CSA-Industry4.E

Grant agreement No 830845 – ECSEL-2018-3-CSA-Industry4E

Coordination & Support action for Lighthouse Initiative Industry4.E

Deliverable 2.2

Summary reports of the workshop on bringing projects together

September 2019

Lead parties for Deliverable: VTT, MGEP, S2i
Deliverable due date: 30.09.2019
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Dissemination level: Public

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Summary

Live interaction remains the most effective tool of bringing projects together and facilitating dialogue and cooperation among all stakeholders. For that reason, the CSA-Industry4.E project will organise two dedicated workshops to bring together stakeholders in the Industry4.E Lighthouse. Where appropriate, in order to save resources and to attract more participants, these workshops might be organised as side-events of relevant well-established conferences/events in Europe.

The first workshop was held in Bucharest, Romania on 19th June 2019. It was organised as a side-event of ECSEL JU symposium that was held on 17-18th June.

This deliverable summarises the action points and main discussion of the first workshop held.

The **Industry4.E Lighthouse** has a special focus on all means of microelectronics and Information and Communications Technology (ICT) for Digital Industry. Operating across project, funding, and national boundaries, Industry4.E is expected to bring together relevant Research, Development and Innovation (RDI) projects funded across various programmes, helping projects to connect with each other and the end-user/stakeholder community.

Team involved in deliverable writing: Matias Vierimaa, VTT; Leire Exteberria MGEP; Meike Reimann S2i; WP2 Lead: Ann O'Connell, Maurice O'Connell, IMR.

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1 Introduction

Live interaction remains the most effective tool of bringing projects together and facilitating dialogue and cooperation among all stakeholders. For that reason, the CSA-Industry4.E project will organise two dedicated workshops to facilitate interactions between Industry4.E Lighthouse stakeholders. Where appropriate, in order to save resources and to attract more participants, these workshops might be organised as side-events of relevant well-established conferences/events in Europe. Both workshops will involve a selection of the following elements:

- Keynote by an EC representative
- Highlight presentations of (Industry4.E) projects
- Relevant results from WP1 and task 2.1
- Interactive sessions on technical topics (4 major challenges and cross-cutting issues)
- Interactive sessions (share and learn e.g. on exploitation, communication, dissemination)
- Brokerage (synergies, speed dating)
- SME related session/presentation (experiences, barriers, successes in EU projects)
- Panel discussion
- Networking
- Interaction with the audience through the slido app

One report will be developed after each workshop, summarising the results.

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This deliverable summarises the action points and main discussion of the first workshop held.

The Industry4.E Lighthouse

ECSEL Joint Undertaking (ECSEL-JU) is an EU-driven public-private partnership, funding innovation in electronic components and systems (http://www.ecel.eu). Through the ECSEL-JU, European industry, SMEs and Research and Technology Organisations are supported and co-financed by ECSEL participating states and the European Union. ECSEL-JU has created “Lighthouse initiatives” as they identified the need to better coordinate and link Research, Development and Innovation (RDI) activities taking place in order to help European industry achieve digital transition and strengthen Europe’s competitiveness and leadership. Three Lighthouses have been launched to date; **Industry4.E**, Mobility.E and Health.E.

The **Industry4.E Lighthouse** has a special focus on all means of microelectronics and Information and Communications Technology (ICT) for Digital Industry. Operating across project, funding, and national boundaries, Industry4.E is expected to bring together relevant Research, Development and Innovation (RDI) projects funded across various programmes, helping projects to connect with each other and the end-user/stakeholder community.

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2 Agenda of the first Industry4.E Lighthouse stakeholder engagement workshop

2.1 AGENDA

The first Industry4.E Lighthouse stakeholder engagement workshop had the following agenda:

	CSA-INDUSTRY4.E | LIGHTHOUSE PROJECTS | WORKSHOP
08:30	**Welcome and Introduction** *Introduction to CSA-Industry4.E and the aims of the day (Ann O'Connell IMR)*
08:50	**Lighthouse Project Presentations** ***Exploitable results and collaboration in Lighthouse projects:*** *10 min per each* - *Productive4.0* - *MANTIS* - *SWARMs* - *DELPHI4LED* - *SEMI4.0* - *I-MECH* - *SCOTT* - *iDev40* - *AFarCloud*
10:20	***Coffee Break***
10:45	**Impact Enhancement / Exploitation session** *(Meike Reimann)*
12:30	**EC Vision (***Berta Ferrer Llosa***)**
13:00	***Lunch***
14:00	**Roadmap session** *(Leire Exteberria)* ***Multi-layer Pathways and mapping framework*** ***Presentation of results of project mapping and roadmap analysis*** ***Discussion on*** *gaps, obstacles and* ***urgent challenges*** *to be tackled in next calls* ***Coffee Break - coffee available at 15***
15:15	**Final Discussion, Conclusions & Feedback**
15:30	**Closing of Workshop**

