



The European Coordination Hub for Open Robotics Development



Echord++ review meeting Y4

WP4 – RIF@Paris-Saclay

Christophe Leroux, CEA

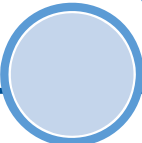
Luxembourg – February 21-22 2018







## Inside RIF@Paris-Saclay







Frédéric Colledani,  
Robotics for agro-agri



François Lansade,  
Robotics for manufacturing

Christophe Leroux,  
Project manager



Pascale Betinelli  
business developer



Gregorio Ameyugo,  
Deputy director, DIGIHALL

Yann Perrot,  
Head of robotics lab



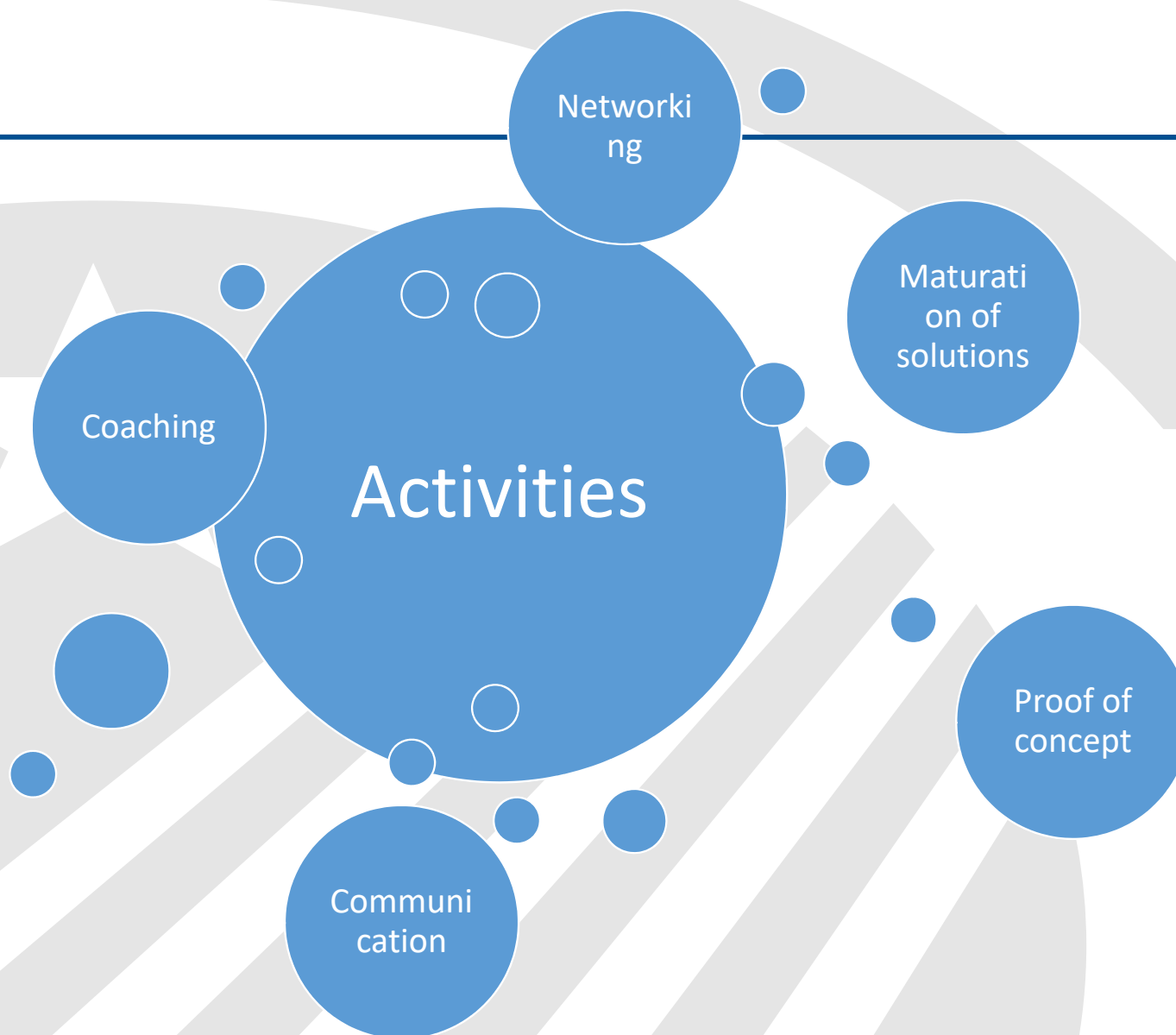
## Hardware

- 1 x STAUBLI TX90
- 1 x 6 DoF HAPTION VIRTUOSE
- 1 KUKA IIWA
- 1 ABB YUMII
- 1 COBOMANIP from SARAZIN
- 1 x SYBOT PK0 (3 dof)
- 1 x SYBOT PK2 (6 dof)
- Lower limb exos HV-SLIM

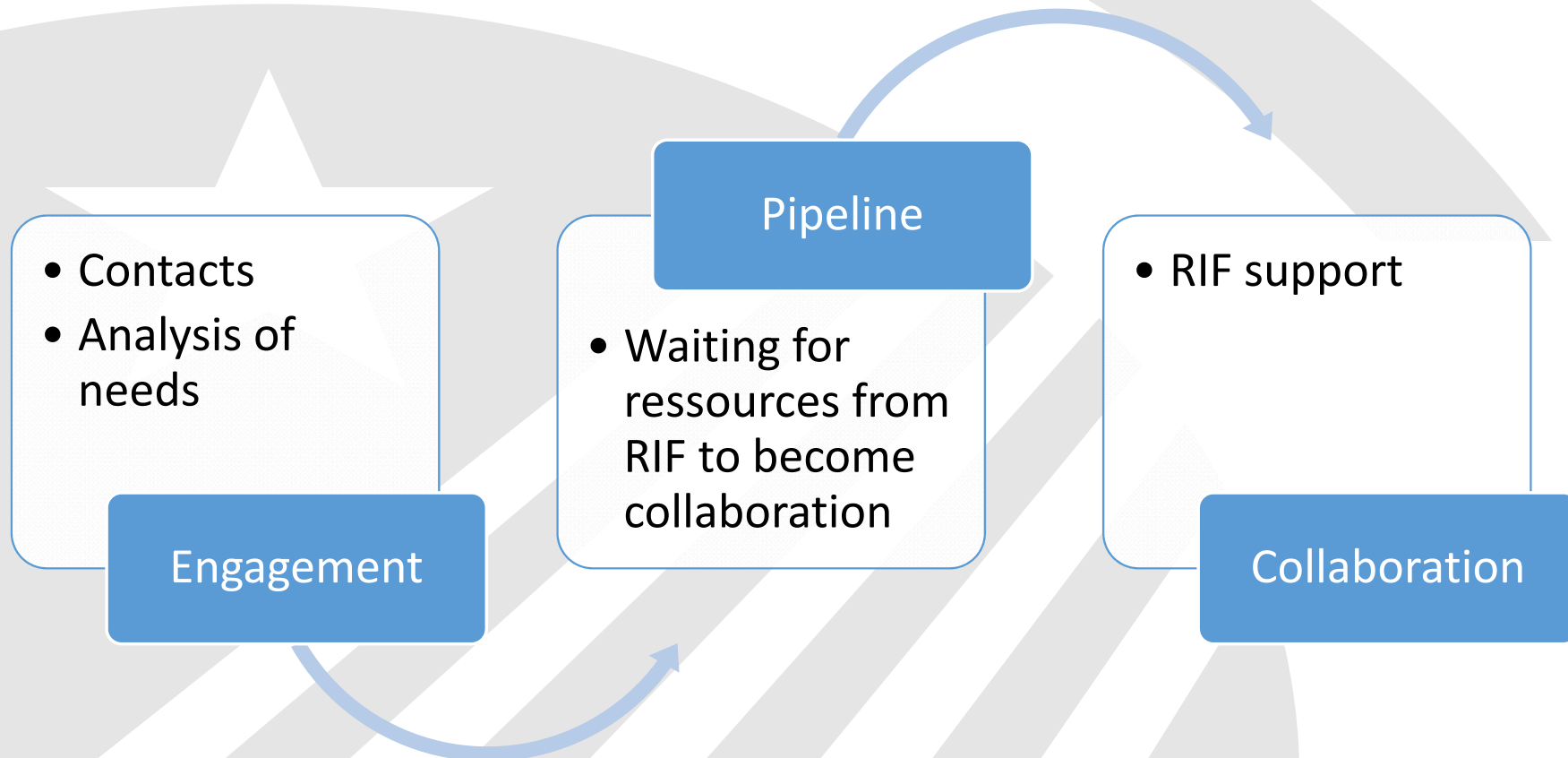
## Software

- TAO control: robotics controller with API
- SCORE: 3D graphic supervisor
- XDE: library usable for realtime graphic simulation





