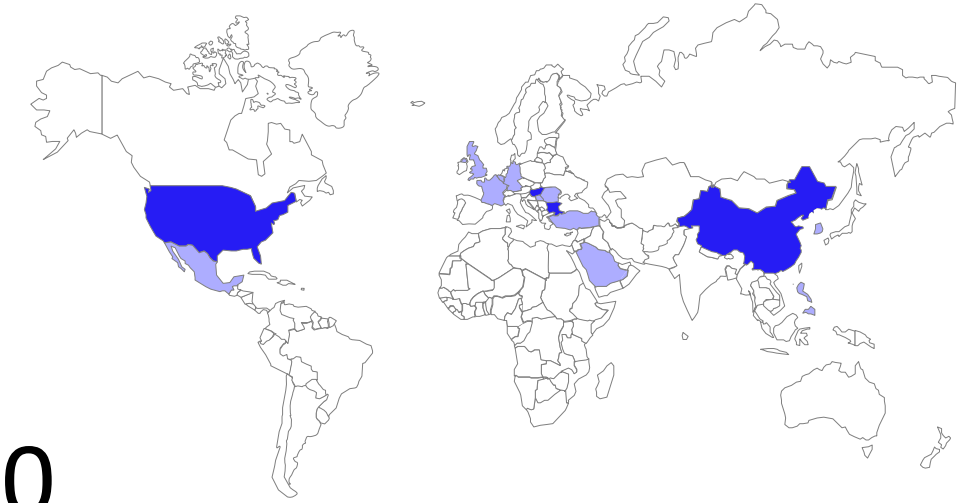
HEPENiX

MTA SZTAKI
Magyar Tudományos Akadémia
Számítástechnikai és Automatizálási Kutatóintézet



INTRO4.0
Introduction Strategies of Industry 4.0 Methodology and Technology for SMEs

NKFIH – Andrássy University, 17th April, 2018.

József Tóth, Director of Business Development

EUREKA
innovation across borders

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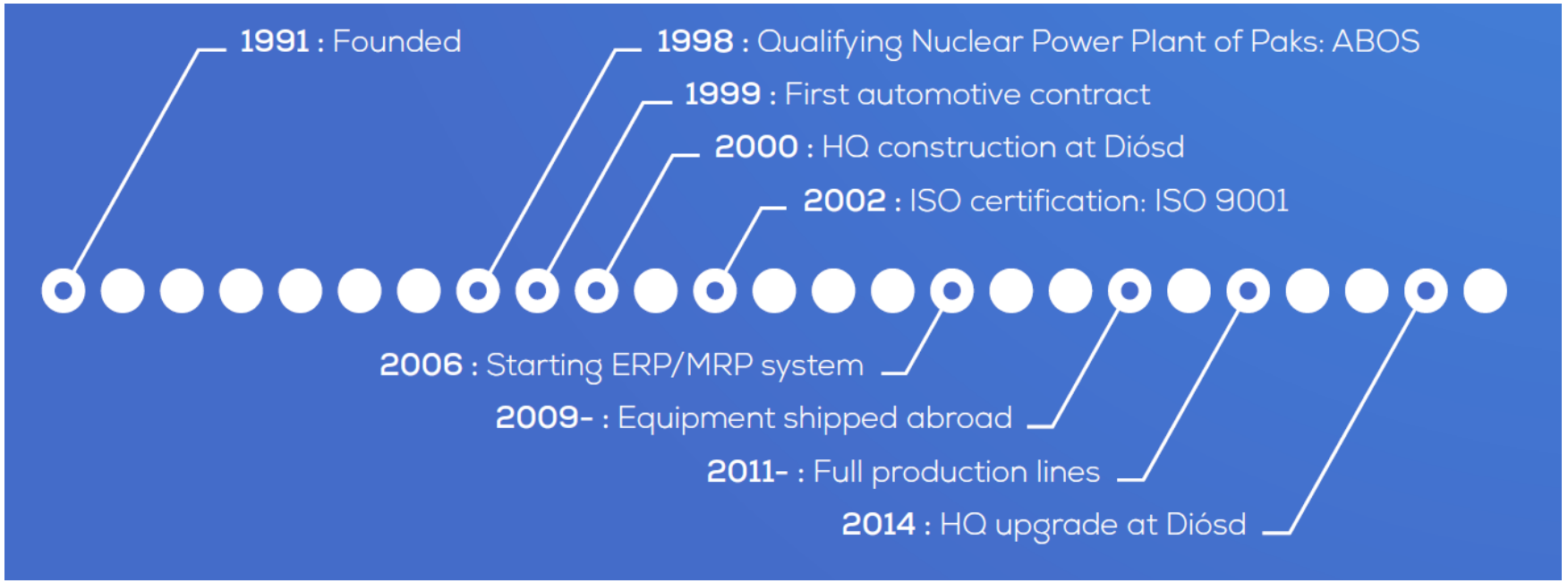
SZÉCHENYI 2020
HUNGARIAN GOVERNMENT
NATIONAL RESEARCH, DEVELOPMENT AND INNOVATION FUND
INVESTING IN YOUR FUTURE

HEPENIX :: Overview

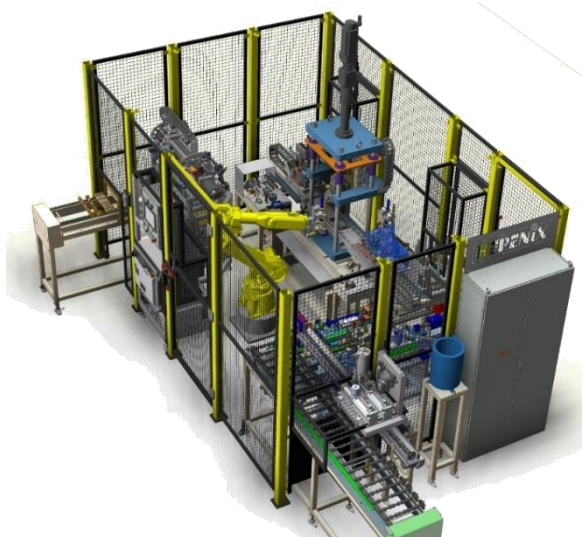


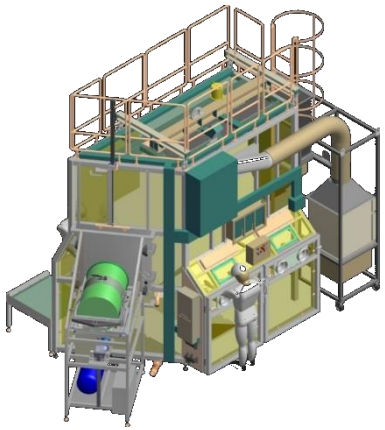
46 employees, €5,3M+ turnover,

80+ completed projects per year

2 sites, HU/EU/global supplier

Areas of Activities





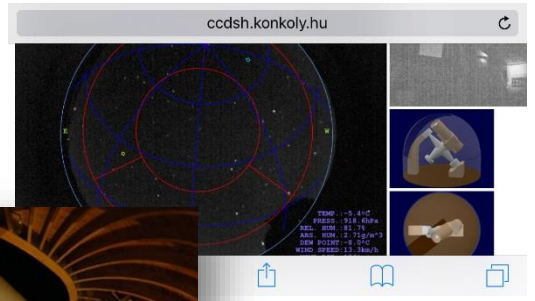
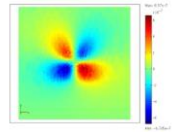
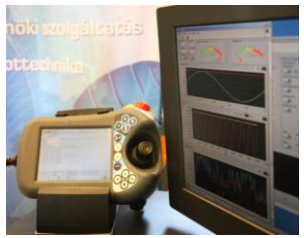


