Industrial Energy-Related Technologies and Systems

A Technology Collaboration Programme established under the auspices of the International Energy Agency

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Digitalisation in industry

a journey beyond productivity and sustainability
Digitalisation in industry is a long journey
The sustainability dimension

Economic drivers

Climate and sustainability drivers

Industry 5.0 ...

- promotes talents, diversity and empowerment
- is agile and resilient with flexible and adaptable technologies
- leads action on sustainability and respects planetary boundaries

Technology Collaboration Programme
by IEA
Sweden Industrial Transformation

• Strategic support for innovation
• Working on applying digitalisation to accelerate integration by showcasing the impact
• Engaging industry to create impact and value
• Securing expertise
• Sharing knowledge and experience
  
• National and international collaboration
Strategic support for innovation in digitalisation and industrial engagement to create impact
Continuous Support - From Curiosity to Impact
Swedish strategic innovation programs

- Strategic road map
- Network of companies and researchers meeting their needs for talent and training professionals
- RDI fund coordination and creating strategic initiatives

Industrial IT och Automation for Process industry
IoT SP – Smart Flows – Opera
Reduced energy consumption by using advance computer science to optimize the district heating system

Partners: Mälarenergi, ABB, Sigholm and RISE
Increased efficiency and traceability through an automated digital solution to measure large quantities of raw materials in the process industry

**Partners:** Boliden Rönnskär, Smurfit Kappa, Metsä Board, SCA Obbola, Norra Timber Kåge såg, DataPolarna, Adopticum and Luleå Tekniska Universitet
Optimization of underground ventilation for energy efficiency

**Partners:** Boliden, ABB and RISE

Reduced energy consumption by using machine learning to optimize the ventilation of underground mines.

Dynamic scheduling and transport visibility in steel production

**Partners:** KTH, SSAB Oxelösund

A feasibility study addressing opportunities and challenges as logistic practices shift from a plan-based management to an adaptive management paradigm.

Dynamic control and optimization of steel heat treatment

**Partners:** Swerim, RISE, Sandvik, Bodycote, Volvo, Linde Gas and Bulten

Optimization of gas flows for minimized energy consumption and CO₂ emissions from heat treatment processes with carbon-rich atmospheres.
Working on applying digitalisation to accelerate integration and creating impact
Digital tools opportunities

- Data used for climate savings
- New business models
- Traceability and identification
- Waste turned into new resources
- LCA – Life Cycle Assessment
- Digital collaboration in valuechains
- Information from products on use, failures and remaining life
- Smart maintenance

Technology Collaboration Programme
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Applying Digitalisation

DFusion- Data Fusion of Disturbance Data

- Explores, develops and demonstrates digital tools and working methods for data fusion, analysis and visualization of data from production systems, with two or more data sources (e.g., disturbance logs, video streams, sensor data, quality data, and maintenance data).
  - Analysis and valuable information for better support with disturbance management.
  - Root cause analyses, predictive maintenance, and quality issues.
  - Increased efficiency, reduced spillage, and increased sustainability.

The Smart Digitalised Sawmill

Goals:
- Increased process efficiency 15%
- Increase product value 10%
- Reduced energy use 10%

U-FEEL (Utility and trust of Electric vHicLes)

- Battery Sizing & Range Prediction for Full Electric Vehicles
- Lower the environmental impact
- Improve operation planning

Project partners:
- Volvo Trucks, Volvo Cars
- Chalmers, VTI, RISE

Technology Collaboration Programme by ieas
Digitalization in industry - a toolbox for sustainability and competitiveness

Digitization as a tool for industry productivity development and transformation to more sustainable processes and business models. Applications of Industry 4.0 and data-driven working methods for a smarter industry with competitiveness.

Innovative energy efficient greenhouses

Through the use of excess heat, we want to create conditions for sustainable and competitive greenhouse cultivation in Sweden by using low-temperature heat from other businesses to a greater extent. The project is carried out in collaboration with leading partners in the area and where RISE is the coordinator.

