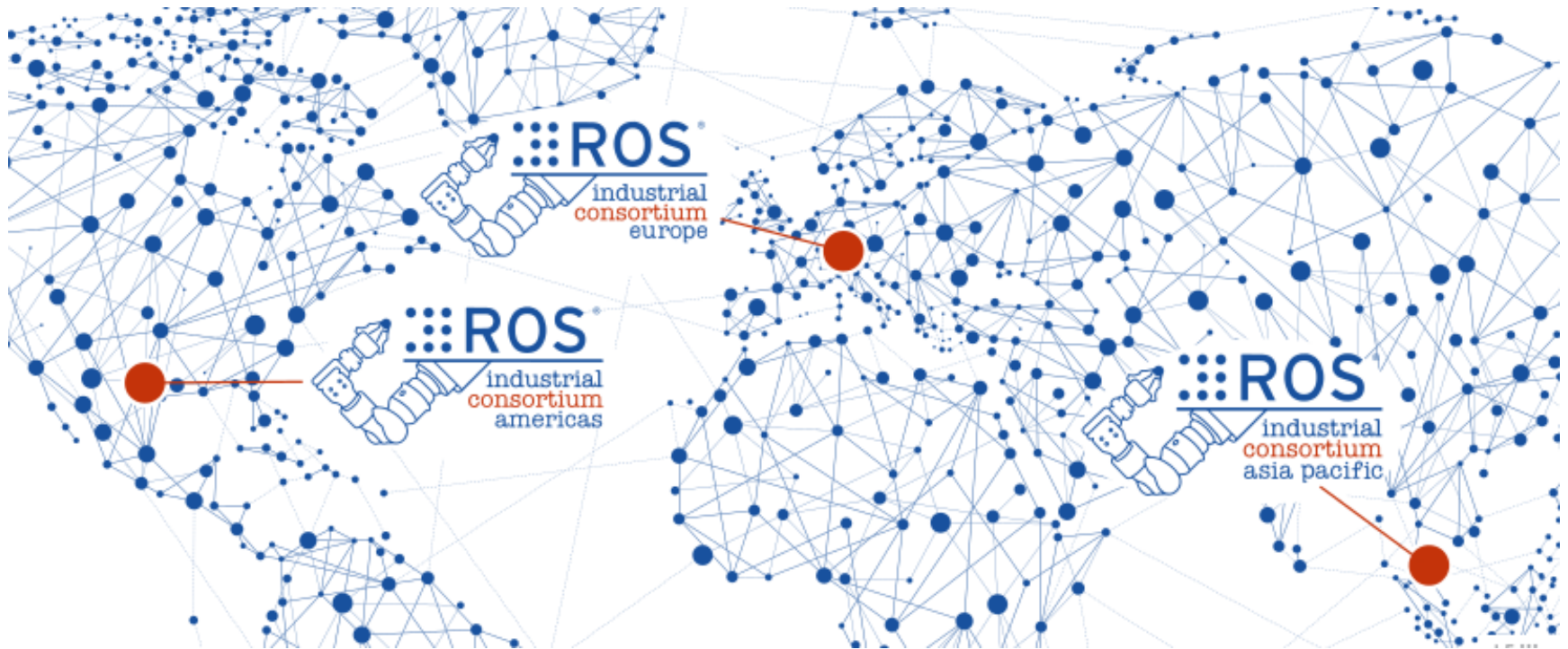
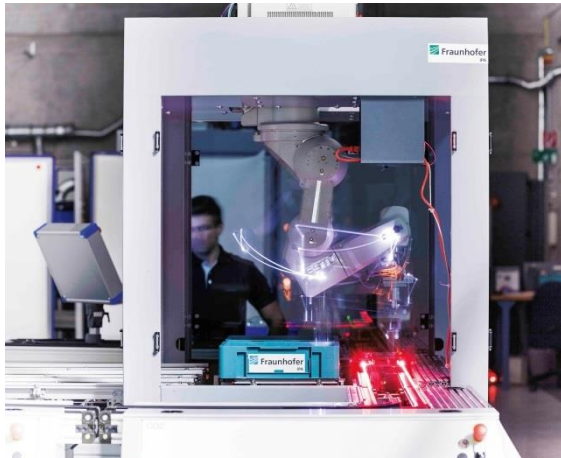

