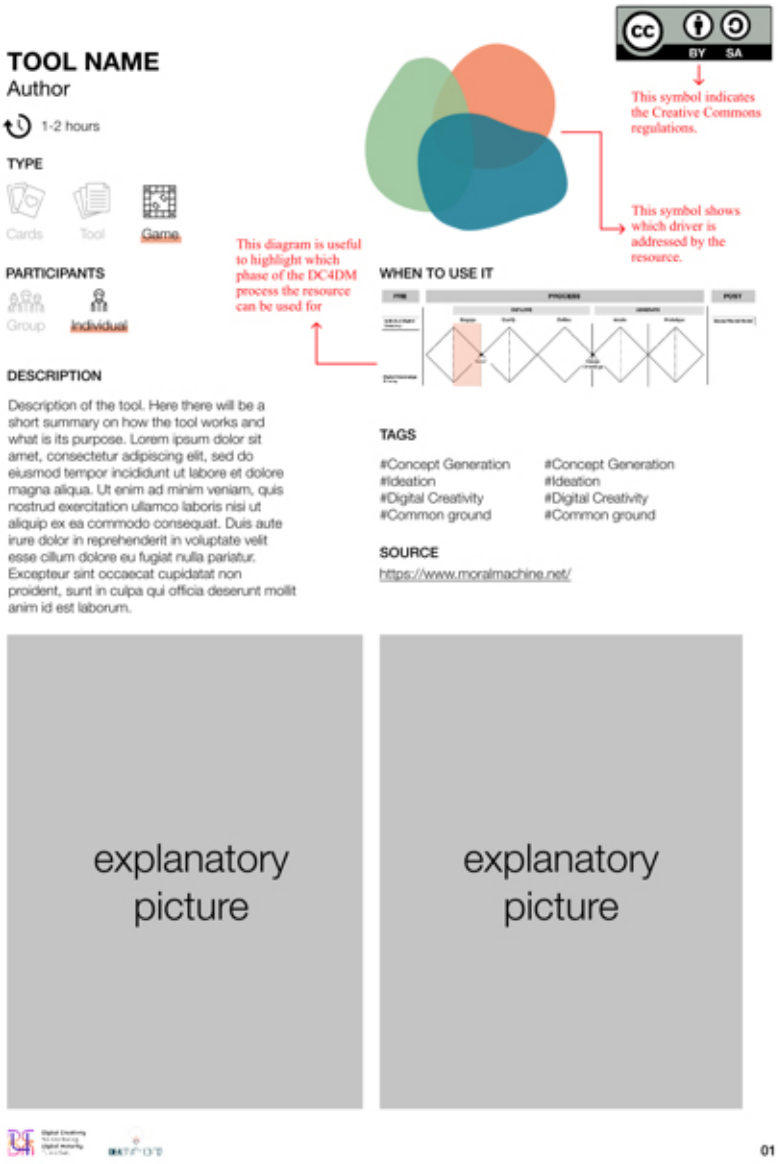

Figure 2: Summary sheet template (2021).

resource, it is now possible to map them on the DC4DM educational model to highlight in which part of it they might be used and implemented. Doing this makes it possible to gain a deeper understanding of whether the collected material is enough to support all the phases of the educational process or if it is necessary to integrate the research and look for other meaningful material. It is easier to perform this operation having the model at hand: it allows to physically place the resources below each phase of the process and have a clear overview (fig. 1).

Once that the extensive investigation is framed, the very final step is to systematize the findings using an ad hoc template (Fig. 2) to summarize the

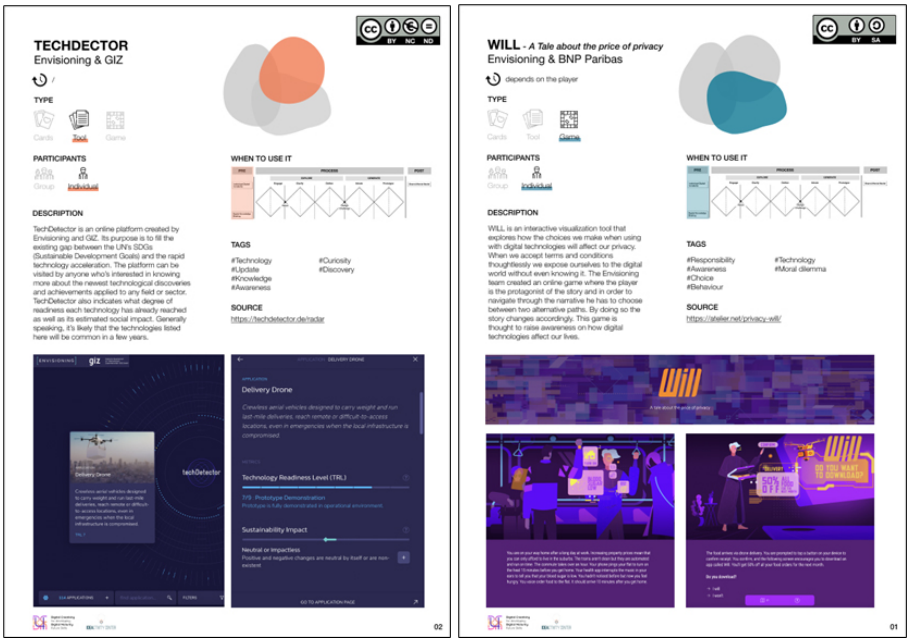

Figure 3: Summary sheets. Some of the summary sheets collecting tools to design responsibly with digital technologies (2021).

resources. As clearly shown, the template features the name of the resource, its author(s) and typology, number of participants involved, a brief description of the activity, a symbol indicating which driver is addressed as well as a simplified model scheme to highlight the addressed process phase. Moreover, each resource is classified by some keywords, called tags, which provide a rapid overview on its features and objectives. A couple of explanatory pictures are provided with the source and references and the Creative Common symbol to show if the resources are open. Summary sheets are used to frame each selected resource and as a last step, they are collected into either digital or physical booklets, shared within a network of learners and professionals and used as teaching materials to train the future Digital Maturity Enablers. The image (Fig. 3) shows a portion of the more than a hundred tools and methods selected in the operational framework for the DC4DM model.

CONCLUSION

The reasons that led to the definition and spread of an operational framework to systematically collect useful resources to learn how to deal responsibly with digital technologies arose from the necessity to up-skill new talents to drive the ongoing digital transformation. As mentioned previously in this paper, changes are happening fast requiring people to quickly and nimbly adapt. To face the current transition, people need to rely on a set of creative abilities that ensure a responsible control and use of technology's potential. The acquisition of such abilities is a long process and requires support material.

Hence the need to share a simple yet functional methodology to research, collect and organize existing resources that might help training specific DCAs. Hopefully this framework will be implemented and adjusted by a growing community of people willing to become aware creators able to design ethical and sustainable future digital scenarios.

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