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2.2 PARTICIPANTS

All of the Industry4.E Lighthouse Projects were invited to the first workshop. Participants who were unable to travel were facilitated, by having a conference call line setup so they could participate remotely. The first workshop had the following participants:

PARTICIPANTS

Berta Ferrer Llosa	ECSEL JU
Ann O'Connell	IMR
Meike Reimann	Steinbeis
Leire Exteberria	Mondragon University
Matias Vierimaa	VTT
Thomas Gutt	Infineon
Anna Laktionova	Infineon
Joan Yu	Signify
Ilan Englard	AMIL
Josef Moser	Infineon
Dorothy Estrada	Steinbeis
Martin Cech	District Plzen-City
Olga Ormond	AquaTT
Martin Mischitz	Infineon
Chris Decubber	EFFRA
Lukasz Szcygieslki	Gdansk University of Technology

3 Presentations

The following section highlights the main issues presented by the participants representing the Lighthouse Projects. Each project was given a template that covered the following main items: exploitable results, collaboration and dissemination (with CSA and other lighthouse projects), and future lines of research needed for extensive targets.

3.1 DELPHI4LED

Presented by Joan Yu.

"From Measurements to Standardized Multi-Domain Compact Models of LEDs. The LED digital twin."

Exploitable results

- Developed multi-domain LED compact model
- Delphi4LED proposed a new LED-based product. Digital Flow
- Virtual prototyping and simulation for lighting design
- LED compact model proposed towards international Standardization committees CIE and JEDEC
    - Recommendations on LED package test data reporting.
    - TC 2-91: Optical Measurement Methods of LED Packages.

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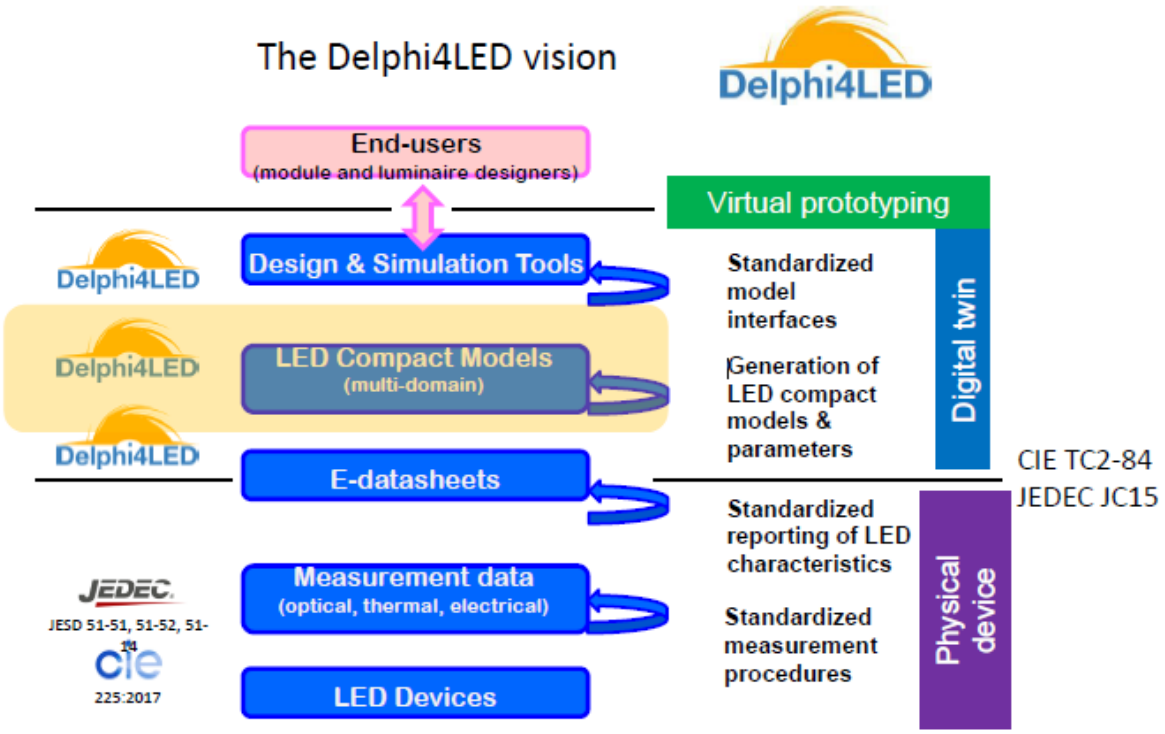
- JEDEC JC 15: Thermal Characterization Techniques for Semiconductor Packages