## Support for take global phasing



## Some figures

- 6 to 8 collaborations a year
- More than 200 contacts a year
- face to face, phone (not accounted since 2017)
- One contract signed for each collaboration
- Focus on impact

## Profile of collaborations

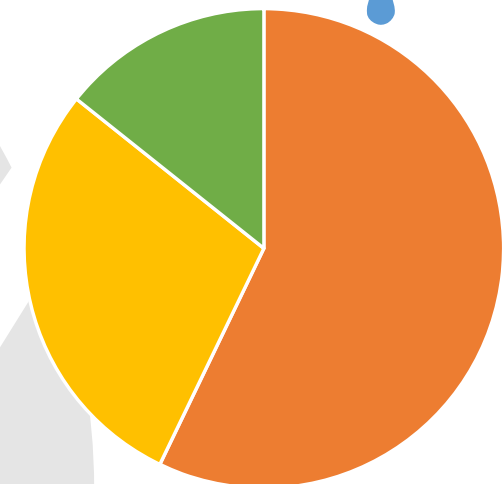
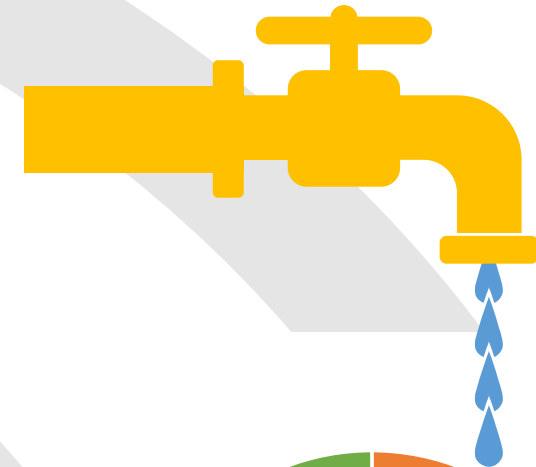
- Large business: 4
- SME: 2
- Other (Academic, RTO): 1

## Domain of application

- Manufacturing, Automotive, Energy, Aeronautics, Transport, Construction
- Education

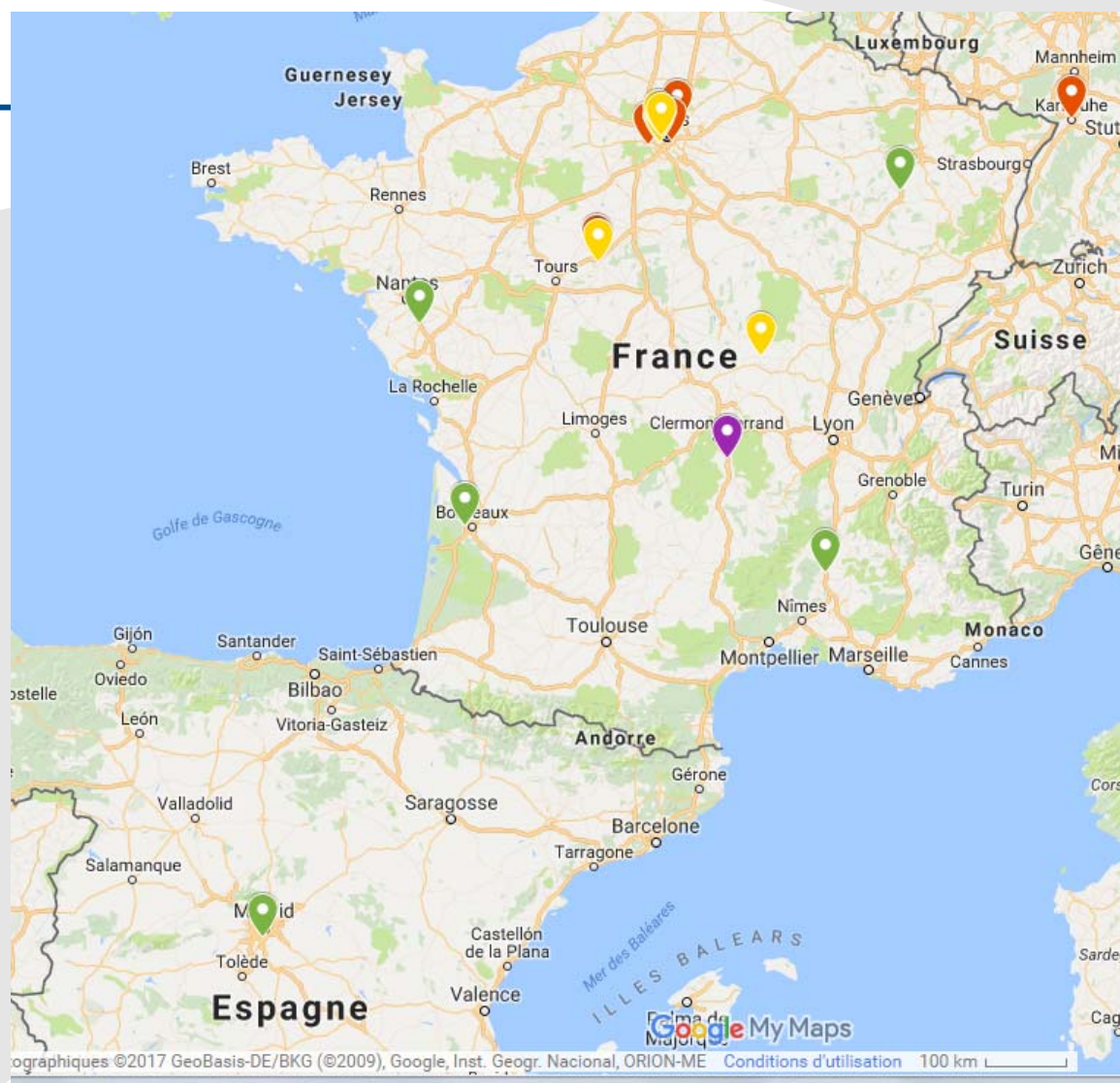
## Median

- Duration: 12 months
- Effort 30 days



■ Large group ■ SME ■ Other ■





### Legend

- 2014
- 2015
- 2016
- 2017

# Experimentations period 1

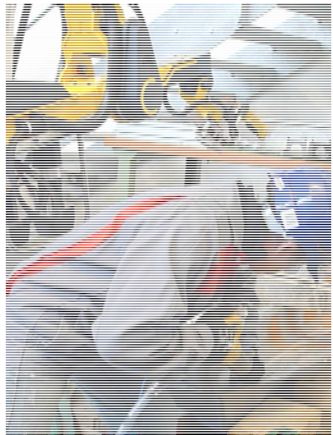
P1 : mars 2014

Presented in 1<sup>st</sup> review meeting

2014

| RIF User   | Town / Country    | User Type      | Objective                   | Outcome  | Ressources |
|------------|-------------------|----------------|-----------------------------|--|------------|
| Interforge | Issoire<br>Vélizy | SME            | Chiseling of iron casts     | Chiseling with an RB3D A6-15 cobot. Reduction of MSD. Increase of productivity. Better flexibility<br>Flash removal on iron casts with and RB3D A6-15 cobot.<br>Reduction of musculo-skeletal disorder. Greater flexibility.<br>Optimization of time. Reduction of costs | A6-15      |
| PSA        |                   | Large Business | Flash removal of iron casts |  | A6-15      |

