A systematic approach to service oriented product development

Throughout the last years, manufacturing industry has experienced a trend towards a higher level of operational integration with their customers, i.e. manufacturers differentiate their offer from competitors by combining physical and software products with service plans and service support operations. This integration of manufacturing and service business holds a number of potential advantages, such as optimised operational performance and improved insights into use phase processes. To realise these potential advantages, products and service operations must fit to and support each other, which calls for an integrated approach to their development. The integrated development of solution concepts spanning products, service delivery systems and matching delivery business models is the theme of this thesis. A design based approach - service oriented product development - is proposed for the creation of these Product/Service-Systems (PSS). The contribution builds on the foundations of engineering design and product development research performed at the Section of Engineering Design and Product Development at The Technical University of Denmark, also dubbed the Copenhagen school. Service oriented product development is based on the analysis of existing product life-, business- and use processes. This helps to identify the opportunities of creating improved solutions, through the combined delivery of products and services, potentially supported by altered customer relationship models. The research contribution is based on three industrial case studies, each emphasising several aspects of the case companies’ experiences and challenges in the transition from manufacturing- to service orientation. Two of the case companies are suppliers of equipment to the shipbuilding industry, the other is a global supplier of refrigeration technology. The main contributions documented in this thesis are the following: 1. A systematic approach allowing the visualisation of product life and related use activities is defined. 2. Service oriented product development must consider a broad range of actors not directly associated with use processes, but rather linked to the product life through associated processes and crossing life cycles. 3. Synthesis of PSS concepts relies on the iterative detailing and concretisation of elements utilising three view domains, being artefact-, activity- and actor based. 4. The development of PSS concepts is a collaborative high level effort, spanning across all or many functional areas of the company. 5. The manufacturing company needs to create an organisation or team in every affected functional area in order to contribute to, receive and implement concepts from the collaborative service oriented product development activity.