Image © Miklós Rácz





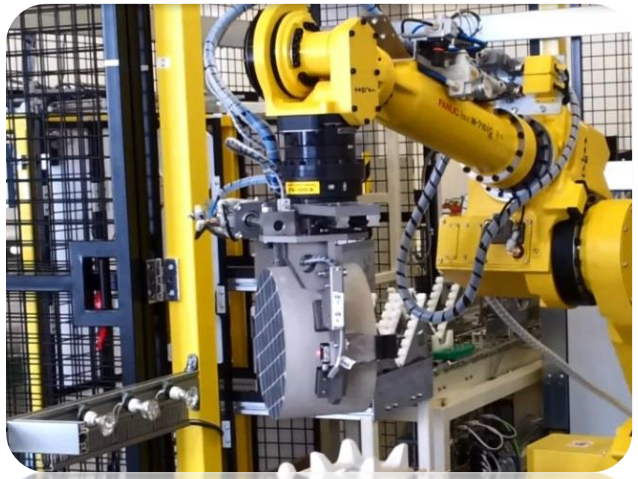
Automotive | Nuclear | R&D

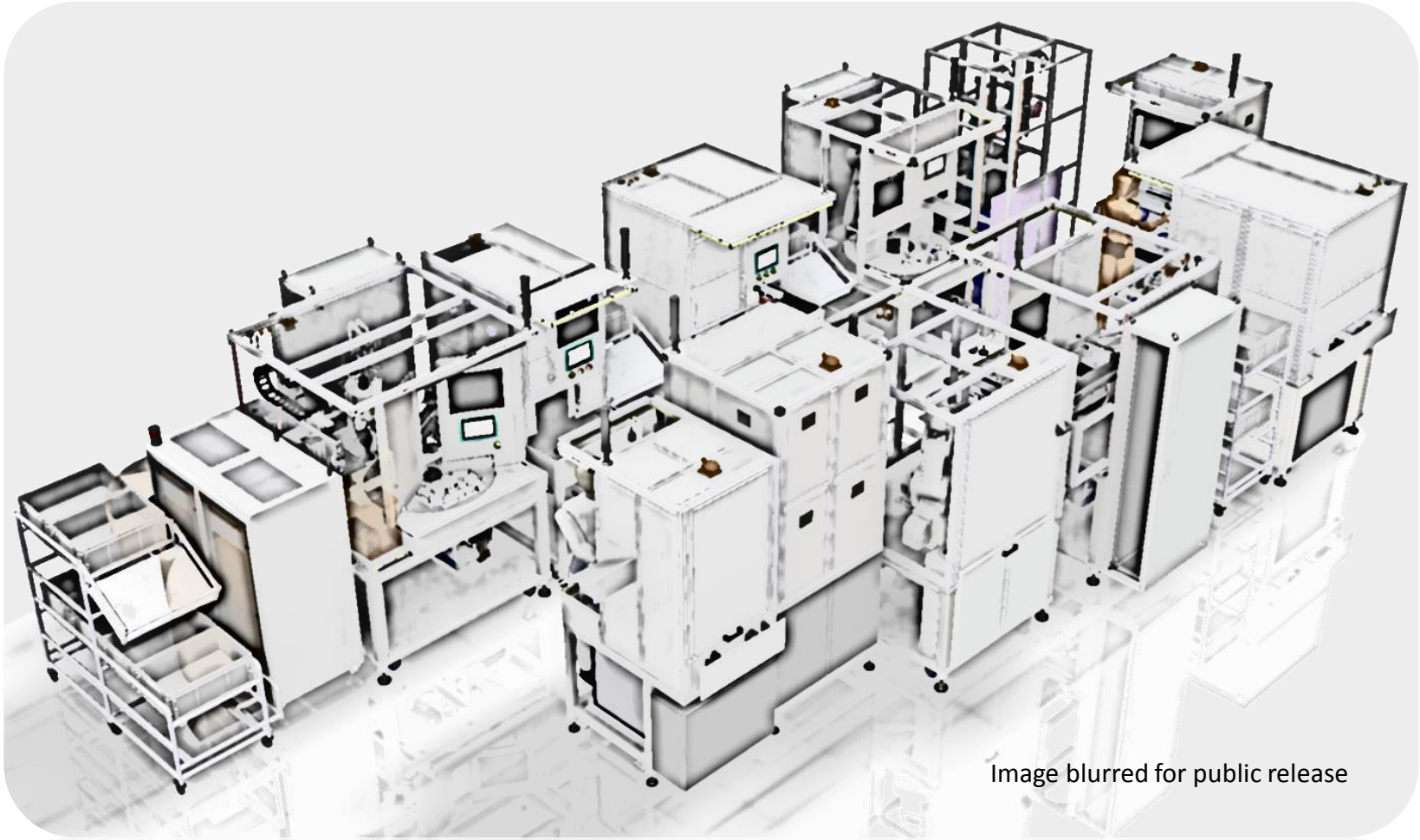
Hepenix References

- More than 800 successfully completed projects
- Long-term partnerships strengthened on mutual advantages



Hepenix :: Regular Activities





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MTA SZTAKI – Introduction

- Established in 1964
- 2001: EU Centre of Excellence in IT, CS and Control
- 2017: EU Centre of Excellence in Production Informatics and Control
- Focused basic and applied research
- Contract-based R&Đ&I
- Transferring up-to-date results to industry and universities

- **Basic research**
  - Computer science
  - Systems- and control theory
  - Engineering and business intelligence
  - Machine perception and human-computer interaction
- **Applied research and innovation**
  - Vehicles and transportation systems
  - Production informatics and logistics
  - Energy and sustainable development
  - Security and surveillance
  - Networking systems and services, distributed computing

Key figures

- **Budget**
  - 11 MEuros/year
  - ~30% basic funding
- **Staff**
  - ~240 (FTE)
  - ~100 with scientific degree
  - 7 members of the Hungarian Academy of Sciences
  - 15 with DSc degree
  - 70+ with PhD degree
  - ~15 members in Hungarian Academy of Engineering