## Chiseling



*Manual process*

*Learning*

*New process*

- Filtering of vibrations in a chiseling operation metal parts in titanium aluminum alloy (1m x 1m max)
- Feasibility experimentation, proof of concept, removal of doubts
- Experimentation:
  - Chisel attached to the end effector of an RB3D A6-15 cobot
  - The operator holds the end effector to chisel the parts.
  - The robot is used to carry the tool, provide force control and feedback and filter the vibrations enabling a reduction of MSD
- Duration and effort (CEA LIST)
  - Preparation: 5 person day, several months
  - Experimentation : 5 person days, one week
- End user foresees the possibility to buy an A6-15 robot conditioned with an adaptation of the ergonomics of the handling system
- Company: Interforge (FR), SME



## Flash removal



- Reduction of muscular-skeletal disorder during flash removal operations on metal parts (1m x 1m)
- Feasibility experimentation, proof of concept, removal of doubts
- Experimentation studied:
  - RB3D A6-15 cobot
  - Disk tool attached to the robot end effector.
  - Operator holds end effector to remove flashes.
  - Robot used to carry the tool and control the effort applied to reduce MSD
- Duration and effort (CEA LIST)
  - Preparation: 5 person day, several months
  - Experimentation: 5 person days, one week
- Contracts under elaboration between PSA and RB3D for an implementation in a production line
- Client: PSA, large group

# Experimentations period 2

P2 : avril 2014 – juin 2015

Presented in 2<sup>nd</sup> review meeting, Lisbon, Oct 2015



2015



| RIF User         | Town / Country           | User Type       | Objective   | Outcome  | ressources   |
|------------------|--------------------------|-----------------|---|--|--------------|
| Senior Aerospace | Fosse                    | SME             | Straightening of bent tubes   | Usage of A6-15 RB3D robot straightening bent tubes.<br>Reduction of MSD.   | A6-15        |
| Renault          | Guyancourt               | Large Business  | Assistance to car part assembly   | Proof of Concept usage of collaborative robot  | COBOMANIP    |
| Mecarectif       | Aulnay-sous-Bois (Paris) | SME             | Charging of rectification   | Demonstration with collaborative robot   | SYBOT 3 axes |
| Air Liquide      | Vitry                    | Large Business  | Piling of separation sheet for a thermic exchanger  | Proof of concept with a collaborative robot  | COBOMANIP    |
| FhG IoSB         | Karlsruhe                | Research Centre | Wireless communication in manufacturing workcell<br>Interoperability assessment with OPC-UA | Realtime and asynchronous wireless communication between a supervisor and a manufacturing robot.<br>Application of new standard OPC-UA for the interoperability in manufactuting. Low level communication protocol adapted to manufacturing environment. | SYBOT 3 axes |

## Bending tubes



- Use of force amplification robotics assistance for manual strengthening of bent tubes.
- Feasibility tests, proof of concept
- Experimentation:
  - Use of the RB3D A6-15 robot to assist the operator in straightening metal tubes
  - Operation suspended because the cobot arm is not powerful enough
  - Investigation for another solution
- Duration and effort (CEA LIST)
  - Preparation: 5 person day, several months
  - Experimentation : 15 person days, 5 week
- Reduction or suppression of MSD for the operator
- Client: Senior Aerospace Ermeto (SME)

## Mounting shock absorber

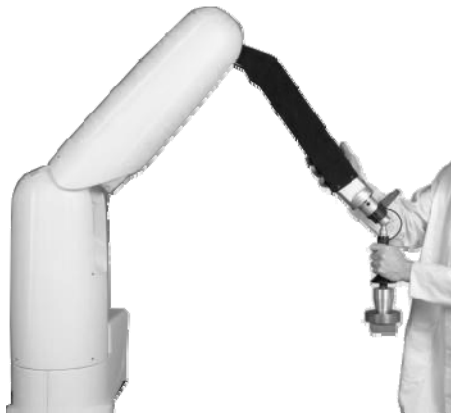


- **Use of force a collaborative robot to assist an operator in handling heavy loads**
- **Feasibility tests, proof of concept**
- **Experimentation:**
  - Use of the Sarazin Cobomanip to assist the operator in handling a Renault Clio Shock Absorber
- **Duration and effort (CEA LIST)**
  - Preparation: 5 person day, several months
  - Experimentation : 5 person days, 2 week
- **Reduction or suppression of MSD for the operator**
- **Client: Renault**

## Polishing



- Use of collaborative robot to control the trajectory and force applied during polishing of curved parts
- Demonstration, feasibility tests, proof of concept
- Experimentation:
  - Use of the SYBOT robot to assist the operator in polishing operation
  - Operation waiting for the availability of the SYBOT robot
- Duration and effort (CEA LIST)
  - Preparation: 5 person day, several months
  - Experimentation : 5 person days, 2 week
- Expectation of reduction or suppression of MSD for the operator, increased quality, increased productivity
- Client: Méca-rectif (SME)



## Industrial boiler making

- Use of collaborative robot to assist the operator in forming of large number of metal sheet in small series
- Demonstration, feasibility tests, proof of concept
- Experimentation:
  - Use of the SYBOT robot to assist the operator
  - In a first stage the operator teaches the robot the trajectory to follow.
  - The cobot constraints the motion of end effector tip. It filters the shocks and amplifies the effort in the impact direction
  - Operation waiting for the availability of the SYBOT robot
- Duration and effort (CEA LIST)
  - Preparation: 5 person day, several months
  - Experimentation : 5 person days, 2 week
- Expectation of reduction or suppression of MSD for the operator, increased productivity
- Client: Bronzavia(SME)



**HII CPS**  
**INDUSTRIE 4.0 Powering Europe**  
**EIT Financial Support: € 2.5M**  
**KAVA: € 3.8M / KIC: € 16.4M**  
 Push the rollout of embedded system  
 production technologies and smart  
 production processes



**Master Arm**



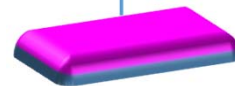
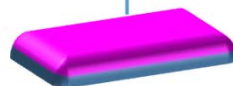
**Slave Arm**



**NOW**

Master controller

Slave Controller



## HII CPS for Industrie 4.0 (KIC ICT labs)

- **Demonstration of secure a software development tool chain, interoperability and robust wireless communication in robotics for CPS in manufacturing applications**
- **Demonstration, feasibility tests, proof of concept**
- **Experimentation:**
  - Wireless communication in coworking/teleoperation
  - IoT application of OPC-UA to coworking
  - Secure software framework with static code analysis and component
- **Duration and effort (CEA LIST)**
  - Preparation: 10 person day, several months
  - Experimentation : 10 person days, 6 weeks
- **A step towards a combined usage of embedded systems, sensors, control systems, into smart systems-of-systems to increase the efficiency and reliability of industrial production systems and critical Infrastructures**
- **Client: FhG IoSB, Siemens, DFKI, FIAT [Thales]**



# Experimentations period 3

P3 : July 2015 – November 2016

Presented in 3rd review meeting, Luxembourg, Jan 2017

# 2016



| RIF User | Town / Country    | User Type      | Objective   | Outcome   | ressources           |
|----------|-------------------|----------------|---|---|----------------------|
| Kuka     | Germany, Augsburg | Large Business | Sensitive gripper technology transfer   | Demonstration and evaluation of an innovative gripper (CEA patent)                          | CEA gripper<br>SYBOT |
| GEBE2    | Boufféré          | SME            | Finishing of metal parts (planar and non planar), sanding to improve aspect, programming by demonstration for aeronautics | Demonstration with collaborative robot  | SYBOT                |
| AIRBUS   | Spain, Ilescas    | Large Business | Correction of planar surfaces defects for aeronautics   | Demonstration with cobot  | COBOMANIP            |
| AREVA-NC | La Hague          | Large Business | Spent fuel reprocessing plant maintenance   | Demonstration of telemanipulation at the RIF  | SYBOT 6 axes         |
| SEIV     | Mérignac          | SME            | Polishing of metal moulds   | Demonstration with Sybot 3 axis   | SYBOT 3 axes         |
| PSA      | Vélizy            | Large Business | Automatic demonstration, programming by demonstration   | Feasibility try, demonstration  | SYBOT 6 axes         |
| WM88     | Chatenois         | SME            | Paquetting, programming by demonstration, comparison of collaborative robotics solutions for furniture fabrication        | Demonstration of packetting in a realistic setting with conveyor and 2 collaborative robots | UR10<br>IIWA         |



