Project number: 826276

CPS4EU

Cyber Physical Systems for Europe

D10.20 - Industrial information, Coaching, Training v3

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Dissemination level: Public

Version	Date	Author (name – company)	Comments
V3.0	19/10/2022	JESSICA France	Creation

Table of content

1. INTRODUCTION

JESSICA France, through the CAP'TRONIC program, is in charge of the task 10.4: promote the project results and best practices to SMEs in different sectors.

To achieve this objective, you will find below an action plan that has been implemented from M12 to M36.

2. FIRST ACTION: COLLECTS CONTENT TO BUILD THE MESSAGE

2.1. Objective

Extract the main challenges and solutions provided by relevant CPS use cases.

2.2. Prerequisites

This extraction presupposes the availability of a large amount of information on problems and solutions developed in CPS4EU use cases.

2.3. Approach

1. Prepare an Excel spreadsheet shared on Pydio to collect relevant contents (Context and problematics, Solutions and action plans (road map), anticipated earnings and achieved outcomes).
   o The Excel sheet has been improved following the test entry of 3 uses cases by Valeo.
   o Following this test, the Excel sheet has been modified to make it easier to understand and fil it in. See below the new Excel sheet contents :

Use Case #	Use Case name	Partner's name	Partner's contact (email address if further info is needed)	Use Case short description	Context and functional problematics, stakes	High level operational problematics	Detailed operational	Link with standard	Solutions and action plans (road map)	Anticipated earnings	Achieved outcome	What message would you like to share ?	Link to referent document
1													
...													

2. Ask concerned partners to fill in the spreadsheet and collect contributions.

3. In addition, to complete this information gathering :
   o we participate to the « CSF Electronic Industry » works about the embedded AI (in connection with sensors for CPS),
   o we participate to a webinar of STMicroelectronics : IA & sensors/imagers,
   o we participate also to the restitution of the CPS market study led by the French DGE and Embedded France.

2.4. Deadlines

We plan to share the Excel sheet with all partners in April 2021. Then, we have collected the information until June 2021.

2.5. Expected results

A summary, presented in a table, of the problems and solutions developed in CPS4EU: see Excel spreadsheet CPS4EU WP10 problems and solutions developed.xlsx

This summary will be the start of the construction of a methodology to support the consulting interventions of CAP'TRONIC engineers.

3. SECOND ACTION: EXTRACT THE MESSAGE TO BE DELIVERED AND IDENTIFY HOW TO DELIVER IT TO SMES

3.1. Objective

- Have a message that can be disseminated to SMEs (advice, seminars).
- Identify interlocutors to speak to (seminar, expertise).
- Have a list of events for promotion (seminars).
- Construction of a methodology to support the consulting interventions of CAP'TRONIC engineers.

3.2. Prerequisites

Results from the first action: a summary, presented in a table, of the problems and solutions developed in CPS4EU.

3.3. Approach

- Identify how to deliver the message to SMEs. To shape this message and choose the appropriate communication media (website, social networks, ppt presentations...).
  - o What is a CPS and what value does it bring (examples "high functional level")?
  - o The issues to be solved illustrated with examples (automotive, energy...).
  - o What are the solutions to answer them ?
  - o What results are expected (or obtained with examples if available)?
- Plan upcoming events for promotion (seminars)
- Build a methodology to support the consulting interventions of CAP'TRONIC engineers

3.4. Deadlines

From M12 to M36.

3.5. Expected results

- A schedule of seminars in which to speak about CPS.
- A methodology to support consulting interventions

4. THIRD ACTION: DISSEMINATION

4.1. Objective

Disseminate the message to SMEs.

4.2. Prerequisites

Results from first and second actions.

4.3. Approach

To promote the project results and best-practices, contributors have used:
- Seminars (JESSICA FRANCE, CEA)
  - o As much as possible contributors have provided the number of participating SMEs, start-ups and research organizations. For some of the seminars, it has been difficult to distinguish the

SMEs from the rest of the attendees. The targeted audience and the number of attendees have then been mentioned.
- o To do this, the seminars has been listed in a shared file "CPS4EU_Dissemination_Publications_Conferences_dashboard.xlsx"
- Advice (JESSICA FRANCE)
  - o JESSICA FRANCE has given advices (through consulting engineer) to SMEs on the integration of the CPS and has provided a number of advised SMEs.

4.4. Deadlines

- From M12 to M18: to list all coming events (to start to speak about the project).
- From M18 to M36: to list all coming events (to disseminate and promote the results and best practices).

