



# **Thesis Proposals**

## **Spring 2020**

### **Operations Management**

**Version 1.2**

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**Management Science - DTU Management**

# Writing your thesis within Operations Management

Welcome to the presentation of thesis proposals offered within the Operations Management group at the department of Management Engineering! With this booklet we hope to inspire you to select an intriguing topic for your coming thesis work.

Although the booklet is primarily directed towards MSc students, a large part of the topics presented will also be able to be scoped to match the academic level and aims of a BSc or BEng thesis project. The booklet could therefore also serve as inspiration to BSc and BEng students.

Some thesis projects are carried out internally here at DTU whereas others are performed in close collaboration with external organisations. In addition to the proposals listed in this booklet, you are welcome to suggest your own ideas for a project topic. If you do so, you need to consult a supervisor in order to scope the project so that it is academically sound, relevant and ambitious but also realistic to achieve within the project period. You should check with the potential supervisor whether you have the relevant prerequisites for carrying the specific thesis topic.

We look forward to meeting you as a thesis student in Operations Management!

The following list of faculty members are potential supervisors:

- Michael Bruhn Barfod, Associate Professor ([mbba@dtu.dk](mailto:mbba@dtu.dk))
- Lars Hvam, Professor ([lahv@dtu.dk](mailto:lahv@dtu.dk))
- Peter Jacobsen, Associate Professor ([peja@dtu.dk](mailto:peja@dtu.dk))
- Martin Kidd, Assistant Professor ([mpki@dtu.dk](mailto:mpki@dtu.dk))
- Melanie Kreye, Associate Professor ([mkreye@dtu.dk](mailto:mkreye@dtu.dk))
- Allan Larsen, Professor MSO ([alar@dtu.dk](mailto:alar@dtu.dk))
- Harilaos Psaraftis, Professor ([hnpсар@dtu.dk](mailto:hnpсар@dtu.dk))

Please note that it is indeed also possible to write your thesis in collaboration with other research groups within the Management Science division as well as across the department.

We wish you good luck in pursuing an interesting and ambitious thesis project!

Best regards,

The OM group

# Michael Bruhn Barfod



## Position:

Associate Professor, Operations Management

## Research Area:

Assessment methodologies used in planning. Specific areas of interest:

- Applied decision analysis, sustainability assessments and customized decision support systems
- Problem structuring and stakeholder involvement in decision support processes
- Model building from initiation to implementation of various methodological approaches and data treatment

The research in particular applies theory in practice, and has often been carried out using real case data in various projects. These projects have besides articles (national as well as international) lead to the research results being applied both in industry and in the education provided at DTU.

## Teaching:

I am teaching the following courses:

- 42580 Engineering Work 1 (5 ECTS) (BSc, Autumn)
- 42583 Engineering Work 2 (5 ECTS) (BSc, Spring)
- 42879 Decision Support and Strategic Assessment (5 ECTS) (MSc, Autumn)

# Lars Hvam

## Position:

Professor, Operations Management



## Research Area:

- Mass customization
- Complexity Management
- Configuration Management
- Production systems

## Teaching:

I am teaching the following courses:

- 42406 Introduction to Production (5 ECTS) (BSc, Autumn)
- 42451 Mass customization – application of product configuration (10 ECTS) (MSc, Autumn)
- 42452 Complexity Management (5 ECTS) (MSc, January)

# Peter Jacobsen

## Position:

Associate Professor, Operations Management



## Research Area:

Develop and apply methods within:

- Production systems - design, planning and optimization
- Logistics - planning and optimization of networks and supply chains
- Optimization of the complexity in production and logistics/SC systems
- Simulation - validation, verification and optimization
- Performance measurement/management
- Digitalization, big data and industry 4.0
- Industrial/healthcare area

## Teaching:

I am teaching the following courses:

- 42371 Design of Lean Production and Service Systems (10 ECTS) (MSc, Spring)

# Martin Kidd

## Position:

Assistant Professor, Supply Chain Management and Logistics

## Research Area:



I am interested in supply chain management, more specifically supply chain analytics and supply chain collaboration.

Supply chain analytics involves utilizing tools from

- mathematical/stochastic modelling
- optimization
- machine learning
- game theory

to gain insights from data and enhance decision making within the supply chain contexts such as

- forecasting
- production/distribution planning
- network design
- coordination and collaboration

ultimately to assist in the improved design and management of supply chains.

When it comes to collaboration, the main research questions concern in what ways companies can collaborate within a supply chain and how to incentivize collaboration. In my research I combine both, using techniques from analytics, especially cooperative game theory, to answer questions about collaboration.

## Teaching:

I am teaching the following courses:

- 42380 Supply Chain Analytics (5 ECTS) (MSc, Spring – from 2020)
- 42401 Introduction to Management Science (5 ECTS) (MSc, Autumn)

# Melanie Kreye

## Position:

Associate Professor, Operations Management



## Research Area:

My research focuses on service operations within the manufacturing industry (engineering services). Specific research areas include:

- Service relationships (provider-customer triads, supplier relationships, contract management etc)
- Innovation of service offerings (development of combined product-service offerings, drivers for innovation)
- Global operations in manufacturing and services
- Employee behavior and management
- Management of change in service-driven manufacturing

## Teaching:

I teach the following courses:

- 42543 Management of Change (MSc, Spring)
- 42B85 Servitization (MBA, Spring)
- 42702 PhD introduction course (PhD, Fall)

# Allan Larsen

## Position:

Professor MSO, Operations Management



## Research Area:

Digitalization and automation of the transport and logistics domains within the context of Industry 4.0. Applications of operations research based methodologies such as mathematical optimisation, metaheuristics and discrete event-based simulation to planning and management problems within supply chain management, freight transport and logistics.

Specific interests include;

- Urban freight transport (city logistics)
- Electro-mobility for freight transport
- Demand-responsive transport systems (autonomous vehicles and fleet management)
- Improvements of efficiency in logistics, supply chains, warehousing, manufacturing through the use of simulation methodology
- Supply Chains in Healthcare and Healthcare Operations Management

## Teaching:

I teach the following courses:

- 42587 Introduction to Operations and Supply Chain Management (BSc, Autumn)
- 42875/42992 Transport logistics and transport optimization (BSc+BEng, offered for the last time in Spring 2020)
- 42417 Simulation in Operations Management (MSc, June)



# Harilaos N. Psaraftis



## Position:

Professor, Transport optimisation

## Research Area:

- Transport Logistics
- Specific areas of interest
- Maritime transport
- Green transport
- Vehicle routing & distribution
- Transport policy

Use of quantitative methods in planning and management of transport systems.

