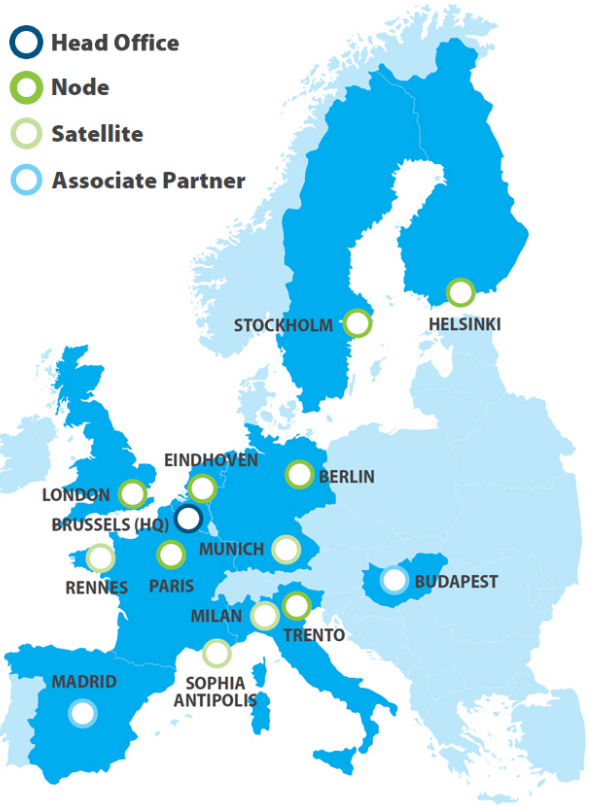
Industry 4.0 at EIT Digital Budapest

Zoltán Horváth | Budapest | 2017. szeptember 21.

EIT Digital Nodes

Partnership with leading universities, companies and research laboratories of Europe



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MINES TELECOM INSTITUT Mines-Télécom

LABS hp

nsn

TNO innovation for life

UNIVERSITÉ DE RENNES 1

BT

Imperial College London

NIRICT

Aalto University

UCL

ENGINEERING

Telekom Innovation Laboratories

orange

IBM

CWI

Alcatel·Lucent

novay

Inria INVENTORS FOR THE DIGITAL WORLD

VTT

PHILIPS sense and simplicity

ST ERICSSON

trentorise

TELECOM ITALIA

German Research Center for Artificial Intelligence GmbH

berlin

KTH VETENSKAP OCH KONST ROYAL INSTITUTE OF TECHNOLOGY

UNIVERSITÉ PARIS-SUD 11

SAP

UPMC SORBONNE UNIVERSITÉS

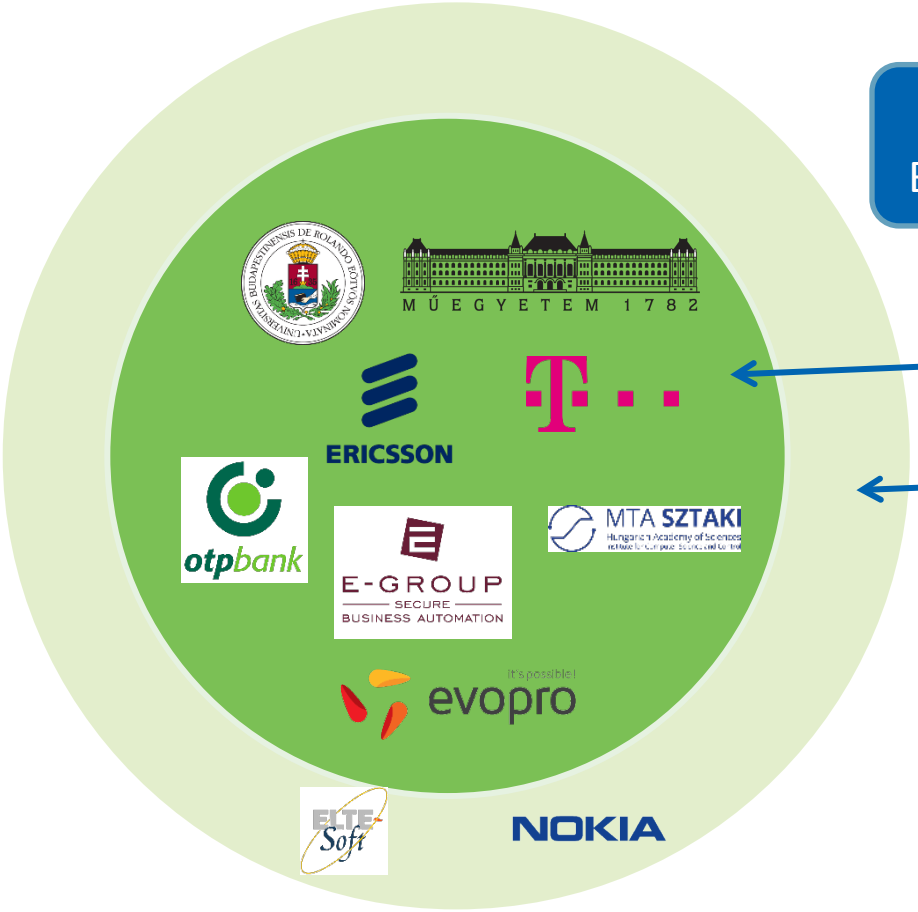
Swedish Institute of Computer Science SICS

