
ROSIN: ADVANCING ROS IN EUROPE

Carlos Hernandez, TU Delft

ROS-I Conference, Dec 10 2019 Stuttgart



rosin-project.eu





6 faculties | **13** departments | **140** staff and PhD

- Fundamental research
- BSc and MSc education
- Industrial collaboration



Cognitive Robotics Department

- Robot Dynamics unit
- Robot control software
- Knowledge Representation and Reasoning for self-adaptive robot control architectures



NETWORK OF DIGITAL
INNOVATION HUBS IN ROBOTICS

TOC

- ROSIN introduction
- Quality Assurance
- Education
- Focused Technical Projects
- Results

ROSIN Introduction

ROS-INDUSTRIAL QUALITY-ASSURED ROBOT SOFTWARE COMPONENTS



- ROSIN: 4 years, ~8 million EUR IA H2020-ICT-2016-1
 - Speed-up the **industrial** uptake of advanced **robotics** applications.
 - Builds upon the **ROS-Industrial Europe** community, to make it sustainable and leading worldwide.

ROSIN
Consortium



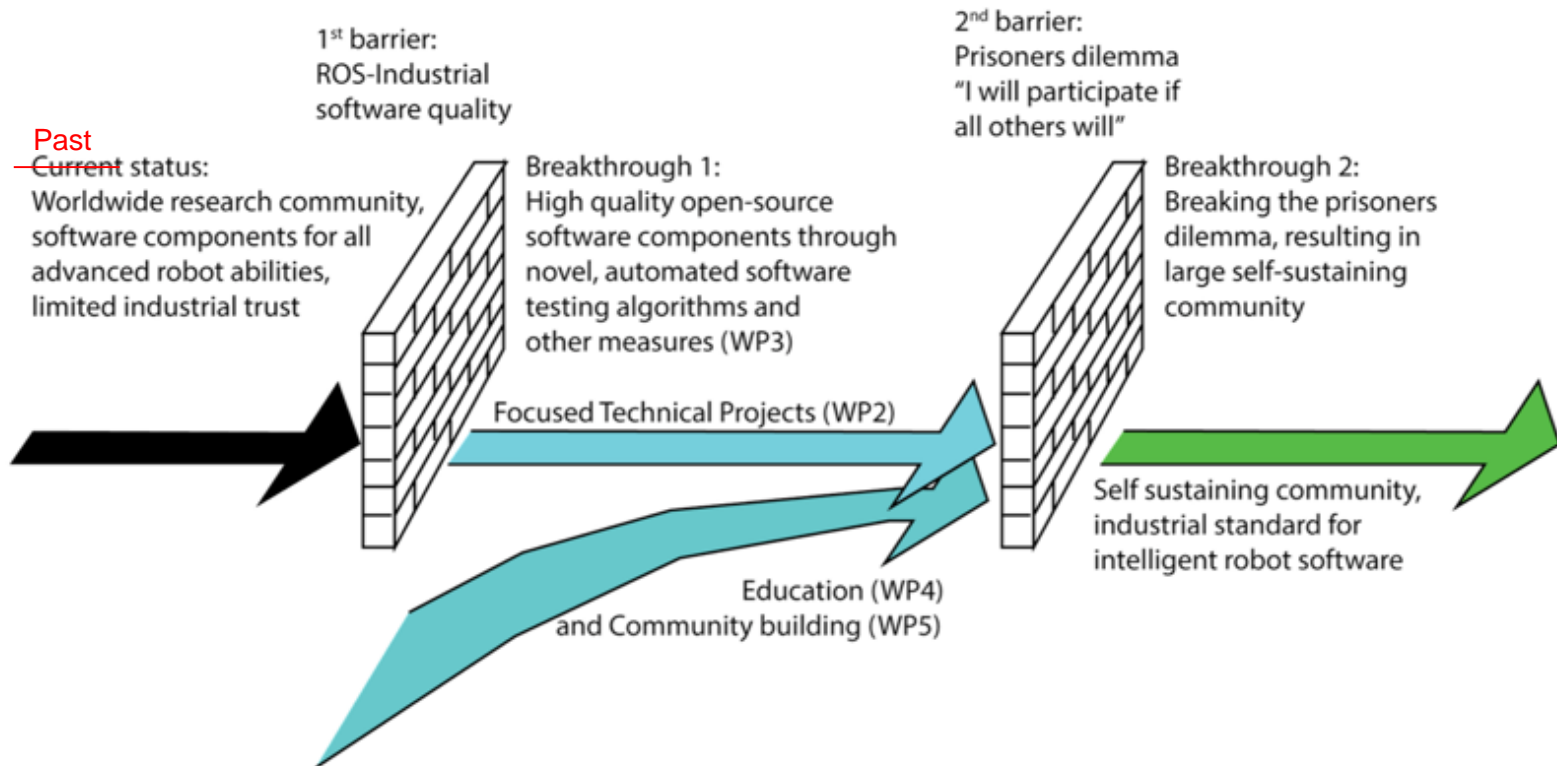
FH AACHEN
UNIVERSITY OF APPLIED SCIENCES

IT UNIVERSITY OF COPENHAGEN

■ H2020 EU Digital Industrial Platform for Robotics



ROSIN Objectives



