ECHORD and ECHORD++
European Clearing House for Open Robotics Development

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The ECHORD-Projects

European Commission

Funding by the EC
ECHORD: 2009-2013
ECHORD++: 2013-2018

Robotics Industry

Academia
ECHORD and ECHORD++

ECHORD:
- funding of 51 experiments
- 3 core partners
- ~100 experiment partners

ECHORD++:
- experiments + new instruments
- 6 core partners
- partners to be added by calls
The original idea of ECHORD

Academia and industry hand in hand

Experiments

Structured Dialogue
Experiments

- Various areas
  - Agricultural robotics
  - Construction robotics
  - Logistics (fleet of robots)
  - Medical and health care
  - Human-robot interaction
  - ...

ECHORD
ASTROMOBILE - Assistive SmarT RObotic platform for indoor environments: MOBILity and intEraction

HUROBIN - Human-Robot Object Interaction

SprayBot - a Robotic Spray Booth for the Automatic Painting of Bodyworks
More experiments
Tech-Transfer Mechanisms

Measurable mechanisms (according to P. Courtney):

- **Patents**
  - By now, 6 patents filed in ECHORD
  - + good to protect R&D investments
  - - academics are sometimes sceptical

- **Standards**
  - Discussions at workshops etc.
  - + reliable basis to build sustainable „eco-systems“
  - - long-lasting process, longer than project duration

- **Open source**
  - open source SW developed
  - + can be used and modified without paperwork
  - - public awareness, documentation, quality?
Tech-Transfer Mechanisms

... but additional aspects determine the success on the long run:

- Personal networks, transfer of personnel and creation of spin-offs
- Mutual understanding of individual “rewards“ (papers, products)
- Taking special needs for SMEs into account
- Long-term cooperation perspective

Stimulate tech-transfer by

- Creating awareness of project results and supporting take-up
- Allowing easy access to infrastructure and competences
- Funding of transfer projects or Pre-Commercial Procurement

Creation of additional new instruments for ECHORD++
Scope of ECHORD/ECHORD++

“Scenarios” and “research foci” for the experiments

ECHORD:
Scenarios:
• Human-robot co-worker
• Hyper-flexible cell
• Cognitive Factory

Research foci:
• Human-robot interfacing and safety
• Robot hands and complex manipulation
• Mobile manipulators and cooperation
• Networked robots

ECHORD++:
Scenarios:
• Cognitive Tools and Workers for Cognitive Factories
• General Purpose Robotic Co-workers
• Cognitive Logistics Robots
• Medical Robotics
• Agricultural and Food Robotics

Research foci:
• Key Issues in Practical Machine Cognition
• Advanced Perception and Action Capabilities
• Multiple Cooperating Mobile Manipulators
• System Architectures, Systems, Software Engineering Processes and Tools
Up to now

- ECHORD almost completed
- All 51 Experiments finished
- Dissemination at various events (IROS, ICRA, RSS, AUTOMATICA fair, etc.)
- Two Lab Tour to North America and Asia
- Results being published in Springer STAR book
The future - ECHORD++

Follow-up project ECHORD++ started October 1st, 2013

- Build on current success and experience
- Consider results of the structured dialogue and recent developments
- Adapt to the goals of Horizon2020
  R&D → R&D&I
- Innovation, i.e. turning research results into practice as a key element

Explore additional innovative instruments besides the “experiments”
European Clearing House for Open Robotics Development
Starting October 2013
Concept of ECHORD++

Adjustment of Scenarios
1. Cognitive Tools and Workers for Cognitive Factories
2. General Purpose Robotic Co-workers
3. Cognitive Logistics Robots
4. Medical Robotics
5. Agricultural and Food Robotics
WHAT IS AN EXPERIMENT?

A small to medium sized scientific research and/or technology development project

WHO PERFORMS?

A team of one or more research institutions and robot manufacturers

HOW LONG IT Lasts?

Typically lasts 18 months.
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EXPERIMENTS

How to apply?