Board of the Institute of MTA SZTAKI

Director

Dr. László Monostori
academician

Director of Science

Dr. József Bokor
academician

Director of Finance

Mrs. Mariann Dörnyei

Deputy Director

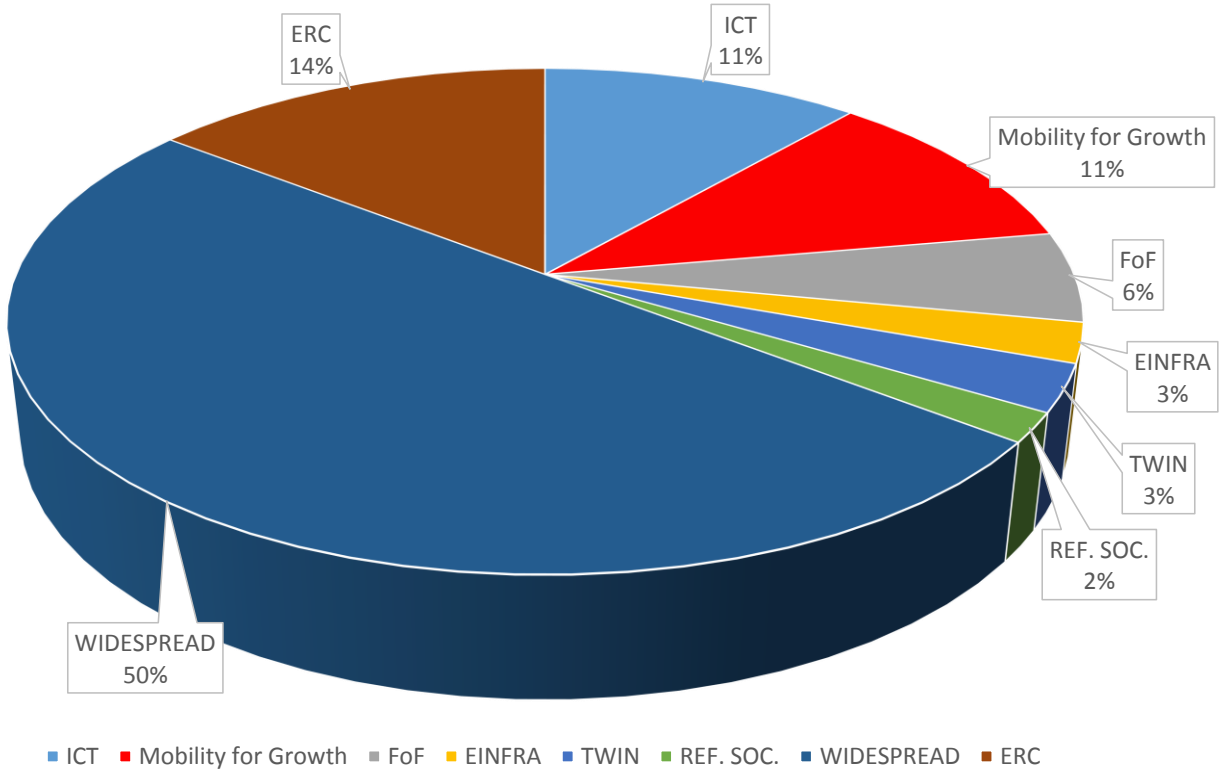
Dr. József Pfeiffer, PhD

Participation in international scientific communities

- Contributions to the scientific organisations acting in the fields of SZTAKI (CIRP, IEEE, IFAC, IMEKO, …)
- The main international scientific recognitions in the past years
  - International Federation of Automatic Control (IFAC): Fellowship, Council membership, and Outstanding Service Award
  - Institute of Electrical and Electronics Engineers (IEEE): Fellowship
  - International Academy for Production Engineering (CIRP): Fellowship and Presidency
  - Royal Flemish Academy of Belgium for Science and the Arts (KVAB): Foreign membership
  - National Academy of Science and Engineering, Germany (acatech): extraordinary membership

Research projects – EU H2020 Programme

- SZTAKI is participating in **14 H2020** projects
- Participant in 11 and project coordinator in 3
- Sum funding for SZTAKI: 10 578 016 € ≈ 3 279 000 000 Ft



SZTAKI - Fraunhofer Society cooperation

- Project Centre for Production Management and Informatics, May 2010

Centre of Excellence in Production Informatics and Control (EPIC)

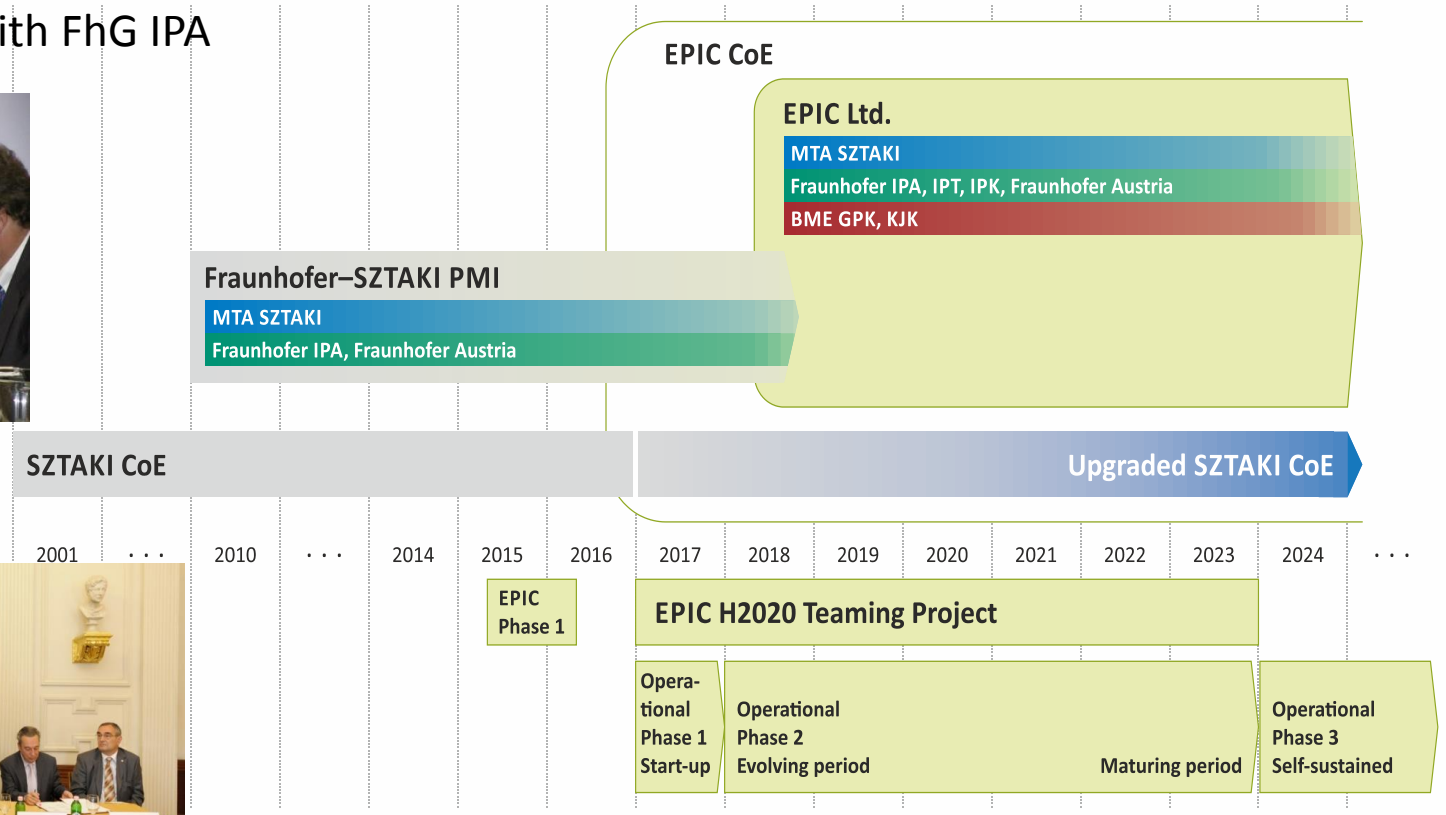
- Signing ceremony, Brussels, 16th Feb, 2017.