## Licensing

- Large group
- Gripper prototype
- Tech transfer
- Based on CEA patent (2009)

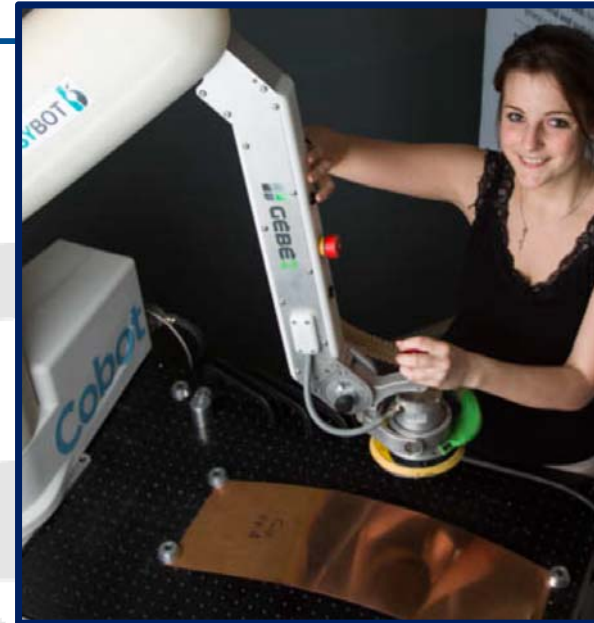
SME, GEBE2, integrator

Automatic sanding to improve aspect

Finishing of metal parts

planar and non planar surfaces

SYBOT



Aeronautics

Large group

Automatic sanding

COBOMANIP, SARAZIN

Spain





Nuclear area

AREVA-NC

Teleoperation

Spent fuel reprocessing plant  
maintenance

Telemanipulation with SYBOT





SME

Mechanical  
fabrication

Polishing of metal  
moulds

SYBOT

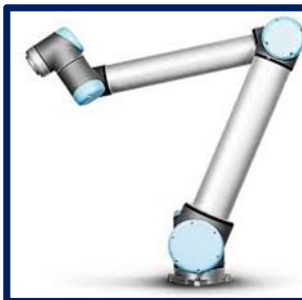


Automotive

Large group

Automatic manipulation

Programming by demonstration



SME, fabrication of furniture

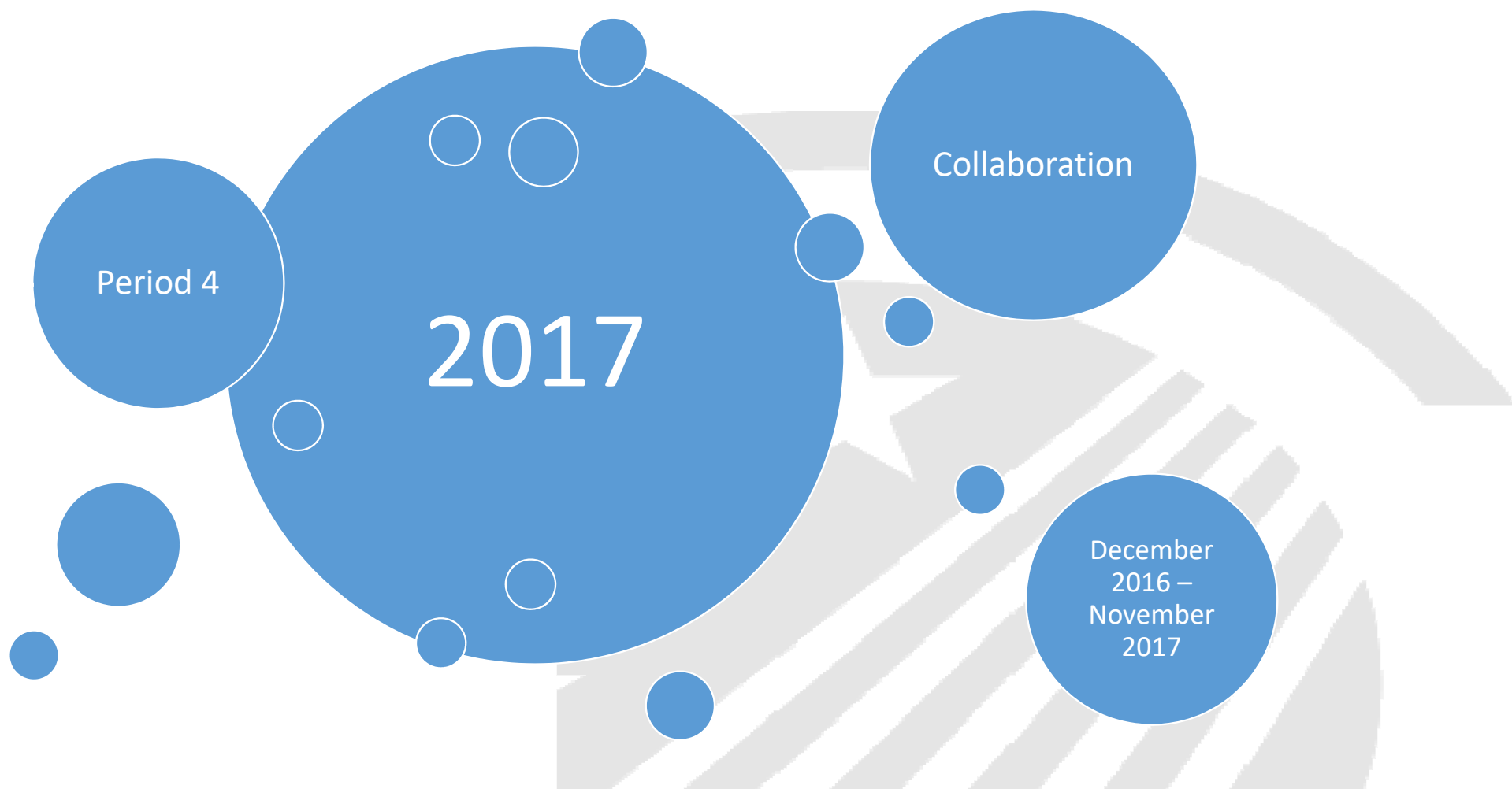
Paquetting task

Programming by demonstration

Comparison of collaborative robots in terms of safety

UR10 and Kuka IIWA

Publication soon



## Examples of engagement at RIF@Paris-Saclay



### Engagements with SME and Mid-market

- ASTI,
- OPTTEAMUM,
- ERI,
- FIVES
- SOLYSTIC
- WM88 FOLLOW UP OF COLLABORATION IN 2016
- LASSARAT

### Engagements with Big businesses

- SANOFI,
- ELM LEBLANC,
- FIAT POWER TRAIN,
- CHICAGO PNEUMATIC,
- CDISCOUNT,
- VEOLIA,
- STX
- ST JEAN INDUSTRIE,
- SOCOMEC,
- VILLEROY ET BOSH,
- SMART,
- SAFRAN

2017

LAMAP (La Main  
à la pâte)

- Academic
- Training and coaching of teacher's pedagogues on robotics
- Courses, robotics demonstration
- all

MBDA

- SME
- Manipulation of parts in aeronautics
- Demonstration with robot
- COBOMANIP

SNCF

- Large business
- Sanding of trains, removal of painting
- Proof of concept
- SYBOT 3 axes

SARAZIN

- Help in choosing a techno for the design of a new COBOMANIP robot
- Demonstration
- Actuator Mock-up

Dassault aviation

- Large business
- Screw driving
- SYBOT 6 axes

COLAS

- Large business
- Assistance to carry tools for demolition
- HV-SLIM

FIAT PowerTrain

- Large Business
- Motor assembly, insertion of jackets in cylinders
- SYBOT 3 axes



## 2017 - Workshop to train and coach pedagogues



### Title of collaboration, applicant

- LAMAP, Academic,

### Description of the Collaboration

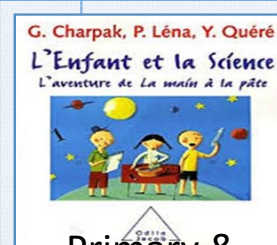
- Action of professional coaching: training and of teacher's pedagogues on robotics
- *In the backstage of the reserach in robotics*
- Courses, robotics demonstration, participation to practical work on robots
- Usage of IIWA, UR10, SYBOT, COBOMANIP, etc.