ERICSSON

Fraunhofer

SIEMENS

EIT Digital Budapest's ecosystem



Expansion – 4 new partners joined
Budapest became a full Node (end of 2016)

EIT Digital Budapest

Strategic industrial and research lab partners and platform of innovative SMEs

Activities:

- Support for I&E education of EIT Digital Academy
- Research & Carrier potential

Expansion – 3 new partners join (2017)

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Budapest CLC

Regional hotspot and meeting place for Digital innovators

- CLC and university and industrial partners in the same area (Budapest Infopark)
- **External and Internal** events to promote activities and increase brand awareness

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In a nutshell

EIT Digital – driving Europe's digital transformation

EIT Digital catalysing the Budapest ICT ecosystem

- **Education**: EIT Digital Master School - universities of Budapest – members of the leading European university consortium in digital innovation
- **Innovation**: projects with top European research and business partners to deliver impact
- **Business**: access to market and access to finance at European level for Hungarian and CEE scaleups
- **External collaboration**: involving CEE region into EIT Digital efforts to leverage European digital innovation

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Innovation projects

BAPG contributed to 15 Innovation projects of EIT Digital in more than 23 tasks based on 20 R&D&I projects (2012-2016)

Engineering PST in Crowdsourcing Environments along all Components – Building a threat model for the EU and evaluating security aspects (*TU Berlin, Reply, Deutsche Telekom and **ELTE, 2015-2016)***

CPS for Smart Factory – Contextualized steels production controller model and industrial robot controller API and anomaly detection and DSL (*KTH, DFKI, Siemens, Fortiss and **ELTE, 2014-2016)***

IntelliSec – Business models for smart grid security data analytics (Siemens, KTH, Engineering Ingegneria Informatica S.p.A., F-Secure and ***BME, 2016***)

FIDES – Use-case scenarios, test and validation report and functional requirements for a federated and interoperable identity management platform. (*FBK, Thales France, Telecom Italia, Politecnico di Torino, Poste Italiane, DFKI, AAA, Reply and **ELTE, 2015)***

Engineering PST in Crowdsourcing Environments along all Components – Building a threat model for the EU and evaluating security aspects (*TU Berlin, Reply, Deutsche Telekom and **ELTE, 2015-2016)***

Better nights, fresh days – Development of spatial-temporal algorithms to derive relevant signals from the baby *(Philips, TU Eindhoven, Imperial College London and **ELTE, 2015)***

FI-PPP Liaison – Process Liaison between FI-PPP and EIT Digital specially in the field of call information distribution an call process counselling & support (*iMinds, Fraunhofer, Orange, Create-Net and **ELTE, 2015)***

Security monitoring for critical infrastructure – Threat monitoring solution prototype for critical infrastructures (*Siemens, KTH **and BME, 2014-2015)***

Innovation projects

EUROPA – EIT's cloud based data – use and extend Stratosphere, developing data analysis algorithms for the use-cases and leading the experimental evaluation (*SAP, Deutsche Telekom, TU Berlin, KTH, INRIA, SICS and* ***ELTE,***

Playful learning on the cloud – A framework for serious games for children with cerebral palsy
(Nokia, Telekom Italia, Tampere, Eindhoven, Milano, FBK and ***ELTE, 2013)***

Multimodal Mobility – Integration of data from various source
(Inria, Fraunhofer, DFKI, TU Berlin, University Bologna, Telecom Italia, Siemens and ***BME, 2013)***

Secure Energy Sytems – Detecting targeted attacks against Smart Energy Systems
(*KTH, Telecom Italia, Siemens, FBK, Engineering, TU Berlin, TU Darmstad and* ***BME, 2013)***

City Crowd Source – Transport crowd sourcing
(Inria, Imperial College London, Alcatel, SAP, KTH, Cap Digital and ***BME, 2013***

Medical CPS Environments – Data Mining Application (*Siemens, TUM, DFKI, ELTE, Trento Rise and* ***ELTE, 2013)***

Smart Content delivery and Storage – Open source library for deterministic source coding for efficient content distribution in mobile environments. Traffic management for ISPs and network coding for improved handover of mediastreams (*Trento University, KTH, TU Berlin, Orange, Institute Mines, both* ***ELTE and BME 2013)***

FITTIING – IoT facility – resource browsing, cross testbed measurement and data repository and extended federation
(Institute Télécom, UPMC Paris, Fraunhofer, INRIA, TU Berlin, Trento both ***ELTE and BME 2012-2013)***

Innovation Projects

2017

Digital Infrastructure:

Security Operations Center for Critical Infrastructures – protects critical infrastructures from advanced persistent threats through developing a security operations center and a corresponding business model for sale as a product and as a service. (*F-Secure, Engineering, KTH,* ***Evopro*** *and* ***BME, 2017)***

