

ECHORD++

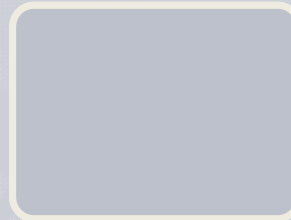
21st January 2018

Christophe Leroux (CEA)

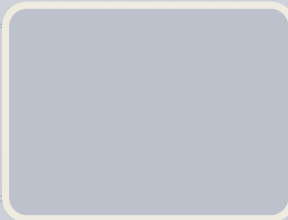
Farid Dailami (BRL)

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The European Coordination Hub for Open Robotics Development



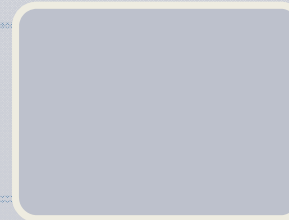
RIF booklet



RIF@Bristol



RIF@Paris-
Saclay



RIF@Peccioli



Title of the collaboration

Applicant

- *Applicant, profile, domain of activity,*

Description of the Collaboration

- *Objective, demonstration made,*

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulos-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*

Illustration

Picture

Video

Chiseling of iron casts

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- Interforge, SME,

Description of the Collaboration

- Objective, demonstration made,
- Chiseling of iron casts with an RB3D A6-15 cobot. Reduction of MSD. Increase of productivity. Better flexibility

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulos-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2014, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Flash removal of iron casts

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- PSA, Large industry,

Description of the Collaboration

- Objective, demonstration made,
- Flash removal on iron casts with and RB3D A6-15 cobot.

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,
- Reduction of musculo-skeletal disorder. greater flexibility. Cycle time optimization reduction. cost reduction

RIF contribution, Echord++ added value

- 2014,RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Straightening of bent tubes

Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- Senior Aerospace, SME,

Description of the Collaboration

- *Objective, demonstration made,*
- Usage of A6-15 RB3D robot straightening bent tubes.

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*
- Reduction of musculo-skeletal disorder.

RIF contribution, Echord++ added value

- *2015, RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*

Assistance to car part assembly

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- Renault, Large industry,

Description of the Collaboration

- Objective, demonstration made,
- Proof of Concept with a collaborative robot COBOMANIP in an assembly task

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2015, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Charging of a grinding machine

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- Mecarectif, SME,

Description of the Collaboration

- Objective, demonstration made,
- Proof of Concept with a collaborative robot ALFRED (Prototype of the ISYBOT robot)

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2015, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Piling of separation sheet for a thermic exchanger

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- Air Liquide, Large Industry,

Description of the Collaboration

- Objective, demonstration made,
- Proof of Concept with a collaborative robot COBOMANIP

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2015, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Collaborative robotics interoperability in a manufacturing workcell

Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- FhG IoSB, Karlsruhe, RTO,

Description of the Collaboration

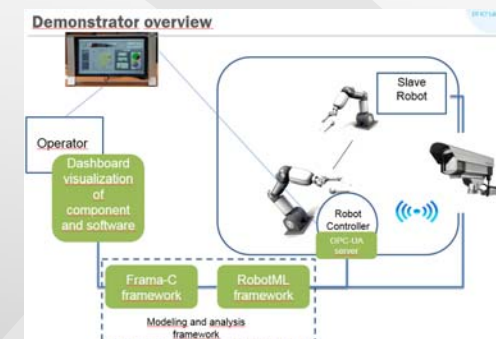
- *Objective, demonstration made,*
- Realtime and asynchronous wireless communication between a supervisor and a robot
- Assessment of OPC-UA for the interoperability of a collaborative robot in a workcell
- Low level wireless communication protocol for robotics in a workcell

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*
- 2 scientific publications: RAMCOM2016, ETFA2016

RIF contribution, Echord++ added value

- 2015, *RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*
- 1 year, *collaborative robot, Camera, PCs, OPC-UA*



Predictive maintenance for a collaborative robot

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- DFKI GmbH, Berlin, Germany
- Agileo Automation, Poitiers, France

Description of the Collaboration

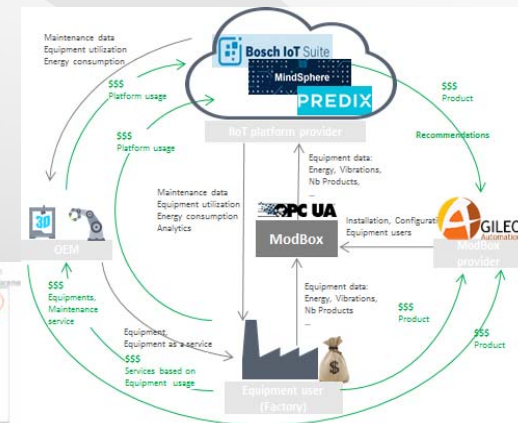
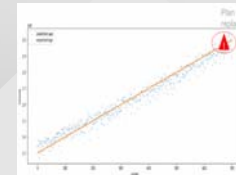
- Objective, demonstration made
- A gateway between Isybot robot and OPC-UA (Agileo)
- Assessment of OPC-UA for the interoperability of a collaborative robot in a workcell (Agileo)
- Communication with and integration to MindSphere Siemens cloud (CEA, Agileo)
- Predictive Maintenance Application (DFKI)