### Impact

- « *Un grand merci pour ces journées. L'articulation entre les ateliers et les temps de visite et d'apports de contenus était vraiment très réussie, ce qui n'a pas échappé aux participants.* »

### RIF contribution, Echord++ added value

- 2017 workshop coorganized with Inria
- More than 2 years between engagement and workshop
- 2 days of workshop



Primary &  
middle  
schools



International  
S&T teaching



Assistance for  
teachers



Inquiry-  
based learnin  
g



Stimulate  
scientific spirit

## Workshop to train and coach pedagogues



<Class'Code>



**Catherine BIDART** Chef de projet en robotique au CEA. Expertise en mécanique.  
**Didier ROY** Chercheur dans l'équipe INRIA Flowers, travaillant sur l'optimisation et la personnalisation des apprentissages à l'aide des technologies numériques. Il est coordinateur des projets de robotique éducative Inirobot et Poppy Education.  
**Selma KCHIR** Ingénieur de recherche au laboratoire de Robotique Interactive du CEA. Ses recherches ont pour objectif de faciliter le développement d'applications en robotique en utilisant les technologies de génie logiciel. Elle travaille sur des applications en robotique dans des domaines variés (industrie, santé, environnements hostiles).  
**Théo SEGONDS** Ingénieur recherche et développement à INRIA, travaillant sur le développement logiciel et matériel de la plateforme Poppy.  
**Susana SANCHEZ RESPETRO** Doctorante au laboratoire de Robotique Interactive du CEA. Spécialisée dans les Systèmes Avancés en Robotique, elle travaille sur une méthode de programmation intuitive et itérative pour la comanipulation homme-robot.  
**Claire CALMET** Bio-informaticienne de formation, formatrice au sein de la Fondation *La main à la pâte*.  
**Thibault DESPREZ** Doctorant en robotique éducative à INRIA.  
**David WILGENBUS** Astrophysicien de formation, responsable Production et diffusion de ressources à la Fondation *La main à la pâte*.  
**Stéphanie NOIRPOUDRE** Ingénieure pédagogique au sein du projet Poppy Education (INRIA et ENSTA Paris Tech)

## 2017 - Choice of a techno to design of a new collaborative robot COBOMANIP

### Applicant

- SARAZIN, FR, SME, provider of robotics technology

### Description of the Collaboration

- Demonstrated on a mock-up of a new actuator
- In parallel, validation of usages with MBDA (with former COBOMANIP machine)

### Results and impact

- A new product COBOMANIP: cheaper, better performance, more integrated, easier to maintain
- Transfer of a technology patented by CEA (2013): screw and cable actuator, version B, « mobile nut »
- 5 machines sold

### RIF contribution, impact of Echord++

- Booster of the technology transfer
- modeling and validation of a technological choice
- Without Echord++, TT made later or possibly not made (initial technology kept)





## 2017 - Manipulation of heavy parts

### Title of collaboration, applicant

- MBDA, SME, Defence, aeronautics

### Description of the Collaboration

- Manipulation of heavy parts in an application for aeronautics with a cobot

### Impact

- New usage of cobotics
- Proof of concept with COBOMANIP first version
- Restructuration of the workcell
- Reduction of MSD
- *Impact under assesment*

### RIF contribution, Echord++ added value

- RIF conducted the demonstration
- Scouting of end user
- Connection between techno provider, and end user



## 2017 - Maintenance of trains



### Title of collaboration, applicant

- SNCF, large industry, transport

### Description of the Collaboration

- Sanding of trains, removal of painting
- Usage of SYBOT 3 axes to demonstrate sanding with a collaborative robot

### Impact

- New usage of robotics
- Purchase of a cobot by client
- Work place design improvement
- *Impact under assessment*

### RIF contribution, Echord++ added value

- Assessment of safe cobotics technology
- Stimulation of iSYBOT business development
- RIF linked Links between iSybot and client

### Transport



- Large group
- Public sector

### Assistance to brushing



- SYBOT
- on site
- TRL 7



## 2017 – Human robot collaborative screw driving

### Title of collaboration, applicant

- Dassault Aviation, large industry, aeronautics

### Description of the Collaboration

- Usage of SYBOT 3 axes to demonstrate screwing using a collaborative robot

### Impact

- New usage of SYBOT cobot on assembly
- Work place design assessment
- *Impact under assessment*

### RIF contribution, Echord++ added value

- Assessment of new collaborative robotics technology with no fences
- Stimulation of iSYBOT business development
- RIF linked Links between iSybot and client

## 2017 - Using a cobot for insertion of jackets in cylinders



### Title of collaboration, applicant

- Fiat PowerTrain, large industry, automotive

### Description of the Collaboration

- Motor assembly, insertion of jackets in cylinders with the 3 axes SYBOT

### Impact

- New usage of SYBOT cobot involving force control
- Work place design assessment
- *Impact under assessment*

### RIF contribution, Echord++ added value

- Assessment of new collaborative robotics technology with no fences
- Stimulation of iSYBOT business development
- RIF linked iSybot and client

## 2017 - Lower limb exoskeleton to assist an operator in carrying heavy tool

### Title of collaboration, applicant

- COLAS, large industry, construction

### Description of the Collaboration

- Usage of HV-SLIM lower limb exoskeleton to demonstrate assistance to an operator to carry tools for demolition

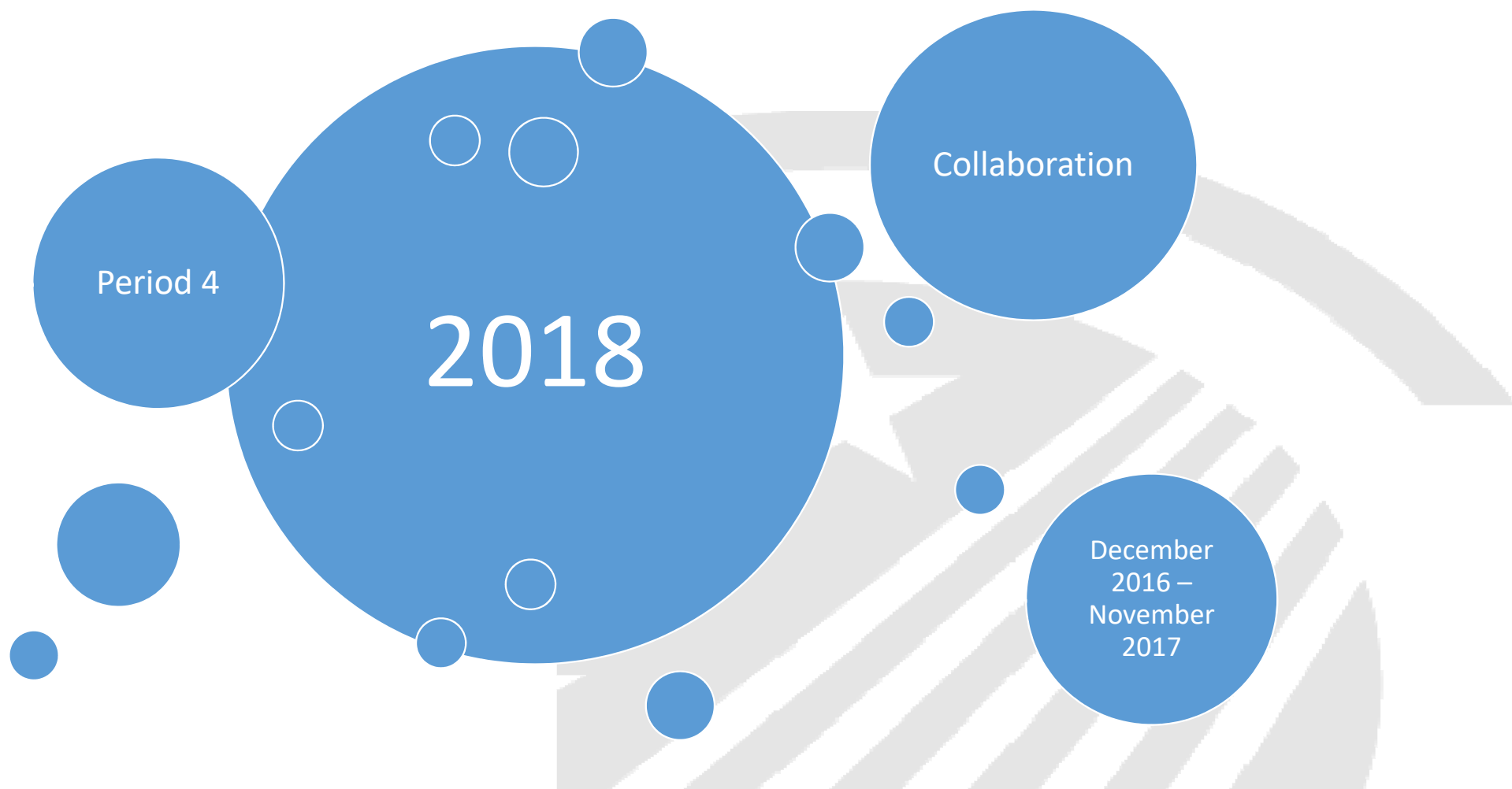
### Impact

- Demonstration of the usage of exoskeletons to assist operators in tedious tasks
- Reduction of MSD
- *Impact under assessment*

