

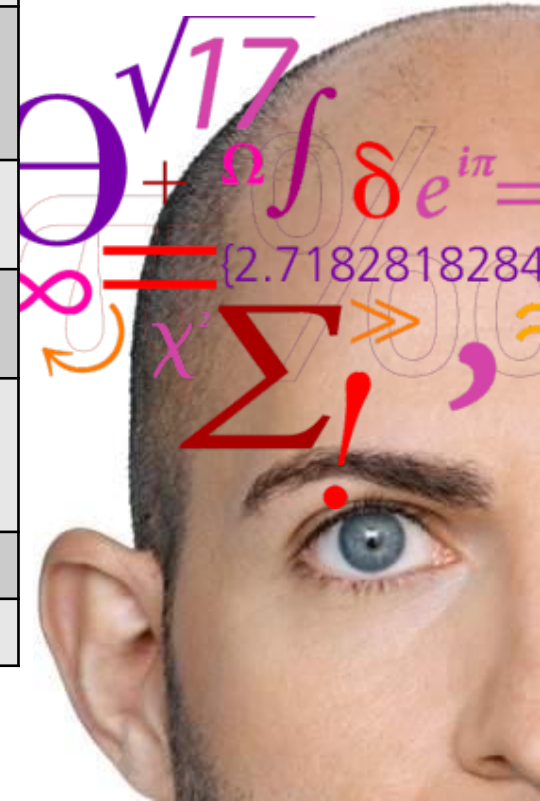
# On track for a career – It's a global business!



# On track for a career

## – It's a global business!

Programme:	
Introduction	Henrik Sylvan, RailTech DTU
From Quantum Physics to the Danish State Railways	Anders Tipsmark, DSB
From building technology to catenary - and from Bergen to the S-line	Nikolai Linding Krog, COWI
Train Management Systems – in London and Copenhagen	Moffassal Hossain, Siemens
Bridges & Constructions – and high speed lines	Mihai Blagniceanu, Atkins Denmark
From DTU Compute to RailNet Denmark - and how to model a railway?	Tanja Søndergaard, Banedanmark (RailNet Denmark)
Summary/Q&A	Henrik Sylvan, RailTech DTU
Networking	Pizza/beer served



# Expanding business!

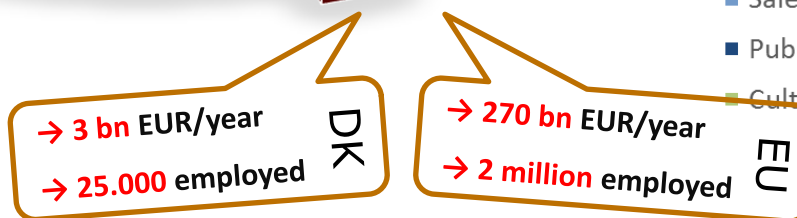
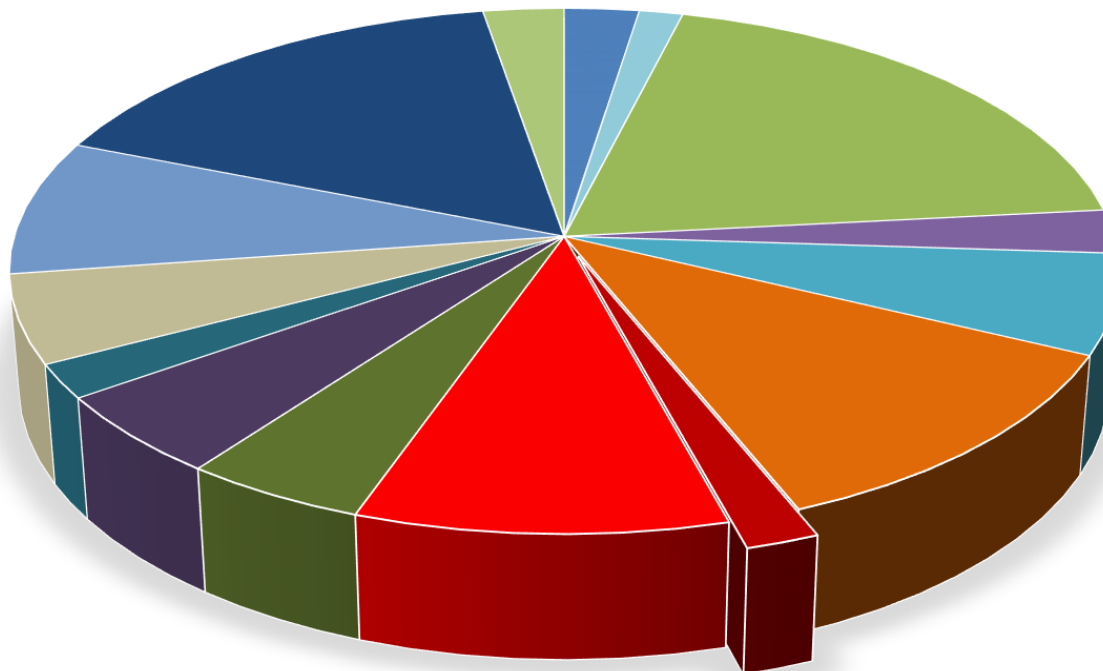
- The Railway was not kept well during many years
- But EU goals settled
  - Double the railway market share
  - Triple the size of HSR network
  - Sustainable mobility
  - Solutions to congestion
- Mobility for a faster moving world
  - Metro
  - Light rail
  - Fast regional
  - High speed long distance