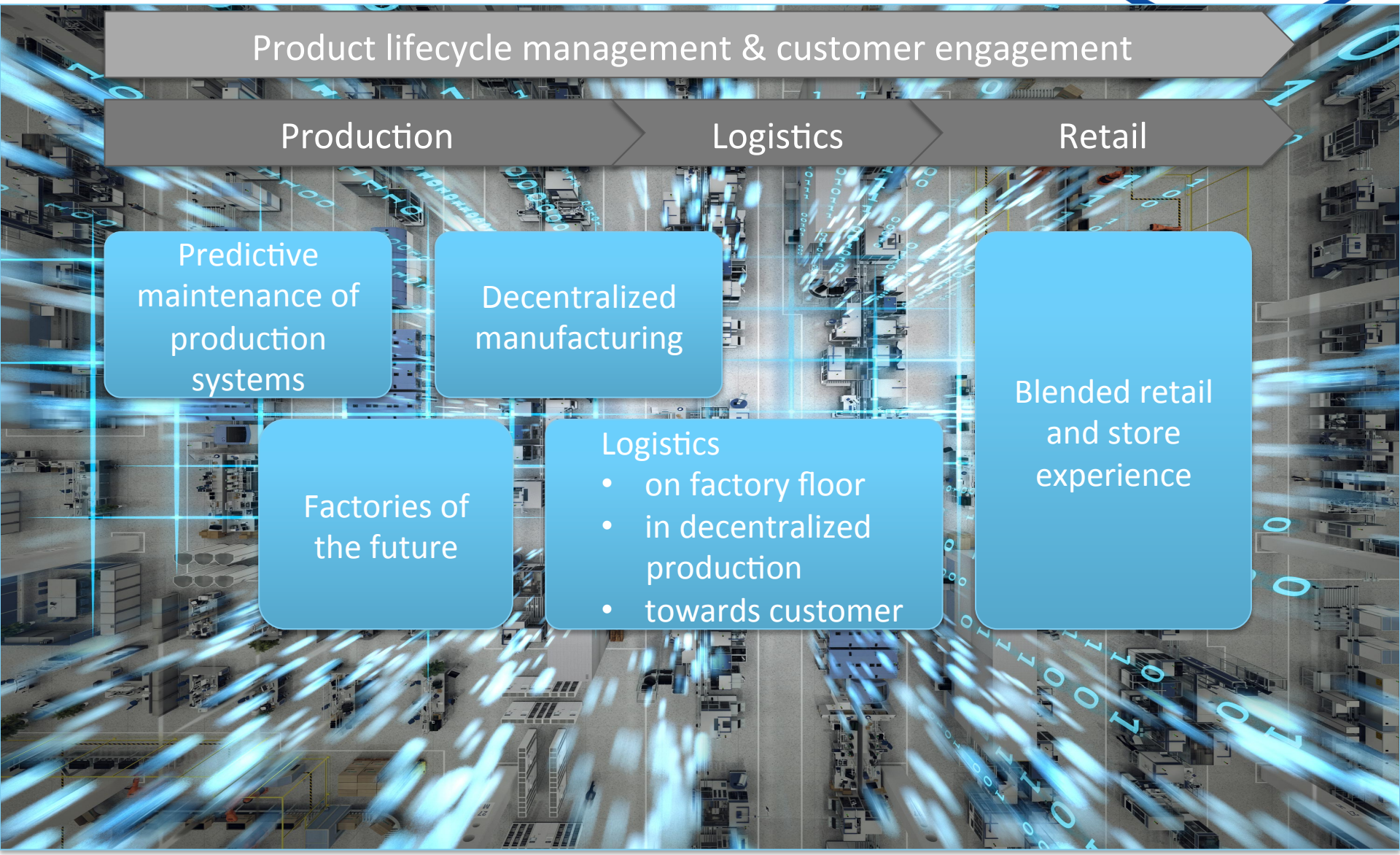
Multi-channels AI-based personal assistant for schedule management – develop a virtual assistant which takes appointments and answers meeting proposals. ***(Telec St E, FBK*** *and* ***E-Group, 2017)***

HopsWorks – HopsWorks will launch the product Hops, a next generation Hadoop distribution from Europe, to provide the first truly multi-tenant, elastic Hadoop distribution with unified batch/streaming. Hops will be backed by a startup, focused on markets: IoT, telecoms and sensitive Big Data owners.(*SICS,* ***Ericsson Hungary and SZTAKI, 2017)***

Digital Finance:

eBIZ– eBIZ (Business Information Zone) introduces a new, disruptive, non-traditional banking service by OTP Bank Plc. first in Hungary, later in the CEE region for SMEs & startups to safely and efficiently perform financial and administrative tasks anywhere, anytime to focus on business opportunities. *(TU-Berlin, Deuche Telekom,* ***ELTE and OTP Bank 2017)***

