Moving towards practical implication of self-organizing logistics –
Making small steps in realizing the PI vision by raising awareness
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MISSION OF TNO

TNO connects people and knowledge to create innovations that boost the competitive strength of industry and the wellbeing of society in a sustainable way.

This is our mission and the professionals of TNO have used their knowledge and experience to this end for more than eighty years.

‘INNOVATION FOR LIFE’
Together with universities

In public-private collaboration with partners

Contract research for and with customers

Exploiting knowledge through spin-offs, licences, etc together with other companies
OBJECTIVE

› Logistics system will / need to change considerably
› For practicioners transition towards PI or SOL seems to be in the far future

› “Examine with logistics practicioners what the practical value of the PI-vision, and a more self-organizing logistics system, could be in real life logistics operations today already”
PI AND SOL

- Physical Internet as an application of a Self-Organizing Logistics (SOL) System (Pan et al., 2017)

- Self-Organization: more autonomy at a decentral level in the system and local intelligence (Wysick et al., 2008)
  - Openness: connectivity, reconfiguration, adaptation
  - Intelligence
  - Decentralised control (Pan et al., 2017)

- Next to benefits of SOL (flexible, adaptive, autonomous) also more critical stances in the literature on whether SOL indeed improves flexibility and efficiency (e.g. Sternberg & Andersson, 2014; Sternberg & Norman, 2017)
First steps in transition of logistics system
SERIOUS GAMING

Main purpose Serious Gaming: learn and generate changes in behaviour (Lebesque et al., 2017).

Raise awareness  Generate new ideas  Experiment in a safe environment
SOLVE IT!

1. Enter into the world of Solve it!

2. Design an organization structure (actors, communication, intelligence, data)

3. Evaluate the system based on disruptions

4. Pitch the comparison of two designs to other teams

5. Discussion to translate findings to current logistics practice
“The workshop is a good conversation starter and makes me reconsider the choices we make in our company.”

“Your basic assumptions and views are challenged. You experience the level of resilience of your organization design and in the discussion you learn from the other players as well, based on the choices they made.”
SOLiD REAL-LIFE EXPERIMENTS

› Raising awareness by experimenting and demonstrating in practice that a more self-organizing logistics system can have advantages already.

› **SOLiD**: 2.5 year research project (partly funded by Dutch Topsector Logistics (TKI Dinalog) and NWO.
  › Experimental environment
  › Perspective to SOL
  › Feasible in practice
  › Logical motive

› **Purpose**: Proof-of-concept that shows how logistics systems can be prepared for the Physical Internet.
1) More dynamically planning delivery areas based local information
2) Adding local intelligence in order to reduce handling activities
3) Continuous replanning of delivery routes based on receiver feedback
4) Making local intelligence of good-performing drivers available

› Simulation environment (complementing case 1 + 3)
› Learning environment for developing future steps
CONCLUSION

› Make the idea of a self-organizing logistics system and the PI more concrete for practitioners

› Two (more bottom up) approaches to contribute to growing conceptual contributions on the PI
  › Serious gaming to raise awareness
  › Real-life experiments as a first step towards transforming logistics

THANK YOU FOR YOUR ATTENTION

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