Objective 1: Assuring the availability of **high-quality robot software tools and components**,

Objective 2: Creating a sufficiently **large European user- and developer base**.

Self-sustainability of ROS-Industrial Europe community

ROSIN Pillars

Software Quality Assurance

- Community involvement
- Continuous Integration
- Code scanning
- Model-in-the loop



ROS Education

- Academy for professionals
- School for students



3+ Million EUR funding

- For ROS-I software development and education.
- 9 calls



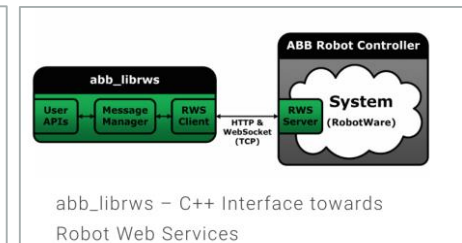
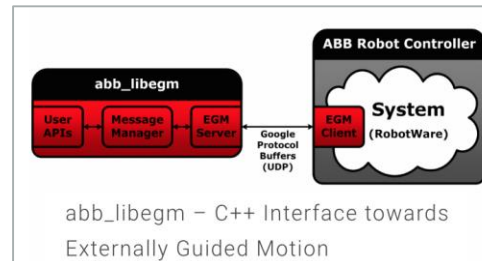
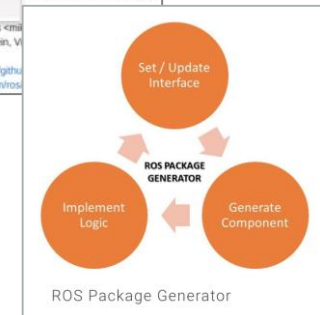
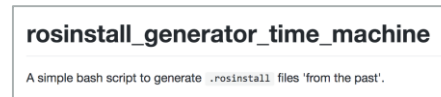
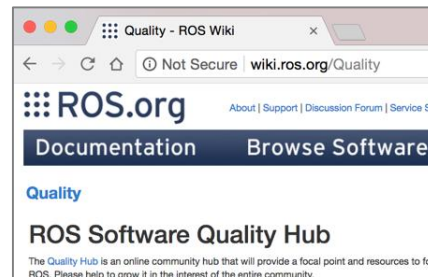
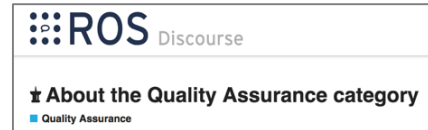
Quality Assurance

QUALITY ASSURANCE

Quality Assurance

Working with the community to have better tools:

- continuous integration
- MDD and model-in-the loop
- automated test generation
- code scanning



MORE ROSIN QA @ROS-INDUSTRIAL CONFERENCE

■ Today

- **14:10** Andrzej Wasowski (ITU Copenhagen)
[Reactive] Programming with [Rx]ROS