## Selected projects:

- SuperGreen, EU FP7 project- overall consortium manager, DG-MOVE (2010-2013).
- RoRoSECA, funded by the Danish Maritime Fund (2015-2017).
- TENTacle, INTERREG VI project, Region Blekinge (Sweden) leader (2016-2019).
- Scandria2Act, INTERREG VI project, Region Berlin-Brandenburg (Germany) leader (2016-2019).
- BlueSiro, funded by the European Space Agency, DTU Space leader (2016-2017).
- SMART MARITIME, DTU scientific advisor, Marintek (Norway) leader, Norwegian Research Council (2016-2019).

## Teaching:

- 42892 Shipping and Port Logistics

# Digital engineering services in manufacturing (MSc)

**PROJECT SUPERVISOR:** Associate professor Melanie Kreye ([mkreye@dtu.dk](mailto:mkreye@dtu.dk))

**BACKGROUND:** Digital technologies associated with Industry 4.0 and include the Internet-of-Things, mobile technologies, context-aware technologies, artificial intelligence, and cloud-based systems are forcing organisations to innovate. Digitization disrupts processes in various industries with particular visibility in manufacturing where not only internal processes change through development such as robotics and distributed production, but also transforms the industry network and cohesion through new value propositions and new collaboration opportunities.

**PROJECT DESCRIPTION:** New digital technologies have enormous potential for further innovation of the individual product and service parts of manufacturing businesses and in particular for the combined PSS offerings. These digital technologies are also at the basis of smart products and create a very different setting for the provision of integrated product-service offerings by a manufacturing firm. Digital technologies have the potential to increase both efficiency and customization, sidestepping trade-offs between these two dimensions. Efficiency can be increased by the use of virtual/remote channels that reduce customer interactions or augmented reality to assist field technicians during product repair activities. Increased levels of customization can be achieved by drawing on IOT data on how customers use products to design improved products and services. Services provided remotely via digital technologies may also lead to a reconfiguration of customer-service networks, traditionally oriented to being geographically close to customer facilities.

**PROJECT PURPOSE:** The purpose of this project is to investigate the changes to the internal and external network of manufacturing firms created through the integration of digital technologies in their engineering services. A more specific focus can be defined by the student(s) in agreement with the supervisor.

**PREREQUISITES:** -

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Improving product quality and reliability through engineering services (MSc)

**PROJECT SUPERVISOR:** Associate professor Melanie Kreye ([mkreye@dtu.dk](mailto:mkreye@dtu.dk))

**PROJECT DESCRIPTION:** In the past years, manufacturing companies have increasingly incorporated services into their business offerings. While this creates a lot of operational challenges, services may also enable them to improve the functioning of their products. Relevant research questions can focus on:

- How can service provision enable manufacturing companies to improve product reliability and functioning?
- How do internal processes need to be structured in order to increase the manufacturer's ability to anticipate product failures and breakdowns?
- How can service operations improve an organisation's responsiveness to product failures?

**PREREQUISITES:** -

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

## Pushing Agile out of its comfort zone (MSc)

**PROJECT SUPERVISOR:** Tabea Ramirez-Hernandez ([tarah@dtu.dk](mailto:tarah@dtu.dk)); Associate professor  
Melanie Kreye ([mkreye@dtu.dk](mailto:mkreye@dtu.dk))

**BACKGROUND:** Rapid changes on the market demand manufacturers to revise their current processes to become more agile. Yet, while agile development methodologies have a history of strong success in software development, challenges arise when transferred into hardware development. Common challenges arise for example, because hardware is not easily refactorable (while software is), hardware prototypes are costly (while software is not), and hardware development follows a rather linear logic (first draft, CAD drawing, prototype, null-series, final product) (while software does not).

**PROJECT DESCRIPTION:** This master's thesis aims to identify the common challenges around agile hardware development, with specific focus on knowledge intensive products of the manufacturing industry, and propose a new framework of (potential) adaptations to the pure agile methods to accommodate the constraints from software development. To achieve this the student will review the academic agile literature and compare these insights with an empirical study at a case company of choice which applies agile to hardware development. The result of the study is a theoretical framework of how agile could be applied to hardware development.

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**PREREQUISITES:** -

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# The role of middle managers in the organisational transition towards engineering services (MSc)

**PROJECT SUPERVISOR:** Madalina Pana ([mpana@dtu.dk](mailto:mpana@dtu.dk)); Associate professor Melanie Kreye ([mkreye@dtu.dk](mailto:mkreye@dtu.dk))

**BACKGROUND:** The provision of services for customers in order to innovate the portfolio of offerings represents for manufacturing companies one of the key attempts to remain competitive in a changing market. Companies like IBM, GE and Rolls Royce increase their revenue by providing solutions that meet customer needs and expectations. In the solutions delivery, different types of offerings that include products and services could remove the hassle of the customer or offer an alternative to the ownership of the asset.

**PROJECT DESCRIPTION:** This process of developing and providing solutions requires changes in the business model as well as in the overall organization. Changes in the strategy, the structure, the values and the processes of the company are a common responsibility during the management of the transition. On the operational level, middle managers are responsible for planning and implementing the change as well as maintaining the ongoing communication between top management and employees. Understanding the group dynamics between middle management during the different activities as discussions, individual and collective meetings and presentations could provide an understanding of the collaboration between middle management during the planning phase of the organisational change required for the servitization process. Specifically, this project proposal focuses on different aspects that contribute to the collaboration between middle management. Potential topics could be challenges during meetings or informal discussion between different middle managers from different department that support the service offerings (e.g. sales, logistics, marketing) or stages of the middle management team development and the overall difficulties that can hinder the collaboration, etc.

**PREREQUISITES:** 42543 Management of Change

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Bed logistics at a hospital (MSc)

**PROJECT SUPERVISOR:** Associate professor Peter Jacobsen ([peja@dtu.dk](mailto:peja@dtu.dk))

**BACKGROUND:** For many hospitals it is a problem to identify where, the beds are at a certain time. It is essential for the hospital to have beds available at the emergency department and not be in a situation where they are running out of clean beads. In addition, the planning of bed cleaning will be easier if the location and identification of the beds are available.