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Product created: MODBOX: a gateway between any robot and OPC-UA
- Impact of the RIF: patents, publications,
- Innovation day in the EIT Digital event

RIF contribution, Echord++ added value

- 2017, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)
- 1 year, Isybot robot, technical support, robotics experts, technicians



Sensitive gripper

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- Kuka, Large Industry,

Description of the Collaboration

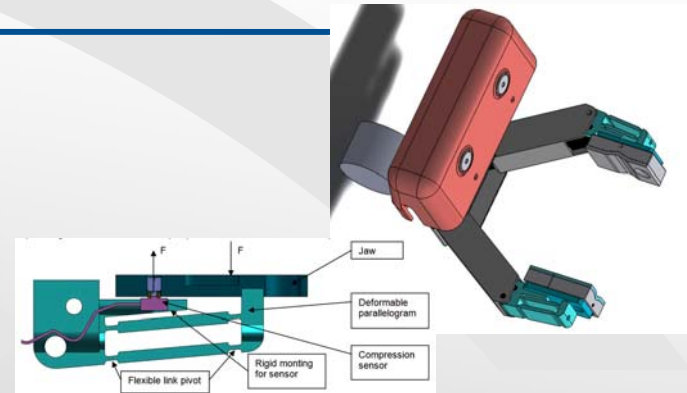
- Objective, demonstration made,
- Demonstration and evaluation of an innovative gripper (CEA patent) using SYBOT

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2016, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Finishing of metal parts

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- GEBE2, SME,

Description of the Collaboration

- Objective, demonstration made,
- Finishing of metal parts sanding of planar and non planar surfaces,
- programming by demonstration for aeronautics
- Demonstration with 3 axes SYBOT

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,
- Improvement of parts' aspect

RIF contribution, Echord++ added value

- 2016, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Ponçage interactif



Correction of planar surfaces defects

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- Aibus, Large industry,

Description of the Collaboration

- Objective, demonstration made,
- Correction of planar surfaces defects for aeronautics
- Demonstration with COBOMANIP

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2016, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Spent fuel reprocessing plant maintenance

Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- AREVA, Large industry,

Description of the Collaboration

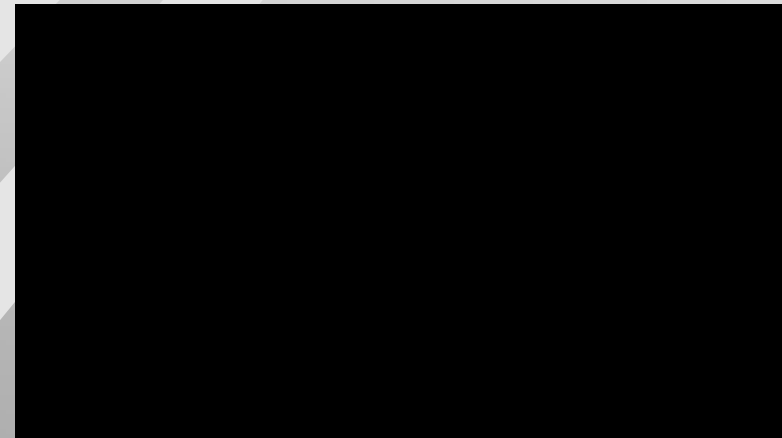
- *Objective, demonstration made,*
- Correction of planar surfaces defects for aeronautics
- Demonstration of telemanipulation with 6 axes SYBOT

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *2016, RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*



Polishing of metal moulds

Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- *SEIV, SME,*

Description of the Collaboration

- *Objective, demonstration made,*
- *Demonstration with 3 axes SYBOT with programming by demonstration*

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *2016, RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*

programming by demonstration

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- PSA, Large industry,

Description of the Collaboration

- Objective, demonstration made,
- Demonstration with 3 axes SYBOT with programming by demonstration

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2016, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Comparison of collaborative solutions for a packing application

Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- WM88, SME,

Description of the Collaboration

- *Objective, demonstration made,*
- 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
- Usage of IIWA, UR10

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *2016,RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*



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++

- 2017, Duration, Time line, Effort, Equipment engaged (hardware and software)
- Booster of the technology transfer
- modeling and validation of a technological choice
- Without Echord++, TT made later or possibly not made (initial technology kept)



Workshop to train and coach pedagogues

Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- LAMAP, Academic,

Description of the Collaboration

- *Objective, demonstration made,*
- Training and coaching of teacher's pedagogues on robotics
- Courses, robotics demonstration, participation to practical work on robots
- Usage of IIWA, UR10, SYBOT, COBOMANIP, etc.