# Economic importance of the railway sector

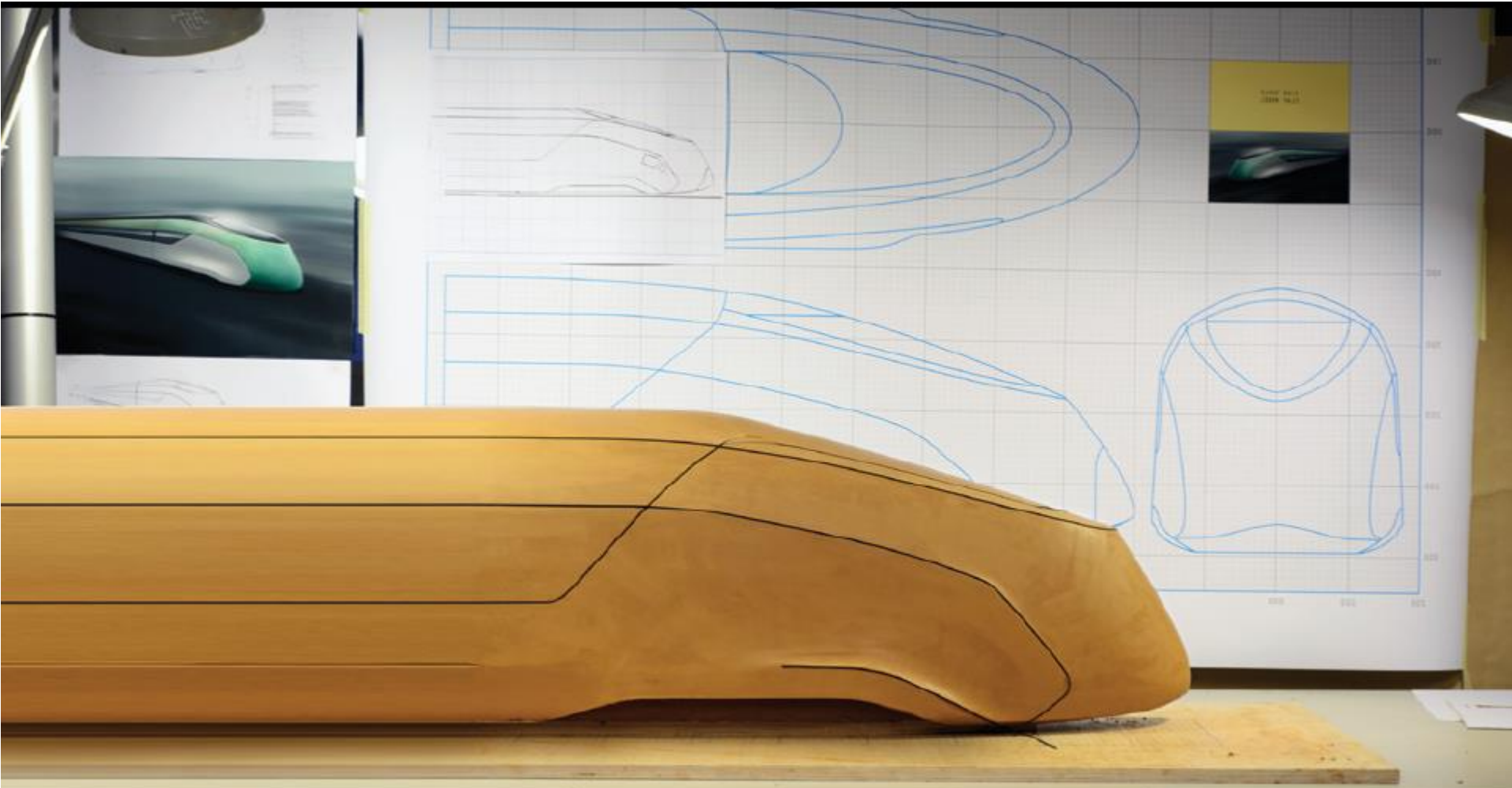
## GDP (total production value)

- Agriculture, forestry and fishing
- Mining and nat. resources
- Industry
- Energy and utilities
- Construction
- Trade
- Rail
- All other transport
- Information and communication
- Finance and insurance
- Real estate, commercial property
- Housing
- Sales
- Public administration, education + health
- Culture, entertainment, other services



# Next generation railway business innovation

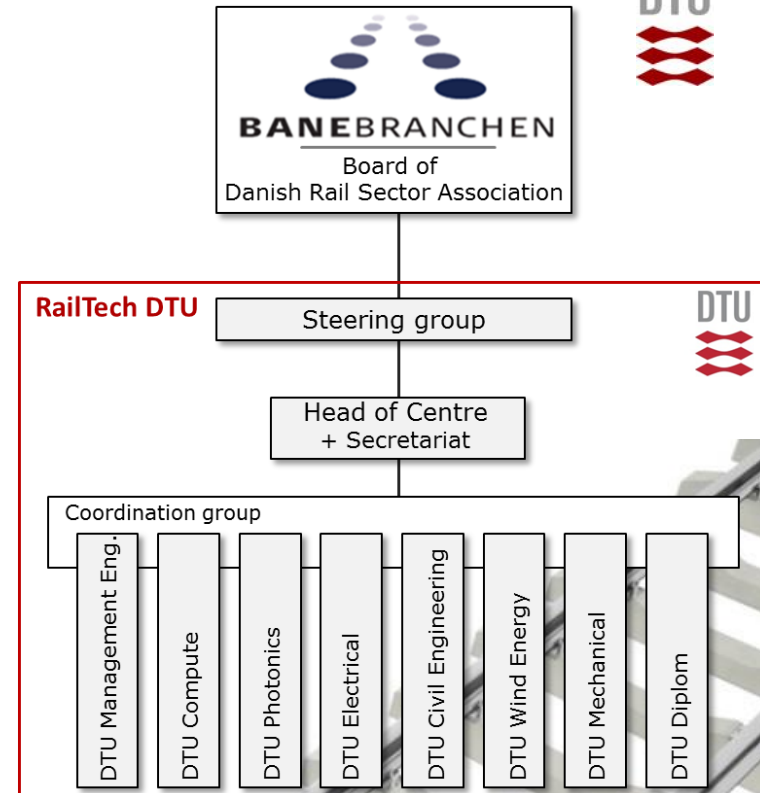
- New visions, new ideas, new people entering the sector