ROS-INDUSTRIAL: STRENGTH IN NUMBERS FOR AUTOMATION

Dr. Mirko Bordignon – ROS-Industrial Europe Consortium Manager, Fraunhofer IPA



FRAUNHOFER INSTITUTE FOR MANUFACTURING ENGINEERING AND AUTOMATION IPA

in cooperation with the institutes EEP, IFF and ISW of the University of Stuttgart



Future is our product
Sustainable. Personalized. Smart.

Fraunhofer IPA

Technology consultant and innovation driver since 1959

- Operational budget of 70.8 million euros
- 25.8 million euros in industrial revenues
- More than 1,000 employees



New technical center "Gebäude D" in Stuttgart

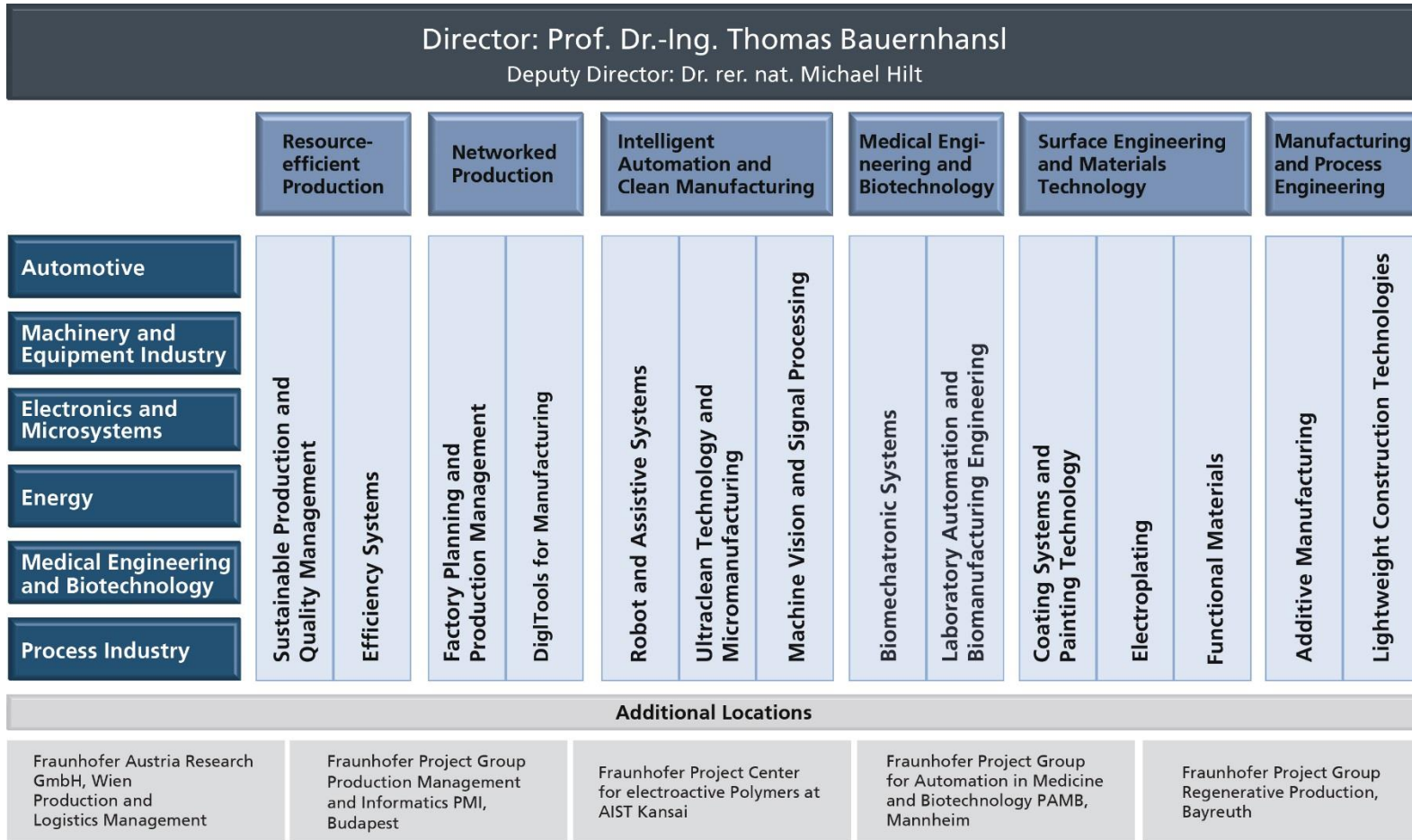


Fraunhofer Institute Center in Stuttgart

Note: key figures for 2016; IPA Stuttgart including locations in Rostock, Mannheim, Bayreuth and Vienna

Fraunhofer IPA

with an interdisciplinary organization



Version as of: 02.2017

Technical equipment and laboratories

In tune with the times



Application Center
Industrie 4.0



Motion laboratory



BioPoLis



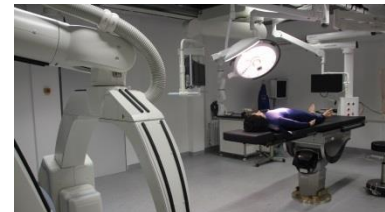
Biomufacturing
laboratory



Factory planning cockpit



