

CIRCULAR DESIGN – LEARNING FOR INNOVATIVE DESIGN FOR SUSTAINABILITY: ERASMUS + KNOWLEDGE ALLIANCE PROJECT FOR SUSTAINABLE DESIGN

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ABSTRACT

The Circular-Design - Learning for Innovative Design for Sustainability (L4IDS) project is a three year (2016-2019) Erasmus + Knowledge Alliance financed project. The goal of the project is to promote sustainable consumption and production of products and services in Europe. This is achieved through a knowledge co-creation process and the development of training materials in order to teach and train students, faculty and enterprise staff of the design sector in Innovative Design for Sustainability (IDfS) strategies. The project is aligned with European Circular Economy policies and contributes to the realization of a more sustainable society.

There is an abundance of learning schemes, courses, and teaching materials in higher education on DfS but few of these focuses on Knowledge Co-Creation and Innovation and none through continuous professional development. This paper will present an overview of previous initiatives around DfS in higher education, focusing on those that rise above the level of a single institution. By mapping these initiatives on the triangle Design for Sustainability (DfS)-Knowledge Co-Creation – Innovation, we will articulate the gap which the L4IDS project aims to bridge. For this, we will use an adapted version of the DfS Evolutionary framework. The mapping will be based on a case study publication on knowledge co-creation processes in design for sustainability. Specifically, the study will focus on the position of Digital Fabrication Labs (DFL) in this innovative design for sustainability triangle.

Keywords: Higher education, co-creation, best practices, open educational resources.

1 INTRODUCTION AND METHOD

The Circular Design - Learning for Innovative Design for Sustainability (L4IDS) project is a three year (2016-2019) Erasmus + Knowledge Alliance financed project. The goal of the project is to promote sustainable consumption and production of products and services in Europe. This is achieved through a knowledge co-creation process and the development of training materials, through Open Educational Resources (OER), in order to teach and train students, faculty and enterprise staff of the design sector in Innovative Design for Sustainability (IDfS) strategies (Figure 1). The project is aligned with European Circular Economy policies and contributes to the realization of a more sustainable society.

The evolution of the DfS field has broadened its theoretical and practical scope over the years [1]. While the first approaches of the early 90's, were focusing predominantly on the technical approaches of sustainability [2], the following ones have recognized the crucial importance of the role of users, resilience of communities, and more generally of the various actors and dynamics of socio-technical systems [22],[23]. This evolution has been accompanied by an increased need for human-centered

design knowledge and know-how. Initial DfS approaches related to the product innovation level predominantly requiring technical knowledge and knowhow. On the other hand, more recent DfS approaches require designers to be provided with a different set of expertise. For example techniques to gather insights from users, news ways of satisfying customers and techniques to co-design with them are essential [1]. The project presented here aims at influencing the overall system, from the physical product to the socio-technical level.