# RailTech DTU

- A virtual centre for railway technology
- Involvement from all relevant disciplines across departments at DTU
- Cross-departmental projects and cooperation on railways in education and research
- Anchored at DTU Management Engineering
- One point of entry for the industry to DTU's programs



# Railway study line

Description	Career	Prerequisites	Study programme	Cases	Student life	Study abroad	Contact
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**Curriculum**

**Study lines**



- Transport and Business Logistics (TBL)
- Transport Planning and Traffic Engineering (TPTE)
- Modelling of Traffic and Transport (MTT)
- Railway Technology (RT)**

**Railway Technology (RT)**

Learn how to plan and run a system that allows large volumes of passengers and freight to be transported fast, safe and efficiently.

**About the study line**  
The railway sector is rapidly expanding and faces numerous engineering challenges. Designing and optimising a modern railway system is a formidable project and requires a combination of engineering skills and advanced visionary thinking. For train services to run seamlessly, the infrastructure (tracks, signals, catenary systems etc.) and train schedules have to be coordinated. To acquire this, engineers need to take responsibility and leadership.

**Study line coordinator**

 **Steven Harrod**  
Associate Professor  
DTU Transport  
+45 45 25 14 86  


**ECTS**

The Bologna Process is a European initiative to bring about transparency and compatibility across higher education in Europe. An important aspect of enabling student mobility, and particularly moving on to a further degree in another country, is a system of credits, used for recognition and accumulation—the European Credit Transfer System (ECTS).

All our courses are assigned a value in terms of ECTS points. Successful completion of an academic year of two terms accumulates 60 ECTS-points. Master's degrees have an ECTS value of 120 points.

42880	Railway Operations and Management	E4A	5 ECTS
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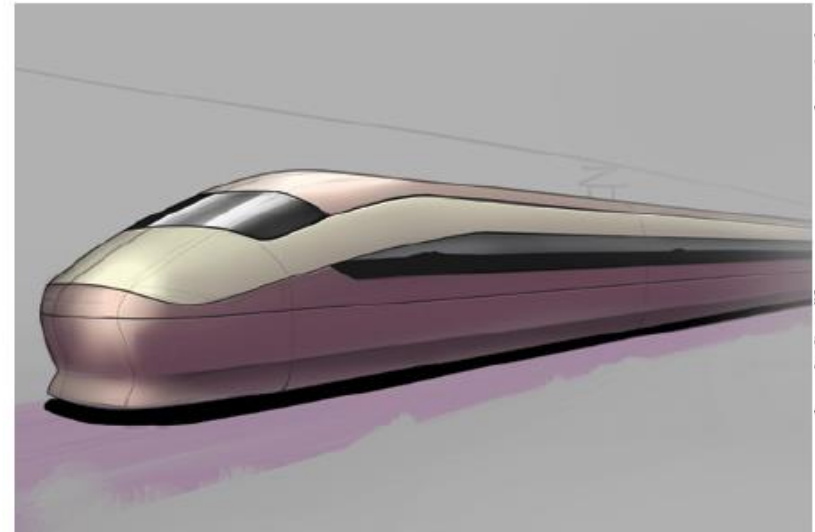
Moreover, it is mandatory to complete the following set of technological specialisation courses:

34345	Signalling Systems and Technology for Railways	E3A	5 ECTS
42878	Rolling Stock acquisition and Management	JUN	5 ECTS

Furthermore, candidates can freely choose from the remaining courses (Min 20 ECTS points):

02431	Risk Management	JAN	5 ECTS
42372	Life Cycle Assessment of Products and Systems	E1	10 ECTS
42877	Railway Design and Maintenance	F5	10 ECTS
42886	Optimisation of operational transport systems	E5B	5 ECTS
42887	Vehicle Routing and Distribution Planning	E1B	5 ECTS

The courses above constitute technological specialisation courses appropriate for the study line Railway Technology, i.e. if students choose 30 ECTS points