**PROJECT DESCRIPTION:** The project will look at the status for the hospitals and a literature research both domestic and international. The whole logistics from a patient is hospitalized and requires a bed, moved in the bed to different examinations at different departments, released from the hospital. The bed is then transported to the bed cleaning department and returned to the emergency department ready for a new patient.

**PROJECT PURPOSE:** The purpose of this project is to identify different technological solutions. Design of different scenarios measuring sensitivity if more beds are necessary or if newer patient treatments require other types of patient transportation. Make a cost benefit analysis and an implementation plan.

**PREREQUISITES:**

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Distribution of pharmaceuticals at a hospital (MSc)

**PROJECT SUPERVISOR:** Associate professor Peter Jacobsen ([peja@dtu.dk](mailto:peja@dtu.dk))

**BACKGROUND:** Hospitalized patients require both customized/individual together with general pharmaceuticals products. The individual products needs to be available when needed. It is time consuming for the employees to keep track of the different types of products at the medicine room, ordering new and return old pharmaceuticals. Besides, they are forced to keep track of the products and an account as soon as the products enter the hospital.

**PROJECT DESCRIPTION:** The project will look at the status for the hospitals and a literature research both domestic and international and suggest solutions that are more efficient

**PROJECT PURPOSE:** The purpose of this project is to identify different supply chain possibilities for supplying pharmaceuticals from a supplier to the individual patients at a hospital.

**PREREQUISITES:**

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

## Performance of a supply chain (MSc)

**PROJECT SUPERVISOR:** Associate professor Peter Jacobsen ([peja@dtu.dk](mailto:peja@dtu.dk))

**BACKGROUND:** Industry 4.0 is a new production philosophy. In some areas, they are also talking about a supply chain 4.0. Industry 4.0 contains new technological possibilities for companies to produce their products. In order to gain the full benefits the complete logistic chain needs to be considered.

**PROJECT DESCRIPTION:** The project will look at the status for Industry 4.0, possibilities for automation and how the performance of the logistic chain can be enhanced by applying industry 4.0 tools.

**PROJECT PURPOSE:** The purpose of this project is to identify possibilities for enhancing the performance of the logistics by using the industry 4.0 tools.

**PREREQUISITES:**

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).



# The role of indicators in the reduction of carbon emissions from ships (MSc)

**PROJECT SUPERVISOR:** Associate professor Michael Bruhn Barfod (mbba@dtu.dk),  
Researcher George Panagakos (geopan@dtu.dk)

**BACKGROUND:** In April 2018, the International Maritime Organisation (IMO) adopted its 'Initial Strategy on Reduction of Greenhouse Gas Emissions from Ships', which among others introduced the target of reducing CO<sub>2</sub> emissions per transport work by at least 40% by 2030 compared to 2008. No indicator, however, is stipulated in relation to this target, as there is a number of alternative metrics that have been proposed for measuring 'transport work'. Recent results from the MASSHIP project (at DTU Management) indicate the insufficiency of existing indicators to ensure a fair benchmarking of ships in relation to CO<sub>2</sub>-intensity.

**PROJECT PURPOSE:** The project aims to investigate the implications of using the alternative indicators in potential measures designed for meeting the IMO target on carbon emissions from ships and draw recommendations for a more appropriate set of indicators.

**PROJECT DESCRIPTION:** The project will:

- identify the indicators proposed for measuring the energy efficiency of ships
- identify the factors that influence each one of them
- use available data from leading Danish companies to discuss advantages and disadvantages of using these indicators for benchmarking purposes
- assess the implications of using the alternative indicators in potential measures designed for meeting the IMO target on carbon emissions from ships
- draw recommendations on the potential use of these indicators in the framework of the IMO strategy

**PREREQUISITES:**

- Good knowledge of statistics
- 42879 Decision support & strategic assessment

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# The use of a Wave-Analogy algorithm to explore Cyber-resilience in a supply chain (MSc)

**PROJECT SUPERVISORS:** Associate professor Michael Bruhn Barfod, Postdoc Daniel Sepulveda, PhD and external supervisor Pablo Guerra, MSc, from Deloitte, Belgium.

**BACKGROUND:** Supply chains are dependent on Information Technology (IT) and cyberspace processes. Yet, despite the advantages of its increased connectivity and systems integration with suppliers and customers, this also has opened the door to new risks from and to supply chain partners. It has become increasingly clear that a supply chain not only needs to prevent cyber-attacks, but also prepare to have a reaction that minimizes consequences and maintains operational levels.

A novel wave-analogy framework has been proposed by Guerra & Sepulveda., (2019) which can serve to both describe the resilience of a system, and to guide the design of the organization for resilience. The use of this framework is dependent on its validation through testing in real cases and by comparing it to other frameworks.

**PROJECT DESCRIPTION:** This is a research-based MSc. thesis that will introduce the student to a scientific research process through case studies. This project requires a planning phase, an operational (data gathering) phase and an analysis phase. The student will interact with a case company or companies, where operational data identified in a planning phase will be gathered. It is expected that the student will develop a literature review of the current resilience evaluation frameworks, and will use one or more of these frameworks, together with the Wave-analogy framework in the analysis of a cyber-event or a cyber-resilience framework in a case company. The analysis should identify aspects where the Wave Analogy presents advantages, disadvantages or is equivalent to the other frameworks chosen for the analysis, and thus produce a recommendation about the applicability of the Wave-Analogy framework. Finally, this project expects the delivery of a paper in a condition to be submitted to a journal.

**PROJECT PURPOSE:** The purpose of this project is to contribute towards the scientific validation of the Wave Analogy framework for understanding cyber-resilience, to potentially to extend its use to other industries, or other process in the supply chain.

**PREREQUISITES:** Supply Chain Management Course, some knowledge about IT Systems.

**NUMBER OF STUDENTS:** 1 MSc. student (Projects of 30-35 ECTS Credits).

## REFERENCE

Guerra, P. J. G., & Sepúlveda Estay, D. A. (2019). An Impact-Wave Analogy for Managing Cyber Risks in Supply Chains. In 2018 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM) IEEE.  
<https://doi.org/10.1109/IEEM.2018.8607563>

# Machine Learning to detect cyber-attacks in shipping (MSc)

**PROJECT SUPERVISORS:** Associate professor Michael Bruhn Barfod, and PostDoc Daniel Sepulveda.

**BACKGROUND:** Information Technology Systems (ITS) are a fundamental part of many modern shipping activities. The interconnectivity and automation enabled by ITS has increased the speed, scope and accuracy of the information shared between ships and with the ports. Yet these characteristics have also increased the attractiveness for others to intervene and use these systems for their own ends (hacking), such as through the transmission of fake information or the jamming of systems by an overflow of fake instructions. The shipping industry is requiring better ways to identify these malicious flows (Cyber Attacks) and contain them before these interrupt operations.