Centre of Excellence in Production Informatics and Control (EPIC)

2002: Virtual inst. with FhG IPA

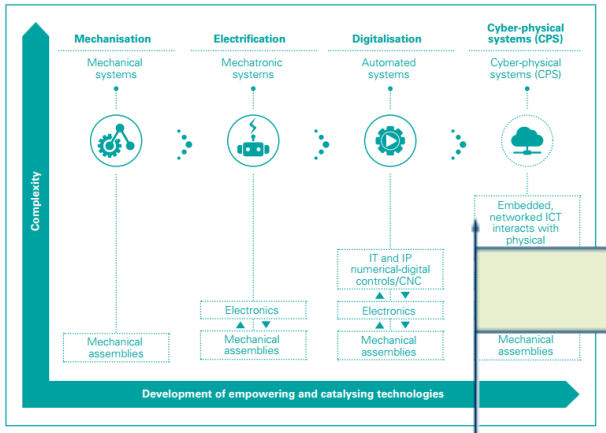
2001: SZTAKI EU CoE

2010: Fraunhofer-SZTAKI Project Centre

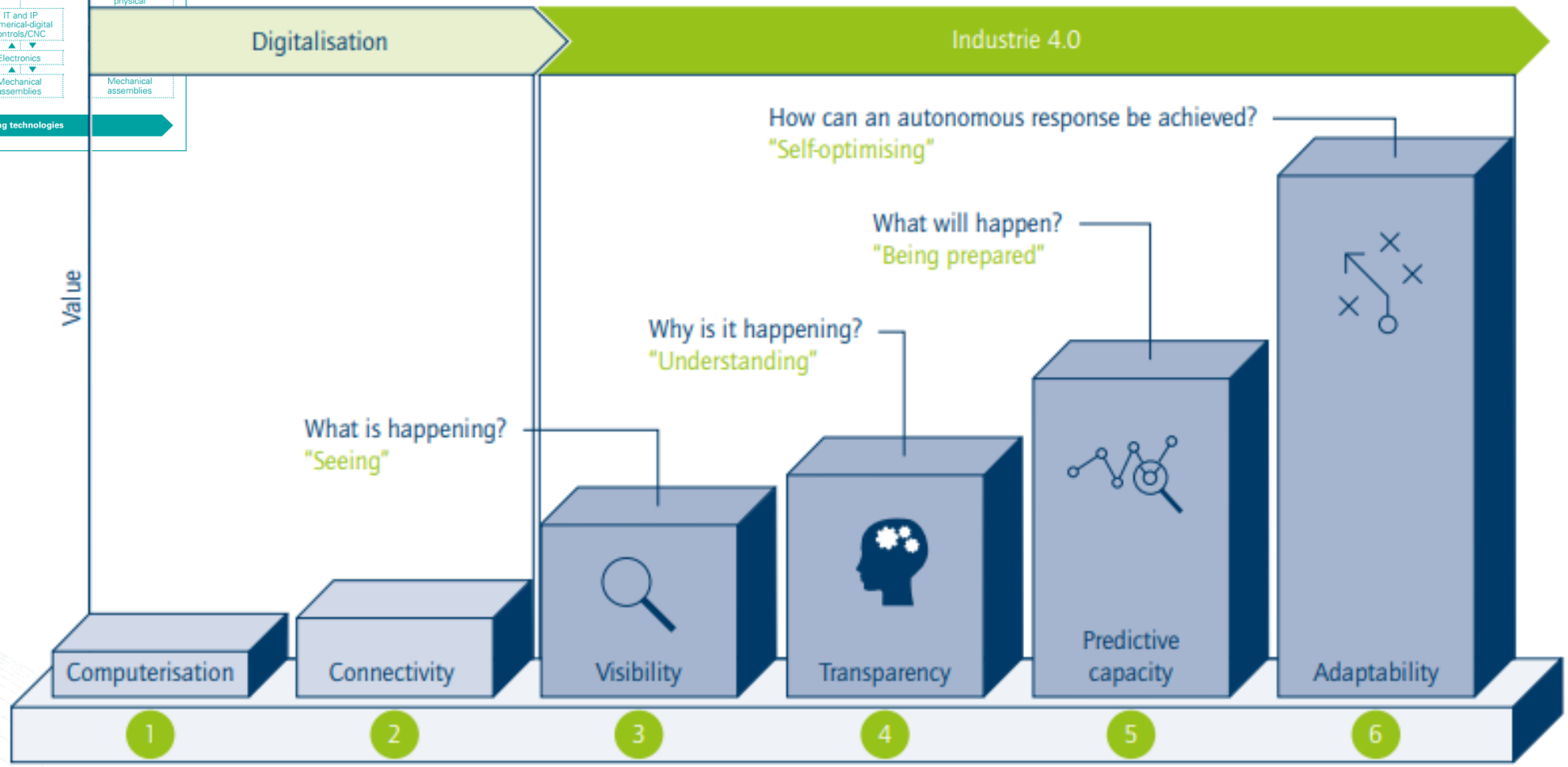


https://www.centre-epic.eu/

Industry 4.0



Forrás: KPMG

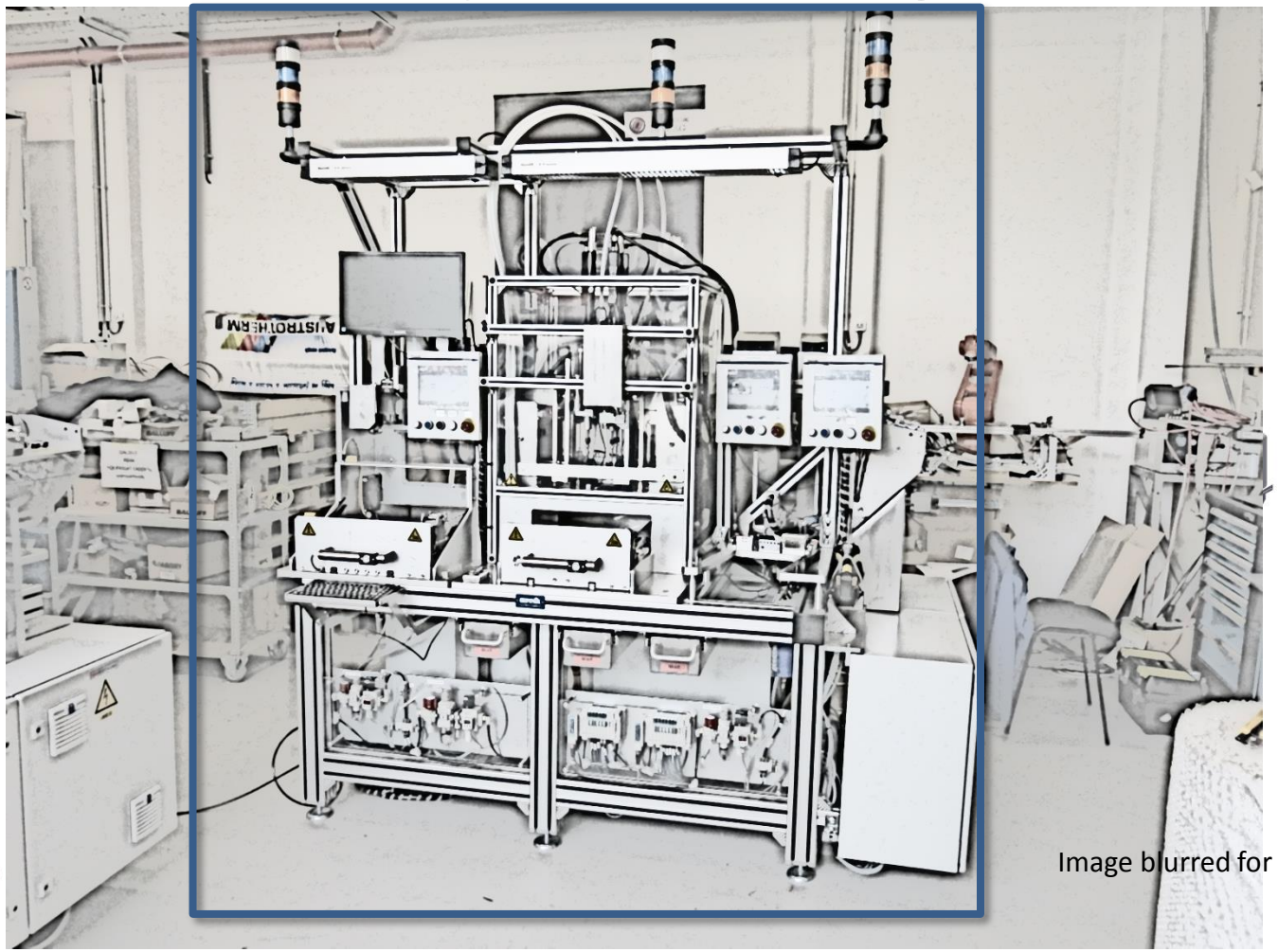


Source: (C) FIR e. V. at RWTH Aachen University via ACATECH

Ipar 4.0 Introduction :: Motivation

- To increase efficiency
  - Requires investment that may return – requires specific assessment