Electroplating laboratory



Intervention room



Coating technology center



Production laboratory



Cleanrooms & cleanliness
rooms



Robotics experimentation
area



Synthesis & reactor park

Cooperating at the highest level

What we do

Product development and optimization

Process development and optimization

Technology development and optimization

Assessments, tests and certifications

Organization and procedure optimization

Market analyses and innovation consulting



IPA and ROS-Industrial

- Involved from the very initial stage in ROS-Industrial, now running the EU consortium (23 members strong)
- IPA \leftrightarrow ROS-I mutual benefits:
 - IPA's vast industrial network gives ROS-I a big and relevant audience
 - ROS-I positions IPA and RIC-EU members at the forefront of “software engineering for modern automation”

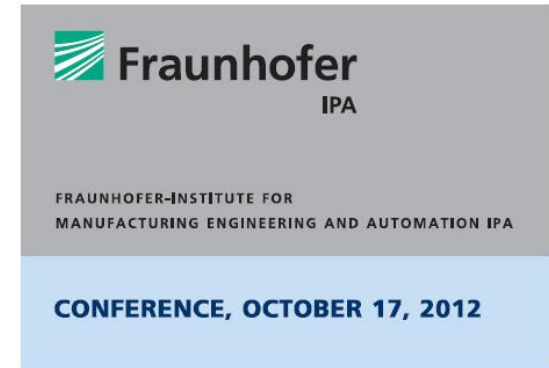


Source: Bär Automation GmbH



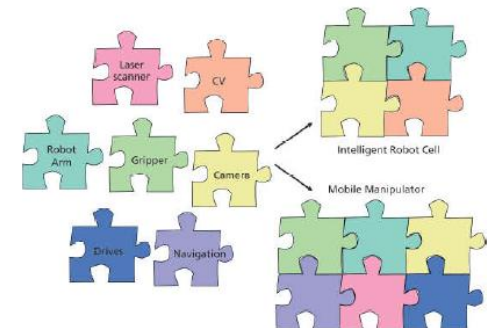
Control System by IT+Robotics

Source: IT+Robotics srl



ROS INDUSTRIAL – AN ENABLER FOR INDUSTRIAL ROBOTICS?