Collaboration activities



Future lines of research relevant for reaching extended targets

- Standardized LED electronics datasheet from LED vendors
- Implementation of the Multi-domain LED compact model in the commercial CFD, FEM tools or interfacing to the Delphi4LED model

The standardization and supply chain are especially seen as common elements with other projects. A discussion was raised how to handle the dissemination if IP is owned by the industry.

3.2 Productive 4.0

Presented by Thomas Gutt and Anna Laktionova.

Electronics and ICT as enabler for the digital industry. Optimized supply chain management covering the entire product lifecycle

Exploitable results

- Semantic web: The digital reference – a language for semiconductor supply chains

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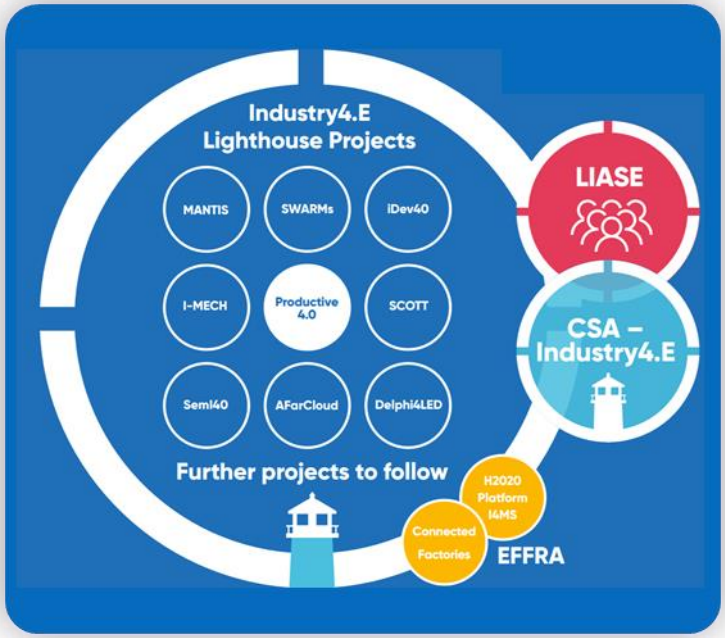
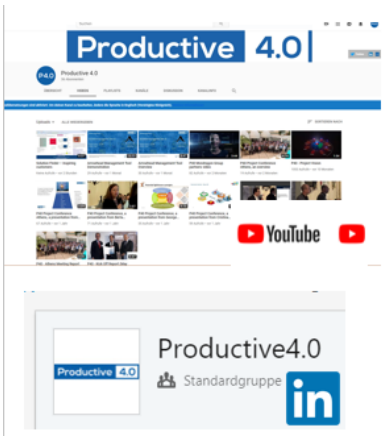
Collaboration activities

Through ECSEL-JU Industry4.E Lighthouse



Dissemination channels:



- The goal to reinforce and share the results during Productive4.0

Productive 4.0

Productive4.0
@Productive40

#Productive4_0
#H2020,
#innovation,
#Industry4E,
#ECSELJU

Future lines of research relevant for reaching extended targets

- to reinforce the using of social media advertisement
- added value of the cooperation with complementary EU projects within the framework of the Lighthouse Initiative (for example like Arrowhead)
- present project achievements including more detailed success stories/ use cases
- community meetings (conferences, workshops)

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- to increase the target group of projects and make Europe´s strength in the field of microelectronics more visible
- AI in production: Combination of data

In conjunction with ICPS (International Conference on Industrial Cyber-physical systems), Productive 4.0 will organise a Conference in Tampere on 8-12 June 2020, partly open to the public. The Productive4.0 exploitation plan contains detailed results about the project.

