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*Published in:*

Proceedings of the 16th International Conference on Engineering Design, ICED07

*Publication date:*

2007

*Document Version*

Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*

Matzen, D., Sakao, T., & Sandström, G. Ö. (2007). Comparison of Design Research on Manufacturing Firms Moving Towards Services. In Proceedings of the 16th International Conference on Engineering Design, ICED07: Theories and Methodologies (16 ed., Vol. 1, pp. 302). Paris: Design Society.

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# COMPARISON OF DESIGN RESEARCH ON MANUFACTURING FIRMS MOVING TOWARDS SERVICES

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TECHNISCHE UNIVERSITÄT DARMSTADT

Session X-2 - Approaches and Rationales in Design



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## Motivation

Corresponding to a steadily advancing integration of products and service operations in the manufacturing industry, a number of research groups within the design community are working with issues of integrated product and service development. Although closely related, the evolving groups focus on different research dimensions, and thus the terminologies and concepts used in research contributions are not fully compatible.

This research attempts to promote and support an evolving collaboration between the different research groups within the design community, by analysing and comparing the key contribution areas of three of the existing groups, namely the groups of

- ▶ Integrated Product and Service Engineering, IPSE, (research project in Sweden)
- ▶ Service/Product Engineering, S/P (research network in Japan) and
- ▶ Product/Service-System development, PSS, (research group at DTU in Denmark).

The groups have recently founded a research network under the heading of *International Product Service System Design Research Community* including also researchers from the Faste laboratory in Sweden, the SFB/TR 29 programme and the pmd group of TU-Darmstadt in Germany as well as the G-SCOP Laboratory at INPG in France.

## Methodology

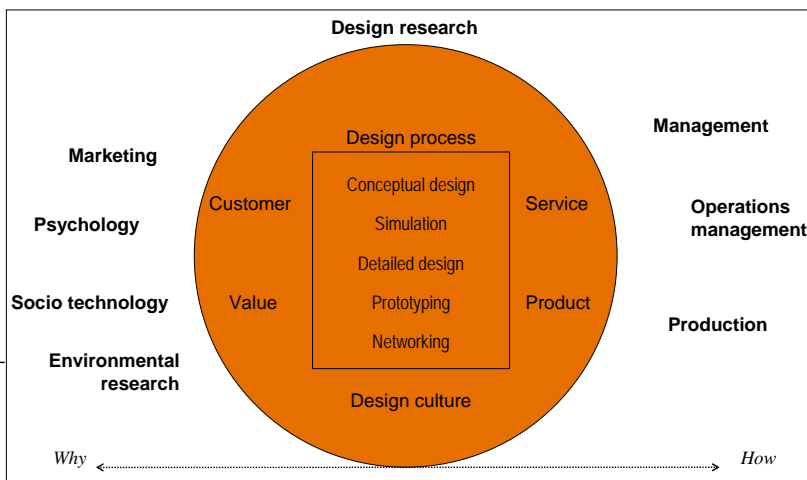
A review of the groups' research contributions is carried out and the main characteristics of their research is compared. Furthermore a comparative table of concepts and terms used in the contributions of the three groups is compiled. Based on this comparison, 3 focal research dimensions are identified. Finally the research domains links to other related research domains outside the design community are identified.

The research is deliberately focused on the research groups of the participating authors, in order to support the exchange of concepts and approaches within the evolving network.

## Domain Links

Design research within PSS links with a large number of other domains of both research and industrial activity.

The figure shows one view on what is the object of design research in PSS, and what external domains of research PSS design research links to.



Areas in which further investigation or closer collaboration with other research domains and groups can be of importance.

## Research dimensions and groups' focus areas

The figure below defines a number of important dimensions within the domain of PSS development.

The boxes illustrate the focus areas and characteristics of the analysed research groups' contributions. The embedded illustrations are drawn from the respective groups' publications.

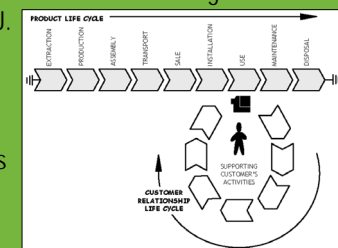
The necessary changes in the customers operational patterns and dispositions is not researched into.

It seems as if a main barrier against the dissemination of PSS business models is the necessary changes and alignment of customers organisation and activity.

An understanding of the different types of relationships and their characteristics is sought in the research at DTU.

The necessary alignment between supplier and customer is emphasized.

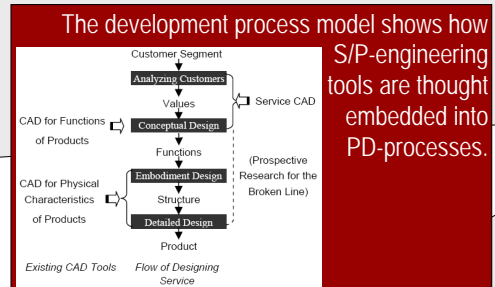
The *Customer Activity Cycle* model and its application in analysis and scenario building visualises the activity sequence of the customer and his interactions with the supplier network over the customer and product life cycle periods.



There still seems to be a lack in research on models and integration tools and technologies for the building of dynamic, yet stable and manageable delivery networks.

The PSS research community needs inputs from other research domains, such as supply chain management, management technology research and also areas such as agile manufacturing etc.

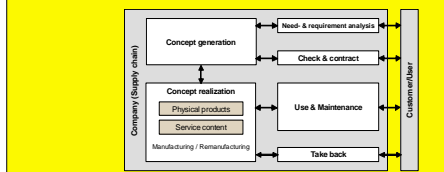
SMEs need guidance and support in restructuring their operational organisation and task division for the delivery of PSS. The IPSE project aims for models providing this support.



One view upon the object of PSS development is the support of a manufactured products through its complete life cycle. The supplier retains operational responsibility throughout all life phase systems of the product.



The IPSE framework model supports the communication channels for understanding the customer and identifying customer needs.



The S/P-Engineering tools enable the creation of activity scenarios describing the activity sequence in the single service delivery interaction. Different customers perception of the service interaction is modelled by the integration of persona models.

The IPSE-methodology is developed and tested together with 12 SMEs in two learning networks. It is a stepwise methodology guiding companies from idea generation, finding customer needs, make a business analysis of the concept and, how to develop and deliver the product and service offering.

The exchange of information between supplier and customer – and between partners in the supplier network, is not addressed specifically in the analysed research contributions. Nonetheless, many contributions point to the benefit potentials of information feedback from use phase to e.g. development.

## Acknowledgements:

This research work was partially supported by a Research Fellowship Program by Alexander von Humboldt Foundation in Germany and the Swedish Governmental Agency for Innovation Systems (VINNOVA). The authors would also like to thank the companies participating in the research exchange networks.

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