

FT07.04_2023 Industrial IoT

IoT-drevet forretningsdesign – digitalisering af virksomheder og samfund



Indledende oplysninger

Indsatsområde	IoT-drevet forretningsdesign – digitalisering af virksomheder og samfund
Institut	FORCE Technology
Titel	Industrial IoT
Nummerering	FT07.04_2023
Version	1.0
Periode	Januar 2023 – december 2023
Kontaktperson	Henrik Hassing (hnh@forcetechnology.com)

Revisions

This is the first version of the activity description for 2023. It builds on activities and results completed in 2022.

Description

Objectives

The activity plan has three general goals:

- Gathering of state-of-the-art knowledge (from academia and industry) concerning Industrial IoT, with the aim to understand current needs that are shared across industry, as well as upcoming trends and new available technologies for addressing such needs
- Building new knowledge in the form of services – to be developed and tested - addressing the needs emerged from research and from industrial experience concerning the adoption of Industrial IoT and its translation into actual business value
- Disseminating knowledge developed during the development and testing of the services

The overall objective is to support Danish production companies improving their production performance by taking advantage of IoT, with a particular focus on small and medium-sized manufacturers.

Content

The activity plan consists of a number of activities to support the achievement of the objectives above. These are:

1. Digital Maintenance: bridging the gap from concept to solution

Due to the nature of IoT (data generation, collection and transmission), maintenance is one of the key application cases for its technologies: IoT is used to monitor the performance of production equipment and identify the need (or upcoming need) for maintenance according to different performance data patterns (condition-based or predictive maintenance). Nevertheless, although maintenance represents a significant lever for production improvement (i.e. it accounts for ca. 24% of production costs – 65% of which are considered unnecessary), small and medium-sized companies are still challenged when it comes to adopt IoT for improving their maintenance policies. The activity plan aims at building an understanding of such challenges and of the mechanisms to address them, enabling a successful transition from a time-based maintenance policy to a condition-based or predictive maintenance policy. The activities to be performed are the following:

- Maintenance digitalization needs: study of the more significant needs for enabling successful maintenance policy improvements through digitalization. Investigation performed by studying data

collected from five companies interested in the transition to condition-based and predictive maintenance and by interviewing domain-experts from universities

- Equipment retrofitting: study, formulation and execution (service development and testing with two companies) of the end-to-end process of retrofitting existing equipment using IoT technologies for enabling the improvement of the maintenance policy (to condition-based and predictive maintenance)
- Knowledge dissemination: publication of a podcast or video presenting the findings concerning the main maintenance digitalization barriers and the key mechanisms to address them

2. Industrial sustainability: designing sustainable development strategies

Sustainability has become of strategic value for Danish manufacturers, entering their innovation agenda and introducing new roles in companies' management (i.e., the "sustainability manager"). Today, the increasing presence of funded programs focused on the topic is proving how sustainability has become of strategic value for Danish institutions as well. Despite the interest, sustainable development is at its infancy when it comes to production companies, and maturity assessments are a good fit when technology innovation is at such stage. The activity plan aims at further researching industrial needs when it comes to sustainability of their factories and at continuing the "Factory Sustainability Assessment" approach started with the 2021-2022 activity plan, to help manufacturers outlining an activity plan for their sustainable development. The activities to be performed are the following:

- Factory sustainability needs: study of the key sustainability needs for factories, linked to both upcoming legislation (i.e. compliance) and market demand (i.e. competitive advantage). Investigation performed by studying data collected from four-six companies engaged in industrial sustainability activities and by interviewing domain-experts from universities and from FORCE Technology (product compliance and/or LCA departments)
- Factory sustainability practices: investigation of the best practices for industrial sustainability by interviewing domain-experts from universities and by attending an international conference or a relevant industrial fair
- Factory Sustainability Assessment: further development (development and testing with two companies) of the Factory Sustainability Assessment approach (developed in the activity plan 2021-2022 to assess sustainability capabilities and formulate activity plans accordingly), aiming at increasing the level of detail when assessing the sustainability capabilities assessment and when defining the activities for capturing the sustainability improvement opportunities accordingly
- Knowledge dissemination: presentation at one event of the Factory Sustainability Assessment approach and of the results from its application in the two companies where it has been tested

3. Industrial IoT Infrastructure: structuring data collection in industrial environments

The Industrial Internet of Things (IIoT) – or the application of IoT in industrial environments – is enabling the collection and use of data within (and across) factories and, consequently, a wide spectrum of new value generation possibilities. However, the equipment generating data and the software platform processing it need to be connected, so that data can flow from one to the other seamlessly. Surprisingly, this still represents a challenge even for large companies. The aim of this activity plan is to analyze successful industrial cases and formalize the knowledge concerning the establishing of an IIoT infrastructure connecting equipment and software platform. The activities to be performed are the following:

- IIoT state of the art: understanding of the upcoming possibilities concerning IIoT platforms by attending a relevant industrial fair
- Knowledge dissemination: formalization of the knowledge collected through past industrial experiences in a whitepaper discussing the process of designing and building an IIoT infrastructure (follow-up of the IIoT whitepaper published during the 2021-2022 activity plan, presenting the IIoT concept and its impact on the automation landscape)

Stakeholders and collaboration partners

The activity plan particularly involves FORCE Technology's competences within operations management, automation and the Industry 4.0 agenda/digital production. The activity plan takes advantage of collaborations with Danish as well as international universities:

- Aalborg University for supporting the "Digital Maintenance" activity, due to its past and ongoing research concerning the integration of IoT in production companies (CIP - Centre for Industrial Production)
- University of Bergamo for supporting the "Digital Maintenance" activity, due to its high expertise and experience in the maintenance field (CELS - Centre on Logistics and After-Sales Service)
- Technical University of Denmark for supporting the "Industrial Sustainability" activity, due to the expertise in the field and the work on the "Ready2Loop" tool

Synergies/collaboration with other projects

As part of the activity plan, coordination is ensured with the following other efforts and projects, so that knowledge and services developed under the auspices of these become available to the target group:

FoU projects:

- The activity plan partly builds on top of learnings obtained through projects co-financed by Industriens Fond (Digital Factory Acceleration) and financed by MADE (Digital Maintenance Program samarbejdsprojekt; LEGO WS2, Fujifilm WS2). At the same time, the activity plan aims at feeding additional FoU innovation projects through its applications to Danish clusters (MADE in the first place).

Advisory Board

The activity plan has been presented to the Advisory Board on Monday 28 November 2022.

Knowledge dissemination

Results developed under the activity plan are disseminated via the Nordic IoT Center (nordiciot.dk) and associated follow-up group and stakeholder groups. The specific activities for knowledge dissemination are described in FT07.09_2023 Knowledge dissemination and ecosystem.