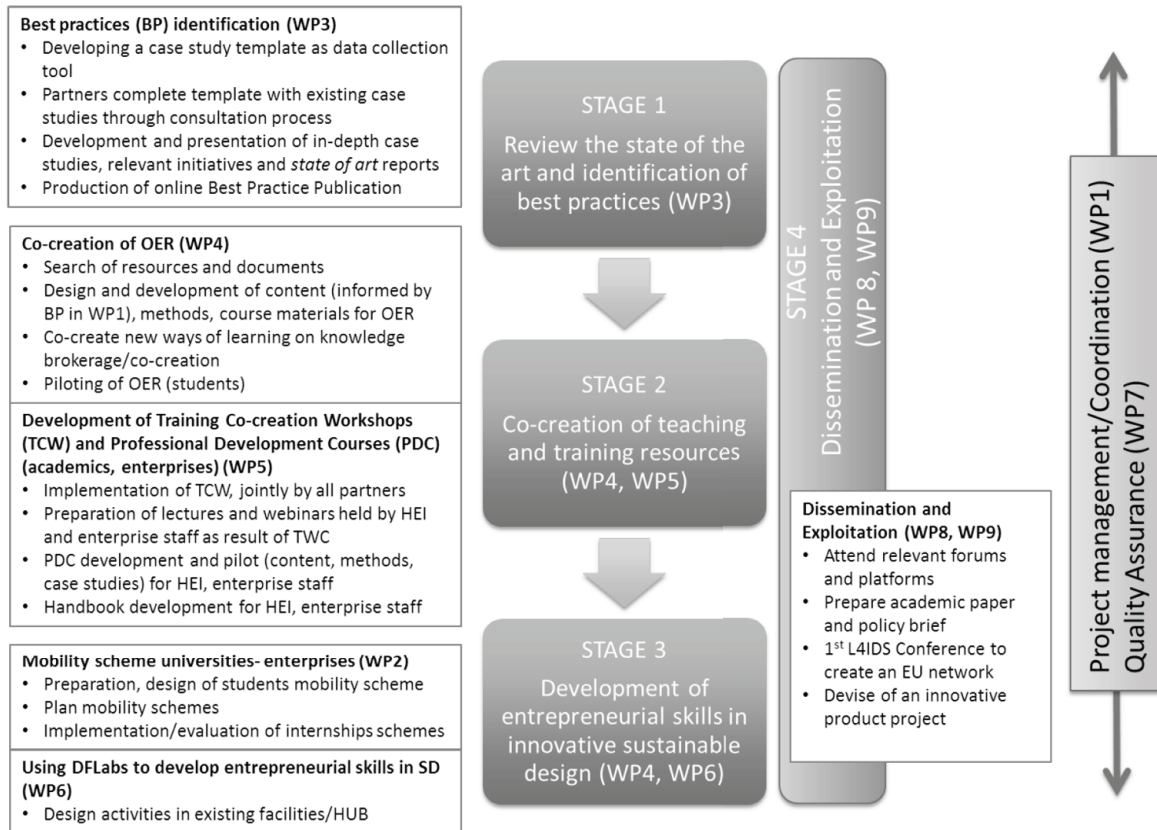


Figure 1. Circular Design – Learning for Innovative Design project rationale

To map the position of potentially new educational tools and methods, this research makes an overview of previous initiatives around DfS in higher education, focusing on those that rise above the level of a single institution. By mapping these initiatives on the triangle Design for Sustainability (DfS) - Knowledge Co-Creation – Innovation we will articulate the gap which the L4IDS project aims to bridge. As a basis for this inventory, the DfS evolutionary framework has been used (see figure 2).

2 INVENTORY OF DESIGN FOR SUSTAINABILITY IN HIGHER EDUCATION

The concept of sustainable design as a specialism within design, business and manufacturing is not a new one. Writers and educators such as Victor Papanek [3] and Buckminster Fuller [4] were advocating a change in the way we taught students how to design and look at the world in which they live. In parallel with this, many other experts [5] [6] were highlighting the difficulties being caused by industrialization and global trade in the natural environment. Issues such as the dramatic impact of the global population on ecosystems; the strains on the global and local economic systems and the challenges meted by social inequity were starting to be raised by scientists, economists and even designers as early as the 1960s. These are now finally accepted as real problems for today's students and professionals and for the world as a whole. They now provide clear opportunity both to graduates and to businesses as fields in which they can provide and develop expertise with a view to mitigating past and future problems.

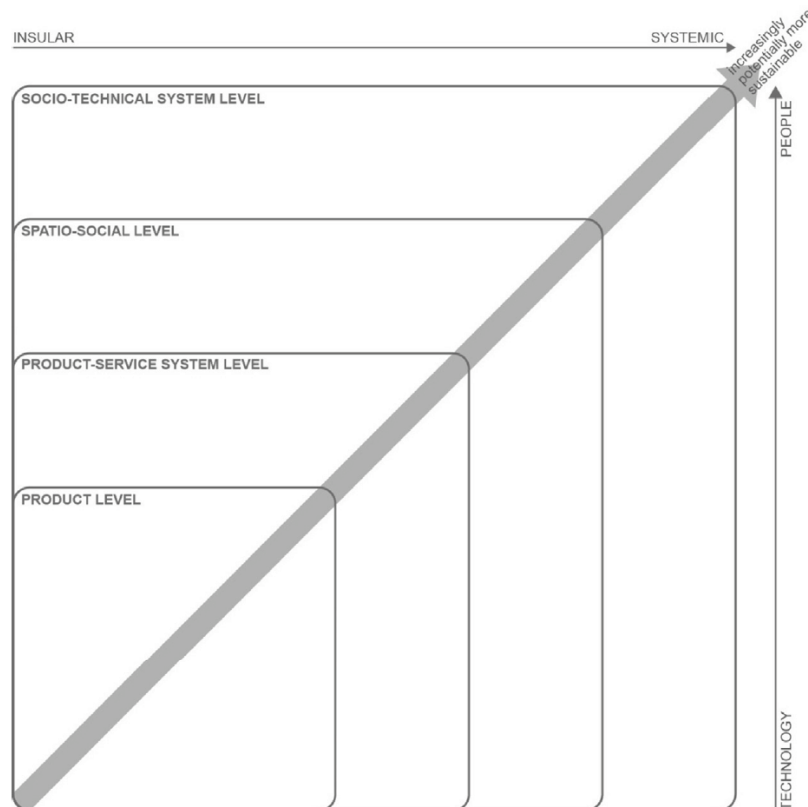


Figure 2. DfS Evolutionary framework [2]