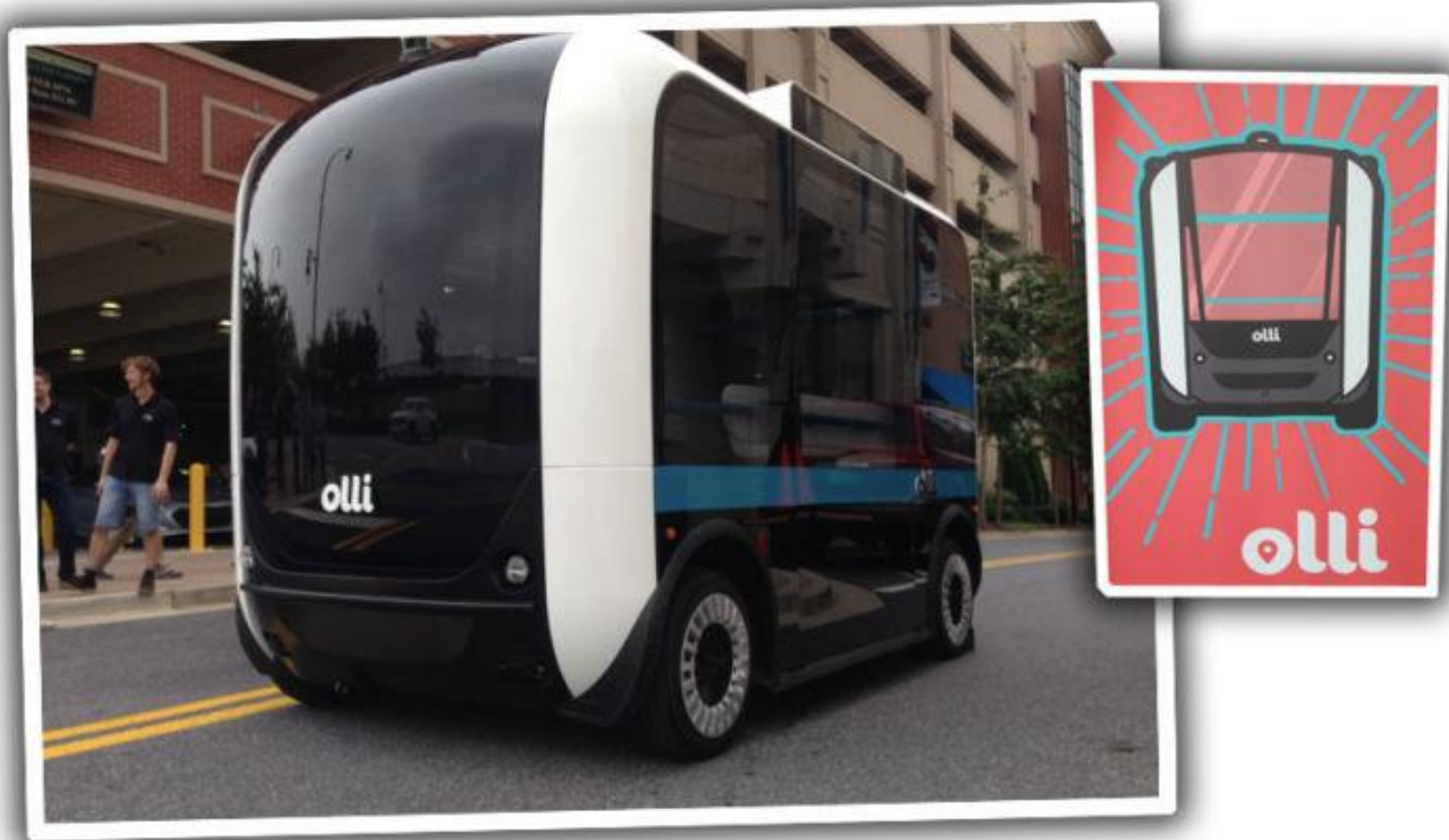


# Designing the future





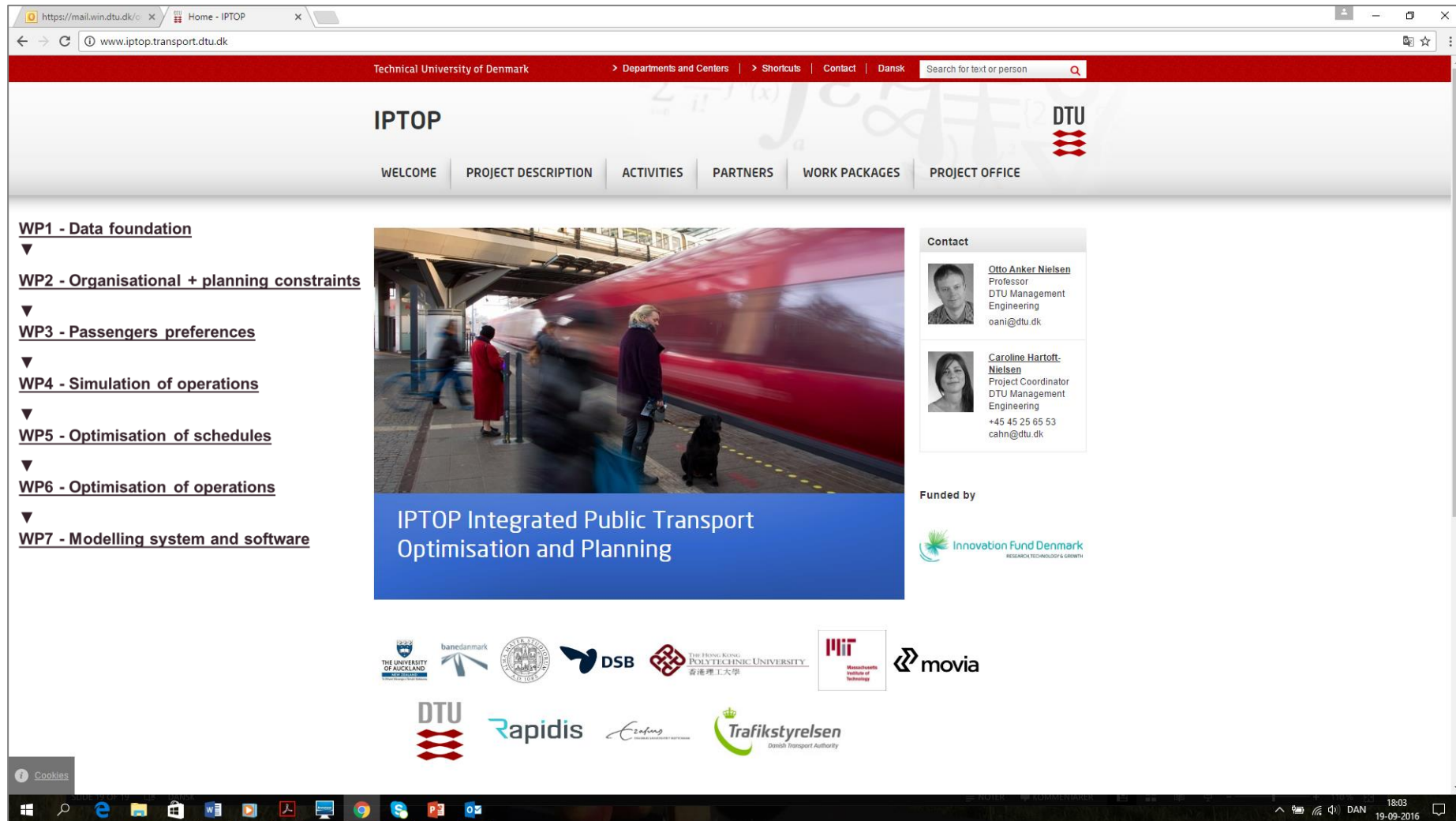
# Other solutions for Smart City Mobility?



