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Creativity and design practices: How can we be creative in designing systems?

Hilda Tellioğlu
TU Wien, Artifact-Based Computing & User Design
hilda.tellioglu@tuwien.ac.at

Creativity can be broadly defined as the ability to generate novel and valuable ideas, solutions, or products. Creativity encompasses a wide range of activities, from artistic expression to problem-solving in various domains, and it plays a pivotal role in human innovation and progress. In this paper, I am interested in the relationship between creativity and practice-oriented design processes.

Robert Keith Sawyer's *Four Ps Framework* highlights the interplay between four factors in fostering creativity: Person (individual characteristics), Process (cognitive and problem-solving processes), Product (the creative outcome), and Press (the sociocultural context) (2012). The *Dual-Process Theory* (De Dreu et al., 2011) suggests that creativity involves two distinct cognitive processes by balancing these processes: divergent thinking (generating multiple ideas) and convergent thinking (evaluating and selecting the best ideas). J.P. Guilford's work laid the foundation for the *psychometric approach* to creativity assessment (1950). He proposed that creativity can be quantitatively measured through various tests and dimensions, such as fluency, flexibility, originality, and elaboration. The *Creative Cognition Approach* of Finke et al. (1992) explores the cognitive processes underlying creative thinking, including mental imagery, problem representation, and insight. It emphasizes the role of mental processes in creative idea generation. Mihaly Csikszentmihalyi's work (1996) focuses on the social and cultural factors that influence creativity. He argues that creativity often occurs in a state of *flow*, where individuals are fully immersed in their creative tasks.

Creativity and design are intertwined concepts, and several approaches and frameworks have emerged to address the relationship between them. *Design Thinking* is a human-centered problem-solving approach that places a strong emphasis on empathy and iterative ideation (Brown, 2008). It involves understanding the needs of users, generating creative solutions, prototyping, and testing. Design thinking has become a cornerstone of innovation in various fields, emphasizing the integration of creative processes into design. *Human-Centered Design* prioritizes the needs and perspectives of end-users in the design process (Norman & Draper, 1986). It encourages designers to employ creativity to develop solutions that are both functional and user-friendly. The *Creative Problem Solving*

Approach (Isaksen et al., 2000) provides a structured framework for problem-solving and idea generation. It involves stages such as problem-finding, fact-finding, idea-finding, solution-finding, and acceptance-finding, where creativity is vital in generating innovative solutions. *Co-Design and Participatory Design* involve collaboration between designers and end-users or stakeholders (Sanders & Stappers, 2008). These approaches leverage the creativity and insights of all involved parties to co-create solutions that meet diverse needs and perspectives.

These approaches and some more provide a structured way to integrate creativity into the design process, whether in the development of products, services, or experiences. They emphasize the importance of empathy, iteration, and interdisciplinary collaboration in fostering innovative design solutions.

The latest *debates about creativity and design processes* encompass a wide range of topics, reflecting the evolving nature of design and its impact on society, technology, and culture, like ethical design and responsibility (Irani, 2021), inclusive and accessible design (Henry, 2021), sustainable ad eco-friendly design (Bhamra et al., 2011), AI and automated design (Shneiderman, 2016), etc.

Speculative design as a creative and forward-looking approach to design explores and provokes questions about possible futures, often challenging existing assumptions and norms (Dunne & Raby, 2013). It involves the creation of design artifacts, scenarios, or narratives that are not necessarily intended for immediate practical implementation but serve as a means to stimulate discussion, debate, and reflection on potential societal, technological, or cultural changes. Speculative design is closely associated with critical thinking and can serve as a thought-provoking tool for addressing complex issues and exploring alternative futures.

Several questions remain: How can one be creative in designing systems? Do we need combinations of methods to consider several design aspects? How much can we afford to be creative while designing? Is speculative design a useful way to support creativity and envisioning the future while designing systems?

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