Call → Pre-proposal → Feedback From E++’s members → Proposal → Evaluation & Selection → Final list of funded Experiments

www.echord.eu
Concept of ECHORD++

ECHORD+

Experiments

Structured Dialogue

Robotics Innovation Facilities (RIFs)
Robotics Innovation Facilities (RIFs)

RIF sites at
- BRL, Bristol
- SSSA, Pisa
- CEA, Paris

Many different application areas
- Industrial
- Domestic
- Urban
- Agricultural
- Co-working
RIFs

• Address different user groups

  Large industry  SMEs  Academia  New users, e.g. psychologists

• For some SMEs, the experiments with the regular EU funding procedures are still too complex

• Quick and easy access to infrastructure and expertise needed

RIFs provide physical infrastructure with low access barriers
The purpose of the RIFs is hence:

- To be a living lab
- To serve as a test-beds for E++ experiments
- To be central and sustainable showrooms for the general public

It will provide a chance to get in touch with other researchers, new users and potential customers of robotics in an operational way.
Concept of ECHORD++

ECHORD++

Experiments
Structured dialogue
Research and Innovation Facilities (RIFs)
Pre-Commercial Procurement (PCP) Pilots
Pre-Commercial Procurement

• Piloting a PCP process in two selected areas
• Involvement of public bodies as end users from the beginning
• Addressing R&D providers to develop robust prototypes with a clear commercialization roadmap
• Competitive approach for R&D providers
Concept of ECHORD++

ECHORD++

- Experiments
- Structured dialogue, outreach
- Research and Innovation Facilities (RIFs)
- Pre-Commercial Procurement (PCP) Pilots
Increased outreach

- Address SMEs and new user groups
- Inform the European robotics community about the opportunities to get involved
Comparison ECHORD / E++

What will be continued and improved in ECHORD++?
- ECHORD experiments are appreciated by the community (and the EC), two calls will be issued (~35 experiments)
- Adaptation and revision of scenario definitions
- Improvement of scheduling
- More outreach

What is new?
- Support SMEs even more and help set up new ones
- Attract new stakeholder groups
- Involve users/customers early
- Use the legal framework created by the EC to generate “pre-commercial” markets
Robotics Innovation Facilities (RIFs)

Cognitive Workers
Target users:
• SMEs considering the automation of one or more of their processes but do not have expertise
• SMEs or larger companies considering automating their processes but where considerable research is needed to establish the industrial feasibility and commercial viability of the process
Robotics Innovation Facilities (RIFs)

Medical & Health Robotics
Target users:
• SMEs in medical engineering interested in the latest robotics equipment and its control as well as interface with operators (doctors)
• Researchers who have an idea in the area of medical technology and want to test it in real environments
• Students from medicine, psychology, biology who want to test an improve real robots for medical use
• Health care institutions and end user association.
Robotics Innovation Facilities (RIFs)

Indoor&Outdoor, Logistic, Agricultural, Medical Robotics

Target users:

- Robot manufacturing SMEs and companies (service robots: autonomous cars, edutainment robots, assistive robots, components)
- Robotics researchers
- Sociology researchers
- Service providers (health care, waste management, museum management, public transportation).
**Target:**
Cognitive Tools and Robot Workers that can work on a diversity of tasks in structured environments, such as cognitive factories, labs, warehouses, landfill (i.e. Robotic worker in rubbish dump), etc.

**What we offer:**
- Landfill of Belvedere

i.e.: Tools for the automatization of compaction process
**Target:**
Cognitive Tools and Robot Workers that can work on a diversity of tasks in structured environments, such as **cognitive factories, labs, warehouses, landfill** (i.e. Robotic worker in rubbish dump), etc.

**What we offer:**
- Landfill of Belvedere
- Kitchens Warehouse Toncelli

i.e.: kitchen assembly, transport and storage in the warehouse
**Target:**
Applications like **personalised companion robots**, “intelligent” teleoperators, assistants in a mechanical or car-repair work-shop, **edutainment robot** (robot guide and robot companion, in museum, in the domotic house and nursing home)

**What we offer:**
- DomoSasaLab

i.e.: domotic house and personalised robot companion
**Target:**
Applications like personalized companion robots, “intelligent” teleoperators, assistants in a mechanical or car-repair work-shop, edutainment robot (robot guide and robot companion, in museum, in the domotic house and nursing home)

**What we offer:**

- DomoCasaLab
- Museum of Russian Icons

i.e.: robotic museum guide
**Target:**
Applications like *personalised companion robots, “intelligent” teleoperators, assistants in a mechanical or car-repair work-shop, edutainment robot* (robot guide and robot companion, in museum, in the domotic house and nursing home)

**What we offer:**
- DomoSasaLab
- Museum of Russian Icons
- Nursing home

i.e.: robotic assistant for deambulation and daycare
Target:
Applications like **personalised companion robots**, **“intelligent” teleoperators**, **assistants in a mechanical or car-repair work-shop**, **edutainment robot** (robot guide and robot companion, in museum, in the domotic house and nursing home)

*What we offer:*

- DomoSasaLab
- Museum of Russian Icons
- Nursing home
- Industries

i.e.: industrial co-worker
Target:

Robotic environment able to provide a service for people in order to simplify the execution of specific tasks, such as logistics robots that provide autonomous transport of goods and autonomous transport of people (especially elderly people) in urban area, from streets to houses passing through condos (i.e. Robotown).