## Other solutions for Smart City Mobility



# The IPTOP project



The screenshot shows the homepage of the IPTOP project website. The browser address bar displays 'https://mail.win.dtu.dk/' and 'Home - IPTOP'. The website header includes the DTU logo and navigation links: 'Departments and Centers', 'Shortcuts', 'Contact', and 'Dansk'. A search bar is also present. The main content area features a large image of a red high-speed train at a station platform. Below the image, the text reads 'IPTOP Integrated Public Transport Optimisation and Planning'. To the left of the main content, there is a list of work packages (WP1 to WP7) with expandable arrows. To the right, there is a 'Contact' section with two entries: Otto Anker Nielsen (Professor, DTU Management Engineering) and Caroline Hartoft-Nielsen (Project Coordinator, DTU Management Engineering). Below the contact section, it says 'Funded by' and lists 'Innovation Fund Denmark'. At the bottom, there is a row of logos for partner institutions: The University of Auckland, bandedanmark, The University of Hong Kong, DSB, The Hong Kong Polytechnic University, MIT, and movia. Below this row, there are logos for DTU, Rapidis, and Trafikstyrelsen (Danish Transport Authority). The Windows taskbar at the bottom shows various application icons and the system clock indicating 18:03 on 19-09-2016.

Technical University of Denmark

Departments and Centers | Shortcuts | Contact | Dansk

Search for text or person

**IPTOP**

DTU

WELCOME | PROJECT DESCRIPTION | ACTIVITIES | PARTNERS | WORK PACKAGES | PROJECT OFFICE

**WP1 - Data foundation**

**WP2 - Organisational + planning constraints**

**WP3 - Passengers preferences**

**WP4 - Simulation of operations**

**WP5 - Optimisation of schedules**

**WP6 - Optimisation of operations**

**WP7 - Modelling system and software**

**Contact**

**Otto Anker Nielsen**  
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oani@dtu.dk

**Caroline Hartoft-Nielsen**  
Project Coordinator  
DTU Management Engineering  
+45 45 25 65 53  
cahn@dtu.dk

**Funded by**

**Innovation Fund Denmark**  
RESEARCH TECHNOLOGY & GROWTH

**IPTOP Integrated Public Transport Optimisation and Planning**

**Partners:**

THE UNIVERSITY OF AUCKLAND | bandedanmark | THE UNIVERSITY OF HONG KONG | DSB | THE HONG KONG POLYTECHNIC UNIVERSITY | MIT | movia

**DTU** | **Rapidis** | **Trafikstyrelsen** (Danish Transport Authority)

**Windows Taskbar:** 18:03, 19-09-2016

# The RobustRails project

Forside - Robustrails
www.robustrails.man.dtu.dk

Technical University of Denmark
Departments and Centers
Shortcuts
Contact
Search for text or person


**RobustRails**  
ResearchProject

ABOUT THE PROJECT
WORK PACKAGES
PUBLICATIONS
UPCOMING EVENTS
MINI CONFERENCE 2016


**Robustness in Railway Operations**

RobustRails is a large interdisciplinary project that will attempt to answer the question that is constantly being asked in the media and among commuters, as well as by politicians and the operators themselves: Can we get the trains to run on time?

This project is funded by the Danish Council for Strategic Research and runs for the four year period 2012-2016. Read more about the project [here](#).