### RIF contribution, Echord++ added value

- Exploration of wearable device solution in a construction application
- Raise of awareness on exoskeletons technology





## Engagements for 2018

Industry of electrical cabinets and inverter (SME):

- asking for industrial support in robotics

SME in agro food

- Seeking for industrial support and RIF@Paris-Saclay expertise on interactions between TANGO (SCADA) and collaborative robotics

JYSE: French start up in configurable dashboards for the industry.

- Undergoing a background survey.

SME in Grenoble, subsidiary of a French group

- assistance and audit on the implementation of an intelligent cell for bio-medical applications

Postal sorter, subsidiary of a US group

- proposal for handling stack of mail. Asking industrial support from the RIF

Ez-Wheel, French smart wheel startup (PRTT ACQU).

- Asking to use of the RIF to take over part of the work and industrial support



## 2018 - pipeline

### DIACE

- SME
- Cobotics for manipulation of castings
- Demonstration
- SYBOT

### SOLISTICS

- SME
- Cobotics for manipulation
- Demonstration
- SYBOT

### STAUB

- SME
- cobotics or manipulation of casserole dish
- Demonstration
- SYBOT

### TOYOTA

- Large business
- Assistance to manipulation on production line
- Demonstration
- Exo HV-SLIM

### PSA

- Large business
- Assistance to manipulation on production line
- Demonstration
- Exo HV-SLIM

## Collaboration between RIFs

- Sharing of practical experience
- Comparison of practical use of robotics hardware or software
- Programming of collaborative robots
- Executing specific tasks (assembly, polishing, ...) with different collaborative robots

## Engagement with integrators



### GEBE2

- integrator in the domain of aeronautics involved in a collaboration on polishing of surfaces with the PK0 (Sybot) collaborative robot

### ACTEMIUM

- integrator in the domain of automotive industry involved in a collaboration on benchmark of collaborative robot

### OPTEAMUM

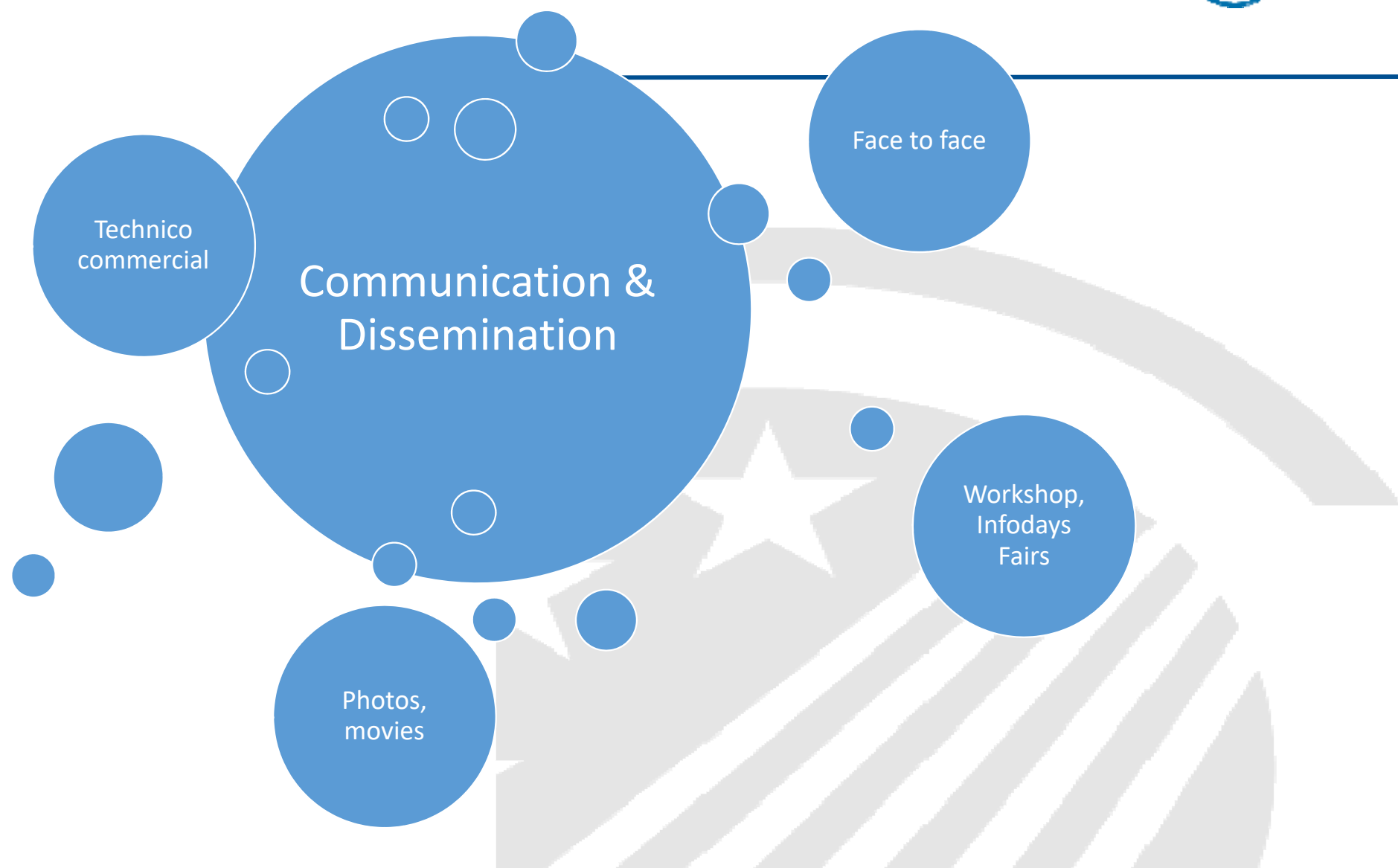
- Integrator in the domain of industry involved in a collaboration on assembly of furniture packings

### FIVES

- integrator in the domain of automotive industry involved in a collaboration on engine small part assembly

### HMI

- Integrator in the domain of industry involved in an exploration of a new domain, agriculture



## Communication – support to the RIF, efficiency and next actions

### Movie

- Photos
- Omni directional movie
- 2D footage does reflect local ecosystem
- Feedback?

### Fairs

- Hannover
- Automatica

### Loterie

- Feedback

### Issues

- How to facilitate engagements?
- How to ease follow up?