What we offer:

- Peccioli: from streets and squares to condos

i.e.:
- Robotic services to assist in every climatic condition (helping in food and medicine shopping and garbage collection)
**Target:**
“intelligent”, adaptive and auto-navigating instruments for **minimally invasive surgery**, **cooperating robots** performing typical tasks in parallel in a surgical environment, **novel interfaces** for instrument control and **multimodal feedback** to/from surgeons, **situation-sensitive assistance** systems for surgical procedures, **observation systems** for tracking the steps in an operation room, etc.

**What we offer:**
- Auxilium Vitae Rehabilitation Centre, **Volterra**
- Joint Open Lab with Telecom Italia on Disruptive Innovation in e-Health Systems, **Pontedera**
- Cisanello Hospital, **Pisa**

- Locomotion Disorders Laboratory, **Pisa**;
- Neuro-Developmental Engineering Laboratory, **Pisa**;
- Center for Micro-BioRobotics IIT @ SSA, **Pontedera**.
Target:
Robotics can change the entire homestead or agricultural facility: thanks to the automatization of the entire process from the raw product to the finished one (i.e. from grain to flour to pasta; from fruit to beverage) and the development of agricultural robots for precision farming (i.e. automatized cleaning of barns, harvest, groom).

What we offer:
- Biofarm Floriddia
- Biofarm Erede Crecchi

i.e.: automatization of process:
- From seeding to final product
Target:
Robotics can change the entire homestead or agricultural facility: thanks to the automatization of the entire process from the raw product to the finished one (i.e. from grain to flour to pasta; from fruit to beverage) and the development of agricultural robots for precision farming (i.e. automatized cleaning of barns, harvest, groom).

What we offer:
- Biofarm Floriddia
- Biofarm Erede Crecchi

i.e.: automatization of process:
- From seeding to final product
- Collecting and cleaning processes
Target:
Robotics can change the entire homestead or agricultural facility: thanks to the automatization of the entire process from the raw product to the finished one (i.e. from grain to flour to pasta; from fruit to beverage) and the development of agricultural robots for precision farming (i.e. automatized cleaning of barns, harvest, groom).

What we offer:
- Biofarm Floriddia
- Biofarm Erede Crecchi
- Farm of Stassano

i.e.: automatization of process:
- From seeding to final product
- Collecting and cleaning processes
- Harvesting
Target:
Robotics can change the entire homestead or agricultural facility: thanks to the automatization of the entire process from the raw product to the finished one (i.e. from grain to flour to pasta; from fruit to beverage) and the development of agricultural robots for precision farming (i.e. automatized cleaning of barns, harvest, groom).

What we offer:
- Biofarm Floriddia
- Biofarm Erede Crecchi
- Farm of Stassano

i.e.: Automatization of animal cleaning and feeding processes
From excellent science and technology to validation in real circuits...
An opportunity to know more

WORKSHOP ECHORD++   Barcelona 20th November 2013

INVITING AND FINANCING PUBLIC BODIES & COMPANIES TO PARTICIPATE IN "ECHORD++ ROBOTIC CHALLENGE IN SMART CITIES"

15:00 - General presentation of the FP 7th PROJECT ECHORD++
15:30 - Pre-Commercial Procurements for R&D Projects in SMART CITIES
16:00 - Examples of Robotics R&D projects in SMART CITIES
16:45 - Open discussion with Public Bodies & Consortiums, Academy & Industry
18:00 - "Robots and Robotic Services in Smart Cities" Dr. Nori Hagita, OSAKA

Invite key presentation in the Smart City World Congress CC5
Conclusions

• Innovative instruments besides the “experiments”
• Fundamental innovation: the RIFs (Robotics Innovation Facilities)
  • Support SMEs even more and help set up new ones
  • Attract new stakeholder groups
• Funding of transfer projects or Pre-Commercial Procurement pilots
  • Involve users/customers early
  • Use the legal framework created by the EC to generate “pre-commercial” markets
• Open to a few (3-4) non-EU proposals
• First Call in preparation and being issued in Spring 2014