Digital Industry action line 2017 focus

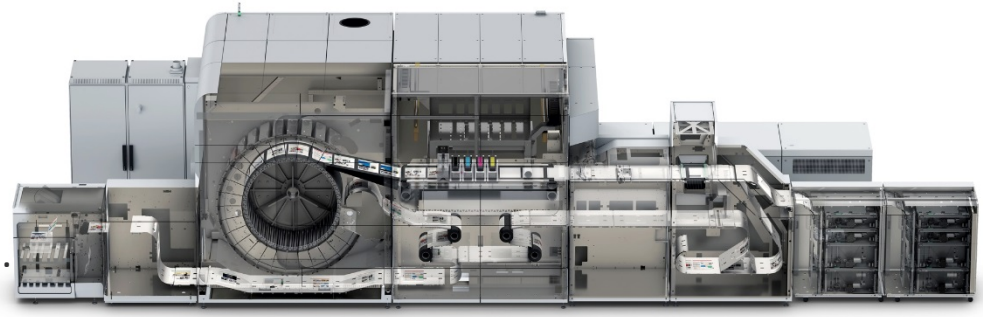


High Impact Initiative: OEDIPUS

Operating European Digital Industry with Products and Services

- An European network of Innovation Centers that are connected via the common Industry cloud data infrastructure for industrial applications.
- I-Centers will conduct trials create new products and services with SMEs for the manufacturing industries in Europe.
- Partners: Siemens, ATOS, CEA, Cefriel, CRF, DFKI, Engineering, Océ, (Agileo, Isybot)