**PROJECT DESCRIPTION:** This is part of a 2 year project called CyberShip, aimed at providing shipping companies and regulators with a reference framework and decision support model to better cope with disruptions originating from a cyber attack. This project is being developed jointly between DTU Compute and the Department of Management Engineering at DTU.

**PROJECT PURPOSE:** The purpose of this project is to identify machine learning techniques that are relevant for identifying cyber-attacks, test these techniques and give recommendations on their scope of use and relevance.

**PREREQUISITES:** Basic programming skills in e.g., MATLAB, Python, R. Ideally some knowledge about machine learning.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Testing of IT architectures to cyber-attacks in shipping (MSc)

**PROJECT SUPERVISORS:** Associate professor Michael Bruhn Barfod, Postdoc Daniel Sepulveda.

**BACKGROUND:** Information Technology Systems (ITS) are a fundamental part of many modern shipping activities. The interconnectivity and automation enabled by ITS has increased the speed, scope and accuracy of the information shared between ships and with the ports. Yet these characteristics have also increased the attractiveness for others to intervene and use these systems for their own ends (hacking), such as through the transmission of fake information or the jamming of systems by an overflow of fake instructions. The shipping industry is requiring better ways to design ITS to contain malicious hacking (cyber attacks) them before these interrupt operations or lead to losses.

**PROJECT DESCRIPTION:** This is part of a 2 year project called CyberShip, aimed at providing shipping companies and regulators with a reference framework and decision support model to better cope with disruptions originating from a cyber-attack. This project is being developed jointly between the DTU Compute and the Department of Management Engineering at DTU.

**PROJECT PURPOSE:** The purpose of this project is to model a series of different ITS architectures, test the behavior of these models during a cyber attack, and represent, compare and analyze these behaviors through the use of performance measures.

**PREREQUISITES:** Basic programming skills in e.g., MATLAB, Python.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Simulation in healthcare

**PROJECT SUPERVISOR:** Professor Allan Larsen ([alar@dtu.dk](mailto:alar@dtu.dk))

**BACKGROUND:** The population growth and the change in demographics we are currently witnessing makes efficient use of resources within healthcare even more vital to the modern society. The healthcare domain holds a wide range of complex planning problems which are obvious to analyse via advanced simulation modelling. Methodologies such as simulation modelling and process optimization may help decision support processes to make better use of resources.

**PROJECT DESCRIPTION:** The admittance of patients to hospitals' emergency departments is a central process in healthcare operations management. This thesis project will in close collaboration with Hvidovre Hospital develop and implement a simulation model to study the admittance processes.

The project is set under the umbrella of the Copenhagen Health Innovation collaboration (please see <https://cobox.dk/#video> for more information).

**PROJECT PURPOSE:** The simulation model developed should be able to study the operational performance of the hospital department studied taking into consideration the uncertain demands for admittance and other stochastic behavior of the department.

**PREREQUISITES:** 42417 Simulation in Operations Management (or a similar course).

**NUMBER OF STUDENTS:** 1-2 MSc students (30-35 ECTS).

# Container terminal simulation

**PROJECT SUPERVISOR:** Professor Allan Larsen ([alar@dtu.dk](mailto:alar@dtu.dk)) and/or Associate Professor Dario Pacino ([darpa@dtu.dk](mailto:darpa@dtu.dk)).

**BACKGROUND:** Simulation modelling has for many years been one of the most important tools used for planning and management of container terminals. Simulation models are capable of analyzing the expected behavior of potential changes to the terminal infrastructure. Such analyses can be used in strategic planning when assessing the future performance of for instance an extension of the capacity or growths in demand.

**PROJECT DESCRIPTION:** The thesis project will develop a simulation model which can be used for assessing the impacts of potential infrastructure investments to the container terminal of Copenhagen Malmø Port (CMP). The project will be carried out in close collaboration with CMP.

**PROJECT PURPOSE:** The simulation model developed should be able to support the planning process of Copenhagen Malmø port wrt. future potential investments in new infrastructure.

**PREREQUISITES:** 42417 Simulation in Operations Management (or a similar course).

**NUMBER OF STUDENTS:** 1-2 MSc students (30-35 ECTS).

# Autonomy in Freight Transport and Logistics

**PROJECT SUPERVISOR:** Professor Allan Larsen ([alar@dtu.dk](mailto:alar@dtu.dk))

**BACKGROUND:** The freight transport and logistics domain is by many researchers believed to be the first area to take up fully autonomous vehicles due to the nature of freight/goods as well as the continuous urge to cut operational costs in the supply chain.

**PROJECT DESCRIPTION:** This thesis topic will be scoped after discussions with the student(s) in order to match the methodological background and interest of the student(s). However, this thesis should focus on one of the following parts of the transport and logistics chain:

- 1) **Autonomous warehouses** – already today highly automatic warehouses exist and creates opportunities for further automation of the interface between the warehouse and the land transport side. Autonomous loading of trucks, autonomous intra-terminal transport movements, auto-guided vehicles etc. plays an important role.
- 2) **First-mile logistics** – the first steps in the transport chain linking the production/warehousing operations to the transport to a consolidation center, a freight hub or to partner up in a truck platoon.
- 3) **Last mile logistics** – the last steps in the transport chain bringing the freight/goods into the final destination, such as the inner part of a big city or a sub-urban mall. This part needs to consider city logistics issues and discuss how automation can be achieved in

This project can either look in to small-sized deliveries such as distribution of parcels in **e-commerce** or large-sized freight transports from/to or between freight terminals.

**PREREQUISITES:** The student(s) should have experience with either applied optimization or simulation modeling. This could for instance have been obtained through the courses such as 42117 Transport optimisation or for the simulation methodology via 42417 Simulation in Operations Management (or a similar course).

