POPULAR SCIENTIFIC ABSTRACT

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Thesis title: Advancing adoption of additive manufacturing - on part identification and knowledge management

Additive manufacturing (AM) has been around since the 1980s, and its fields of use expanded from prototyping to include tooling and end-use parts. However, despite continuous growth, AM has yet to become mainstream in manufacturing, as it has several barriers and limitations. This thesis advances AM adoption by investigating it from two perspectives: knowledge management (KM) for AM and part identification for AM.

AM knowledge and KM are important because the misconceptions and hype around AM prove that organizations lack general AM knowledge and awareness. Furthermore, organizations without adequate AM knowledge cannot efficiently adopt AM because they cannot strategize about AM or build solid business cases at the strategic level, or because they do not have the technical capabilities to design for AM or do the actual printing at the operational level. Thus, operationalizing AM knowledge to establish knowledge creation and sharing mechanisms is required to advance AM adoption.

Furthermore, in order to build suitable business cases, organizations must be able to identify the most suitable part candidates. Currently, two approaches exist: a data-driven approach and a user-driven approach. The data-driven approach requires a lot of data, and the user-driven approach requires the organization's workers to have sufficient AM knowledge. However, the current part-identification literature does not account for these needs lacks theoretical underpinning.

Therefore, this thesis moves beyond current research and offers suggestions for advancing AM adoption from two perspectives. The first paper operationalizes AM knowledge by using communities of practice (CoPs) to establish knowledge creation and sharing mechanisms. The second and third papers infuses part identification with KM to enable holistic assessments tailored to the focal organization based on theoretical underpinnings. Furthermore, the third paper provides guidelines for designing part-identification approaches for AM.

The findings suggest that CoPs are suitable for operationalizing AM knowledge. The findings also suggest that the participant's background (design-oriented or supply chain-oriented) moderates the link between the type of approach (data-driven or user-driven) and the outcome (parts for redesign or 1:1 substitution). Additionally, the findings highlight the importance of combining both design-oriented and supply chain-oriented knowledge to provide a holistic assessment and to pre-assess the organization's AM knowledge and data foundation.