Several studies have compared efforts at different institutions with regard to the inclusion of sustainability within design (engineering) curricula. Based on experiences at three European undergraduate programs, Dewulf [7] explores how to truly integrate sustainability in a program beyond a single module. Also studying multiple programs, de Eyto [8] makes a first attempt at exploring the impact of such integrated teaching on the professional careers of designers and engineers. Finally, again based on experiences from multiple institutions, Wever [9] gathers early experiences from educators in teaching a circular economy perspective to designers, exploring how the required skill set is different from regular design as well as design for sustainability

There is growing evidence that the design business has a keen appetite for graduates who have a sustainable literacy as an integral part of their undergraduate skill set [10]. Unfortunately, many educators are at odds with each other as to how to effectively implement this subject. Opinions diverge from arguments on stand-alone courses [11], to others for embedding sustainable development inherently into all third level programs [12]; while the most radical re-builds the entire curriculum with sustainable development underpinning it [13]. Besides education also businesses are starting to address the lack of capacity in sustainable design practice [14].

The UK Design Council's Scoping Report from 2005 [15]. It undertook a broad brush assessment of existing Sustainable Design Education in the UK and compared it to what they term Mainstream Design Education. They concluded that many of the differences between Mainstream Product Design Education (MPDE) and Sustainable Product Design Education (SPDE) mirror the differences between Mainstream and Sustainable Product Designers. The report states that in general, MPDE still focuses primarily on equipping students for positions within mainstream product design which sees the mainstream marketplace as providing the main employment opportunities. [15]

Research conducted by de Eyto, McMahon et al [16] concluded that there were various limitations to the nature of DfS within higher education in most EU countries. Specifically, the fact that while DfS was topical and of interest to undergraduate and master's students, the teaching faculty in many of the EU design HEIs (Higher Education Institutes) were limited in their capacity to deliver high quality case studies and DfS expertise.

A variety of new programs and initiatives have developed since the late 2000s which have sought to address this imbalance in design education. (Under)graduate Design Programs at TU Delft (NL) [17]

[18], Loughborough University (UK), University of Limerick, Institute of Technology Carlow (IRL) and others developed specialist modules in DfS as a means to integrate it within the standard curricula. In addition, many other engineering and industrial ecology programs throughout the EU have included DfS and Circular Economy (CE) as a specific area of study within their programs.

3 MAPPING THE CIRCULAR DESIGN – L4IDS EDUCATIONAL TOOLS

The L4IDS project distinguishes itself by focusing on IDfS, hence going beyond incremental innovations. The current leading approach for such innovation is CE thinking, although there are now also many incremental innovations being promoted as solutions for a CE. For cases to be good examples of innovative design for sustainability and/or circular economy, they need to go beyond the redesign of an existing product within an existing and unchanged business model or socio-technical system context.

While there are examples of case study or best practice publications within circular economy (e.g. [19], [20], [21]), the one the L4IDS project proposes will:

- have a focus on projects utilizing co-creation approaches,
- describe the actual processes, and not only final results,
- explicate the learnings for the stakeholders involved.

As this will be a co-design for sustainable learning processes publication, the successful learning will be more important for the inclusion of cases than the successful innovation. This is also interesting because of the fact that we are studying the combination of DfS strategies with Co Creation processes, so that the publication will showcase a methodology that combines the environmental approach with the social sciences leading to the IDfS.

By doing so, the relevance of the case descriptions for designers will be maximized, and therefore the usability of the publication within the L4IDS project. It will be utilized as study material in the student exchanges, and in the training material for the Professional Development Course, and within the Open Educational Resource. The selection criteria for the best practice will be that they have:

- Process design defined.
- Product, service, business model, system.
- Academic/professional transfer.
- Circular Economy point of view.
- Real (or relevant part) implementation tested.
- Sustainable and/or social strategies adopted.
- Easy to evaluate through indicators.

That means, in addition to the previous criteria; we will focus on cases with measurable results.

The initial results of the mapping exercise shows the area in which the educational tools and methods that will be developed in the L4IDS project should be located, in order to contribute to existing tools and methods in the field. See figure 3.