**NUMBER OF STUDENTS:** 1-2 MSc students (30-35 ECTS). The project topic may also be scoped to the requirements of a BSc thesis.

# City logistics and urban freight transport

**PROJECT SUPERVISOR:** Professor Allan Larsen ([alar@dtu.dk](mailto:alar@dtu.dk))

**BACKGROUND:** Freight transport in large cities is becoming an increasingly challenging task as cities are growing (higher demand), the citizens expect low response time (higher intensity) and traffic congestion is rising (lower travel speed).

**PROJECT DESCRIPTION:** This thesis topic will be scoped after discussions with the student(s) in order to match the methodological background and interest of the student(s). However, the projects should take departure in the area of ***last mile logistics***, which can be described as the last steps in the transport chain bringing the freight/goods into the final destination, such as the inner part of a big city or a sub-urban mall.

The student(s) will be invited to be part of the research and demonstration project EUFAL, which deals with efficient planning and optimization methods for demonstrating the potentials of using electrical vehicles for commercial urban transport, such as city logistics.

The Danish side of the EUFAL project includes external partners such as MT Højgaard and Region Hovedstaden, which will contribute with case studies from real-life.

**PREREQUISITES:** The student(s) should have experience with either applied optimization or simulation modeling. This could for instance have been obtained through the courses such as 42117 Transport optimization or for the simulation methodology via 42417 Simulation in Operations Management (or a similar course).

**NUMBER OF STUDENTS:** 1-2 MSc students (30-35 ECTS). The project topic may also be scoped to the requirements of a BSc thesis.



## Short-term, medium-term or long-term measures for GHG emissions reduction in maritime transport (MSc)

**PROJECT SUPERVISOR:** Professor Harilaos N. Psaraftis ([hnpсар@dtu.dk](mailto:hnpсар@dtu.dk)), Senior Researcher  
Thalis Zis ([tzis@dtu.dk](mailto:tzis@dtu.dk))

**BACKGROUND:** International shipping accounts for 2.2% of anthropogenic CO<sub>2</sub> emissions, and produces some 796 million metric tons of CO<sub>2</sub> per year (2012 fleet data). Much regulatory activity is tasked to find ways to significantly reduce CO<sub>2</sub> and other greenhouse gas (GHG) emissions. Shipping is not yet included in the Kyoto protocol, that being the mandate of the International Maritime Organization (IMO). The IMO, on its part, has adopted in 2011 the only mandatory GHG reduction scheme to date, in the form of the Energy Efficiency Design Index (EEDI), and has decided in 2018, among other things, to reduce GHG emissions by 2050 by at least 50% vis-a-vis 2008 levels and reduce carbon intensity by 2030 by at least 40% vis-à-vis 2008 levels. A broad variety of candidate measures have been proposed. Short-term measures (2018-2023) include speed optimization and speed reduction, various goal based measures and power reduction. Medium-term measures (2023-2030) include Market Based Measures (MBMs). Long-term measures (2030-2050) include low carbon fuels, use of electricity and innovative energy saving devices such as sails, rotors, air bubbles and others. Currently no prioritization among these measures exists at the IMO, so this project provides a great opportunity to contribute to the IMO debate.

**PROJECT PURPOSE:** A number of distinct MSc thesis variants can be defined under the above umbrella. The purpose of each project will be to analyze possible measures, short-term, medium-term or long-term, appropriately defined, for various shipping markets, tramp and liner, in terms of reducing GHG emissions and other criteria. Short-term and/or long term impacts of these measures will be analyzed.

**PROJECT DESCRIPTION:** This project will examine the potential impacts of the measures under examination for various scenarios in international shipping. Interaction with research projects ShipClean and MBM SUSHI is foreseen.

**PREREQUISITES:** A minimum knowledge of maritime transport and/or maritime technologies. Optionally: 42892 Shipping and Port Logistics

**NUMBER OF STUDENTS:** 4-5 MSc students (30 ECTS Credits).

# Optimizing Vessel Speed Reduction Programmes (VSRP) (MSc)

**PROJECT SUPERVISORS:** Senior Researcher Thalís Zís ([tzis@dtu.dk](mailto:tzis@dtu.dk)); Professor Harilaos N. Psaraftis ([hnpsar@dtu.dk](mailto:hnpsar@dtu.dk));

**BACKGROUND:** Regulatory bodies and port authorities have been developing green agendas that seek to reduce shipping emissions in areas near ports. This can be achieved through the use of clean fuel and technologies, as well as through changing the operating patterns of the vessels near the port and specifically reducing sailing speed. While emissions per vessel call are reduced through compliance to such programs, there may be time penalties and increased operating costs for ships.

**PROJECT DESCRIPTION:** This project considers the emissions reduction potential of VSRP to enhance the environmental performance of ports. The implications of a complying decision to the ship costs need to be identified (e.g. costs due to delays, technological investments, increased fuel consumption) and compared with the emissions reduced at the port. The option of a convincing monetary incentive provided by the port authority to the ship operator will be considered. It is expected that the value of the incentive will influence the ship operator's decision to participate or not in the proposed emissions reduction measure. The research question can be formulated as an optimization problem whereby the objective is the maximization of emissions reduction, or the minimization of the cost per abated ton of pollutant.

**PROJECT PURPOSE:** The purpose of this project are to enhance an existing model that predicts emissions savings from port authority programs with a cost benefit analysis that minimizes the cost per abated ton of pollutant emissions near the port. The decision variables in the proposed optimization problem will depend on the examined policies during the project.

**PREREQUISITES:** At least one of the following: 42892 Shipping and Port Logistics, 42884 Green transport logistics. Some Programming experience desirable.

**NUMBER OF STUDENTS:** 1-2 MSc students (30 ECTS Credits).

# The Chinese Belt and Road Initiative (BRI): status, challenges and opportunities

**PROJECT SUPERVISOR:** Professor Harilaos N. Psaraftis ([hnpсар@dtu.dk](mailto:hnpсар@dtu.dk))

**BACKGROUND:** Between 2006 and 2016, total trade volumes between the EU and China have almost doubled and are expected to grow further. Recent forecasts predict significant growth in production and distribution flows in the EU, particularly for eastern states with more limited access to maritime transport. Given proper infrastructure and management, container transport between Asia and Europe by rail may become competitive with maritime transport both in cost and in carbon emissions. The bulk of the trade between Asia and Europe is currently carried by ship, however some cargoes go by rail, as the land distance is much shorter. On the other hand, a number of substantial barriers exist, such as incompatible rail systems, administrative barriers and lacking infrastructures. Trends that could accelerate demand for rail transport in the Asia-Europe corridors include industrial development in western China, and trade and economic development along the improved transport routes through Central Asia.