Passengers using the S-train (City Train)
1 / 3


The Danish Council for Strategic Research  
RobustRailS

**DTU Collaboration:**  
DTU Management Engineering  
DTU Transport  
DTU Compute  
DTU Fotonik

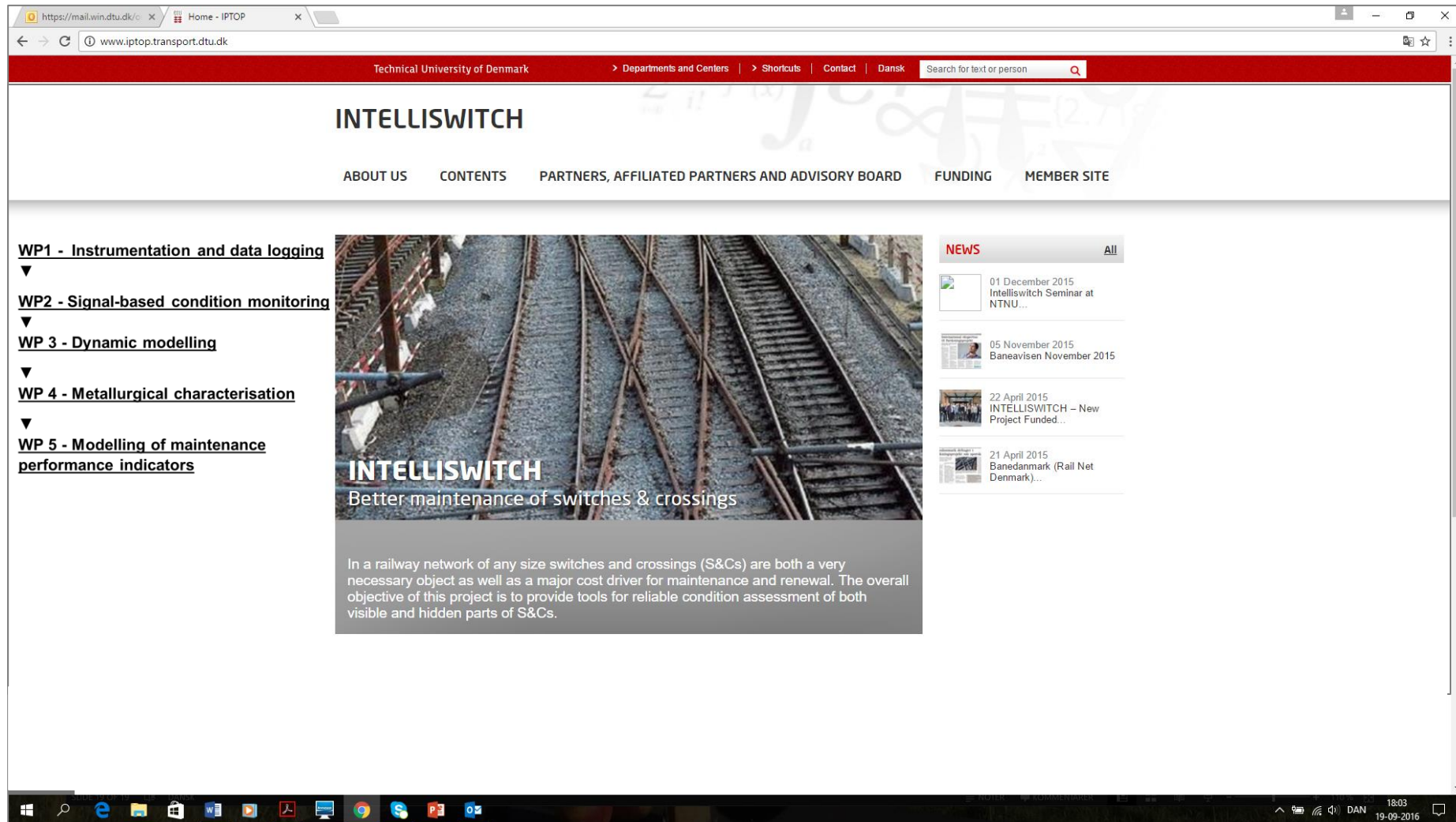
Partners

Cookies



# The Intelliswitch project



The screenshot shows a web browser window displaying the Intelliswitch project website. The browser's address bar shows the URL <https://mail.win.dtu.dk/> and the page title is "Home - IPTOP". The website's header is red and contains the text "Technical University of Denmark" and navigation links: "Departments and Centers", "Shortcuts", "Contact", and "Dansk". A search bar is also present.

The main content area features the title "INTELLISWITCH" and a navigation menu with links: "ABOUT US", "CONTENTS", "PARTNERS, AFFILIATED PARTNERS AND ADVISORY BOARD", "FUNDING", and "MEMBER SITE".

On the left side, there is a list of work packages (WPs) with expandable arrows:

- [WP1 - Instrumentation and data logging](#)
- [WP2 - Signal-based condition monitoring](#)
- [WP3 - Dynamic modelling](#)
- [WP4 - Metallurgical characterisation](#)
- [WP5 - Modelling of maintenance performance indicators](#)

The central part of the page features a large image of railway tracks with a switch. Overlaid on this image is the text "INTELLISWITCH" and "Better maintenance of switches & crossings". Below the image, a paragraph states: "In a railway network of any size switches and crossings (S&Cs) are both a very necessary object as well as a major cost driver for maintenance and renewal. The overall objective of this project is to provide tools for reliable condition assessment of both visible and hidden parts of S&Cs."

On the right side, there is a "NEWS" section with a list of recent news items:

- 01 December 2015: Intelliswitch Seminar at NTNU...
- 05 November 2015: Baneavisen November 2015
- 22 April 2015: INTELLISWITCH - New Project Funded...
- 21 April 2015: Banedanmark (Rail Net Denmark)...

The bottom of the screenshot shows the Windows taskbar with various application icons and the system clock displaying "18:03 19-09-2016".



# The Roads2Rails project

- Asphalt based railway construction in a cost-effective and innovative system design.
- Different asphalt mix designs are developed including both very stiff and very soft/flexible mix designs for model calibration
- .
- Full-scale lab tests, stability analysis and determination of stiffness modulus, resistance to fatigue, permeability, heat resistance, cold temperature cracking, water sensitivity and binder optimization
- .
- Emphasis will be on ensuring use of reclaimed asphalt materials
- .
- Full-scale test facility and development of prototypes of a new track LCC-model



ke Ui



ATKINS



Sagsnr. 5156-0006B

# RAILTECH DTU



ACTIVITIES

EDUCATION

CONSULTANCY

RESEARCH PROJECTS

ABOUT RAILTECH

NEWS

Home > News > RailTech field trip to InnoTrans

Back



## Visiting technology and big machines in Berlin!



FRIDAY 30 SEP 16 |

A sponsorship from the board of **Banebranchen** (The Danish Rail Sector Association) made it possible for a group of DTU-students to travel to the InnoTrans fair in Berlin September 20-21. RailTech DTU had arranged the field trip.

