ADVANCING RESILIENCE IN LOGISTICS USING SMART IOT PALLETS

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INVITED TALK – 1ST AREADS WORKSHOP

IN CONJUNCTION WITH THE 32ND INTERNATIONAL CONFERENCE ON ADVANCED INFORMATION SYSTEMS ENGINEERING (CAISE)
OUTLINE
STRUCTURE AND CONTENTS

- Resilience in logistics
- Architecture for situation aware smart logistics
- Smart IoT pallets and scenario
- Advancing resilience
- Discussion
Resilience is emerging research area and relevant topic
Multidisciplinary and multidimensional concept
Gaining attention in IS research
For this presentation, resilience is defined as the:
- “capability of an element to return to a pre-disturbance, stable state after a disruption”
- “ability to sense, recognise, adapt and absorb variations, changes, disturbances, disruptions and surprises”

Bhamra, Dani & Burnard (2011), Hollnagel et. al. (2006), Holling (1973)
Disruptions and exceptions are important risk sources in logistics

Need for situation-aware information systems and decision making

IoT is capable of real-time monitoring and exception detection

Enhancing and linking IoT data with internal and external data sources

Taking available knowledge and detection by users into account

**Goal:** achieving system-wide resilience

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EARLIER WORK
ARCHITECTURE FOR SITUATION-AWARE SMART LOGISTICS

- Layered viewpoint:
  - Business processes
  - Application
  - Technology

- Detailed viewpoints:
  - Exception management functions
  - Case study for validation
  - Information system prototype
EARLIER WORK
ARCHITECTURE FOR SITUATION-AWARE SMART LOGISTICS

M. Iacob, G. Charismadipta, M. van Sinderen and J. P. S. Piest (2019)
EARLIER WORK
ARCHITECTURE FOR SITUATION-AWARE SMART LOGISTICS

M. Iacob, G. Charismadiptya, M. van Sinderen and J. P. S. Piest (2019)
EARLIER WORK
ARCHITECTURE FOR SITUATION-AWARE SMART LOGISTICS

M. Iacob, G. Charismadiptya, M. van Sinderen and J. P. S. Piest (2019)
CURRENT WORK
IN THE DATAREL RESEARCH PROJECT

- Experiments and testing in real-life situations:
  - Multi-actor business process in logistics: product recall
  - Systems integration for real-time data streaming: condition monitoring
- Improve functionality and usability of the architecture:
  - Storage of historical data for data analytics and mining
  - Connectors for ERP integration and APIs for third parties
- Incorporation of artificial intelligence:
  - Capture ‘situational data’: temperature, humidity, pressure, shock, …
  - Usage of machine learning and deep learning techniques
  - Enhanced decision making based on intelligence amplification

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SMART IOT PALLETS
AHRMA’S SMART PALLET, IOT TECHNOLOGY AND DATA SERVICES

1. Pallet
   - Smart pallet including transponder technology
     - (real-time measuring location, shock, temperature, weight, humidity)

2. IoT
   - Gateway solutions to send collected information into cloud

3. Data
   - Information storage via cloud and information access via dashboard/API

4. Data Services
   - Value for the customer based on provision of data or services

Operations
- (e.g. end-to-end transparency in supply chain)

Goods
- (e.g. shock-information on pallet-level)

Problem solving (tbd)
- (e.g. customized consulting approaches)

AHRMA Cloud
- API into Customer’s (ERP) System
- Ahrma Dashboard
- Stationary Gateway (e.g. in warehouse)
- Mobile Gateway (e.g. in truck)
- Smart Phone with Ahrma App as Mobile Gateway (e.g. in field)

SCENARIO
ADVANCING RESILIENCE IN LOGISTICS WITH SMART PALLETS

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6/10/2020

International Data Space
THOUGHTS ON ADVANCING RESILIENCE
HOW SMART IOT PALLETS CONTRIBUTE TO RESILIENCE IN LOGISTICS

- Using Smart IoT Pallets extends the data coverage in the supply chain
- IoT actively transmits events, barcoding / RFID are passive
- IS contributes to resilience:
  - Faster exception detection
  - Event processing and presentation in context
  - Information sharing with supply chain partners and 3rd parties
- Individual and organization resilience for response and readiness
FUTURE WORK
WHAT ARE THE NEXT STEPS FORWARD?

- Assessment and modelling of resilience in enterprise architectures
- Development of demonstrator based on IDS for secure data sharing
- Deployment of business logic and –rules: edge, fog and/or cloud
- Algorithms for event detection, prediction and decision support
- Measurement of intelligence amplification

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DISCUSSION
PLEASE SHARE YOUR THOUGHTS AND ASK YOUR QUESTIONS
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