- Higher control, increased production reliability
  - Avoiding errors! Logistics but also process trends
- Keeping up with the state of the art – or jumping ahead
  - Others will definitely do it: competitive situations
- *Homogenizing existing investment*
- *Preparation for new, currently unavailable toolsets*

Assembly lines, in general



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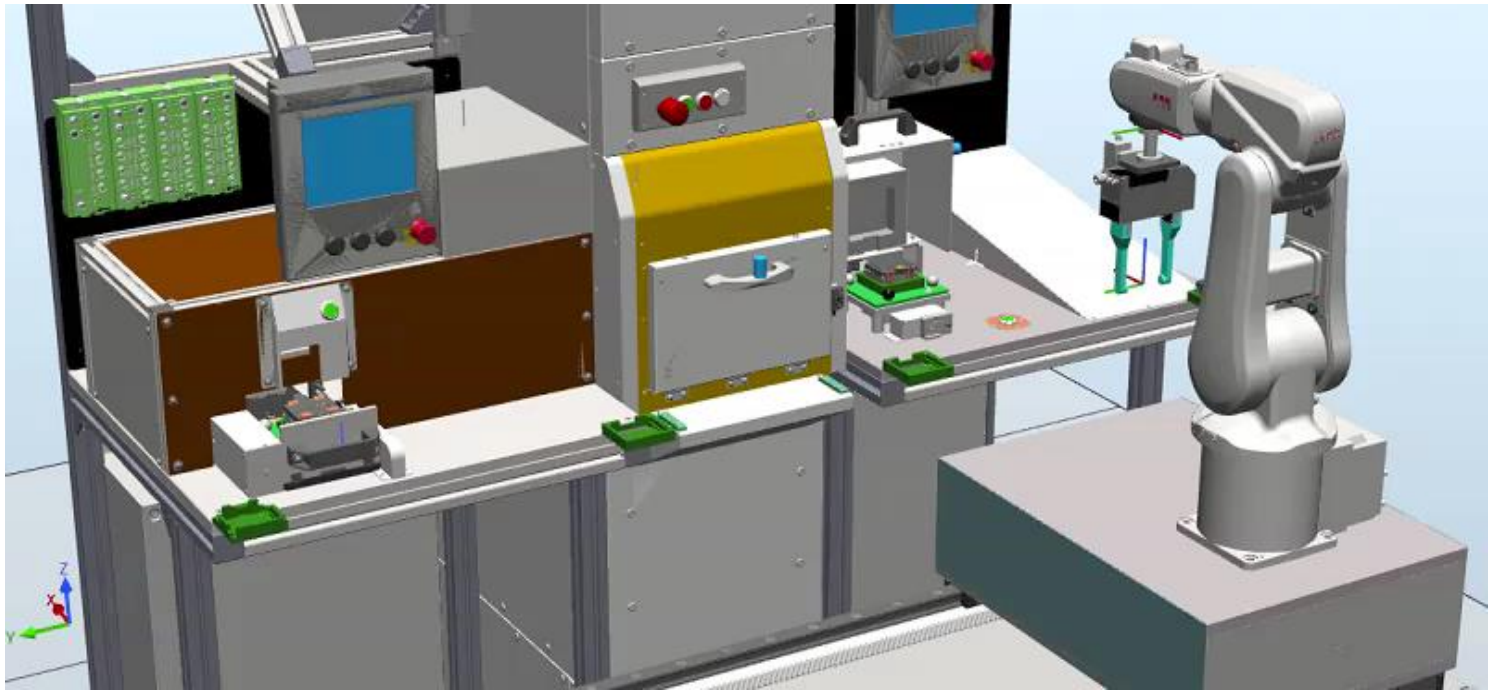
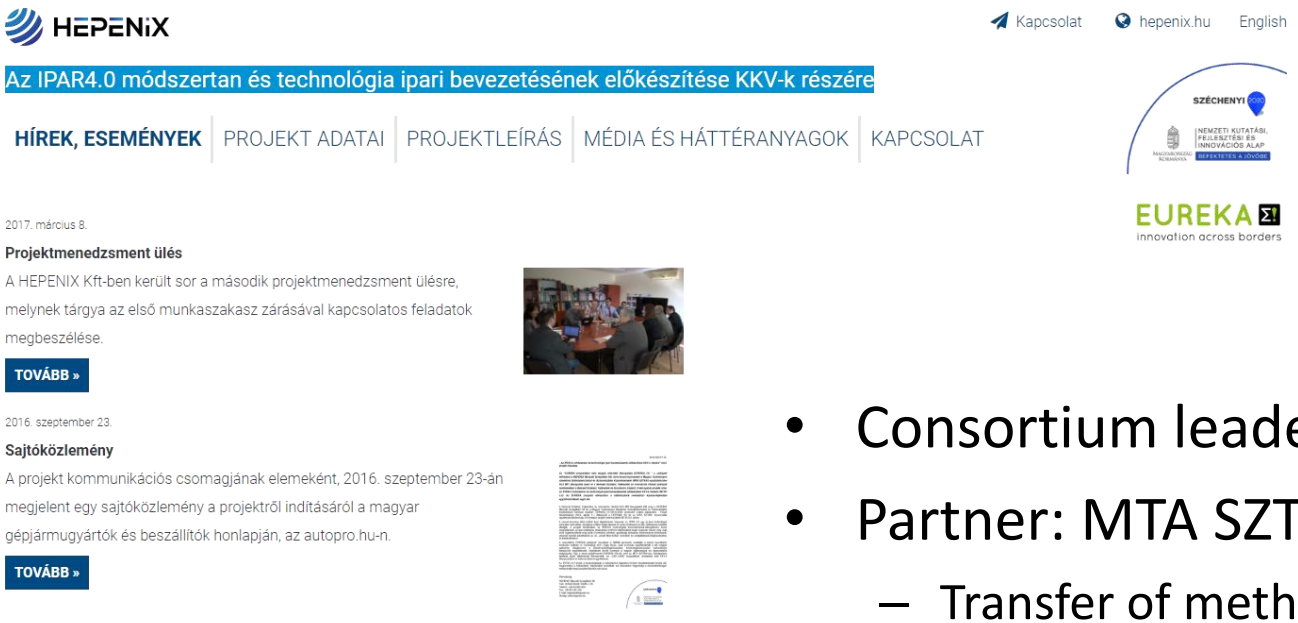
Specialties / Emerging Technologies