DigiCORE – Collaboration and Research

DigiCORE is a lab and demo facility focusing on digitalization technologies and their real-world applications.

Eco Edge Prime Power

Further digitalization of society over the next decade demands infrastructure that is closer to the consumer as the shift in consumption requires data services at the edge of the digital networks. The key to meeting this demand is to rollout digital infrastructure that penetrates urban areas in support of this digital future.

Industrial Applied AI

Adapting to the new AI-driven paradigm guarantees sustainability, competitiveness and success of the future industries. AI is already changing the entire business models by offering new ways of automation and knowledge creation. RISE will help you to see the possibilities, identify the opportunities and realise your AI strategies.

ICE datacenter Cloud and IT

Cyber range - test bed for cyber security
Securing expertise, sharing knowledge and experience
PiiA & IndTech

Industrial IT & automation meets digitisation …

1980 + Proprietary Automation and Industrial IT

Installed base worldwide 5 000 mdr €
Digitalisation need cross-disciplinary teams

- Projects with industry
- Internal initiatives
- Scientific contributions

Mission oriented road map

Industrial production and process
- Modeling package for Digital Twins
- Construction Industry 4.0

AI and Big Data in Industry, AIBIND
- Computer vision
- Sustainable valuechains after COVID19

Productivity and Security
- AI for smart predictive maintenance
- Smart & Secure industrial Digitalization

Digitalisation in value chain
- Digital foundries
- Private 5G networks for Industry and society
- Organizational capability to digitalize

Technology Collaboration Programme by IEA
Knowledge platform DIGIPROD

Digitalisation process of an industrial production system

- Business model
- Ownership
- Application design
- Data processing and safety
- Coordinate needs, competences and resources

RISE digitalised testbeds for testing, demonstrations, and education

Knowledge Platform DIGIPROD

- Research projects with academia and industry
- Industrial assignments with expertise competence

Technology Collaboration Programme by IEA
The importance of sharing lessons

How to share?

• Case studies
• Reports
• Short digital format
  example: Software Center brown-bag seminars
• Courses:
  example: https://learning4professionals.se/
International Collaboration
IEA-IETS TCP and Swedish Digitalisation Consortium
Swedish Digitalisation Consortium

SubTask I: Structure and Benefits, Digitalisation, Digital Twin, Data-driven
SubTask II: Methods and Applications of Digital Twins and AI in Digitalisation
SubTask III: Lessons Learned and Created Values by Digitalization, Case-studies in forestry, mining and process industry
SubTask IV: Road maps and future agenda

https://www.ri.se/en/what-we-do/projects/energy-saving-in-industry
IETS – Swedish Consortium
Swedish Consortium - mission and agenda

• **Purpose and focus:**
  • Value creation as digitalisation impact in industry
  • Sustainability, Energy efficiency and CO\textsubscript{2} reduction

• **Result dissemination**
  • Knowledge sharing and transfer, nationally and internationally
  • Participation in seminars, conferences and visits

• **Internationalisation**
  • Connecting Sweden industry with international peers
Initial activities

- Analysis of **PiiA project portfolio and related programs** to find **best practices**
  - Matrix presenting technology and areas for digitalization, connected to the three international sub-tasks.
  - Coordination of webinars for the **Swedish consortium**.
- **Collaboration** with international consortium **IEA – IETS**
  - Share material with Task Managers; inquiries, project descriptions, on-going activities in Sweden.
  - **Co-coordination** of and **participation** in international webinars and workshops.
Continuous collaboration

• Focus on short- and long-term challenges
  • The impacts of digitalisation
  • The gaps and priorities to create impact
  • The practical challenges for digitalisation and solution integration in the industry

• Engaging industrial partners in international collaborations

• IEA – IETS Collaboration

• Knowledge and experience dissemination
Sustainable, green and competitive industry

Vision

- Needs and Benefits
- Reality and Practice
- Business Value
- Securing Expertise
- Strategic Roadmap
- Continuous Investment
- Support for Innovation
- Collaboration and Cocreation

... synergies and expanded collaboration!
Digitalisation in industry

a journey beyond productivity and sustainability

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