4 CONCLUSIONS

Masters programs have developed across Europe that demonstrate an expanding interest in DfS, CE and Eco Design. Many innovative approaches to the teaching of DfS and CE have been outlined at EESD (Engineering Education for Sustainable Development) and E&PDE conferences however it is the link between CE and participatory/Co-Design that is under development here as an opportunity for further research.

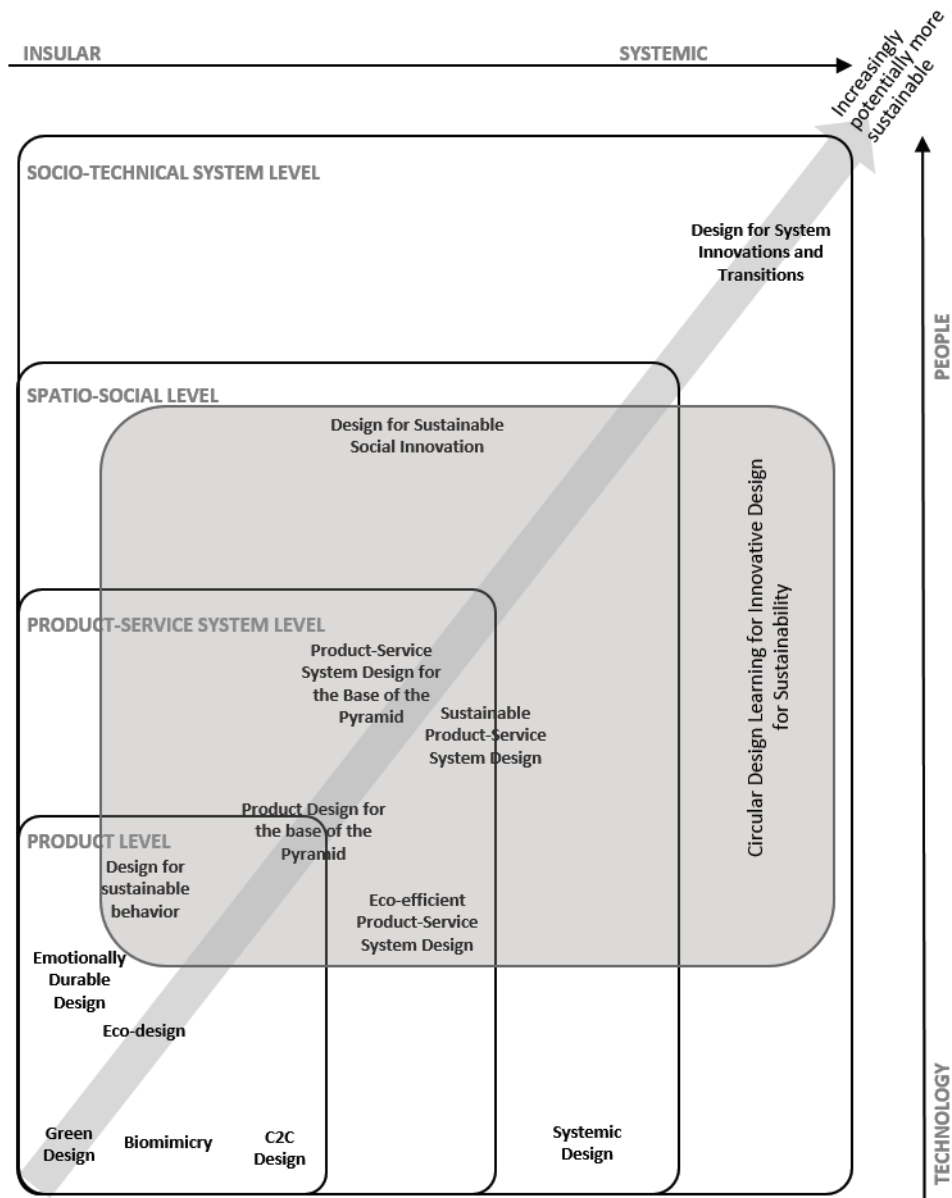


Figure 3. Circular Design Project within the DfS evolutionary framework (adapted from [1])

The Circular Design project aims to build on the experiences of the undergraduate and masters' level of learning around DfS and to link it with SME needs in a CE environment. Many of the DfS programs that currently exist have a real challenge in implementing their learning within societal and industrial contexts. It is intended that the use of co-design methodologies alongside of CE strategic approaches will provide a link between stakeholders within the real economy. i.e. the SME sector and the students.

Moreover, this paper serves as a call for contributions to others in the field, to contribute their best practices, both in the form of real-world cases and in the form of educational set-ups.

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