The so-called Belt and Road Initiative (BRI) (formerly known as One Belt One Road-OBOR) is a global development strategy adopted by China involving infrastructure development and investments in 152 countries and international organizations. A substantial part of this program is devoted to the trade between China and Europe, and specifically to the development of land-based and intermodal corridors linking China and Europe. On its part, the EU has made substantial investments in the so-called Trans-European Transport Network (TEN-T), which also foresees connections to countries outside Europe. A question then is, how does the EU transport and trade strategy stand with respect to BRI, and how can the associated challenges be addressed.

**PROJECT PURPOSE:** The purpose of this project is to take stock at recent developments as regards BRI, analyze associated challenges and propose pathways for further developments. An EU perspective will be taken.

**PROJECT DESCRIPTION:** The project will make an inventory of recent and current activities as regards BRI, propose criteria for evaluation of alternatives, identify barriers and bottlenecks and recommend possible actions that are compatible with the listed criteria.

**PREREQUISITES:** Minimum knowledge of rail and/or maritime systems.

**NUMBER OF STUDENTS:** 1-2 MSc students (30 ECTS Credits).

## Vehicle routing with cross-docking

**PROJECT SUPERVISOR:** Assistant professor Martin Philip Kidd ([mpki@dtu.dk](mailto:mpki@dtu.dk))

**BACKGROUND:** A common problem in real world transport optimization is the option of cross-docking. The production of goods takes place at factories from which the goods can be distributed directly to the customers. Often however it may be fruitful to divide the distribution into two “legs” where the goods are transported to a cross-docking location and then repacked onto a different vehicle and transported to the customers.

It is of great interest to consider the option of cross-docking while solving these vehicle routing problems.

**PROJECT ASSIGNMENT:** Given real-life VRP data including factory and cross-docking locations. The student should construct an algorithm for solving the VRP which should be able to consider which orders should be cross-docked and which should not.

**PREREQUISITES:** OR courses, especially useful one is 42887 (Vehicle Routing and Distribution Planning), good programming skills

**NUMBER OF STUDENTS:** 1-2.

# Product configuration

**Supervisor:** Professor Lars Hvam (lahv@dtu.dk)

**Background:** Product configurators are increasingly being used to support sales and engineering for making specifications like quotations, and other product and production specifications. Configurators are a means to control the product assortment and increase efficiency in sales, engineering and production.

**Project description:** A master project on product configuration may cover one or more of these areas:

- Defining scope and business cases for product configurators
- Modelling products for a product configurator
- Making a prototype product configurator
- Modelling and developing sales and engineering processes
- Analyzing impact from using product configurators

# Complexity management

**Supervisor:** Professor Lars Hvam ([lahv@dtu.dk](mailto:lahv@dtu.dk))

**Background:** Industry and service companies experience increasing complexity in their products and operations. There is a strong management on reducing complexity and the potential benefits for the companies are significant.

**Project description:** A master project on complexity management may cover one or more of these areas:

- ABC analysis of products and customers
- Identification and quantification of the most significant complexity cost drivers and allocation of complexity costs to products
- Quantification of other impact than costs e.g. impact from complexity on delivery performance or quality
- Identification of initiatives for reducing complexity in products and/or processes
- Quantifying expected and cost benefits from each suggested initiative and plan for implementation

# Reducing complexity in the hearing aids product portfolio

**PROJECT SUPERVISOR:** Professor Lars Hvam ([lahv@dtu.dk](mailto:lahv@dtu.dk))

**BACKGROUND:** William Demant is a global market leader in hearing healthcare, and the company's core business is the development, production, marketing and service of William Demant products and services under various brands i.e. Oticon, Benafon, Sonic and Philips, which in turn are operated as part of the function DGS (Demant Group Services). In recent years, the company has been dynamically developing, which has led to an increase in the number of product variants at both module and finished goods level. Currently, the William Demant's product portfolio has more than 12 000 products and more than 69 000 SKUs. Due to this, the company does not have a clear overview of the impact on costs and delivery performance resulted from increased product variety, what the complexity drivers are, and how they impact the company's performance.

**PROJECT DESCRIPTION:** A master project on complexity management may cover ABC analysis of products and customers as well as quantification of the most significant complexity cost drivers and allocation of complexity costs to products

**PROJECT PURPOSE:** The purpose of this project is to identify and quantify complexity cost drivers

**NUMBER OF STUDENTS:** 1-3 MSc students (2 projects of 30-35 ECTS Credits).

Contact [akst@dgs.com](mailto:akst@dgs.com) for more information about the project.

# Modeling of IT services and its complexity impact (MSc)

**PROJECT SUPERVISOR:** Professor Lars Hvam ([lahv@dtu.dk](mailto:lahv@dtu.dk))

**BACKGROUND:** Today, IT services are becoming a central part of the business strategy for both the service industry and traditional manufacturing companies as IT services are used to enable or support business processes. Compared to the rigid structure of a production system, the IT enterprise architecture and computing infrastructure has the advantage of having a quite flexible setup, meaning that making an extra effort to fulfil a customer request may be an easy step to take and something the customer expects. Given the customized nature of IT services, companies can ultimately increase their service portfolio rapidly without paying much attention to its consequences, especially to a steady increase of complexity and its impact on profitability. Complexity management is therefore becoming a core part of the management agenda aiming to help companies to not miss out on profits due to non-value adding complexity costs.

**PROJECT DESCRIPTION:** During a case study, the Master thesis student will investigate the design of IT services or IT service management processes at a case company and relate them to cost or complexity impact. DSV A/S could serve as a case company. However, students are very welcome to bring in their own case company or IT project as basis for the thesis.

**PROJECT PURPOSE:** The purpose of this project is to identify how IT services can be delivered in a cost-transparent way and how non-value adding complexity costs during the lifecycle of an IT service can be identified and reduced. Therefore, different IT service models and IT service management frameworks will be applied to an existing IT service to identify the costs of delivering an IT service.