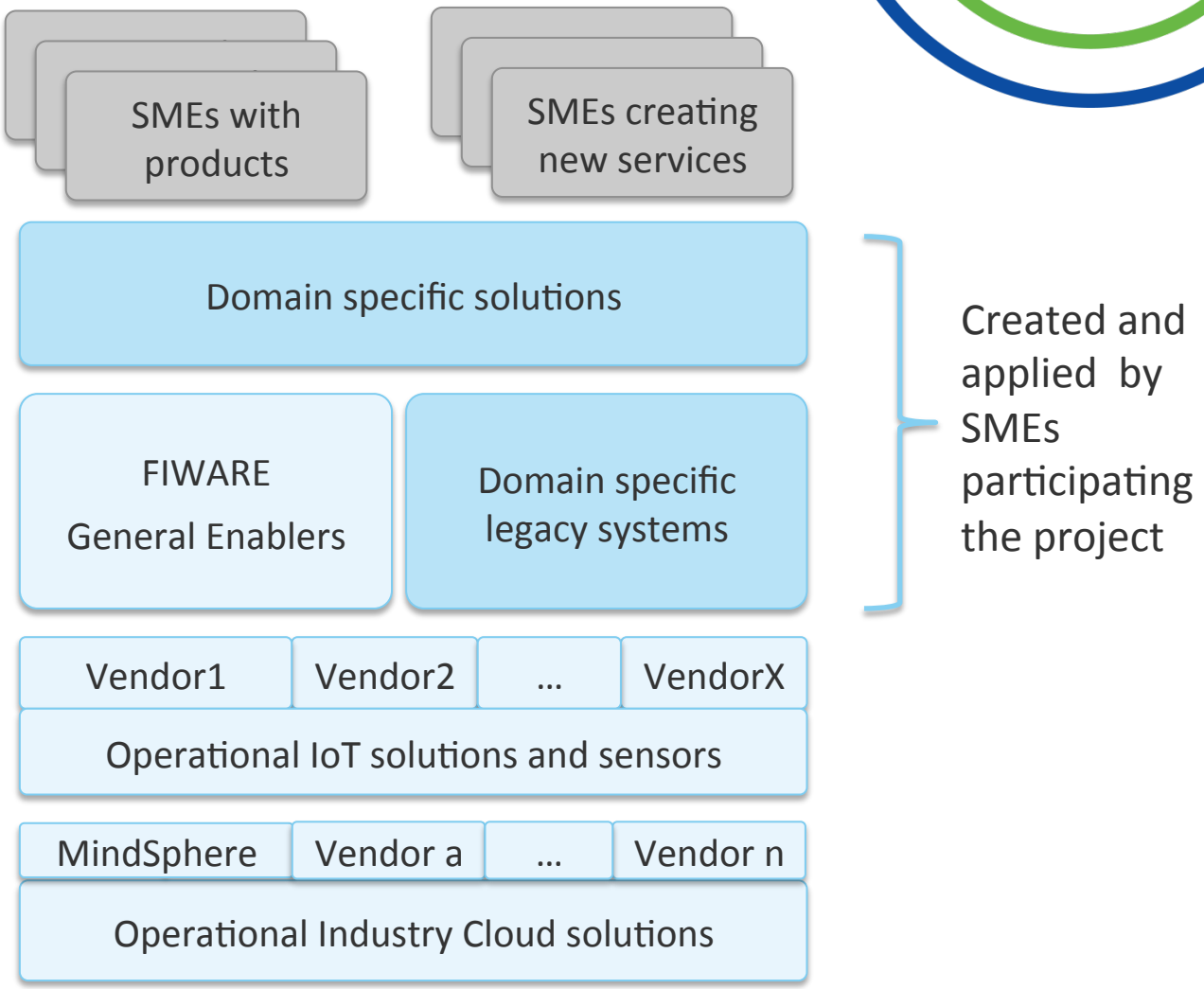
First cases



Predictive maintenance of industrial printers

Robots connected to different cloud platforms

High Impact Initiative: OEDIPUS



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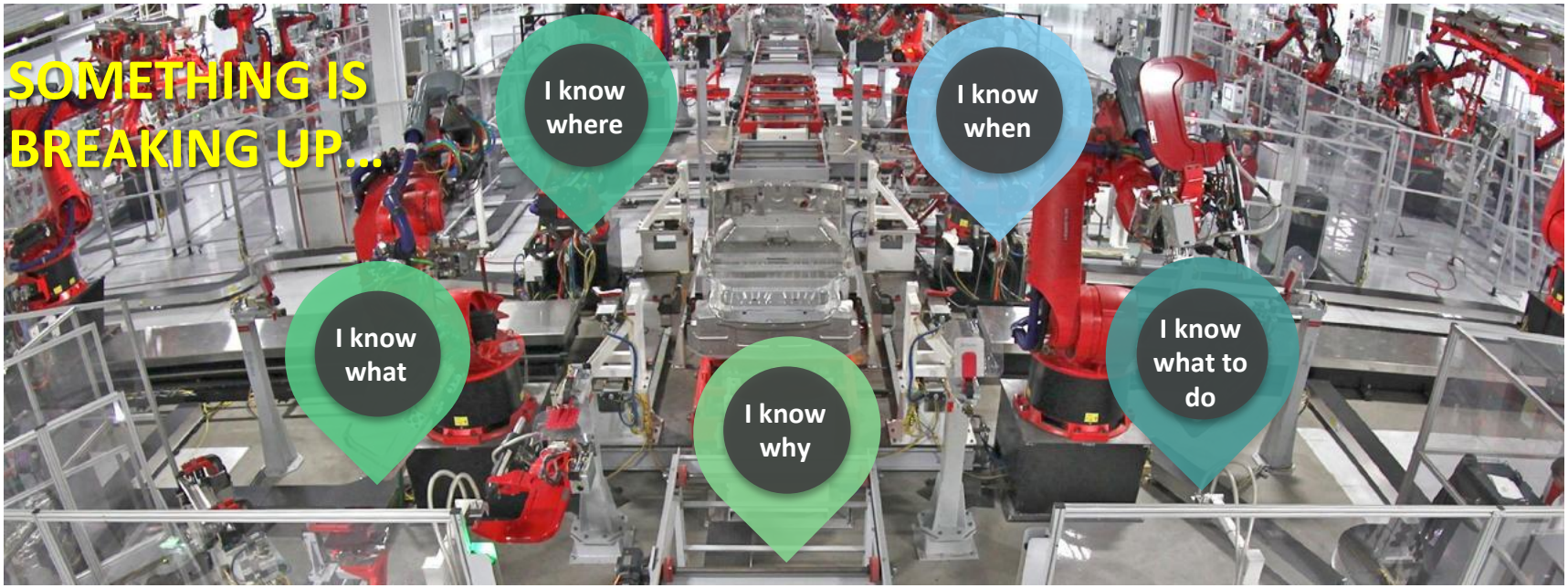
Innovation activities: Predictive Maintenance



ALM-enabled Smart Maintenance –
lowering investment barrier for smart maintenance

- Add-on Low-cost Multipurpose (ALM) solution kit for IoT modules for fitting machinery/production plants with reduced setup costs using commoditized hardware.
- The kit consists of add-on multiple sensors, connectivity and applications optimizing machinery performances, lowering the investment barrier for smart maintenance.
- Partners: Reply, FBK, Politecnico di Milano, ST Microelectronics, and TU Berlin. (and technology providers Cohaerentia, Konux and Crowdee)

Innovation activities: Factory of the future

Virtual Factory Floor - Automatically updated 3D map of the factory floor

- 3D map of factory floors that is automatically updated in real-time, based on fixed, mobile and depth cameras.
- The data allows robots and automated vehicles to work efficiently in constantly changing environments.
- Partners: VTT, DFKI, CRF.

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Innovation activities: Factory of the future

Industrial Paperless Production Process

- Still today, many production processes are mainly based on paper documentation, which has a severe impact on the speed and quality of the overall process.
- Digitize the production process in order to reduce the usage of paper in industrial plants and increase overall efficiency.
- Partners: CEFRIEL, Franhofer, (customer: Zoppas)

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Innovation activities: Factory of the future

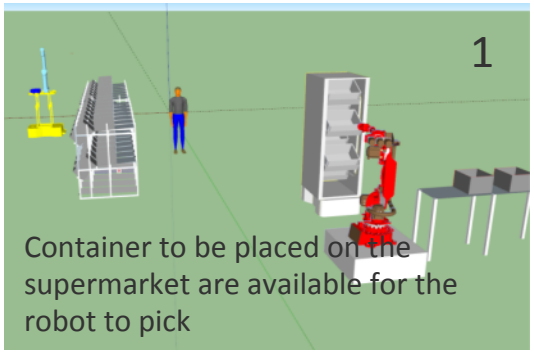
Production Quality Prediction (PQP) Tooling