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *2017, RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*

Illustration

Picture

Video

Manipulation of heavy parts

Title of collaboration, applicant

- Applicant, profile, domain of activity,
- MBDA, SME

Description of the Collaboration

- Objective, demonstration made,
- Manipulation of heavy parts in an application for aeronautics
- Usage of COBOMANIPaeronautics

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2017, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)



Maintenance of trains

Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- *SNCF, large industry*

Description of the Collaboration

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

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Musculo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *2017, RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*

Illustration

Picture

Video

Screwing with a Cobot



Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- *Dassault Aviation, large industry*

Description of the Collaboration

- *Objective, demonstration made,*
- *Usage of SYBOT 3 axes to demonstrate screwing using a collaborative robot*

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *2017, RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*

Illustration

Picture

Video

Lower limb exoskeleton to assist an operator in carrying heavy tool



Title of collaboration, applicant

- Applicant, profile, domain of activity,
- COLAS, large industry

Description of the Collaboration

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

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- 2017, RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)

Illustration

Picture

Video

Using a cobot for insertion of jackets in cylinders



Title of collaboration, applicant

- *Applicant, profile, domain of activity,*
- Fiat PowerTrain, large industry

Description of the Collaboration

- *Objective, demonstration made,*
- Motor assembly, insertion of jackets in cylinders with the 3 axes SYBOT

Impact

- *Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulo-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,*
- *Impact of the RIF: patents, publications,*

RIF contribution, Echord++ added value

- *2017, RIF contribution, What if E++ did not support*
- *Duration, Time line, Effort, Equipment engaged (hardware and software)*

Illustration

Picture

Video

2018

RIF User	Town / Country	User Type	Objective	Outcome	ressources
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

Questions

Applicant

- Location

Collaboration

- Duration?
- Timeline?
- Location

Communication

- Picture of the set up for PoC of the usage of the actuator
- Video?

Technico commercial

- Payload?
- Price of the machine?

Impact

- Job creation? Job safeguarding

Title of collaboration,

- Applicant, profile, domain of activity,

Description of the Collaboration

- Objective, demonstration made,

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulos-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)

Illustration

Picture

Video

Title of collaboration,

- Applicant, profile, domain of activity,

Description of the Collaboration

- Objective, demonstration made,

Impact

- Impact for the applicant: Adoption of robotics technology, Impact on quality, production, productivity, reduction of Muskulos-skeletal disorders, Jobs creation, jobs safeguarded, Products created or improved, Start ups,
- Impact of the RIF: patents, publications,

RIF contribution, Echord++ added value

- RIF contribution, What if E++ did not support
- Duration, Time line, Effort, Equipment engaged (hardware and software)

Illustration

Picture

Video

Template collaboration RIF@Paris-Saclay

- RIF user
- Period of collaboration
- Robot and equipment used
- Ressources including profile of people
- Description of the technical challenge
- Feedback from user
- Impact: patent, follow up,
- Publishable information

RIF Beneficiary Follow-up Survey

- Useful information leading up to the discussion
- Organization name, nature (SME, academia, big business, etc.), sector of activity (manufacturing, automotive, etc.),
- RIF it interacted with, pre-existing relation (legal, financial, or other) between RIF and beneficiary,
- Dates of RIF collaboration,
- Overview of collaboration content and outcomes (from RIF's perspective),
- Contact person's name, quality/function, email, phone number,
- Relevant confidentiality elements if any.

Before: How the engagement came to be?

- How was the contact made/initiated?
- What motivated the collaboration?
- Perspective on engagement process leading to actual collaboration? (e.g. duration of discussions, ease of contact, clarity of perspectives)

During: What happened?

- In (if possible) a few words, what was the tenor/substance of the interaction: when, where, what, who?
- How would you qualify the quality of the service you received? Resources invested or made available by the RIF for the collaboration?
- What was it like, what is the RIF-user experience?

After: What next?

- What did you get out of the collaboration, what will you do with it going forward?
- If at all possible, can you quantify the impact (either already materialized, or expected) of the RIF collaboration?
- In what manner has the collaboration affected your perception of automation and robotics technology?