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Prerequisites for Data Sharing & Realizing Off-peak Deliveries

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Agenda

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- Acknowledgement

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Introduction: off-peak deliveries

- An efficient way to transport goods in urban environments where congestion impact deliveries productivity
- Battery Electric Vehicles (BEV) are quiet and enables for off-peak city deliveries
  The transport companies then have the opportunity to use the vehicles 24/7
- Previous research shows that unmanned reception of deliveries is a prerequisite for scaling up off-peak distribution
- However, there are some remaining challenges;
  - noise pollution at night, increased labour costs, liability & safety issues, and finding values and incentives for all involved stakeholders
- The HITS (Sustainable & Integrated Urban Transport System) project is a Stockholm-based multi-stakeholder collaboration aiming at developing transport-efficient solutions that provide cleaner and safer cities based on e.g. digitalisation and off-peak deliveries.

Introduction: data sharing

- In the HITS project, we demonstrate unmanned off-peak solutions, based on a “Physical Internet”-setup
- For off-peak deliveries on a “Physical Internet”-setup to work, data need to be shared between the actors. One part of the HITS project has studied the prerequisites for data sharing to enable a trustful collaboration.
- We have also evaluated the strengths and challenges of the current solution, to identify needs for further investigations and development

Methodology

Design thinking

- Design thinking process is a very efficient method in structuring problem framing and to ensure that the right customer value is met
- Unlike traditional linear methods Design Thinking is an iterative and insight-driven process where testing and pivoting from the original ideas to new ideas, are fundamental
- The iterative process includes the phases Empathize, Define, Ideate, Prototype and Test
- The process prototypes (e.g., "proof of concept") in close collaboration with customers to understand the customer values and quickly gather insights from actual situations

Literature review - data sharing

- The work on data sharing is mainly based on a broad literature reviews

Practical input - data sharing

- The synthesis of relevant factors for data sharing is partly based on the author’s (A. Hultåker’s) almost 15 years of practical data sharing between departments within the automotive manufacturer company Scania

Research process: Off-peak pilot

1. Design thinking workshops with the aim of identify and understand the stakeholders' needs and challenges
2. Creating a prototype "Physical Internet"-setup system connecting goods to the vehicle and to a digital lock at the restaurants, using data sharing
3. Demonstrating of unmanned off-peak deliveries carried out by the shipper HAVI

   HAVI delivered off-peak (22.00 – 06.00) to 4 restaurants in the Stockholm City area during 2 months

photo: Havi

Data sharing: barriers

- **Cultural and organizational barriers:** e.g. no perceived potential benefits, lack of trust, fear of competition
- **Legal and regulatory barriers:** e.g. restrictions on data location, restrictions/ uncertainty about lawful grounds to use or share data, uncertainty about data ownership and data access
- **Technical and operational barriers:** e.g. lack of data interoperability, lack of standards, high costs of data curation to adapt it for sharing

Data sharing: enabling factors

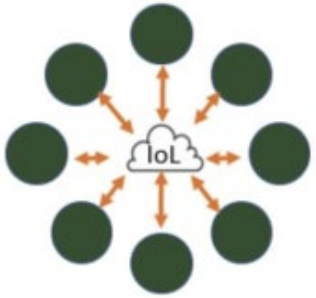
- We claim that there are eight factors are needed in other to enable successful data sharing (see list)
- Usually all factors are needed
- Which factors are more or less important vary depending on the individual cases
- Data, business value, and regulatory foundation, play a specific role as a starting point for any data sharing
- There is an interdependence between the factors
- Some of the factors have to do with the internal culture of a company (e.g., trust), while some of the factors (primarily infrastructure, security, and skills) can be obtained from external partners

Data sharing enabling factors
Data
Business Value
Regulatory foundation
Trust
Infrastructure
Security
Meta data
Skills