- **16:10** Carlos Hernandez (TU Delft)
Metacontrol for ROS2 systems



■ Wednesday

- **11:10** Nadia Hammoudeh (Fraunhofer IPA)
Ros Model



Education

EDUCATION IN ROS-INDUSTRIAL

Education

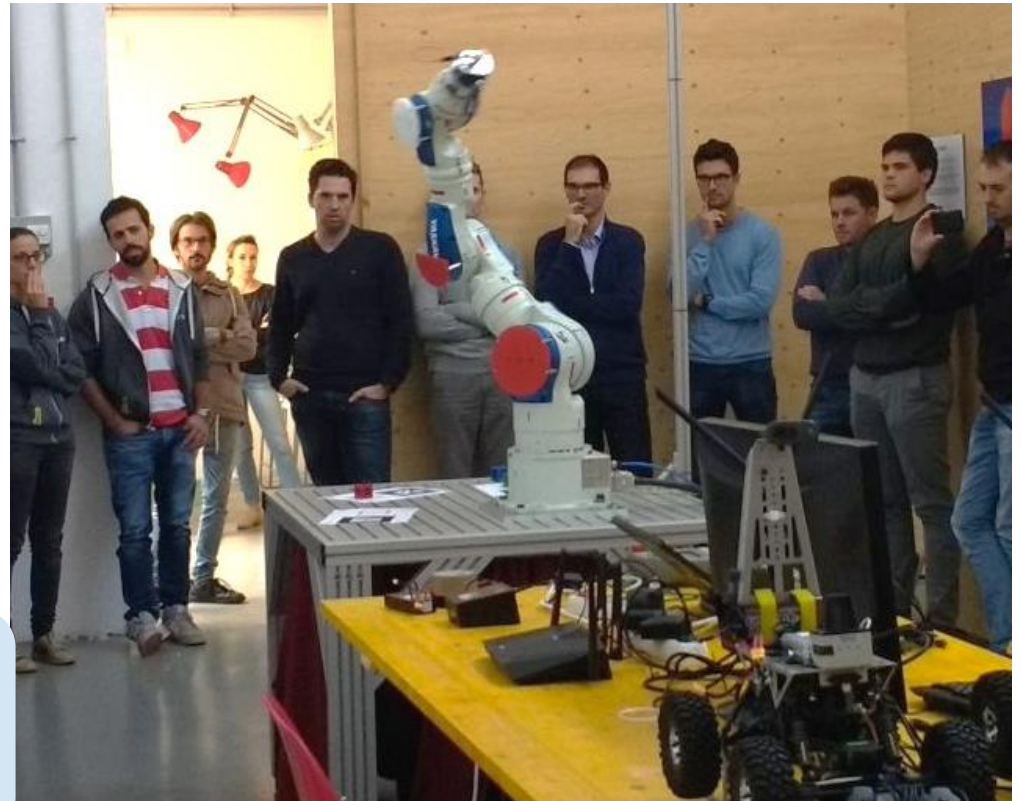
Professionals trained in ROS

- curriculum
- ROS-I **Academy** professional trainings
- ROS-I **Schools** for students
- **3rd party** ROS education

12:20 Kallweit, Stephan

***FH Aachen** University Applied Sciences*

kallweit@fh-aachen.de



MOOC: *next edition January 15, 2020*

Hello (Real) World with ROS – Robot Operating System

Learn the fundamentals of ROS, Robot Operating System, to create advanced robotic systems.

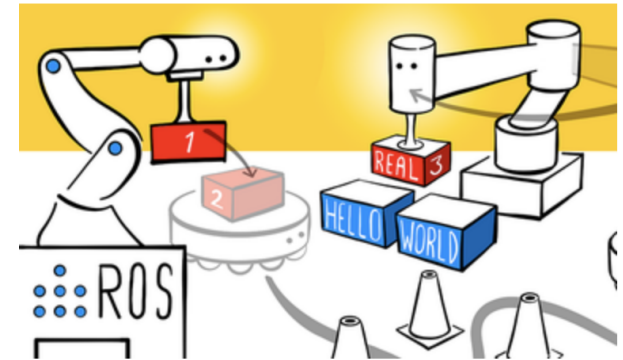


10,856 already enrolled!

