

## Explore the Intriguing Intersection of the Circular Economy and its Digital Transition, with a Focus on Long-Lasting Products

The transition towards a more resource-efficient society is a core goal of governments in Europe and worldwide. In March 2020, the European Commission adopted the new CE action plan (CEAP)<sup>1</sup>, as one of the main building blocks of the European Green Deal, Europe's new agenda for sustainable growth. The EU's new circular action plan paves the way for a cleaner and more competitive Europe. The CE comprises an integral approach to a resource-efficient future, necessitating the cooperation of stakeholders along the value chain. To achieve this, next-generation designers need to link product and service design with (reverse) supply chain management, manufacturing technologies, product and service use, and product treatment and end-of-life (EoL), while making innovative use of digital technologies<sup>2</sup> (such as blockchain, digital twin and AI). This holistic approach will be the focus of the proposed invited track session. Achieving circularity in various innovative and complex industry sectors is very challenging but if we succeed, it would make a massive impact and have a spill-over effect on other innovative industry sectors. These challenges may increase when dealing with products with long-lasting life cycles. The absence of intelligent models, guidelines and decision support systems that can aid next-generation designers to incorporate circularity in product design, manufacture and life cycles in practice represents a significant gap in the state-of-the-art.

We invite academics, industry experts and policy makers to submit papers that explore the following two major topics but not limited to:

- 1) New guidelines, frameworks, decision support systems and digital tools to incorporate and measure circularity in product and service design, (reverse) supply chain management, manufacturing technologies, product and service use, and EoL.
- 2) Studies to understand and recognise cross-sectoral commonalities and differences in incorporating circular economy strategies, and standards and its digital transition.

This invited track distinguishes four perspectives that are particularly relevant for a transition to a digital CE. We invite submissions that consider the above two major topics with the following four perspectives.

- (a) **Product and service design:** Products such as EV batteries, industrial robots, and outdoor power tools, among others that are suitable for upgrading, reuse, refurbishing or remanufacturing require different design strategies, user involvement processes, assembly-disassembly processes, and marketing strategies compared to more traditional products. Digital technologies such as blockchain, digital twin, and AI are important enablers for more circular products and services.
- (b) **Reverse supply chains:** The EoL recovery and collection of long lasting products for refurbishment, remanufacture or recycling will require new kinds of collaborations in the value chain, as well as new ways of data acquisition and data management. This perspective focuses on the organization of reverse supply chains for circularity.
- (c) **Users and stakeholders:** These are customers, product users, governments and other stakeholders (retailers, NGOs, etc.). The engagement of end-users and other stakeholders is vital for the success of any circular offer or strategy. This perspective focuses on stakeholder engagement in the transition towards more circularity.
- (d) **Systems:** When assessing the socio-economic and environmental aspects of new circular offers, a systems perspective is important to avoid sub-optimisation in a small segment with adverse effects elsewhere. Scenario building and simulation tools for CE need to be further developed to support decision making when trade-offs occur. This perspective aims to ensure economic and environmental benefits and to support change related to circularity.

### Session Chairs:

Dr Pezhman Ghadimi, School of Mechanical and Materials Engineering, University College Dublin, Ireland.

Prof Vincent Hargaden, School of Mechanical and Materials Engineering, University College Dublin, Ireland.

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<sup>1</sup> [https://ec.europa.eu/environment/strategy/circular-economy-action-plan\\_en](https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en)

<sup>2</sup> Hedberg et al., (2020). The circular economy: Going digital. European policy centre, 1-120. [https://www.epc.eu/content/PDF/2020/DRCE\\_web.pdf](https://www.epc.eu/content/PDF/2020/DRCE_web.pdf)