Data sharing platform

- The HITS off-peak pilot is based on a “Physical Internet”-setup, using the communication standard “Internet of Logistics” (IoL). This is an integration platform which enabled all actors and data sources to connect and communicate with each other without the need to set up individual integrations.
- The IoL standard has been developed in a collaboration between LogTrade Technology, Ericsson, IBM, and many more
- A key element is to digitalize individual goods by giving them e-identities and thus allowing tracing
- One-time encrypted digital smart lock solutions enable the right goods, from the right truck, at the right time, in the right location to get access to e.g. restaurants after closing hours
- The data sharing platform can be used to create applications needed for company specific services based on the common shared data

Without IoL



With IoL

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Off-peak IoL based deliveries

- The process from receiving a Purchase Order (PO) in the planning system (PS) to completing the delivering and securing the facility can be described with the following steps;

• A purchase order is received in the planning system • The system creates; - a Trade unit digital identity (TU) - a transport instruction (TI) in the IoL	• An association is created between the TU, TI, and assets that will be used for the shipment	• During the journey all assets independently stream their position and status through the IoL.	• At the destination the driver gets a onetime encrypted key - if the data show that the right goods is at the right destination at the right time	• The driver marks the TU as delivered and leaves • The driver receives a notification that the facility is locked and secured.

Results

- The tests showed that the concept works and;
  - can be used in scale and can enhance transport efficiency (deliveries/hour) by ~30 %
  - can be achieved using existing technologies and without high labour cost on the receiver side
- Key enabling factors;
  - A data sharing model, with mature and structured data
  - A willingness to apply data-driven decision, creating trust between the different actors
- There were some initial learnings;
  The off-loading initially took ~ 50 - 80 min. due to uncertainty about the process. The restaurant had not prepared sufficient space, so the drivers needed to reorganise goods to find space for the goods. There were physical obstructions e.g., pallets and garbage cans that needed to be removed.
- The drivers were very pleased to work night-time as they felt less stress
- For safety reasons, HAVI used two people for the delivery. This is a cost that is necessary, but not justified for serving only 4 restaurants. However, initial calculations indicate that for a larger delivery system this investment in security for the drivers and the goods is justified.
- Battery electric trucks can, especially if equipped with geofence technology, open more opportunities for safe and sustainable urban distribution

Results: data sharing analysis

Factors	Issues
Data	- Exists - Shared through secure IoL communication standard, for interoperability - Is stored and can be used for analytics to further develop the business case
Business value	- Incentives to decrease congestion and be able to sell “green deliveries”. - Incentives for receivers to reduce the number of man hours - Challenges with silent handling of material, driver safety issues and finding values and thus incentives for all involved stakeholders
Regulatory foundation	- Based on business-to-business contracts - Temporarily permits for night time deliveries had to be requested and requires silent delivery - Involving security service to fulfils insurance requirements - Data ownership structure setup between supplier, carrier, and recipient
Trust	- Existing stakeholder relationships since many years - Clear data ownership - Smart lock solution and logs increases trust
Infrastructure	- Data exchange, logging, and analysis were done through IoL platform. - Parts of pre-existing IT-system not compatible with API:s, had to build work around solution - Had to equip the facilities with digital locks and additional security systems
Security	- The goods, trucks, and drivers each have unique authentication through different API sources - One-time encrypted digital smart lock solutions, as well as logging of all event provides secure IT-solution - Driver and goods safety needs to be further addressed
Meta data	- Using API:s for data transfer with an agreed content and form
Skills	- Combining traditional delivery with IT competence, competence on digital locks and security service - Recurrent training sessions for all parties involved

Results: Remaining challenges

- Although the BEV vehicles are silent, there is still a risk of noise from the equipment, accidental slamming of doors etc.
- Need to further investigate and ensure the security for personnel working at night-time
- Ensure good communication and adherence to the routines from all actors involved
- Need of further update the regulatory policy issues that today hinder large-scale off-peak distribution with BEVs.
- Need to further investigate the business models and whether there are cost savings to be made in the system to understand how upscaling can be done.

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