Enroll

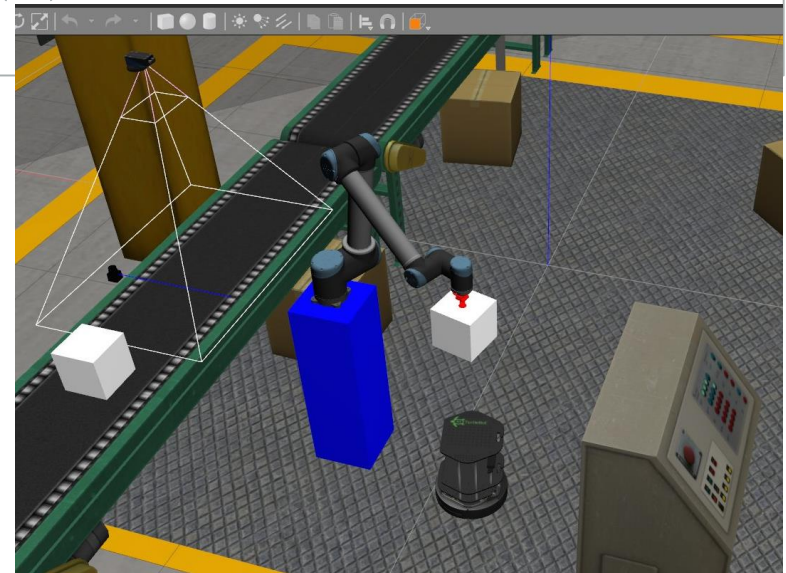
Starts Jan 15, 2020

☐ I would like to receive email from DelftX and learn about other offerings related to Hello (Real) World with ROS – Robot Operating System.



Learn the fundamentals of ROS to create advanced real-world robotic systems

<https://www.edx.org/course/hello-real-world-with-ros-robot-operating-system>



ROBO HOUSE

@ TU DELFT CAMPUS

- 800 M² FOR ROBOTICS
- CONNECTS **END-USERS** <> **ROBOT DEVELOPERS**
- **ROS-INDUSTRIAL TRAININGS**, TESTING FACILITIES, WORKSHOPS
- <https://tudelftroboticsinstitute.nl/study/ros-academy>

2020 TRAININGS:

27 and 28

February

28 and 29 May

20 and 21 August

19 and 20

November

DISCOVER
TEST
DEVELOP



Focused Technical Projects

ROSIN FOCUSED TECHNICAL PROJECTS

What service?

■ Finance ROS open source development

■ Concrete industry need:

driver, algorithm, application template, license or code audits...

■ We fund 1/3 of the development efforts

■ Up to **EUR 100K** ~ 1 year duration

■ also **ROS education** actions

Who can benefit?

■ Robot software **developers** and **users**: companies, research centers...

■ EU H2020 program eligible entities (small consortiums)

Scope of FTPs

■ All industrial application areas:

- Manufacturing, but also
- Intralogistics
- Agriculture
- Drones
- ...



■ ROS(I) and ROS2.0

Scope of FTPs

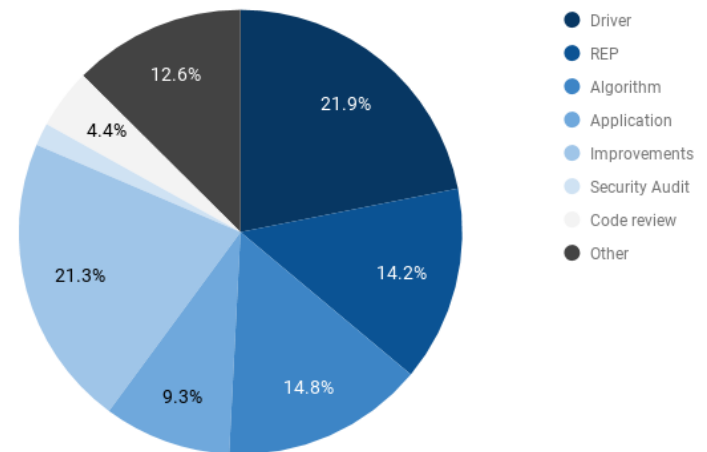
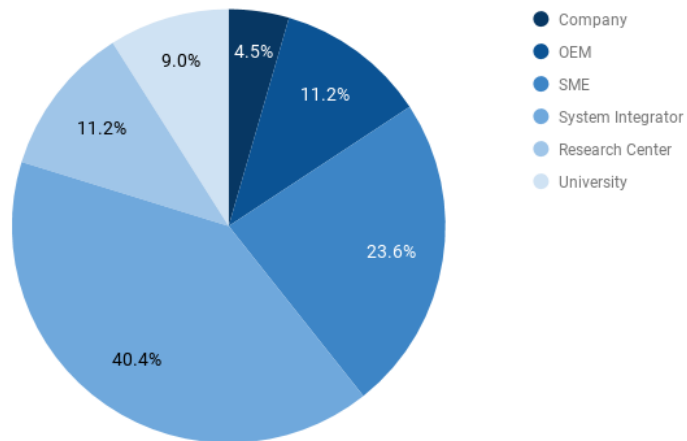
Target a **concrete business need**, i.e.: software development, definition of technical standards, security and license audits, etc.