Discussion was raised on managing such a large project. Solutions: Project management has enough people, differentiated roles. Two WP leaders (academic + industry) for each WP.

3.3 MANTIS

Presented by Leire Exteberria.

The overall concept of MANTIS is to provide a **proactive maintenance service platform architecture based on Cyber Physical Systems** that allows to estimate future performance, to predict and prevent imminent failures and to schedule proactive maintenance

Exploitable results

- MANTIS has already ended
    - MANTIS reference architecture, has been published in an open access MANTIS book (https://www.riverpublishers.com/research_details.php?book_id=573)
    - The project has led to launching 36 products (goods or services) into the market, 13 processes and 16 methods, according to the partners

Collaboration activities

- Arrowhead: MANTIS is providing extensions to the Arrowhead Framework upon which maintenance service applications are built
- Productive 4.0: Several partners of Mantis in the project, enhancing ECSEL MANTIS project results
- Arrowhead tools: MANTIS is providing specific background to Arrowhead Framework core system technology
- MANTIS legacy: Two follow-up H2020 FoF projects:
    - PROPHESY: Platform for rapid deployment of self-configuring and optimized predictive maintenance services
    - 29Z-BRE4K: Strategies and Predictive Maintenance models wrapped around physical systems for Zero-unexpected-Breakdowns and increased operating life of Factories

Future lines of research relevant for reaching extended targets

- Bring the Intelligent Functions from the Cloud to the Edge
- Improve HMIs

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3.4 I-MECH

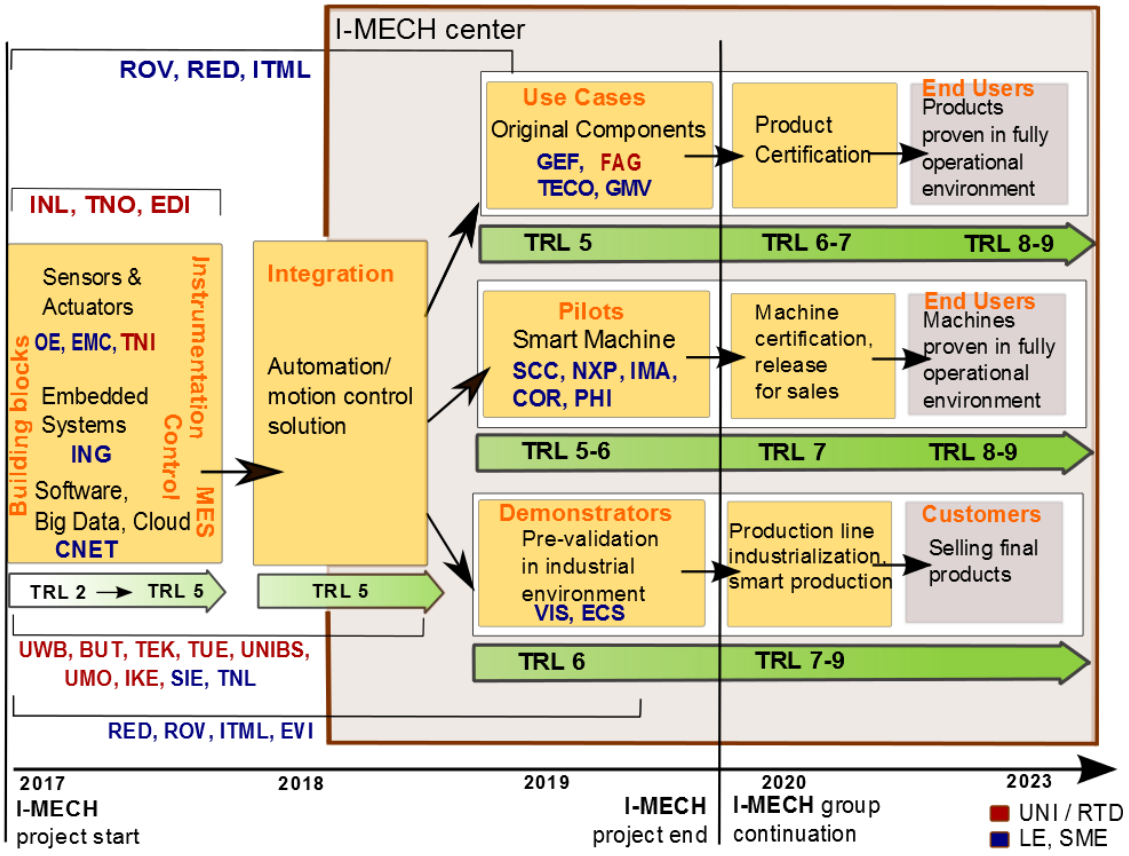
Presented by Martin Cech.