## Events

- **Events organized:**

- 1) RIF launch, CEA, January;
- 2) RIF infodays French ministry of research, April;
- 3) GS1, CEA, May

- **Events Foreseen:**

- 1) Healthcare device, November
- 2) Methodology to assist industries in taking up robotics



## Dissemination, outreach: Fairs, Workshops Infodays



## Video

- [Public video available](#)
- Video produced in February
- [Omnidirectional video](#)

## Dissemination in 2017



### Networking and dissemination

- RIF@Paris-Saclay upkeeps and develops links with French regions
- RIF model interesting for other organizations in Metz, Nantes, Bordeaux, Lille and Toulouse

### Connections with technological platforms dedicated to manufacturing

- **Factory-Lab** in Ile-de-France region (inaugurated in October 2016)
  - Cofounded with: ACTEMIUM, PSA, DCNS, SAFRAN, Dassault, CETIM, Arts&Métier
- **FFLOR** in east of France (inaugurated on the 31<sup>st</sup> of January 2017) are meant to facilitate take up of ICT (including robotics) on the production lines.
  - Cofounded with: PSA and Grand Est region

## Communication in 2017



Participation to event to attract SMEs and communicate about the RIF offer:

- **April 2017, Hannover fair**, communication about the RIF@ParisSaclay activities with SMEs and interaction with robotics industries to improve the relay between research and industry
- **June 2017, Florence**, communication about the RIF activities and TANGO SCADA tool
- **November 2017, Grenoble**, to stimulate SMEs in the region to use the RIF
- **December 2017, Bordeaux** to communicate about the opportunities at the RIF@Paris-Saclay

ecosystems



Factory Lab  
inaugurated in october  
2016



FFLOR, inauguration in  
January 2017



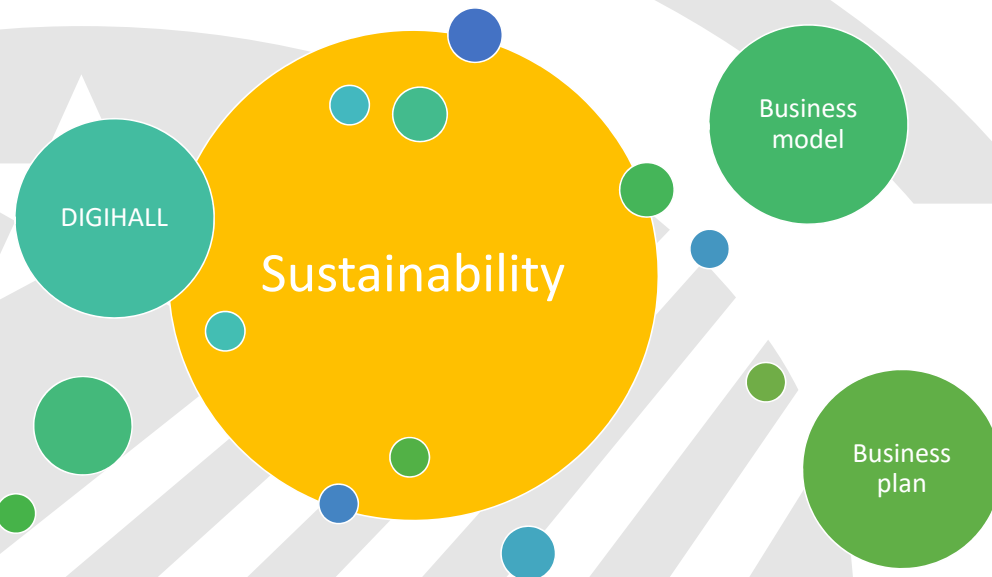
## RIF Booklet



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RIF@Paris-  
Saclay



## RIF concept follow up, Several tracks



### I4MS Competence Centre

- Convergence between RIF concept and the principle of defined in the [I4MS](#) program.
- RIF@Paris-Saclay is the [Competence Centres](#) in robotics for manufacturing in Paris region in 2016

### EIT digital robotics iCentre

- RIF became [Paris iCenter](#) for robotics for the KIC EIT DIGITAL since 2017.
- I-Center rely on hardware equipment to provide applications like human-robot collaboration, healthcare and agriculture.
- I-Center propose services like training, technical support for SMEs, advices on the management of IPR, assistance to TT, advices on ELS issues in robotics.

### Convergence with other projects

- H2020 ROBMOSSYS, [pilot](#) for software engineering in robotics
- H2020 COVR, [Shared facility](#), Competence Centre for regulation and certification
- H2020 ESMERA, Competence Centre for challenges targetting SMEs
- H2020 TERRINET, [Robotics research infrastructure](#)

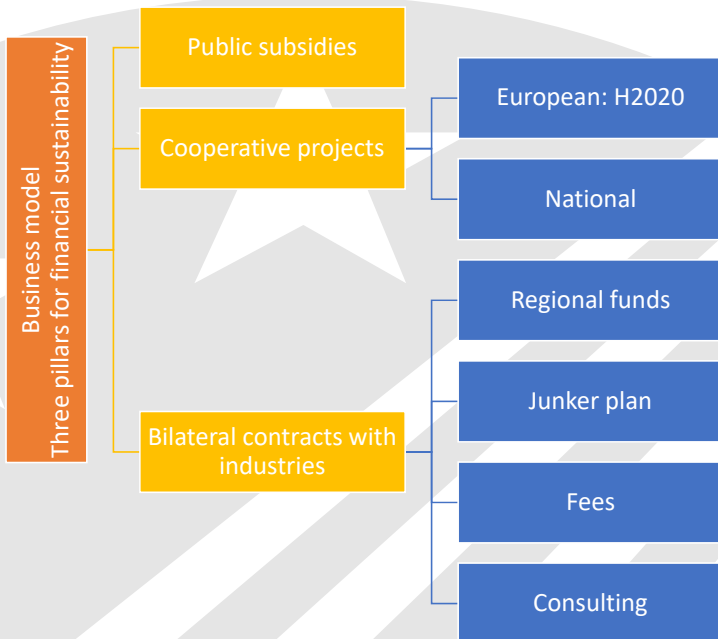
## DIGIHALL DIH

- RIF@Paris-Saclay experience used for CEA position paper on DIH for French Ministries and EC
- DIGIHALL creation supported by Ile-de France region
- DIGIHALL implemented at level institute CEA LIST
- DIGIHALL has a broader scope than robotics and covers all application domains supported by IdF
- Takes advantage of experience gained at the RIF
- RIF@Paris-Saclay embedded in DIGIHALL DIH
- DIGIHALL Aligned with S3 priorities for Ile de France
- Founding members: CEA, IRT SystemX, Systematic cluster, Inria, Télécom ParisTech and SudParis, ...
- Four axis: AI, FoF, CPS and Digital trust.



## Financial Sustainability

- business model relying on different sources of funding.