- **HW-related components**, e.g. drivers, configuration tools;
- **ROS Enhancement Proposals (REPs)**: REPs are akin to, e.g. IEEE standards with a reference implementation of a working system;
- **algorithms**: e.g., a SLAM algorithm which currently exists only as a MATLAB implementation;
- **“application templates” driven by concrete use cases**, e.g. a configurable software component for a palletizing work cell;
- **improvement of existing components**, e.g., Rviz, the ROS navigation stack;
- **process-related work**, e.g. code security audits.
- **improvement of documentation**: technical manuals, deployment guides, etc.
- **integration with other software frameworks**

... (this is a non-exhaustive list)

FTP grant program

- **9 selection rounds**
- **> 80 applications received**
- **> 50 funded projects**
- **EUR granted > 3M**



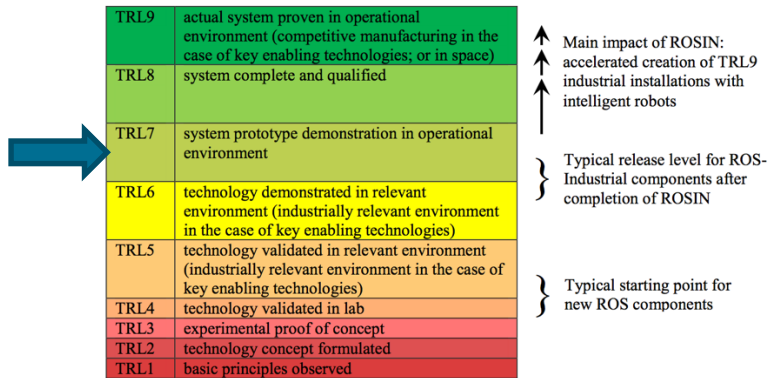
MORE ON FTPS

@ROS-INDUSTRIAL CONFERENCE

- **14:40** Commercial exploitation with ROS-Industrial and introduction into FTP session
Jon Azpiazu Lozano (Tecnalia)
- **14:50** Highlights of the FTPs / outcomes of ROS developments