The group travelling to InnoTrans consisted of 15 students, Associate Professor Steven Harrod and Head of RailTech DTU Henrik Sylvan. The group travelled to Berlin Tuesday September 20 - with two days tickets for the fair - 20-21, September.

**InnoTrans** is held every other year in Berlin - and it is the worlds largest international fair on transport technology. A special feature at InnoTrans is the large outdoor area where high speed and freight trains can be exhibited on at 3500 meter track.

### News and filters

Get updated on news that match your filter.

Your email



# **Presentations today**

**DSB, COWI, Atkins,  
Banedanmark, Siemens**



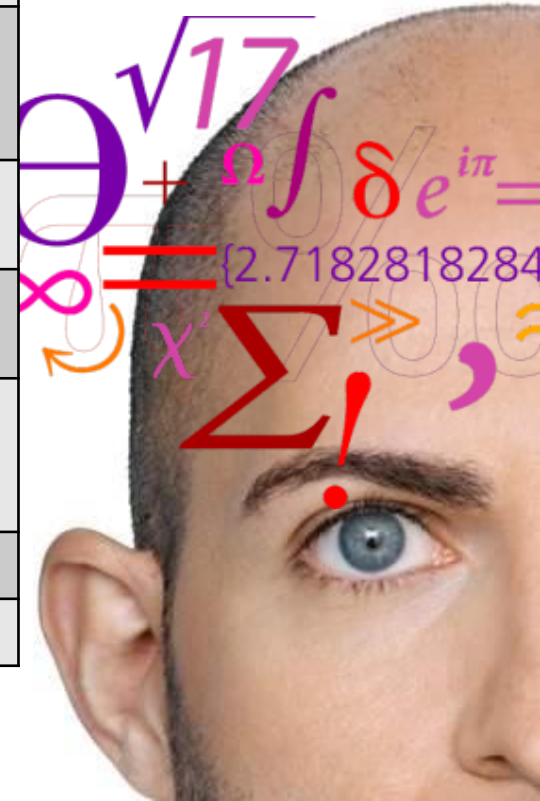




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# Upcoming activities for students

- Conference on Railways hosted by Banebranchen (the Danish Rail Sector Association)
- Presentations in both Danish and English
- Participants from Denmark and abroad
- Sign up at [www.banekonferencen.dk](http://www.banekonferencen.dk)
- Tivoli Congress Centre
- 15<sup>th</sup> May 2017  
Full day program and Gala Dinner

Viden / Knowledge		Løstans / Light Rail		Konkurrence		Current projects /		Innovation		2030+		Kunden / The Customer	
Vedligeholdelse / Maintenance		Løstansprojekter		Åbning af markedet		Store jernbaneprojekter		Software Management		Jernbanen efter 2030		Freight Customers	
Lokaler 1	Lumbye	Carstensen	Harlekin	Carstensen	Harlekin	Congress Hall	Congress Hall	Pierrot	Columbine	Glassalen	Pierrot	Glassalen	Pierrot
10:45-11:15	Asset Management Planning for Good Intervention Decisions Chief Engineer Graham Stroud Atkins EIR Info Slides	Aarhus Status og mulige udviklinger Dirkster Claus Rørdal Madsen Arhus Løstans Info Slides	Status og tendenser på jernbanesektoren i et EU-perspektiv Knut Erik Rasmussen Transportministeriet Info Slides	København - Ring III og Frederiksborg Prosjektleder Jan Schouder Til Info Slides	Signalling Programme - Laboratory Test Senior Consultant Gite Oberbauer Rambøll Info Slides	Et teknisk blik på den danske jernbane Brancheløber Michael Insa Danish Industry Transport Info Slides	Expectations and Possibilities for Automotive Deliveries by Train Supply Chain Developer Young Mario / Logistics Developer Daniel Sanderom Info Slides						
11:15-11:45	Unified Strategy for Operation & Maintenance of Rolling Stock and Infrastructure Managing Director Claudia Casanova Metro Service Info Slides	København: Ring III og Frederiksborg Vores ansvar og muligheder Managing Director Claus Rørdal Madsen Lundgaard Info Slides	Indførelse af nye tog og biler Managing Director Martin Bratt Thelle Copenhagen Economics Info Slides	Fjerns ledning - Ringsted - Høby Prosjektleder Jens Ole Kuhlmann Info Slides	Low BIM (10D) Railway Project Railroads Group Manager & BIM Strategist Daniel Albrecht / BIM Manager Tor Lundberg Info Slides	København: Ring III og Frederiksborg Vores ansvar og muligheder Managing Director Claus Rørdal Madsen Lundgaard Info Slides	The Rail Freight Corridor through Denmark Chief Advisor Hans Christian Wöhrer Trafikstyrelsen Info Slides						
11:45-12:15	Aarhus R. Fjernsynsprojekt Indeholder Paa Aker Brønstad Sponberg & Madsen Info Slides	Odense og Aalborg Status Prosjektleder Claus C. Thelle / Copenhagen Economics Info Slides	Udenlandske erfaringer Managing Director Martin Bratt Thelle Copenhagen Economics Info Slides	Fjerns tunneling mellem Rødby - Puttgarden Dirkster Claus Rørdal Madsen Info Slides	Purchase and Approval Process of Software Lead Assessor Trends Witter RTO / RTO Denmark Info Slides	Høst på TEN korridorerne Informationscenter Den Danske Region Dänne Info Slides	Signalling Programme in Relation to Freight Trains Project Director Martin Sanderom Sanderom Info Slides						
12:15-12:30	ERTMS	Rolling Stock and Operation	Forretningssmuligheder	Electrification & Signalling	RailTech	Økonomi	Rejseinformation						
Lokaler 2	Lumbye	Carstensen	Harlekin	Congress Hall	Glassalen	Columbine	Pierrot						
13:30-14:00	ERTMS introduktion Brancheløber Jens Ole Kuhlmann Migration Manager Tommy Gade Jensen Info Slides	Rolling Stock for a Small City Sales Manager Tobias Koch Siemens Info Slides	Freemove konferencemuligheder Dirkster Claus Rørdal Madsen Info Slides	The Electrification Programme Project Director Søren Laurson Info Slides	RailTech DTU Brancheløber Allan Larsen / Formand Nasse Nybo Johansen Info Slides	Økonomi 2030 Regional Manager Stefan Gustafsson Info Slides	Rejseplaner Communications Manager Birgitte Woolridge Info Slides						
14:00-14:30	ERTMS introduktion Brancheløber Jens Ole Kuhlmann Migration Manager Tommy Gade Jensen Info Slides	Rolling Stock for a Small City Sales Manager Tobias Koch Siemens Info Slides	Freemove konferencemuligheder Dirkster Claus Rørdal Madsen Info Slides	The Electrification Programme Project Director Søren Laurson Info Slides	RailTech DTU Brancheløber Allan Larsen / Formand Nasse Nybo Johansen Info Slides	Økonomi 2030 Regional Manager Stefan Gustafsson Info Slides	Rejseplaner Communications Manager Birgitte Woolridge Info Slides						
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# Contact