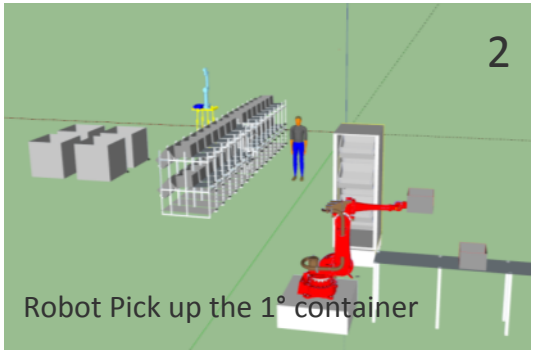
- Analyses sensor data of the production process to predict how unique products score on quality parameters. A predictive model that uses sensor data from all machines in a production line as input to predict whether the quality requirements for the product are met for every individual product.
- This insight enables manufacturers to reduce quality control and setup time.
- Partners: BrightCape, Philips, SICS

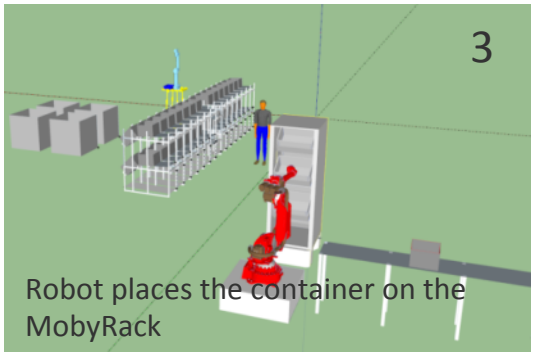
Innovation activities: Decentralized production

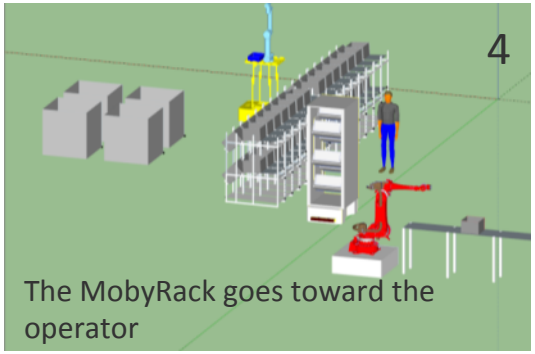
intraLogistics Enabled by autonomous Vehicles cooperATing with Operators and Robots (iLEVATOR)

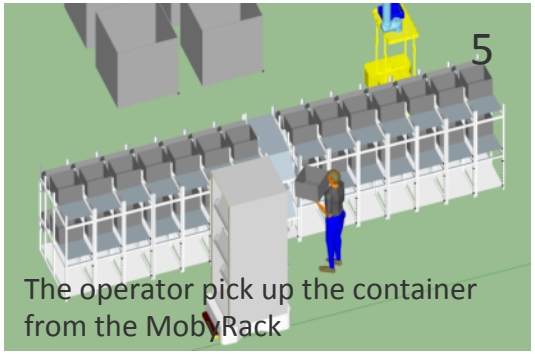
- Modular and plug-and-play platform for factories' intralogistics.
- Increases the utilization rate of warehouse and logistic systems by coordinating autonomous vehicles, robots and human operators.
- Partners: COMAU, CRF, DFKI, FBK, Fortiss, Fraunhofer, Reply, University of Edinburgh

