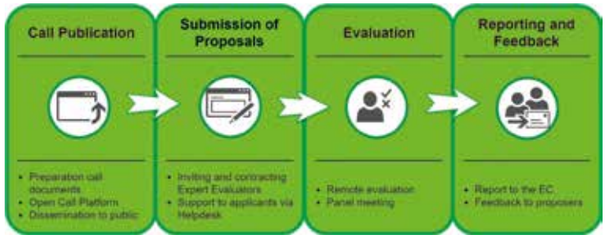
Open Call Management

The Technical University of Munich (TUM) has gained wide practical experience in managing Open Calls of EU-projects, i.e. **ECHORD++, RobMoSys, ESMERA, HORSE, Human Brain Project (HBP)**.

The portfolio includes:

+ Preparation of the call documents
+ The opening of the call via our own Open Call Platform
+ Dissemination of the call to the public
+ Support to applicants via an email helpdesk
+ Contracting of independent Expert Evaluators
+ Organization of the Panel meeting
+ Reporting of the funding suggestion to the European Commission
+ Communication of results to the applicants



Echord++

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www.echord.eu

FROM LAB TO MARKET

ECHORD++

(The European Coordination Hub for Open Robotics Development)

The European robotics research project ECHORD++ promotes the interaction between robot manufacturers, researchers and users. It facilitates the cooperation between academia and industry to enhance the knowledge transfer from lab to market.

The five-year EU-funded project (2013-2018) supports small research projects, so-called experiments, innovative robot technologies in public institutions „Public End-User Driven Technological Innovation" (PDT1) and three „Robotics Innovation Facilities" (RIFs). RIFs offer access to high-tech robotic equipment and expertise at zero risk: using the RIF is not only free of charge, it also safeguards your intellectual property.

Tailor – made robotics solutions for the public sector

PDT1 – Public end-user Driven Technological Innovation

Public bodies often have specific requirements for the products they are looking for. The **Public end-user Driven Technological Innovation (PDT1)** scheme of **ECHORD++** offered R&D consortia the possibility to develop robotics technology according to the needs of public bodies.

In **ECHORD++** two application areas were identified:

Healthcare

Urban Robotics

Various public bodies submitted challenges, out of which a panel of experts selected one challenge for each scenario:

Robotics for Comprehensive Geriatric Assessment **(CGA)**

Robots for the Inspection and Clearance of the Sewer Network in Cities

PDT1 HEALTHCARE: BECAUSE WE CARE ...

Assesstronic – Robotic for CGA

makes the execution of **C**omprehensive **G**eriatric **A**ssessment **(CGA)** exams easier, faster, more traceable and repeatable. Moreover it provides added-value outputs in different, more objective and subtle dimensions; it uses existing low-cost technologies such as 3D cameras, standard computers and tablets.

ASSESSTRONIC

- improves the user experience for both the caregiver and patients by performing **CGA** tests through natural interfaces as voice and touch. Thanks to such interaction means, the system is able to carry out the assessment autonomously.
- explores multimodal signal analysis for fine diagnosis. The platform extracts and analyses non-verbal behavioural parameters, based on non-verbal indices, i.e. prosody, facial expressions, gestures, gaze, etc.
- allows automatic physical assessment of tests for further analysis and quantification of motor, psychomotor and sensory-motor abilities on the basis of physical activities.
- collects, treats and stores health data related to each patient's **CGA** in a safe and efficient way.

Cooperation partners:

+ ACETIAM, France
+ Université Pierre-et-Marie-Curie, Sorbonne Université, France
+ Consorci Sanitari del Garraf, Spain

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CLARC – a Smart Clinic Assistant Robot for CGA

CLARC significantly reduces total times for **CGA** sessions and at the same time increases the quality and quantity of the collected data collected. It moves autonomously in the care centre, receiving the patient and his family as a clinical assistant and accompanying them to the medical consulting room.

CLARC incorporates a RGB-D sensor, a touch panel, and a shotgun microphone, being able to perform Barthel and GetUp&Go tests without supervision. Additionally, these sensors allow the robot to collect further data automatically during the **CGA** interactive session using non-invasive procedures. For performing the Barthel test, **CLARC** offers the interviewee an external device that eases him to answer the questions. The aim is to automatically perform the session to the patient allowing the healthcare professional to take more time for addressing tasks such as personal interviewing, data evaluation or care planning. **CLARC** works autonomously and does not impose any constraint on the patient. The monitoring abilities of the software architecture allow **CLARC** to ask the medical expert for help, if needed during a **CGA** session.

Cooperation partners:

+ MetraLabs GmbH, Germany
+ SERVICIO ANDALUZ DE SALUD (SAS), Seville, Spain
+ Universidad de Málaga (UMA), Spain
+ Universidad Carlos III de Madrid, Spain
+ University of Troyes, France

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PDT1 URBAN ROBOTICS: TO BOLDLY GO!

ARS1 – the flying robot

The sewer network is one of the places where nobody wants to go or work. It is a very large and underground grid of pipelines and galleries, frequently narrow and worn out, full of obstacles and sporadic accumulation of waste. **ARS1** is a small and fast flying robot relying on the developments in autonomous aerial navigation in confined, not illuminated environments. The integral design of a multi-rotor drone, endowed with sensors to be used both for navigation and inspection is able to communicate with an on-surface operator. **ARS1** is composed by the following contributions:

- Design and optimization of the drone covering challenging requirements such as limited dimension, extended autonomy and integrating sensors used for both navigation and inspection, as well as artificial lighting.
- A probabilistic localization system based on the fusion of multiple sensors (RGB-D, inertial an infrared sensors) combined with the a-priori information of the network.
- Bidirectional motion planning and control algorithm based on reactive control using onboard ranging sensors and the development of specific modes (tunnel following, etc).
- **ARS1** also addresses the exploitation of inspection sensors data. A highly realistic 3D reconstruction is produced in post-processing that together with the images obtained serves for the subsequent automatic analysis of defects (cracks, clumps, chipping). A management tool has also been developed that allows easy review and treatment of these results.

Cooperation partners:

+ Eurecat, Barcelona, Spain
+ Fomento de Construcciones y Contratas (FCC), Barcelona, Spain
+ Simtech Design S.L., Barcelona, Spain
+ IBAK Helmut Hunger GmbH & Co. KG, Kiel, Germany

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S1AR – Autonomous inspection crawler

The **S1AR** robot has six wheels, each with an independent motor, and a mechanism that allows to change its width for a better adaptation to the dimensions of the sewage. It autonomously navigates and inspects the sewage system with minimal human intervention. Self-powered wireless repeaters offer communication with the base station during all the inspection procedure. These repeaters could be deployed either manually or by the robot itself by using a robotic arm. In case of manual deployment, the operators do not need to enter the sewer but rather the communication devices can be easily fixed to the manhole cover, dramatically reducing the deploying time and human risks. Therefore, **S1AR** improves the efficiency of the inspection service while reducing the associated risks.

To safely navigate through the sewage system while following an inspection plan, the robot can be localized at any time. Thanks to the onboard sensors and given prior geometric information of the sewer's structure **S1AR** is capable to self-localize in real-time with an absolute error below 1m.

The robot only weighs 55 kg and can wear additional 30 kg. Its batteries allow operation up to 4 hours at a maximum velocity of 0.75 m/s.

Cooperation partners:

+ IDMind Lda, Lisboa, Portugal
Universidad de Sevilla, Spain
Universidad Pablo de Olavide, Seville, Spain

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