Areas including:

- Small footprint – high capacity technological storage, heating, cooling and testing functions, manual/automatis
- COBOTs, human-machine cooperation
- Heating/Cooling tunnels
- Climate and shock chambers
- Parts feeders



INTRO4.0 - EUREKA



EUREKA

IPAR 4.0
NEMZETI TECHNOLÓGIAI PLATFORM

www.i40platform.hu

- Consortium leader role
- Partner: MTA SZTAKI
  - Transfer of methodology for maturity assessment
  - Development of demonstration use-cases
- First public Hungarian Industrie 4.0 initiative

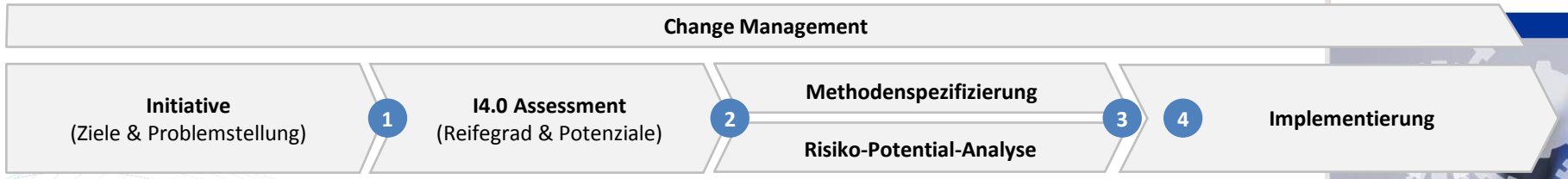
+ founding member of Ipar 4.0 National Technology platform

KIT connection

Gefördert vom Bundesministerium für Bildung und Forschung
Betreut vom PTKA Projektträger Karlsruhe Karlsruher Institut für Technologie

- Karlsruher Institut für Technologie: INTRO4.0 consortium leader
- Participation at workshops, factory visits
- Transfer of methodology and practices
- Use-case collection

INTRO 4.0 Vorgehensmodell

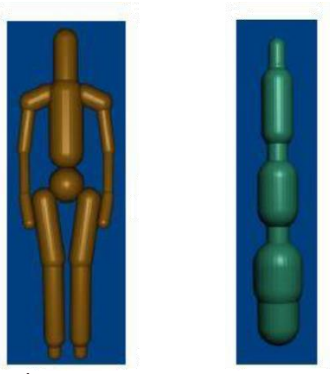


- Ongoing cooperation

Portions: (C) "Liebrecht, Christoph (wbk)" Christoph.Liebrecht@kit.edu et al

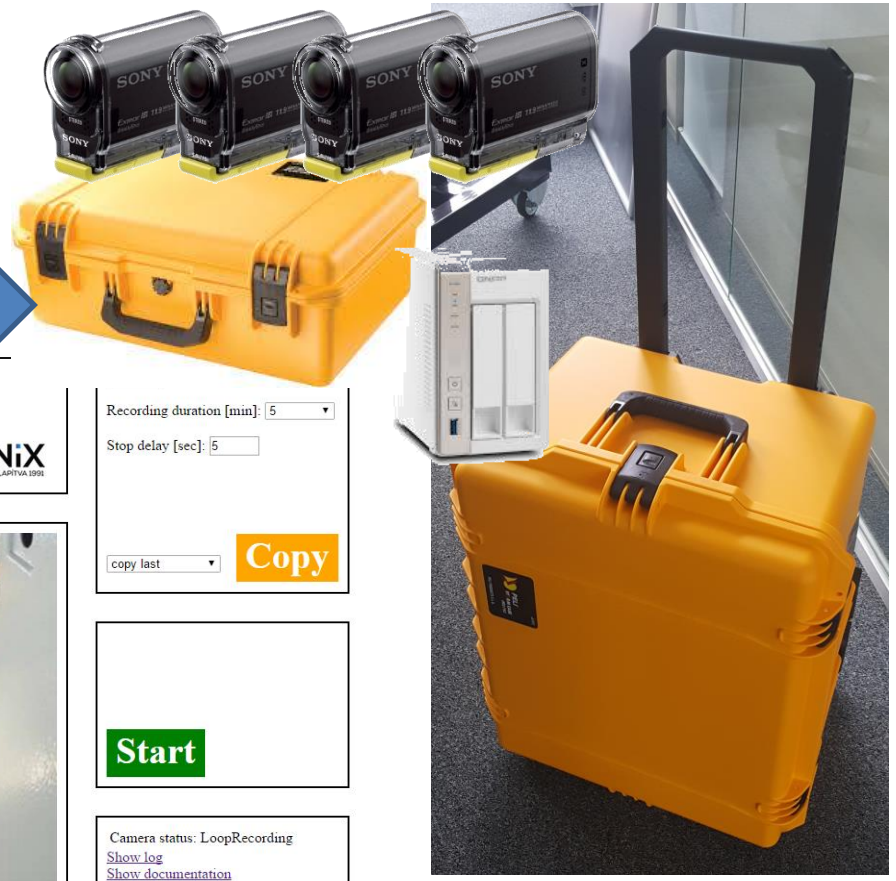
Industry 4.0 Use Cases :: H-M Collaboration

- Motivation: investigation of prediction
- Gesture-based control
- Supervision of Human mate
  - Position and rhythm of work
- Demonstration cell
- Based on FLEXtender
- Results: working demo + experience
- further research



Industry 4.0 Use Cases :: Cyclops II

- Motivation:
  - Remote maintenance
  - Data collector
- Event-based
- „Time-machine”
- Remote-access and control in EU
- Used in Support



