



School of Engineering

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# Product-Service Systems

## 7.5 ECTS Post Graduate course

### Background

A Product-Service System (PSS) is an integrated combination of products and services. This concept embraces a service-led competitive strategy, environmental sustainability, and the basis to differentiate from competitors who simply offer lower priced products, moving into more value-based product offerings.

A PSS can be thought of as a market proposition that extends the traditional functionality of a product by incorporating additional services. Here the emphasis is on the 'sale of use' rather than the 'sale of product'. The customer may pay for using an asset, rather than its purchase, and so benefits from a restructuring of the risks, responsibilities, and costs traditionally associated with ownership. Similarly, the supplier/manufacturer can improve their competitiveness as these 'solutions' may be clearly differentiated from product-based offerings while simultaneously retaining asset ownership that can enhance utilization, reliability, upgrading, design, and protection.

The concept of a PSS also embraces sustainability. The underpinning expectation is that a pure PSS will have a lower environmental impact than, simply, a more traditional transaction where an enterprise manufactures products but then transfers responsibilities of ownership and use to the customer. An illustration of both the business and environmental benefits of a PSS is apparent in the Total-Care Package offered to airlines by Rolls-Royce plc. Here, rather than transferring ownership of the gas turbine engine to the airline, Rolls-Royce (R-R) deliver 'power-by-the-hour'. The gas turbine technology is world leading and the spares and maintenance service they offer exemplary. Furthermore, as R-R maintains direct access to the asset they can collect data on product performance and use. Such data can then enable the improvement of performance parameters (for example, maintenance schedules etc.) to improve engine efficiency, improve asset utilization, and so reduce total costs and the environmental impact.

PSS is a potentially valuable concept for manufacturers based in developed economies. Manufacturing industries worldwide continue to undergo colossal change. Many traditional producers are increasingly challenged by countries with a low-cost labour base, with the survival of many European operations continuously in doubt, and the relocation of production facilities prolific.

PSS innovation and development is 'simplistically' seen as the development efforts of making sure that the function that is the carrier of the PSS is being developed in a suitable way; taking care of the integrated service & artefact development processes.



## Aim and goal

The course aims to give an overview of the current literature within the field and the practical ability to adopt and implement parts of the containing methodologies in a case study approach.

After the course, the successful participant should show the following abilities:

- Know central pieces of literature within the PSS field, including main contents, area of applicability.
- Be able to in detail discuss chosen product- and service oriented development theories.
- Be able to apply methodologies supporting PSS development.
- Be able to discuss trends and development needs within the area of PSS development.
- Be knowledgeable in research method approach for PSS

## Course set-up

The course builds upon a number of central literature readings (see literature). In the course, PhD students' team up (2-3 persons per team) choose readings for deeper study with reference to own research focus. The group writes a short write-up on the reading that summarizes the parts of the methodology together with an analysis of the applicability in terms of fields, and advantages/disadvantages of the methodology. This work is also presented for the other groups.

A chosen 'set' of methodologies/tools/methods are then applied to a suitable problem and documented in a case report. The results from the write-up and the case study are then presented for the entire class in order to compare and discuss the different methodologies. Finally, every student writes a reflection report where a personal view on the development needs for the area and analyses the relation between the literature and the personal research field. If desired, the reflection report can be in paper form for dual use in research process.

## Literature

Below is a list on some books and papers that can be seen as input for the course work.

- Books
  - New Business for Old Europe - Product-Service Development, Competitiveness and Sustainability
    - Edited by Arnold Tukker, and Ursula Tischner.
  - Eco-service Development - Reinventing Supply and Demand in the European Union
    - Siegfried Behrendt, Christine Jasch, Jaap Kortman, Gabriele Hrauda, Ralf Pfitzner and Daniela Velte
- Papers
  - T A Alonso-Rasgado, G Thompson, B O Elfström. (2004). The Design of Functional (Total Care) Products. Journal of Engineering Design. Vol: 15. Issue: 0. No.: 6. pp 510-540.
  - Aurich, J., Fuchs, C., and Wagenknecht, C. (2006) Life cycle oriented design of technical product service-systems. J. Cleaner Prod., 14(17), 1480–1494.
  - Baines, T.S., Lightfoot, H.W., Evans, S., Neely, A., Greenough, R., Peppard, J., Roy,



R., Shehab, E., Braganza, A., Tiwari, A., Alcock, J.R., Angus, J.P., Bastl, M., Cousens, A., Irving, P., Johnson, M., Kingston, J., Lockett, H., Martinez, V., Michele, P., Tranfield, D., Walton, I.M. and Wilson, H. (2007), "State-of-the-art in product-service systems", Journal of Engineering Manufacture, Vol. 221 No.B, pp.1543-52.

- Mont, O. PSS – a review of achievements and refining the research agenda. (2006) Editorial. J. Cleaner Prod., 14(17).
- Morelli, N. (School of Architecture and Design, Aalborg University) (2003) Product service-systems, a perspective shift for designers: a case study – The design of a telecentre. Des. Stud., 24(1), 73–99.

### Examination

To pass on the course the following is required:

- Approved write-up, and oral presentation of chosen literature
- Approved application report (case study) including oral presentation
- Approved reflection report
- Approved opposition on other group presentation

Examiner is Professor Tobias C. Larsson (course certificate will be issued by Blekinge Institute of Technology)

### Schedule

The course, that is international, consists of physical meetings, web meetings, and group work at, and in between, the meetings.

Scheduling will be done according to participants' availability.

### Teachers

The main teachers are (other experts in the field will be involved and invited):

- Professor Tobias C. Larsson (PhD)
  - Product Innovation, Blekinge Institute of Technology.
- Professor Göran Broman (PhD)
  - Sustainability Assessment, Blekinge Institute of Technology.
- Associate Professor Andreas Larsson (PhD)
  - Innovation Engineering, Lund University of Technology.
- Assistant Professor Åsa Ericson (PhD)
  - Division of Functional Product Development, Luleå University of Technology.
- Assistant Professor Anna Öhrwall-Rönnbäck (PhD)
  - Industrial Economics, Linköping University.
- Adjunct Professor Ola Isaksson (PhD)
  - Volvo Aero

### Contact

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