4.5. Expected results

This task has contributed to the "Industrial Dissemination" KPI-4.2: Make at least 800 SMEs from all over Europe aware of the CPS technology developed in CPS4EU.

5. FIRST RESULTS

SEMINARS

Three seminars have already occurred. The total number of attendees reach more than 1500 persons.

Type of event	Occurred / Foreseen	Name of event	Date	Location	Targeted audience	N. of attendees
Full day annual workshop	**Occured**	Assises de l'Embarqué - 2019 This year's theme : Convergence between Safety and Secured Embedded Systems : myth or reality ?	Nov-19-2019	Paris, France	SMEs, project coordinator, engineers	400
2 Full day annual workshop	**Occurred**	AIR-tificial Intelligence – hackathon	December 12 2019	Italy, Florence	Startup, sw developers, reseachers, engineers	400
Digital Guest Lecture	**Occured**	Creating Digital Twins of Sheet-metal productions	Mai 18th, 2020	Lüneburg, Germany	Students	125

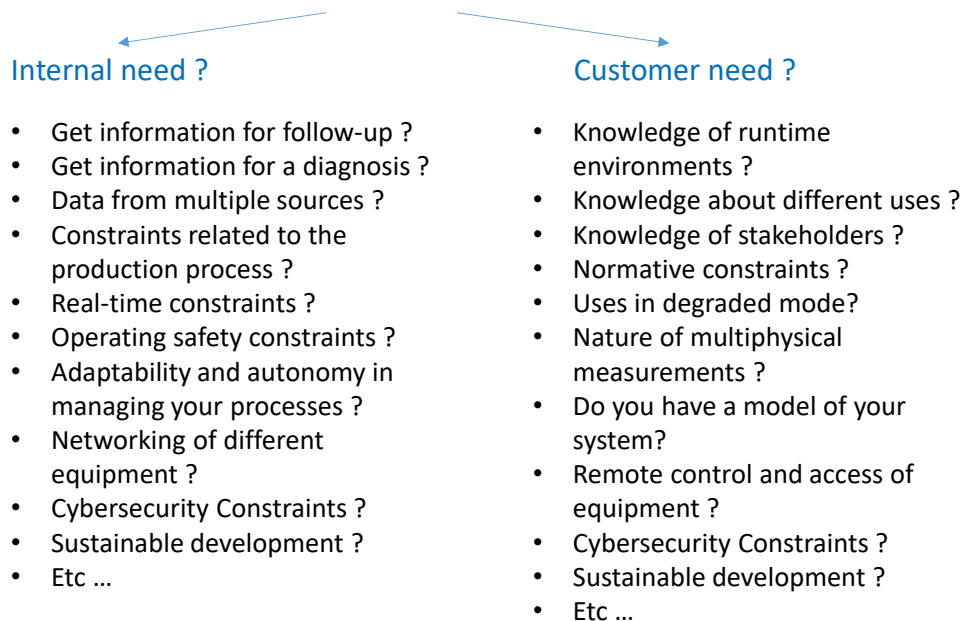|						
Show and showroom	**Occured**	SIdO	September 3rd and 4th 2020	Lyon, France	Startup, SMEs, project coordinator, engineers	19 qualified leads
Full day annual workshop	**Occured**	Assises de l'Embarqué - 2020. This year's theme : Embedded Systems at the heart of industrial systems value chain: how to keep mastering of key technologies (Artificial Intelligence, CPS, 5G, EDGE , Open Source Hardware …) » (avec Trophées de l'Embarqué)	January 18th 2021	Paris, France	SMEs, project coordinator, engineers	352 (+1 300 replay views)
Show and showroom	**Occured**	SIdO	September 22nd and 23rd 2021	Lyon, France	Startup, SMEs, project coordinator, engineers	100 qualified leads
Conference	**Occured**	NETWORK VIRTUALIZATION, THE EXAMPLE OF ENERGY	September 23rd 2021	Lyon, France	Startup, SMEs, project coordinator, engineers	22
Webinar	**Occured**	CYBER-PHYSICAL SYSTEMS, AT THE HEART OF THE INDUSTRIAL REVOLUTION	October 14th 2021	Online	Startup, SMEs, project coordinator, engineers	29
Booth	**Occured**	SIdO	September 9 and 10 2021	Paris, France	Startup, SMEs, project coordinator, engineers	5 500 people visited this first edition of SIDO Paris
Show and showroom	**Occured**	SIdO	September 14 & 15 2022	Lyon, France	Startup, SMEs, project coordinator, engineers	12 000 visitors,