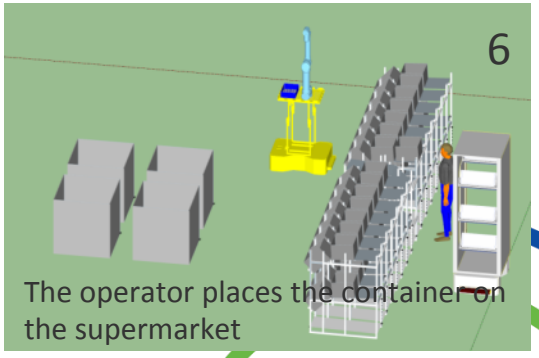




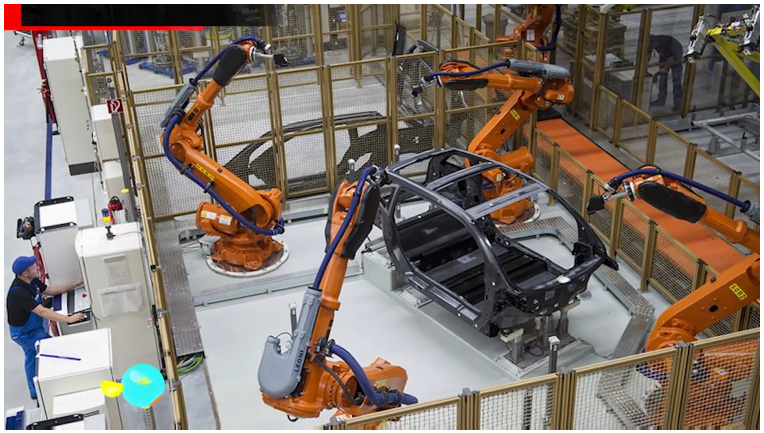








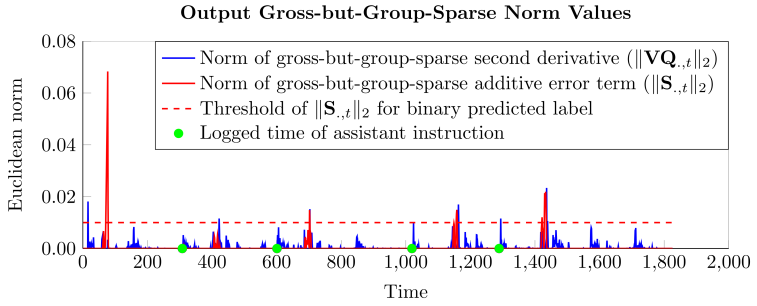
Human-AI-Robot (HAIR) Collaboration



"HAIR" ⇨ they should understand each other *very quickly*

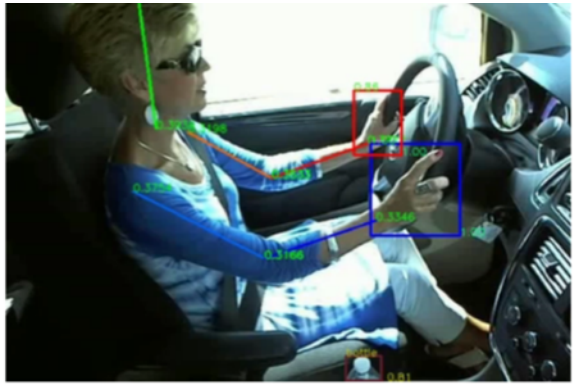
- gaze ⇨ intention
- manipulation ⇨ ongoing goal oriented activity