**PREREQUISITES:** Affiliation to IT, no coding skills required.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

Contact Franziska Schorr at ([frsc@dtu.dk](mailto:frsc@dtu.dk)) for more information regarding the project.



# MSc Project at ROCKWOOL International A/S

## Postponement/Delayed Differentiation in Production

With over 20.000 finished goods emerging from their global production base, ROCKWOOL is looking to be smarter in the way to deliver product variety to the market with high production efficiency. Postponement (or delayed differentiation) is one of the methods high variety industries utilize to do this, and ROCKWOOL would like to investigate what postponement could bring in their production context.

Your primary task in this project is developing a postponement strategy for ROCKWOOL factories considering the product variety, production setup, stock levels, and market requirements at the company.

Key aspects of this study are:

- Applying Theory of Constraints thinking to identify and protect bottleneck resources with buffer inventory
- Analysis of a suitable customer order decoupling point
- Determining the optimal work-in-process inventory at the decoupling point
- Use strategic thinking to understand consequences of postponement for supply chain and operations (e.g., how will it affect delivery service)
- A case study at one or more ROCKWOOL production lines
- Quantitative analysis of production data

This project will be for a group of 2 MSc students. Students should be able to sit 3-4 days per week at the company in Hedehusene working directly with our Operations team. The results of the project will have a direct impact on the capacity and flexibility of the ROCKWOOL facilities.

If you are interested in the project, please send a short email explaining your motivation along with your CV and grade transcripts to Lars Hvam [lahv@dtu.dk](mailto:lahv@dtu.dk) or Tina Rytter Nørregaard ([tina.noerregaard@rockwool.com](mailto:tina.noerregaard@rockwool.com)).

# Vendor managed inventory

**PROJECT SUPERVISOR:** Assistant professor Martin Philip Kidd ([mpki@dtu.dk](mailto:mpki@dtu.dk))

**BACKGROUND:** In this route planning problem a number of fixed customers is serviced at regular intervals. Each customer has a stock of goods (e.g. petrol) that they gradually consume over time. It is necessary to refill the stock of the customers before they run out. However, the time at which the customers are refilled will determine both the size of the order that should be delivered as well as the expected interval before another delivery is needed.

The biggest challenge in this type of planning scenario is not solving the route planning problems themselves, but determining the right day for visiting the customers.

**PROJECT ASSIGNMENT:** Given real customer data including known stock levels and consumptions, the task is to design and test various strategies for when customers should be visited.

**PREREQUISITES:** OR courses, especially useful one is 42887 (Vehicle Routing and Distribution Planning), good programming skills

**NUMBER OF STUDENTS:** 1-2.

# Auction theory

**PROJECT SUPERVISOR:** Assistant professor Martin Philip Kidd ([mpki@dtu.dk](mailto:mpki@dtu.dk)), Professor Jesper Larsen ([jesla@dtu.dk](mailto:jesla@dtu.dk))

**BACKGROUND:** Kopenhagen Fur solely sell furs through auctions. 5 times during the year approx. 30 million skins are sold on auction at Kopenhagen Fur, making KF by far the biggest fur auction house in the world. The mink farmers' turnover come from these auctions. The selling method is based on very high tacit knowledge among our auctioneers.

**PROJECT ASSIGNMENT:** Come up with methods to improve the average selling bid. Through video analysis, auction room behaviour, data analysis etc. Develop operational theories that can help KF auctioneers to improve the selling bid.

**PREREQUISITES:** Game theory would be an advantage, but is not essential

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Machine learning for fur quality detection

**PROJECT SUPERVISOR:** Assistant professor Martin Philip Kidd ([mpki@dtu.dk](mailto:mpki@dtu.dk)), Professor Jesper Larsen ([jesla@dtu.dk](mailto:jesla@dtu.dk))

**BACKGROUND:** Copenhagen fur sort their mink skins by quality manually using a mostly visual process. The project will look into ways to better subdivide the quality and speed up the process for a limited subset of the incoming mink skins. The quality can be subdivided into several manually detectable features.

**PROJECT ASSIGNMENT:** Setting up a machine learning strategy to improve the classification success rate for one or more manually detectable features. The assignment will consist of:

- Selecting filters and features on images of mink skins
- Analyzing, selecting and implementing an adaptable machine learning strategy like neural network, nearest neighbor, SVM etc.
- Finetuning the image acquisition process to optimize the results

**PREREQUISITES:** Operations Research, basic knowledge on machine learning. Programming ability is an advantage.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Transport Project Evaluation: Decision Support and Multi-Criteria Decision analysis (MSc)

**PROJECT SUPERVISOR:** Associate professor Michael Bruhn Barfod ([mbba@dtu.dk](mailto:mbba@dtu.dk))

**BACKGROUND:** Recent research has shown that conventional cost-benefit analysis is inadequate as a decision support tool for appraising transport infrastructure projects as it fails to capture criteria of a more strategic and qualitative character. Multi-criteria decision analysis (MCDA) can be applied to the appraisal scheme to deal with this issue.

**PROJECT DESCRIPTION:** Current research deals with the difficult task of identifying the most suitable decision aids for supplementing the cost-benefit analysis. Several MCDA techniques have been suggested suitable for decision making in the transport sector when dealing with selections among a limited number of alternatives. However, these techniques become inappropriate when dealing with large a number of alternatives and criteria such as in a screening phase.

**PROJECT PURPOSE:** The purpose of this project is to look into the possibilities of using outranking methods belonging to the so-called constructive MCDA approach. These methods are able to handle a large number of alternatives and criteria simultaneously using a sort of voting mechanism. The different methods can be applied to a suitable case study and the results can be benchmarked against the outcome of a conventional analysis.

**PREREQUISITES:** 42879 Decision support & strategic assessment.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Transport Planning: Decision Support and Planning workshops (MSc)

**PROJECT SUPERVISOR:** Associate professor Michael Bruhn Barfod ([mbba@dtu.dk](mailto:mbba@dtu.dk))

**PROJECT ADVISORS:** Professor Steen Leleur ([stle@dtu.dk](mailto:stle@dtu.dk))

**BACKGROUND:** Tendencies in the transport sector has revealed a growing need for involving stakeholders more in the decision support process in order to capture all aspects of the of very complex decision problems. Planning workshops has been suggested to deal with this issue by gathering relevant stakeholders and decision makers with the purpose of generating a fruitful discussion to improve the final decision making.

