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THE STATE OF USER-CENTERED DESIGN IN THE SPACE DOMAIN THROUGH A LITERATURE SCAN OF THE PAST IAF PUBLICATIONS.

Abstract

Since decades, both scholars and the industry have investigated and recognized the role that User-Centered Design (UCD) plays in new product, service, and value creation, in both physical and digital domains. There are multiple ways this approach is defined in the literature, including Human-Centred Design (HCD) and People-Centred (PCD) Design. However, in its essence, UCD is an iterative process in which designers and creators focus on the users and their needs in each phase of the creation process.

Historically, within the technology-driven space industry, this approach has been relatively rare. If applied, it focused on the human factors and interior design in relation to human spaceflight. This, however, has been changing due to space industry transformation towards more commercial business models and interdisciplinary approach.

This paper demonstrates the changing landscape of how the user- and human-centered methodologies were evolving within the space industry through a literature scan of the past IAF papers in the last 71 years. By analyzing the depth and frequency of the publications related to the topic, the authors contribute to the definition of what UCD means in the context of the space domain, and how its understanding has been changing over time. For the purpose of this paper, the authors developed a specific taxonomy system to cover different types of UCD applied to space, both in relation to space exploration and terrestrial applications. That covers the areas related to product and industrial design, architecture, service design, strategy, human to machine interface design (UX/UI), communication design, design research and theory, fashion design, future foresight and speculative design.

The thematic literature review uses both quantitative and qualitative approaches, performed in two phases: firstly, by automatically filtering the abstracts within the online IAF database using key words based on a taxonomy in a semi-systemic way. In the second phase, a more in-depth analysis is performed on a selection of papers and a mapping of an evolution of each area is provided.

As of early 2023, there are 4,702 papers using the word "design" (9,9%), out of which 2,161 papers mention "human" and 651 discuss the "user". By understanding the context in which these words are used, this paper contributes to our understanding of the trend underpinning the transformation of the

space industry, as well as understanding the research gaps of using UCD in both upstream and downstream space applications.