DEVELOPMENT OF INDUSTRIAL APPLICATIONS WITH ROS – EXPERIENCES



ROS-Industrial: Open-Source Software for Robotics and Automation

ROS-Industrial: Open-Source Software for **Robotics and Automation**

Robotics and Automation: the market you want to be in

Double-Digit Growth Highlights a Boom in Robotics

By Martin Haegele

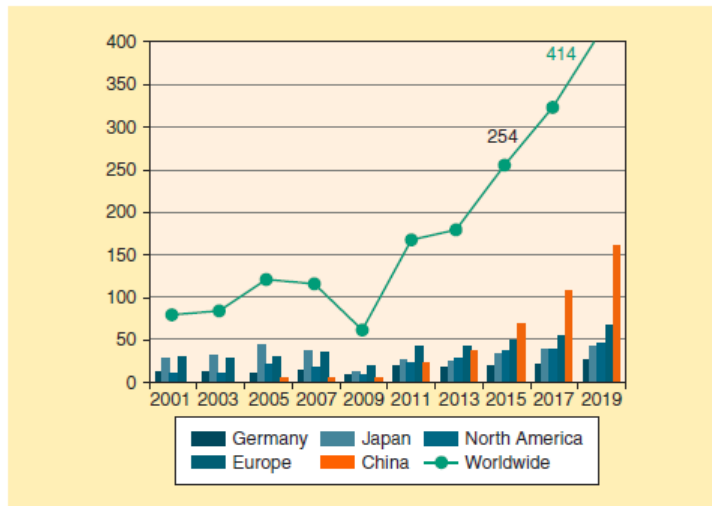


Figure 1. The industrial robot shipments worldwide in thousands of units (2016+ estimated).

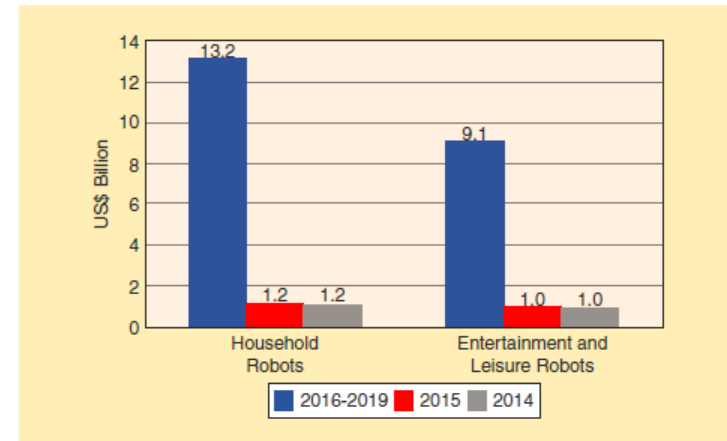


Figure 5. The service robots for personal/domestic use. The estimated value of sales in 2014 and 2015 and the aggregate sales forecast 2016–2019.

source: IEEE Robotics and Automation Magazine, March 2017

ROS-Industrial: Open-Source **Software** for Robotics and Automation

It's all about software

THE WALL STREET JOURNAL.

Home World U.S. Politics Economy Business Tech Markets Opinion Arts Life Real Estate

ESSAY

Why Software Is Eating The World

By Marc Andreessen

August 20, 2011

source: wsj.com

“Companies in every industry need to assume that a software revolution is coming.”



This definitely includes robotics and automation,
where innovation often lies in algorithms “packaged in software”

ROS-Industrial: **Open-Source** Software for Robotics and Automation

You can't ignore Open-Source

McKinsey&Company

An executive's guide to software development

High Tech February 2017

Among key factors to take into account are cited:

“extensive use of available and mature open-source software”

“assembling capabilities through available libraries rather than writing code from scratch”

What is (successful) Open-Source?

- Code made available under open source licensing **AND** the community around it
- The “medium” in which stakeholders a in given business consolidate common infrastructure efforts to help their field move forward