**PROJECT DESCRIPTION:** Planning workshops consist of three main elements: group processes, decision analysis and information technology. The purpose is to link these three elements and use the best from each of them in the decision support process. The composition of such a workshop will, however, depend on the decision context, the participants' affiliations, the participants' level of power, and many other issues.

**PROJECT PURPOSE:** The purpose of this project is to test how the planning workshop concept can be used for real decision support. The implementation of the concept can be tested through a current running decision problem, where workshops e.g. can be held on different levels (citizens, municipality, regional, or organizational) to improve the actual decision support in form of more diverse and detailed information to the final decision makers.

**PREREQUISITES:** 42879 Decision support & strategic assessment.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

NB! A smaller version of the project can be aligned to suit both BSc and BEng student theses.

# Smart parking in Copenhagen (MSc)

**PROJECT SUPERVISOR:** Associate professor Michael Bruhn Barfod ([mbba@dtu.dk](mailto:mbba@dtu.dk))

**EXTERNAL ADVISORS:** Annette Kayser and Kasper Brenøe Isbrand, City of Copenhagen, Technical and Environmental Department

## **BACKGROUND:**

Since 1995 the number of cars in Copenhagen has increased with 40% and there are no indications that the development will stop within the near future. On the contrary it seem that the already desperate situation will worsen further in the years to come. A part of the explanation on this development is the extensive urban renewal which has attracted socioeconomically more advantaged families to the city. The establishment of parking spaces has, however, not followed the rapid increase in cars, and Copenhagen is for this reason struggling with problems related to an insufficient number of parking spaces.

## **PROJECT DESCRIPTION:**

The project is focused on establishing a new, smart parking strategy for Copenhagen aiming at optimizing the parking space usage, improving the efficiency of parking operations and help traffic in the city flow more freely. Several technological solutions already exist within private parking companies that allows the users to pay using an app and/or guide the user to a parking house with empty spaces. However, a more comprehensive solution that includes all parking spaces in the city on a common platform does not exist.

## **PROJECT PURPOSE:**

The purpose of this project is to propose a frame for a common, comprehensive platform that aims at improving the issues above. In this respect it will be necessary to consider both current technological options and governance issues related to such a task. The smart system will need to work in an environment with many stakeholders as well as political barriers. A key issue will be to propose a system that can mediate between the different interests of conflict.

## **PREREQUISITES:**

**NUMBER OF STUDENTS:** 1-2 MSc students (30-35 ECTS Credits).

# The feasibility of Molten Salt Reactor technology in ship propulsion (MSc)

**PROJECT SUPERVISOR:** Associate professor Michael Bruhn Barfod (mbba@dtu.dk),  
Researcher George Panagakos (geopan@dtu.dk)

**BACKGROUND:** Nuclear power can become a game changer in marine propulsion not only due to its superior environmental characteristics (zero-CO<sub>2</sub> fuel) but also due to important operational features (no need for ships to refuel or carry bunkers). However, a skeptical public that cites concerns with waste handling, safety, nuclear weapons, and costs hampers the widespread use of nuclear fuels. The Molten Salt Reactor (MSR) is a new non-conventional nuclear technology that sufficiently addresses these concerns.

**PROJECT PURPOSE:** The bibliography on the viability of small modular reactors is very thin. It is even thinner when it comes to marine applications and the MSR technology. The industry is keen to be informed on the potential applications and prospects of this alternative. The project intends to address this need.

## **PROJECT DESCRIPTION:**

The project will:

- undertake an exhaustive literature search on the subject
- identify all public concerns on the use of nuclear power for marine propulsion
- assess the potential that MSR technology exhibits in addressing these concerns (on the basis of information provided by SEABORG – a Danish company specializing in this field)
- quantify operational benefits and costs associated with MSR applications
- draw recommendations to all stakeholders involved (e.g. ship operators; marine equipment manufacturers; governing institutions; research community; general public)

**PREREQUISITES:** 42879 Decision support & strategic assessment.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).



## Inaccuracy in road transport infrastructure projects (MSc)

**PROJECT SUPERVISOR:** Associate professor Michael Bruhn Barfod ([mbba@dtu.dk](mailto:mbba@dtu.dk))

**EXTERNAL ADVISOR:** Risk Manager Trine Holst Veicherts, (Danish Road Directorate) ([thv@vd.dk](mailto:thv@vd.dk))

**BACKGROUND:** Recent research has proven that construction costs are embedded with substantial degrees of uncertainty, which ultimately can lead to wrongful input to decision support models.

**PROJECT DESCRIPTION:** Currently, the Danish Road Directorate possess information with regard to construction costs within a large database system. This project seeks to investigate and assess the data material within the database in order to benchmark estimated costs against realized costs for road projects.

**PROJECT PURPOSE:** The purpose of this project is to structure, validate and verify the huge amount of data within the database and hereby to investigate whether there in fact is bias in the estimating of construction cost within road transport projects.

**PREREQUISITES:** 42879 Decision support & strategic assessment

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

# Sustainable Decision Support: Sustainable transport and infrastructure planning (MSc)

**PROJECT SUPERVISOR:** Associate professor Michael Bruhn Barfod ([mbba@dtu.dk](mailto:mbba@dtu.dk))

**PROJECT ADVISORS:** Professor Steen Leleur ([stle@dtu.dk](mailto:stle@dtu.dk))

**BACKGROUND:** There is a growing focus on sustainable transport planning in order to reduce CO<sub>2</sub> emissions as well as congestion. This is a global focus which has to be dealt with locally, thus implying challenges in defining the main planning objectives.

**PROJECT DESCRIPTION:** The project can either take its starting point in a specific case of transport or infrastructural planning or in the development and testing of an assessment methodology. It should consider the different structural and sectorial frameworks related to the planning process and thereby approach the problem of defining and assessing sustainability within infrastructural planning, which so far remains unsolved.

**PROJECT PURPOSE:** The purposes of this (these) suggested project(s) are to clarify potential obstacles for the implementation and realization of a sustainable transport network as well as to present a possible assessment and evaluation method for advancing and encouraging sustainable development within transport and infrastructural planning.

**PREREQUISITES:** 42879 Decision support & strategic assessment.

**NUMBER OF STUDENTS:** 1-2 MSc students (2 projects of 30-35 ECTS Credits).

NB! A smaller version of the project can be aligned to suit both BSc and BEng student theses.