Use-Case :: Digital Twin & H-M Cooperation

INTRO4.0 – EUREKA Cockpit

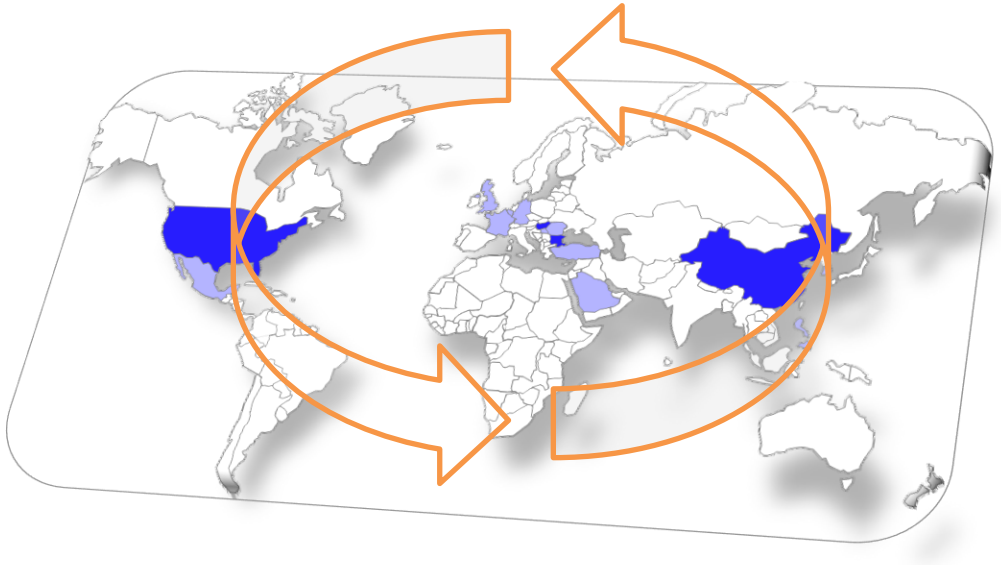
- Combines hardware and software elements in a single toolset
- Enterprise-wide assessment
- Assessment of main waste factors
  - Direct, including potentials
  - Indirect, characterizing

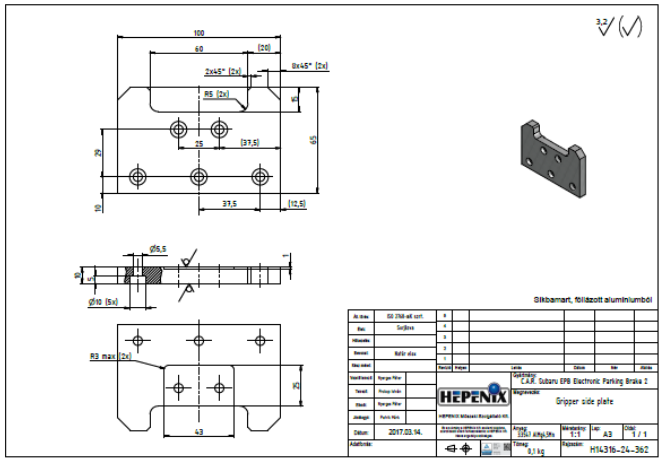
Leading to the development of an activity tracking toolset :: EMESE

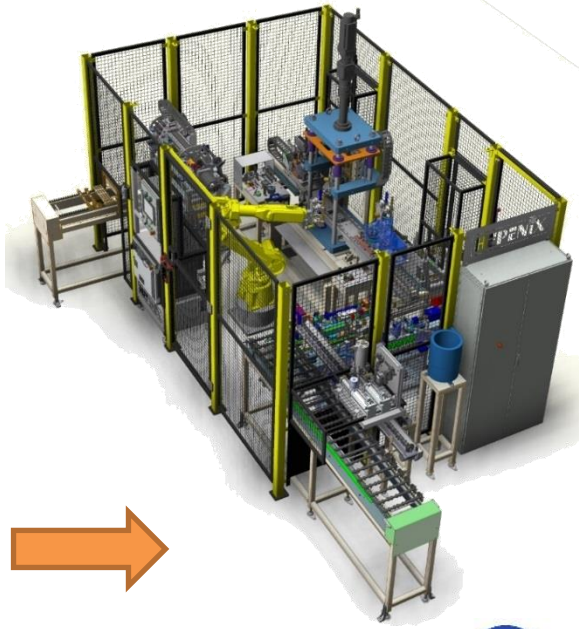
Image forrás: uswitch.com via internet

INTRO4.0 EUREKA :: Cockpit

- 35-40.000 parts, 20.000 kind
- Manual tracking

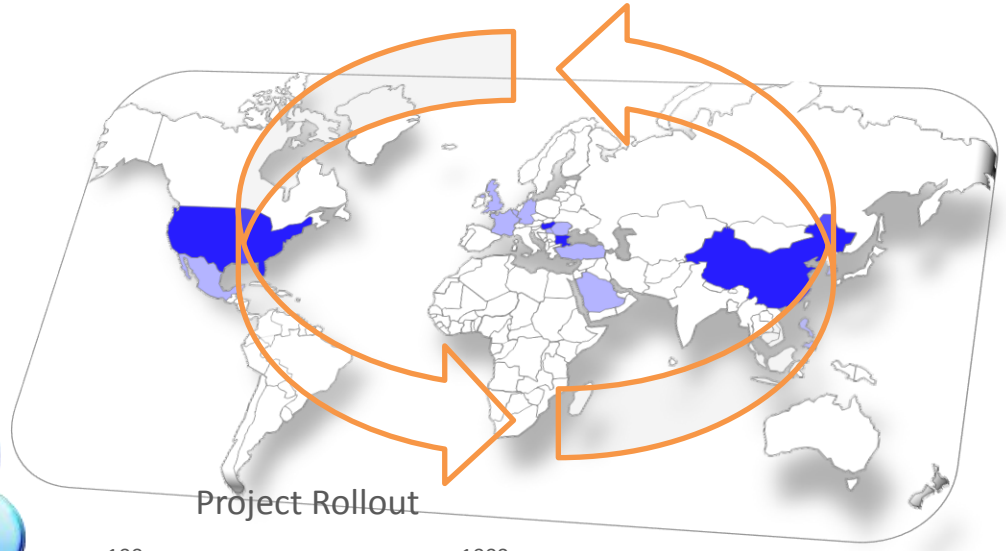


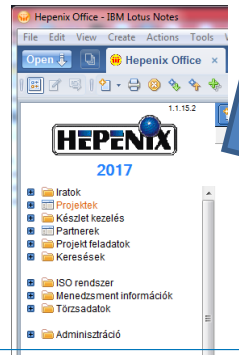


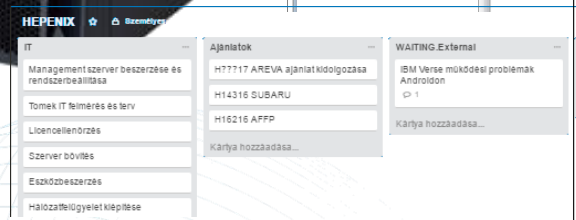


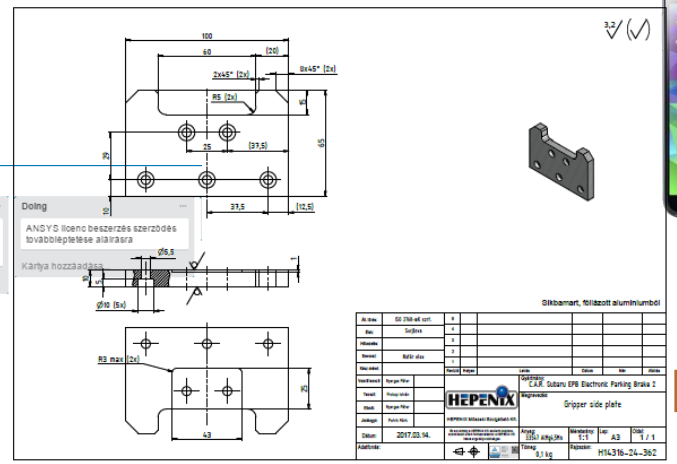
INTRO4.0 EUREKA :: Cockpit

„EMESE”