Web and e-mail:

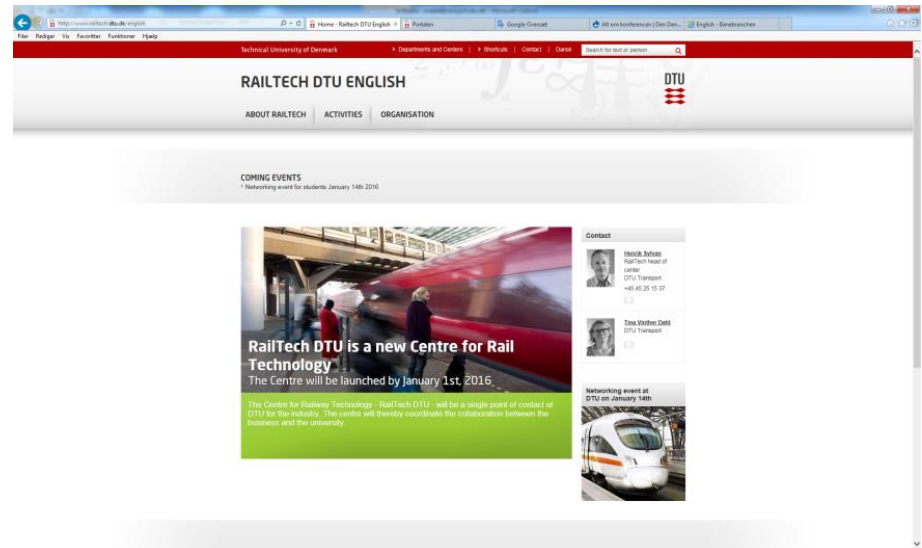
- [www.railtech.dtu.dk](http://www.railtech.dtu.dk)
- [railtech@dtu.dk](mailto:railtech@dtu.dk)

Head of centre:

- Henrik Sylvan  
[sylvan@dtu.dk](mailto:sylvan@dtu.dk)

Coordinator:

- Tina Vinther Dahl  
[tvdahl@dtu.dk](mailto:tvdahl@dtu.dk)



<b>Introduction</b>	<b>10 min/Henrik Sylvan, RailTech DTU</b>	<b>Welcome – introduction to the centre; the aims and the visions. The railway business, the education, the career opportunities etc.</b>
From Quantum Physics to the Danish State Railways	10 min/ Anders Tipsmark, DSB	Anders is currently working as an Operations Research Analyst with DSB - various aspects of Planning and Operations, e.g. Disruption management and re-insertion for S-tog, daily reserves, maintenance planning and passenger statistics. He is also involved in IT-projects such as enterprise datawarehouse solutions and realtime monitoring of operations.
From building technology to catenary - and from Bergen to the S-line	10 min/ Nikolai Linding Krog, COWI	Nikolai has been with the Railway and Metro Division at COWI since 2015. He specialised in Structural Engineering at DTU and is currently working with catenary. This has brought him to Bergen in Norway where he worked on the cityline, but he has also worked with speed upgrades on the S-line in Copenhagen.
Train Management Systems – in London and Copenhagen	10 min/ Moffassal Hossain, Siemens	Moffassal has a BEng from Ballerup and has since 2011 worked with Siemens. He works in the Mobility TMS (Train Management System) Division and his job has so far brought him to London to work with Train Control Systems at Cross Rail – and he has worked with the Danish Signalling Programme.
Bridges & Constructions – and high speed lines	10 min/ Mihai Blagniceanu, Atkins Denmark	Mihai came to DTU five years ago for a Master's degree in Structural Engineering and has since joined Atkins' Bridges & Constructions Department. With Atkins he has worked on various railway projects – e.g. the new high speed line Copenhagen Ringsted where he has worked with the design of the substructures of the bridges.
From DTU Compute to RailNet Denmark - and how to model a railway?	10 min/ Tanja Søndergaard, Banedanmark	Tanja has a degree from DTU Compute and joined Banedanmark's (RailNet Denmark) Planning Division in 2014. She works with data analysis and life cycle cost models which perform mathematical optimization using technical and economical input data. Output from Tanja's work is used when determining the coming years renewal on tracks, bridges and catenary.
Summary	Henrik Sylvan, RailTech	Summary and Q&A
Networking	Pizza/beer served	Talk career, ask questions, network - and get a beer and a pizza..... RailTech DTU