I-MECH strategic partnership delivers **reference motion control platform** for smart mechatronic systems and robots

Exploitable results

- I-MECH reference platform
  - HW building blocks (Soc+FPGA, multi-many core, wireless communication, fast signal processing, fast computer vision)
  - SW building blocks (vibration control, multivariable control, repetitive control, auto-tuning)
  - Methodologies (creating reliable machine models/digital twins, co-simulation, MIL-SIL-PIL-HIL control design cycle)
  - -> Final pilot machines

Collaboration activities



Opportunities in:

- Production planning (ERP, MES),

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- predictive maintenance
- zero-defect strategies
- IoT
- Communications

New applications domains: mobility, automotive, aerospace, healthcare, industrial inspection.

Future lines of research relevant for reaching extended targets

- Full machine digital twins living parallel life used for predictive maintenance
- Combining AI with information from the machine (nobody knows the machine better than the control system which controls it – edge computing)
- New principle sensors (even self-powered) namely for vibration measurement
- New principle actuators
- From machine level to system level
- Collaborative robots – elastics joints

3.5 IDEV40

Presented by Josef Moser.

Efficient and secure technologies for industry 4.0 in ECS industries. Radically improve and accelerate the whole supply chain processes through digitization.

Exploitable results

- Concept for implementation of data and knowledge management systems that intelligently manage data in a large heterogeneous ECS environment
  - Goal of implementing AI approaches in the ECS domain
  - Semantic web approach
- Digitize and virtualize the ESC value
  - Concept for the supply network virtualization of the entire IFX fab cluster, to prepare for zero-failure production.
  - Visualization tools and multi-factory planning. Different concepts for the semiconductor industry.
- Development of a common understanding of SSoT (Single Source of Truth) and Digital Twin concepts for implementing them along the value chains. Digitize and optimize the product lifecycle and change management.
- Enhancing the innovation capability by a human-centred design of ECS development processes, production systems and value chains

Collaboration activities

- European advances in digital Transformation Conference (1-2)
- Vision: install a real platform for digital transformation discussions in Europe
- 3rd conference – April 2020, conference open to other ECSEL JU projects

Future lines of research relevant for reaching extended targets

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- AI algorithms have the potential to support and automate many processes and combine information from different sources
- Consistent IT security throughout the value chain bears the potential for dramatic increase in trust and efficiency
- Autonomous production systems by digital twins
- SSoT enables seamless data and information re-use across the hierarchical levels of each system and between systems, concerning the whole product lifecycle
- Socio-economic aspects are crucial for the upcoming digital transformation -> Human aspects
    - Interviews in 3 different companies. For designing the digital control centre

3.6 MadeIn4

Presented by Ilan Englard.

Metrology Advances for Digitized ECS industry 4.0 (Semiconductor and Automotive industries). Two industries: Semiconductor and automotive industries

Exploitable results

- High throughput, next generation metrology and inspection tools development.
- Develop combinations of Design (EDA), Product/process Life Cycle Management (PLM), modelling, simulations and advanced metrology data analysis with Machine Learning (ML), Digital Twinning and predictive diagnostics of the process (predictive yield) and tools performance.

Collaboration activities

- Productivity booster 1: High throughput metrology and CPS: The metrology companies will collaborate with the IC and Automotive manufacturers to achieve the metrology tools and sensors throughput and reliability requirements which are necessary to support the data growth associated with artificial intelligence, virtual commissioning and digital twinning
- Productivity booster 2: Artificial Intelligence: An EDA company, in collaboration with the metrology companies, research institutes and the large manufacturers, will develop predictive yield system in the manufacturing lines, using machine learning techniques.
- Virtual commissioning: Automotive, Robotics and IT companies, will extend the virtual representation and validation of production processes up to the deployment, to reduce the time spent in process change validation and deployment
- Digital Twinning: Automotive, robotics, IT and metrology companies, together with academia will develop Digital Twin applications to hybridize the virtual representation of Product and Process Lifecycle Management with asset performances information coming from real processes.