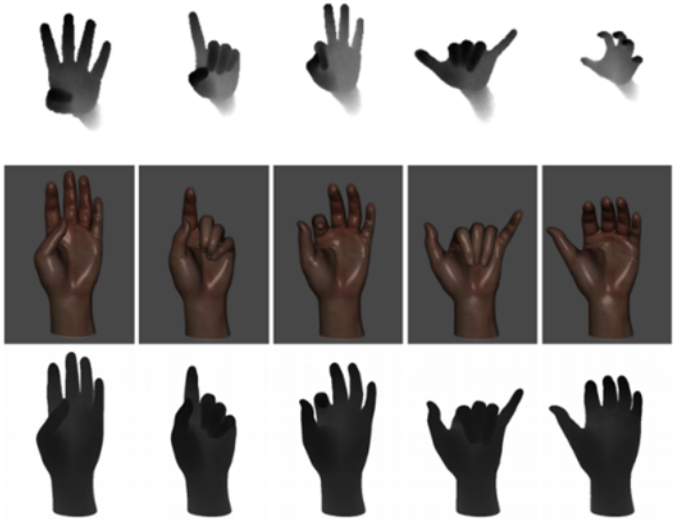
If not, then anomaly detection

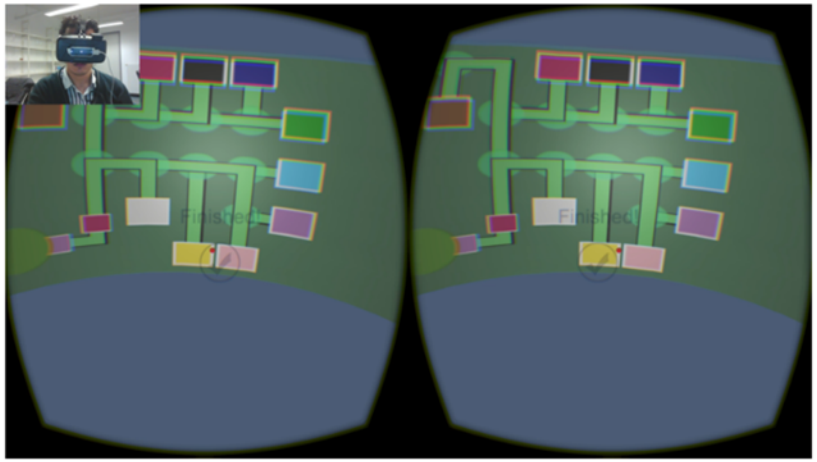


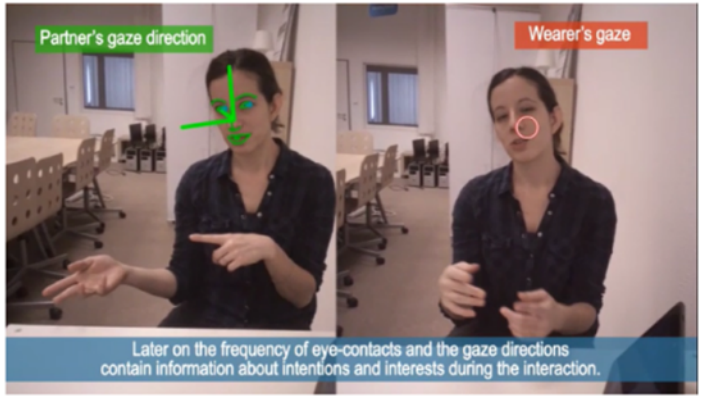
Deep learning (DL) & human modeling

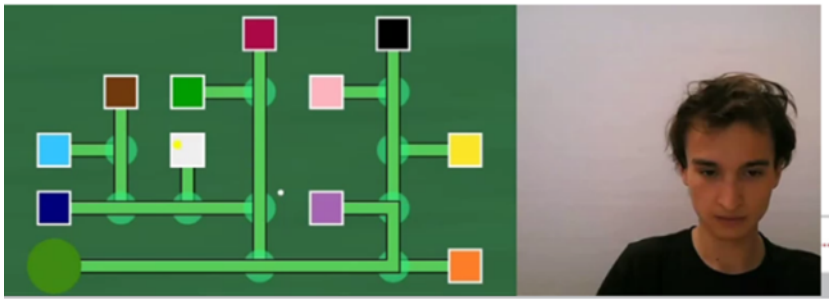
Hand
Pose
Objects
Face
Gaze
Attention











DL & situation understanding

Object recognition
example: cell phone

Situation understanding

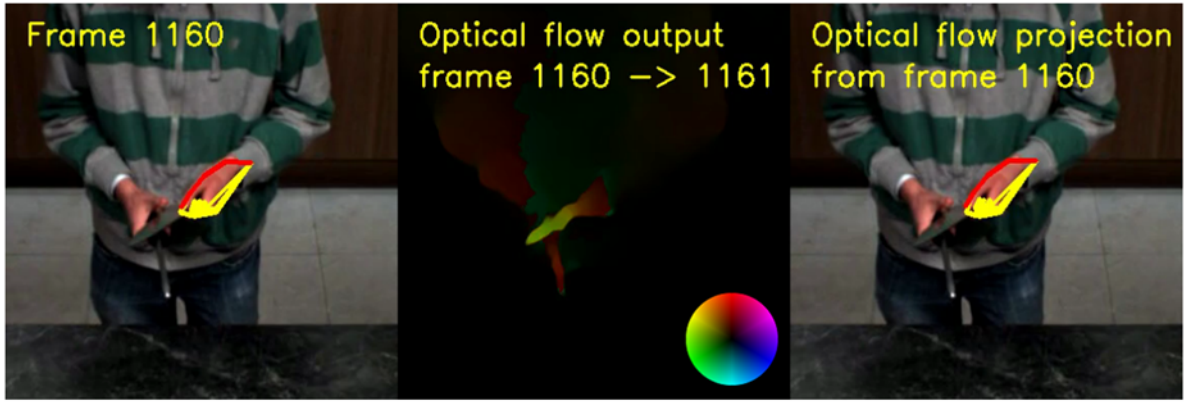
Speech deidentification followed by *speech recognition in the cloud*

Multi-modal emotions
words, pose, prosody, gestures

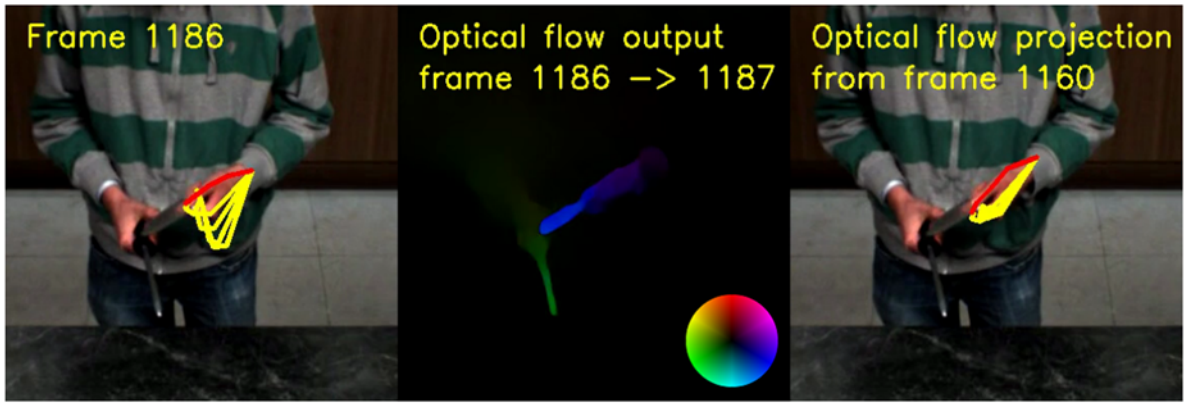
Time vector series
- **recognition**
- **prediction**

subject to
- **time warping**
- **fast deep learning**

DL & object manipulations
& self-training via sample collection



(a) Starting position of convolutional pose machine (CPM)



(b) CPM degrades quickly in this case, but **deep optical flow** can track the hand all the way through 1 sec or more.

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