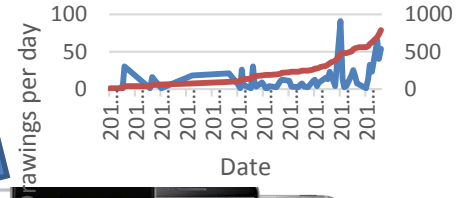
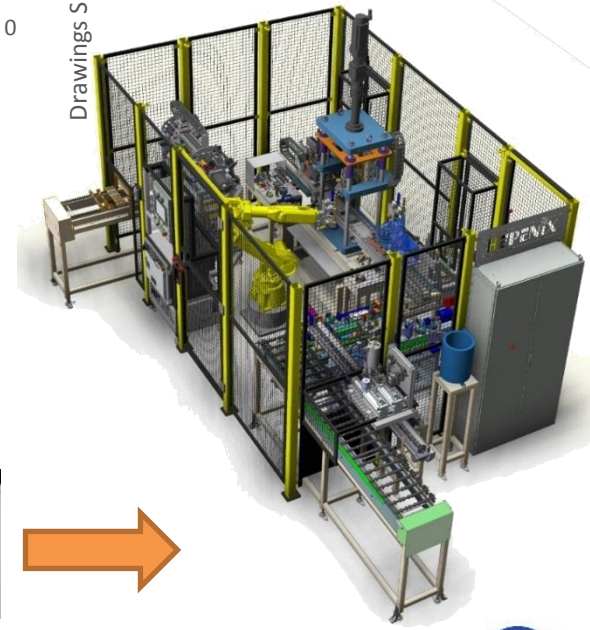
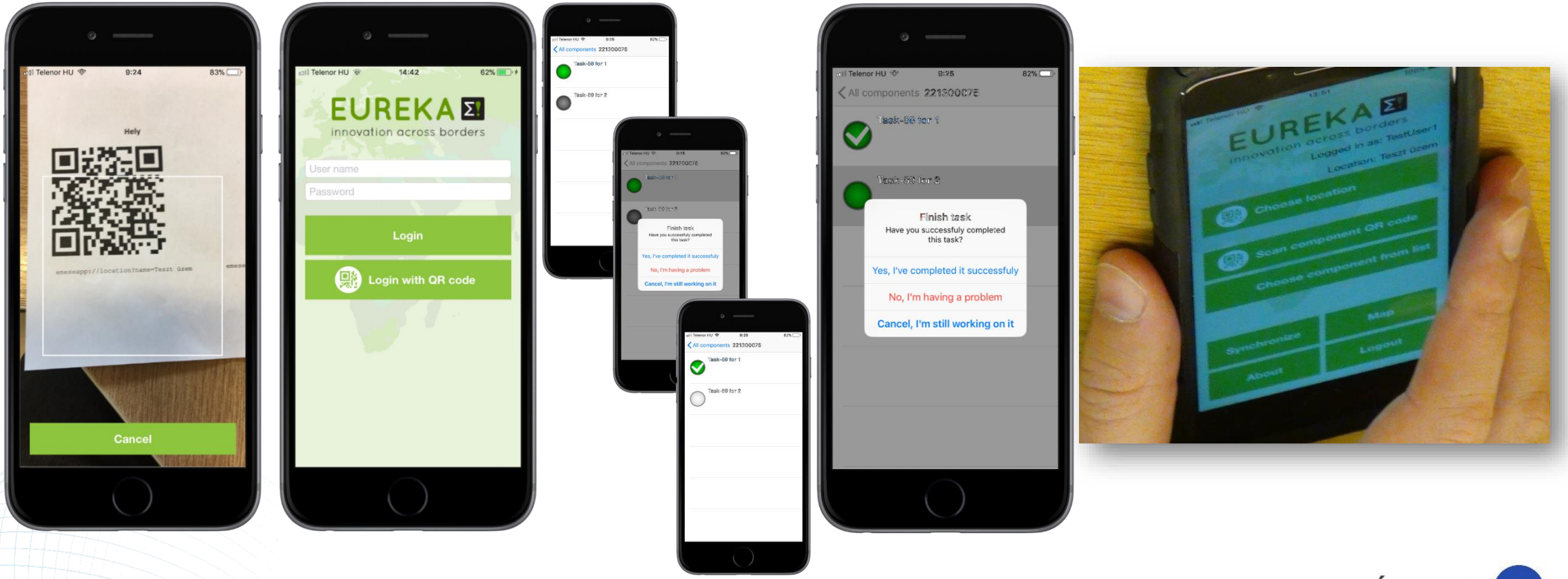


Image source : uswitch.com via internet



EUREKA :: EMESE

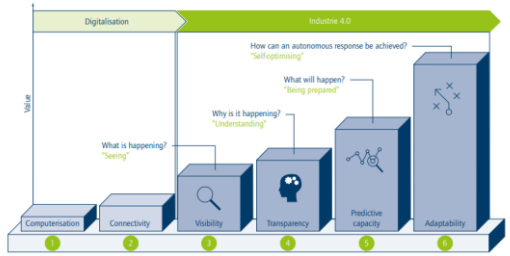


EUREKA :: EMESE Vision

HEPENIX Ltd :: József Tóth and Éva Hegedűs, SZTAKI :: Géza Haidegger (Central Lead)**, Richárd Beregi, Ádám Szalóki** (Research Laboratory for Engineering and Business Intelligence), **Zsolt László Márkus, Gábor Kaposi** (eLearning Department)

EUREKA :: INTRO4.0 Results and Gains

- Besides the undertaken direct results,
- Visits and networking, further collaboration
- Cutting edge toolsets



Source: (C) FIR e. V. at RWTH Aachen University via ACATECH

- HEPENIX-SZTAKI: Industrial partnership
- Transfer of I4.0 methodology and toolset
- Assessment of Hungarian I4.0 maturity
- Compatibility with requesting industries

Closing Words

EUREKA :: INTRO4.0

- Industrie 4.0 methodology :: Assessment and Implementation
- Development of Use-Cases

Our results fuse the experience of an internationally renowned research and development organization and a system integrator!

We thank the support received by project EUREKA_15-12016-0024 in the call „Support for Hungarian presence in the EUREKA (EUREKA_15) program” (EUREKA programban való magyar részvétel támogatása (EUREKA_15))„