

# NEW MODELS IN FREIGHT TRANSPORT: SUSTAINABLE SUPPLY CHAINS, THE PHYSICAL INTERNET AND IRREDUCIBLE COMPLEXITY



Smart freight TranspOrt and  
logistics research Methodologies

8th International Workshop on Sustainable Road Freight Transport 9th-11th November 2021

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# STORM

## Smart freight TranspOrt and logistics research Methodologies

### Objectives

- Screen existing trends and challenges in freight transport
- Elaborate new analysis frameworks & models to address structural change in logistics / freight transport.
- Recommendations for research and development on new data, methods, tools

### Project Consortium



- VTT, Technical Research Centre of Finland
- Fraunhofer, Institute of Systems and Innovation Research, Germany
- Chalmers University, Department of Space, Earth and Environment, Sweden
- Czech Technical University in Prague, Faculty of Transportation Sciences, Czech Republic
- ERTICO – ITS, Belgium

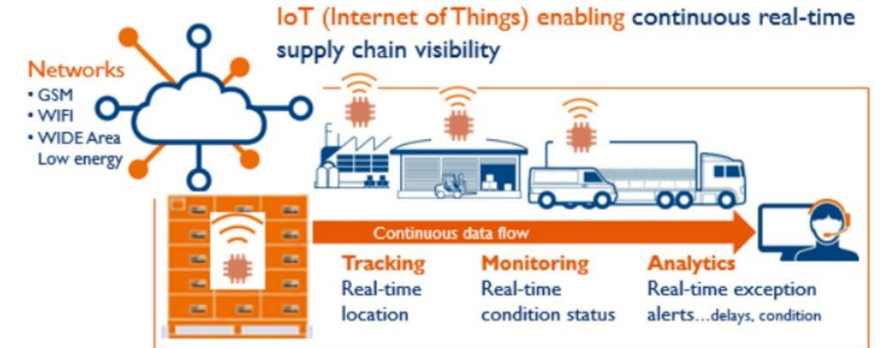
# SYSTEM CHANGE IN FREIGHT TRANSPORT: DIGITALISATION AND THE INTERNET

## ■ Digitalisation

- digital/Internet based business models
- Blockchain based market structures – fragmented markets?
- Fewer fixed supply chains? Internet of Things enables real time optimisation of supply chains
- less need for centralised hub and spoke systems with massive distribution centres
- more, smaller cross-docking and intermodal terminals – automated to be competitive with larger terminals using economies of scale in cargo handling

## ■ Continuing emphasis on reducing delivery times?

## ■ Predictive demand management makes warehouses redundant?



# SYSTEM CHANGE IN FREIGHT TRANSPORT: SUSTAINABLE SUPPLY CHAINS

## ■ Decarbonisation

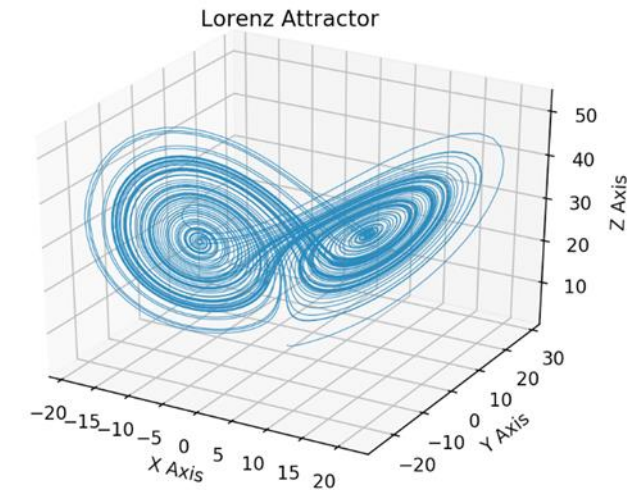
- New drive trains and fuels
- Fuels infrastructure with lower density energy storage
  - or overhead electric catenary..
- Fuel cells vs. batteries vs. catenary
- Synthetic fuels?
- biofuels?
- where is all the low carbon energy going to come from? Who says road freight will get it?
- global renewables/biofuels supply and demand



## ■ Demand management? Scenarios of lower growth in freight transport?

# MODELLING AND ANALYSIS OF COMPLEX SYSTEMS IN FREIGHT TRANSPORT

- Models for analysing big data
- Access for research to big data from IoT and:
  - GPS vehicle data AIS shipping data
  - Software and analysis of big data
  - Use of samples and synthetic data
- Developing methods for policy and business strategy assessment



# MODELLING ISSUES

- How to model system change in technologies, operations, infrastructures?
- How to include new business models?
- How to model and communicate systemic uncertainty?
  - Conventional Monte-Carlo analysis is not feasible with big data?
- Bigger model for big data analysis?
  
- What about policy assessment?
  - How to influence policy making for system change in digitalisation for decarbonisation?
  
- Can we think of an expansion of modelling methods and applicable theories to address these different issues at different levels of market, policy and geographical aggregation?





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# FIRST IDEAS: BIG MODELS OR LITTLE MODELS OR BOTH?

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- Key features of models
  - Dynamic processes of system change
  - New digital systems, susustainable transport systems and supply chains
  - Behaviours
  - Big Data
  
- Different kinds of models for different kinds of issues
  - Hadley Centre as example or Integrated Assessment models  
or IAMs or 'micro' level models or transitions niche-regime models?
  
- Models for understanding , especially ,behavioural' decision making
- Models for 'case specific policy advice'
- Models to faciliate stakeholder processes

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