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Future lines of research relevant for reaching extended targets

- HiFIVE "Heterogeneous integration for 5G deployment and Industry 4.0 data growth Viability supported by ECS developments" project (2019 ECSEL IA submission)
- The two MADEin4 productivity boosters can be enhanced further by novel heterogenous integration IT technology, which will increase bandwidth, reduce latencies and overall energy consumption of the future IT infrastructures and in consequence will support, within others, a true wireless manufacturing
- Semicon conference

3.7 SCOTT

Presented by Lukasz Szczygielski. "Secure connected trustable things, IoT + Trust"

Exploitable results

- Re-usable and scalable technology building blocks including HW and SW for security, distributed cloud integration, energy efficiency and autonomy of devices facilitating cross-domain sharing of technologies and services. Metrics and framework for measuring security and privacy, e.g. Multi-domain reference architecture
- Trust framework for specifying contextualized trust issues, trust objectives, and trust requirements

Collaboration activities

- STRING, by close cooperation with AIOTI, by looking for synergies with FiWare initiative etc., STRING
    - IoTSec – Security for smart grids: privacy labelling
    - AIOTI: high-level reference architecture, recommendations for multi-domain reference architecture
    - Fiware: compatibility with Fiware platform and modules
    - Lighthouse initiative STRING: involvement of European business ecosystems

Future lines of research relevant for reaching extended targets

- Safety and security of IoT,
    - Is defined by each domain and use case.
    - Define model of evaluation of safety and security. Flexible, adjustable…
- Application of AI
    - Dissemination: short project video available soon. Dissemination of results is at different levels – for the beginners and general public this is through the SCOTT Facebook page[1]. Dissemination to experts is done through book chapters and scientific publications. SCOTT description in ECSEL-JU Book of projects[2].

[1] SCOTT facebook

[2] https://scottproject.eu/2018/06/25/scottecsel-ju-book-of-project/

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3.8 Arrowhead Tools

Presented by Leire Exteberria.

The Arrowhead Tools project aims for digitalisation and automation solutions for the European industry. Closes the gaps that hinder the IT/OT integration by introducing new technologies in an open source platform for the design and run-time engineering of IoT and System of Systems (SoS).

Exploitable results

- Provides engineering processes, integration platform, tools and tool chains for the cost-efficient development of digitalisation, connectivity and automation system solutions in various fields of application.
- Tool chains for IoT and SoS digitalisation/automation engineering and management, adapted to:
  - existing engineering methodologies and tools
  - new IoT and SoS engineering and management tools
  - security management tools
- Efficient training of professional engineers

Collaboration activities

- Joint training and technical workshops and meetings with Productive 4.0 regarding Arrowhead framework.

Future lines of research relevant for reaching extended targets

- Engineering evolvable automation systems (integration of legacy systems and being able to include unforeseeable technologies)

Action points

AP1: Access to slides for participants.

4 Special sessions

4.1 Impact enhancement/Exploitation session

The dissemination & exploitation questionnaire was presented by Meike Reimann (Steinbeis). Needs for training and exploitation were discussed.

Following main observations were recorded during the discussion:

- It will be valuable to have guidelines and common understanding about exploitation.
- It is important to communicate exploitation items as they offer building blocks for other (lighthouse) projects.

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- Exploitable results should be shared between the projects
- Consider common repository for document sharing?
- As an example, SCOTT project has done detailed analysis of stakeholders, and after that defined exploitation plan. Open access repository should be available.
    - CSA: To gather the links to the repositories.
- Align dissemination and exploitation strategies between (lighthouse) projects
- How to handle exploitation? In research institutes there is no problem but in industry it is often confidential. Should be addressed during **AP4** & **AP5**.