						84 qualified leads
Conference	**Occured**	Convergence of physical and virtual worlds: Agility and autonomy of cyber-physical production systems	September 14 2022	Lyon, France	Startup, SMEs, project coordinator, engineers	43
Conference	In process	Cyber-physical systems: Managing complexity with a modular architecture	December 2022	Bordeaux, France	Startup, SMEs, project coordinator, engineers	

ADVICES

Based on the first and the second action, CAP'TRONIC has built a methodology to support the consulting interventions of CAP'TRONIC engineers with the following 2 steps:

1/ Structured interview of the company
(for a general understanding of the project and related issues)

Internal need ?

- Get information for follow-up ?
- Get information for a diagnosis ?
- Data from multiple sources ?
- Constraints related to the production process ?
- Real-time constraints ?
- Operating safety constraints ?
- Adaptability and autonomy in managing your processes ?
- Networking of different equipment ?
- Cybersecurity Constraints ?
- Sustainable development ?
- Etc …

Customer need ?

- Knowledge of runtime environments ?
- Knowledge about different uses ?
- Knowledge of stakeholders ?
- Normative constraints ?
- Uses in degraded mode?
- Nature of multiphysical measurements ?
- Do you have a model of your system?
- Remote control and access of equipment ?
- Cybersecurity Constraints ?
- Sustainable development ?
- Etc …

2/ Analysis of the problem

Uses / Data

- Monitor in real time
- Diagnose failures
- Anticipate problems
- Remote control
- Multiple stakeholders

Data Use Environment

Measure where the operator cannot be	• Nuclear environment • High temperature environment • Significant electromagnetic environment • Chemical environment …
Exchanges possible with the operator but complex environment	• Complex and restrictive environment (dust, water, vibration, etc.) • Shielding • Difficult accessibility • Small footprint
Multi-measurable quantities	• Yes / No / Don't know : Addressing the problem of data capture and fusion
Need to act on equipment	• Yes / No / Don't know : model, digital twin, decision support based on model complexity…

CAP'TRONIC engineers advised and supported more than 150 SMEs with the following project examples:

- Predictive maintenance on cutting tools
- Instrumentation of production lines (mechanical industry and food industry)
- Gas analysis system for industrial process control
- Advanced sensors for the control of microalgae production
- Inline monitoring solutions tracking in real time process parameters as grammage, density, humidity
- Agricultural robotics
- Distribution measurement system for spreading
- Intelligent irrigation systems
- System for measuring the concentration of mineral elements in fodder
- Hydrometeorological radar
- Communicative collision avoidance system with obstacle detection on construction site
- Structural Health Monitoring for buildings
- Connected system for measuring and monitoring the development of cracks on buildings
- On-site vibration measurement system
- Solution for monitoring consumption in buildings (water, electricity, gas)
- Smart electricity router produced by photovoltaic panels
- Pollutant analysis systems (liquid and gas)
- Gas analyzers by chromatography
- Buried Person Detection System
- Disaster Watch System

- Electromagnetic field sensor connected
- Digital solution dedicated to waste collection and recycling
- Fall detection for motorcycle airbag vest
- Surveillance system for works of art during transport
- Ultrasonic recorder for bat detection
- Infrared Vision System for Firefighter Respirators
- Medical device for early and rapid detection of cardiac abnormalities
- Portable brain imaging device for the diagnosis of stroke
- Medical device for treating injured tissue
- Miniaturized electronic sensors communicating wireless for health
- Functional rehabilitation devices to accelerate patients' return to autonomy
- Traceability of vital signs of patients in hospitals
- Service trolley instrumented and connected to manage nutrition
- Detection of falls, inactivity and wanderings for people with loss of autonomy
- Instrumentation and management of mobile food processing units
- Instrumentation and digitalization of electricity generation turbine monitoring
- Instrumentation and monitoring of water treatment systems on industrial sites
- Data capture for wine-related by-product processing facilities
- Machine vision and image analysis system
- Autonomous industrial robots
- Intelligent Energy Management System
- Physical quantity acquisition connected unit
- Instrumentation of barrels for winemaking
- Test bench for motors
- Data collection on machine operation
- Implementation of customized and advanced features on measuring machines
- Atmospheric monitoring and storm hazard management system
- Pump instrumentation
- Gear motor instrumentation
- Industrial camera with AI
- …