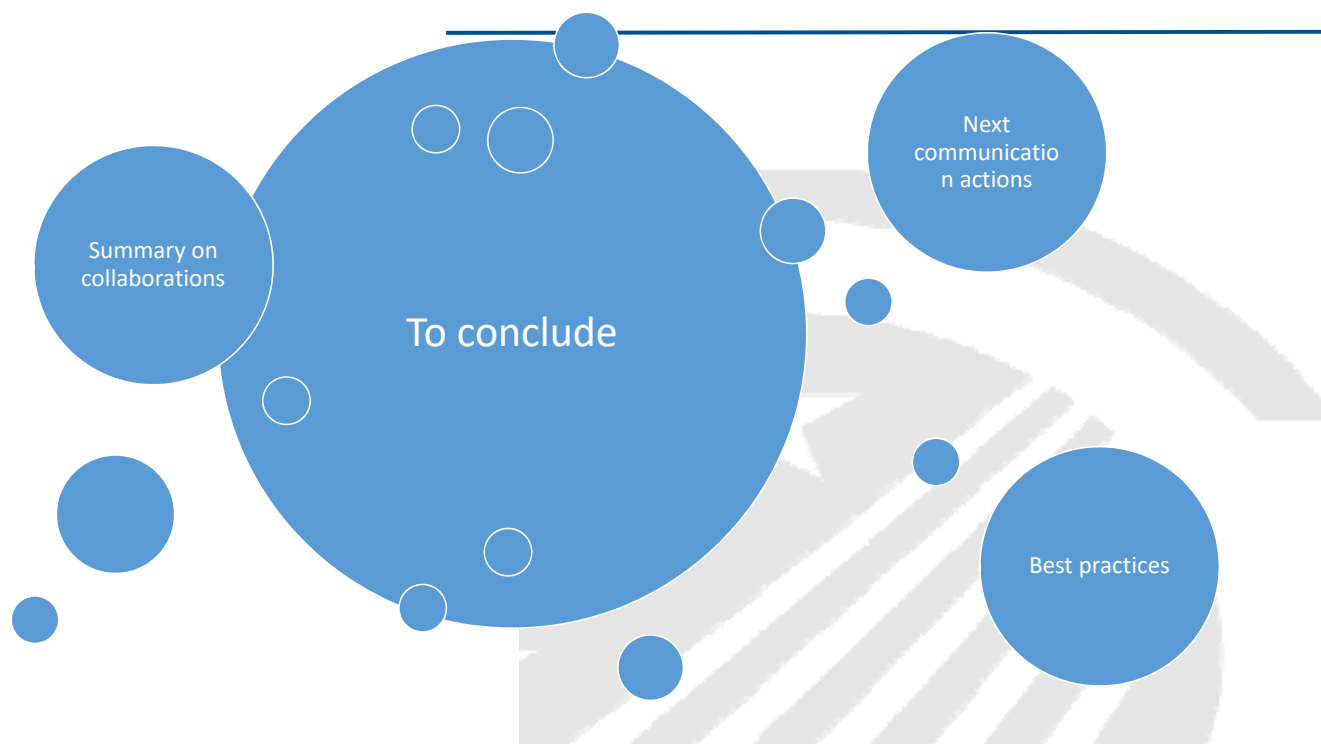


## Business plan

- Relies on CEA experience.
- Objective 1.2M€ each year for each pillar
- Target a median income of 100k€ per experiment to cover cost for resources, effort, equipment, consumable and travel.

## Phasing

- Y1: 3 experiments per year
- Y1+2: 6 experiments per year
- Y1+3: 12 experiments per year





## Key facts



### Collaborations

- New set of collaborations in robotics
- One workshop
- 7 collaborations already planned for period 5 (Nov 2017 / Sept 2018)
- Focus on impact

### Impact

- First indications on socioeconomic impact
- Enabling of start up iSybot
- Accelerator of new product creation
- Stimulation of interaction within the value chain

### Sustainability

- Creation of **DIGIHALL** supported by the Ile-de France region
- Initial business model and business plan

## RIF@Paris-Saclay in one slide

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- **Domains of application**
  - Initial focus on *Healthcare*; few applications (lack of maturity)
  - More opportunistic strategy: *Industry, Logistics, Transport, Security, Agrofood, Hazardous environment*
- **RIF@Paris-Saclay connects with different FoF initiatives**
  - **French national initiatives (NFI)**: *Lorraine region platform (PFLOR)*, *Ile-de-France region platform (Factory Lab)*
  - **I4MS**: Competence Centres and Innovation Hubs through FoF project *HORSE*
- **Organizations targeted**
  - *Industry, Research* with a trend to reinforce the support to SME
  - Looking for *new users, new usages* of robotics,
- **Offer**
  - Specific offer in Human robot collaboration with no fences: *interaction, security, coworking*
  - Robotics in the production line,
  - Innovation in robotics

## RIF@Paris-Saclay activity overview

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- **Engagements**
  - Around 20 *per month*, a majority for industrial applications
- **Demands**
  - *Consulting, advising, feasibility tries, demonstrations*
  - *Application of processes in robotics*: welding, handling, polishing, finishing, metal folding, leather, wood, etc.
- **Objectives**
  - Adaptation of working space to the operator (MSD reduction),
  - Increase of the production, of the productivity, of the quality,
  - Reduction of dependent to skill workers (welding)
- **FAQ**
  - How do I introduce robotics in my production line?
  - What funding can I get for prototyping, for deployment? How to overcome the “*valley of death*”

## RIF@Paris-Saclay

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- **Some issues**

Improve methodology to record the activity

Concern from the SME about IPR and confidentiality, concerns from the integrators,

- **Lessons learnt from 2015**

Very good success of the Infoday mechanism to inform about the possibilities offered

Engagement need time and need to be in mid/long term

Regional ecosystem, strength of network structure to share information, experience, good practice

More and more included in the CEA strategy in manufacturing: connections to Platforms in Lorraine, and in IdF region

Need some complementary funding for prototyping, deployment of solutions

- **Future actions**

More information days,

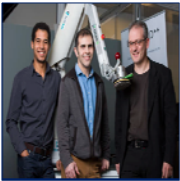
MIP event in January to be confirmed

Video to promote the RIF@Paris-Saclay

Very positive model Interesting to generalize in regions

Business model to be established

## Success stories



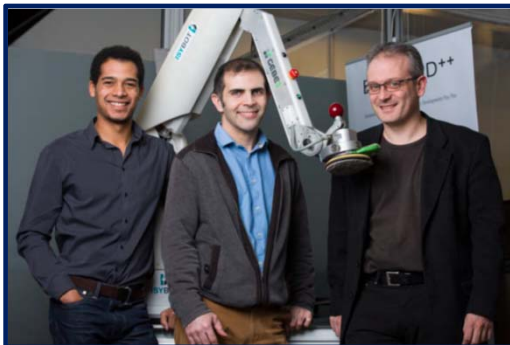
### iSybot

- Echord++ collaborations key enabler to the creation of the iSYBOT October 2016.
- SYBOT arms (3 axis PK0 and 6 axis PK2) used in several experimentations
- roots to the product to be commercialized by iSYBOT
- iSYBOT has now 6 employees
- iSYBOT developing its own commercial activity.



### Sarazin

- New product Cobomanip
- One collaboration demonstrated interest of a new actuator to enhance the performances of a robot for co manipulation.
- New users
- Several collaborations demonstrated the interest to clients on the former version of the Cobomanip robot for an industrial application in aeronautics.



**SYBOT**  
start up

**ECHO**RD++



Support creation

October 2016

Robot arm safe for operators

Applications: manufacturing,  
healthcare, nuclear, agro, game,

Three jobs created

Licencing five CEA patents





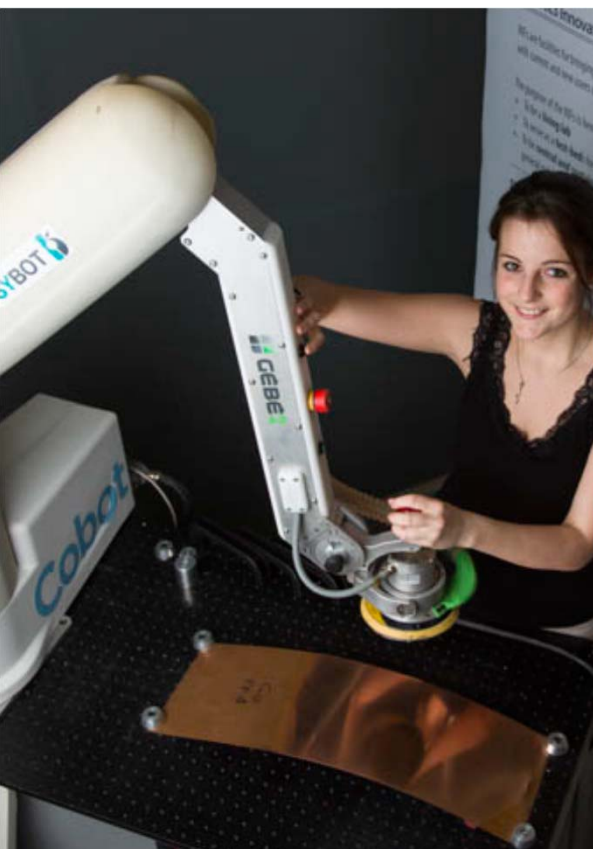
ECHORD++

### Lower limb exoskeleton

- HV Slim

### Demands from

- Industry
- Construction



## Summary



### Success stories, socioeconomic impact

- Six collaborations
- Support creation of iSYBOT
- Productivity, quality, production, MSD

### Effort

- Intense commercial & technical
- Engagements: several months
- Need to build trust
- Collaborations: six to eight weeks effort
- TRL 5 to 7
- Opportunistic choices
- Publication, fairs, info / techdays, workshops



## Next steps



### Strengthening ecosystem

- IdF region,
- SMEs: CETIM, SYMOP,
- ASTEC, CAP Digital

### France

- Regional platforms: Factory Lab, FFLO
- CEA Tech PRTT

### Europe: Involvement in DEI

- I4MS Competence Centre in robotics for manufacturing
- Networking with I4MS robotics CC
- Aligned with DIH policy & S3 priorities

Your turn?



Thank you for your attention

## RIF Paris-Saclay surrounding at night

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Looking forward to welcoming you