Action points

AP2: Create Lighthouse Exploitable Results Map

AP3: Combine Exploitable Results with challenges in SRA

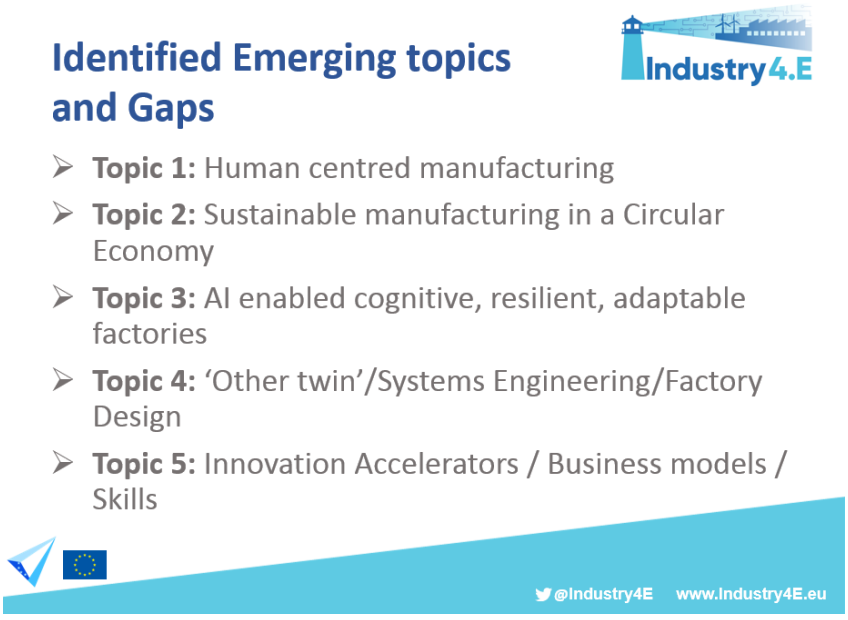
- Challenges of SRA (digital industry)
- Challenges of SRA: industry related technological topics

AP4: Arrange training for exploitation

AP5: Arrange full-day workshop on exploitation between lighthouse projects

4.2 Roadmapping session

Leire Exteberria presented findings from the roadmap analysis. Participants were presented the emerging topics and gaps presentation.



The main question set in workshop was: "Are the new topics proposed relevant?"

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Following main observations were recorded during the discussion:

- Human centred manufacturing is very relevant.
- How important are non-technical topics to ECSEL-JU?
    - Berta: Yes, cross-cutting topics are important (even if not so highlighted in SRA). As an example, Arrowhead tools is addressing education. Other lighthouses should address it too.
      Circular economy was considered important.
- AI is highly relevant, almost all Lighthouse projects tackle with it.

4.3 EU Vision

Berta Ferrer Llosa presented EU vision.

Industry 4.E lighthouses represent more than 356M€ in total costs, having more than 430 participants from 25 countries.

There are several projects that are candidates for Industry4.E Lighthouse projects, namely APPLAUSE, CPS4EU, PIN3S, Power2Power, VIZTA. Arrowhead tools and Made4in are already expected to join the Industry4.E Lighthouse, pending approval from the ECSEL-JU governing board. It was noted that Lighthouse project SCOTT is also in Health.E.

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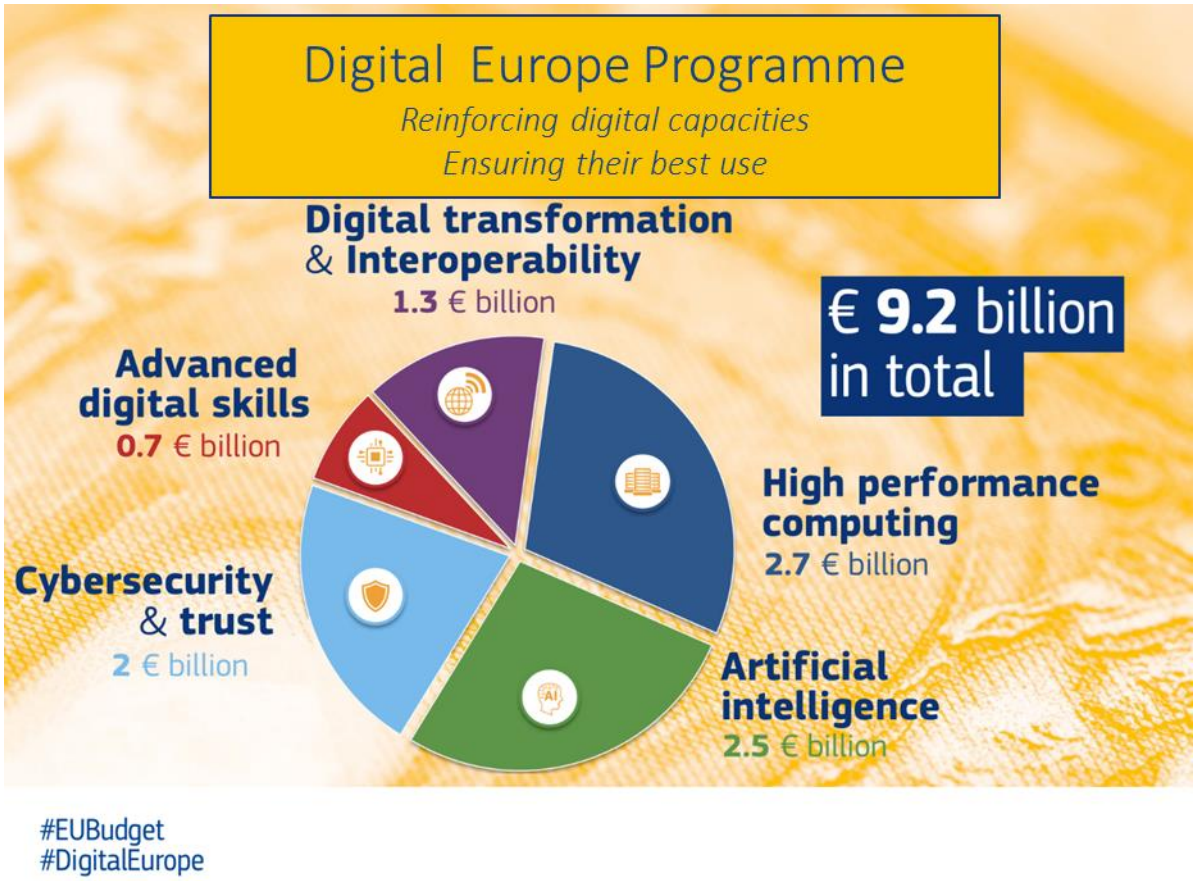
The EC is aiming at a digital Europe programme with the following topics and funding:



The future of ECSEL-JU will be decided in the coming months.

It was discussed how to address Lighthouses during EFECS 2019. Several options were discussed, have a Lighthouse day, workshop day before or after addressing the exploitation/other training needs addressed by Lighthouse coordinators and organized by CSAs, perhaps half-day for collaboration, half-day for training. The final result will be a session for all three existing Lighthouses (Industry4.E, Mobility.E, and Health.E), to give a 15 minute presentation each as part of the EFECS 2019 programme.

4.4 Wrap up

Based on the sessions and discussion held, some general findings were that standardisation is important, supply chain is critical for many. Issues mentioned in several presentations included:

- Semantic web
- How to link with other projects
- Digital twin
- Predictive maintenance
- Demo pilots
- Skills gap
- Digitalise process
- Knowledge transfer
- Importance of exploitation

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Industry4.E
INITIATIVE FOR EXCELLENCE IN DIGITAL INDUSTRY

Industry4.E Workshop:
Shaping the future Industry4.E Lighthouse

19th June 2019, Bucharest

A 1-day workshop for Industry4.E Lighthouse Projects exploring exploitation, future challenges, collaboration opportunities, and Industry4.E.

Agenda

08:30 Welcome and Introduction (Ann O'Connell, IMR)
08:50 Lighthouse Project Presentations (Project coordinators/representative)
10:20 ***Coffee break***
10:45 Impact Enhancement/Exploitation session (Meike Reimann, S2i)
12:30 EC Vision (Berta Ferrer Llosa, Programme Officer, ECSEL Joint Undertaking)
13:00 ***Lunch***
14:00 Roadmap Session (Leire Exteberria, MGEP)
15:00 ***Coffee available***
15:15 Final discussion, Conclusions & Feedback
15:30 Closing of Workshop

MANTIS afarcloud SWARMs))) Delphi4LED Productive 4.0 iDev40 SMI40 MECH Smart Mechatronic Solutions SCOTT Secure Connected Trustable Things

SHAPING DIGITAL INNOVATION

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https://industry4e.eu/event/wp2-workshop-shaping-the-future-industry4-e-lighthouse/

5 Version history

D2.2 Summary reports of the workshop on bringing projects together	
Version - Date	**Comments & Recommendations**
V1 – 19.06.2019	Draft created
V2 – 25.06.2019	Combined - based on memos from Leire and Matias
V3 - 25.09.2019	Added new template, send for review round
V4 - 27.09.2019	Added inputs from Leire and additional info to SCOTT, added internal review comments
V5 - 30.09.2019	Ready for submission
	Subsequent revisions possible following regular strategy reviews

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