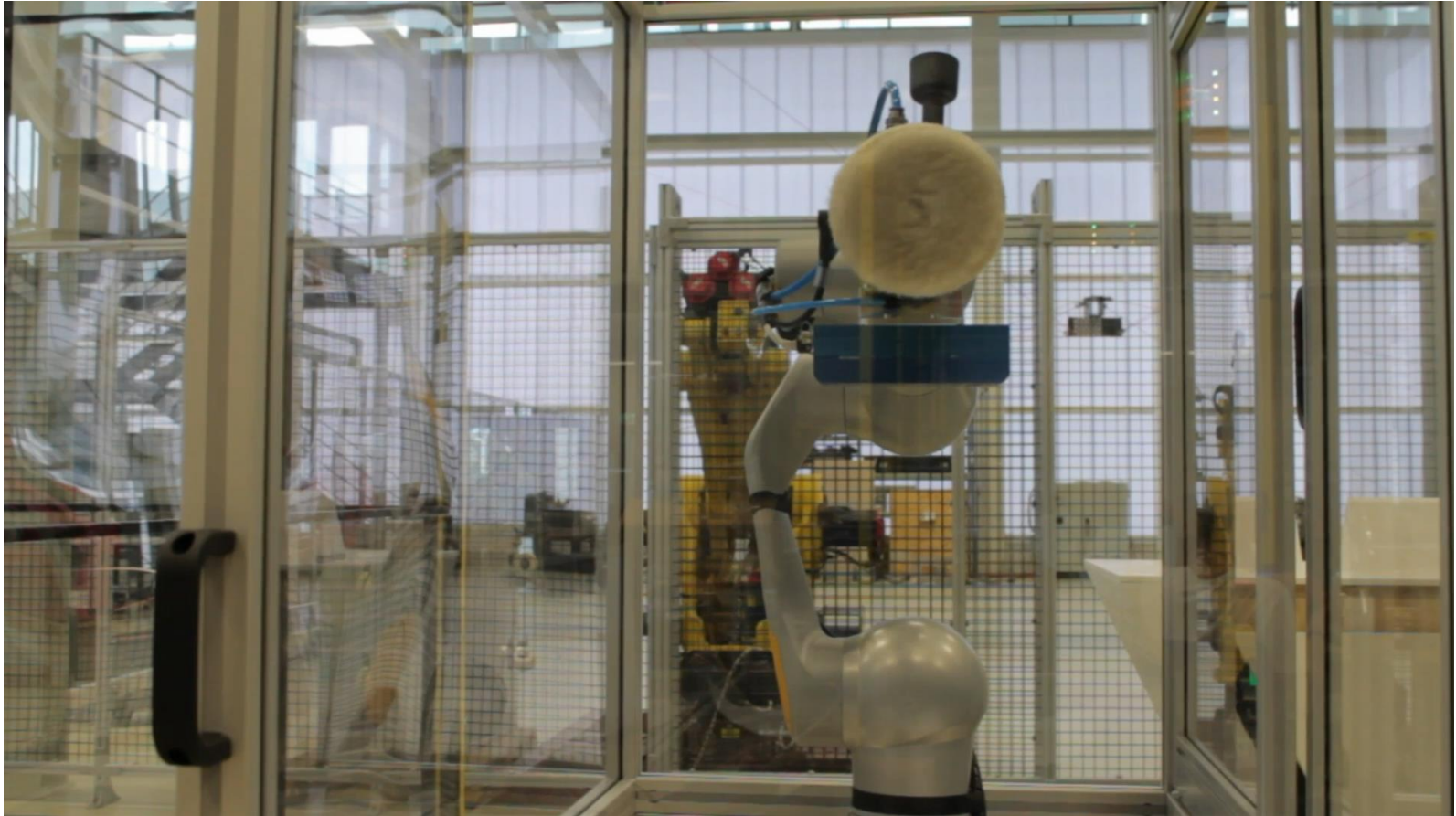
Results

ROSIN EXAMPLE: INDUSTRIAL TRL



ROSIN Industrial demonstrator at IROS18

- <http://rosin-project.eu/tool/scan-and-polish-application>
- **Integrates** results from:
 - FTP “Ensenso-ROSIf”
 - FTP “Industrial trajectory generation for MoveIt!”
 - Scan-and-plan ROS-Industrial Consortium



H2020 EU DIGITAL INDUSTRIAL PLATFORM FOR ROBOTICS



Champion CEA LIST
Country France
Project budget 281 001 €
ROSIN grant 93 667 €
Duration 12 Months

ROS2 Integration Service

Champion eProxima - Proyectos y
Sistemas de
Mantenimiento SL,
Spain



Champion: TU Delft
Budget: 300 000 € 12 months

RoScan

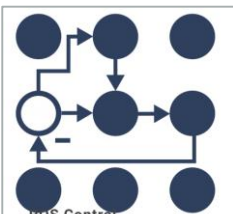
Champion: Bosch

ROS2 Automated Benchmark

Champion: eProxima

ROS2 shared memory

Champion: eProxima



ROS Control

Champion PAL Robotics S.L.,
Spain
https://github.com/pal-robotics-forks/ros_control2



PAL Statistics Framework

Champion PAL Robotics, Spain
https://github.com/pal-robotics/pal_statistics



NEED FOR SUPPORTING OPEN SOURCE SOFTWARE



TOOLBOX • 01 JULY 2019

How to support open-source software and stay sane

*Releasing lab-built open-source software often involves
a mountain of unforeseen work for the developers.*

Anna Nowogrodzki

- Consolidate and **valorise** the scientific and technical **results** of research projects
- **Problem:** funding for supporting the **software engineering required**
- Maintenance, Code Reviews, Community Work, travel grant or budget for hackathons like WRID etc. as a (standard) work package in more projects?
- What can we do?

SUMMARY

- **ROSIN** EU project fostering **industrial use of ROS** through **open source** – 2020 final year
- **New Quality Assurance tools** available
- **Education activities** will continue after ROSIN
- **New open source ROS components** - FTP program

More information

Carlos Hernandez Corbato
Delft University of Technology
c.h.corbato@tudelft.nl



<http://rosin-project.eu>

<http://rosindustrial.org>

 @ROSINproject

Thilo Zimmermann
Fraunhofer IPA
thilo.zimmermann@ipa.fraunhofer.de

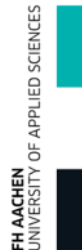


Supported by ROSIN – ROS-Industrial Quality-Assured Robot Software Components.

More information: <http://rosin-project.eu/>

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 732287.

ROSIN
Consortium



IT UNIVERSITY OF COPENHAGEN