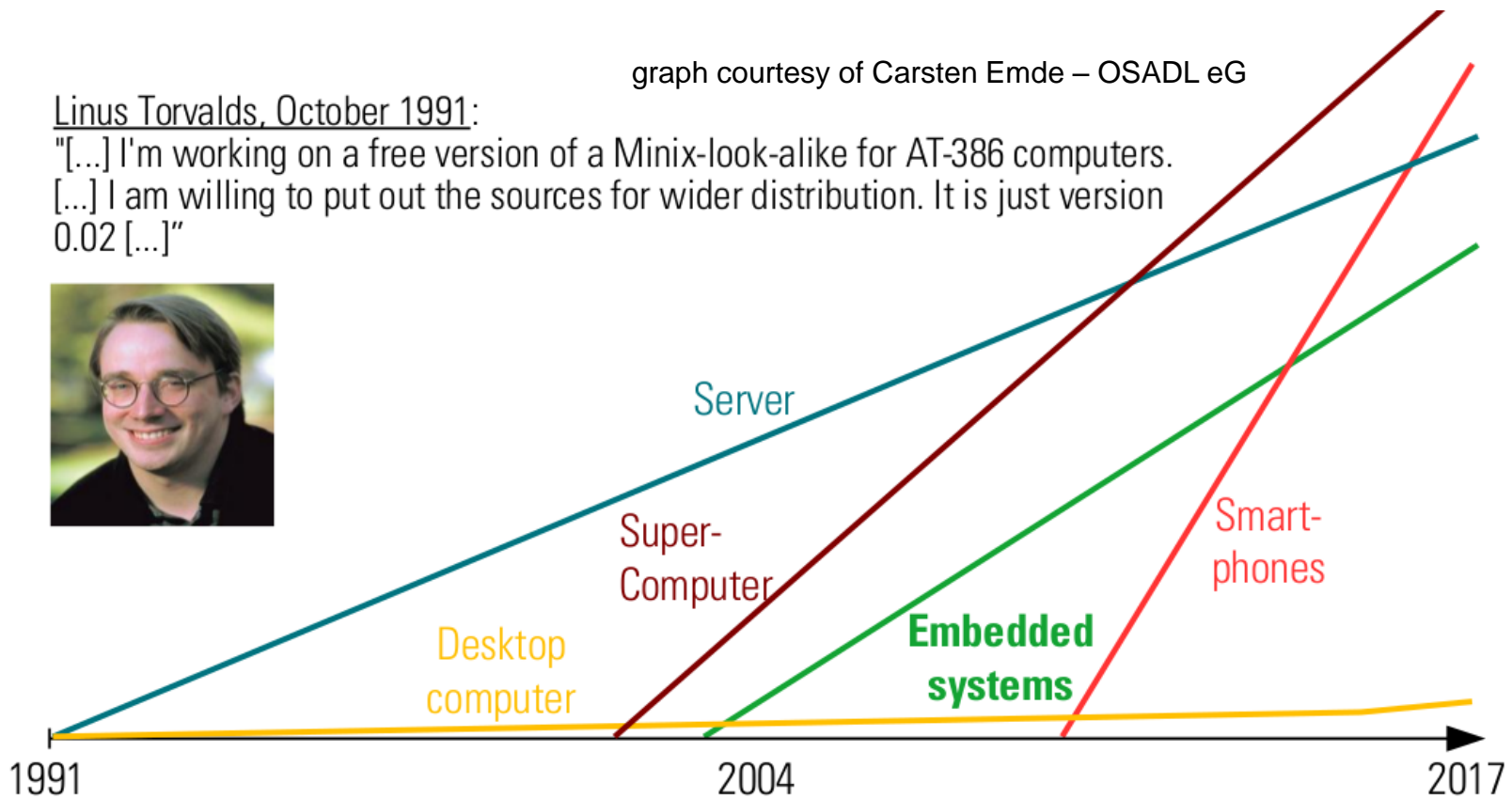
An example that you are probably familiar with



graph courtesy of Carsten Emde – OSADL eG

Linus Torvalds, October 1991:

"[...] I'm working on a free version of a Minix-look-alike for AT-386 computers. [...] I am willing to put out the sources for wider distribution. It is just version 0.02 [...]"



IBM Launches Biggest Linux Lineup Ever

SAN JOSE - 02 Mar 1999: At LinuxWorld today, IBM announced support for Linux**, the open-source operating system. The announcement, of planned key alliances, flagship products, and the industry's most comprehensive service offering, makes IBM the only company to provide complete solutions of hardware, software and technical support for Linux.

ROS-Industrial: Open-Source Software for Robotics and Automation

ROS-Industrial

- Code made available under open source licensing **AND** the community around it
rosindustrial.org ✓
- The “medium” in which stakeholders a in given business consolidate common infrastructure efforts to help their field move forward

(some of) the stakeholders

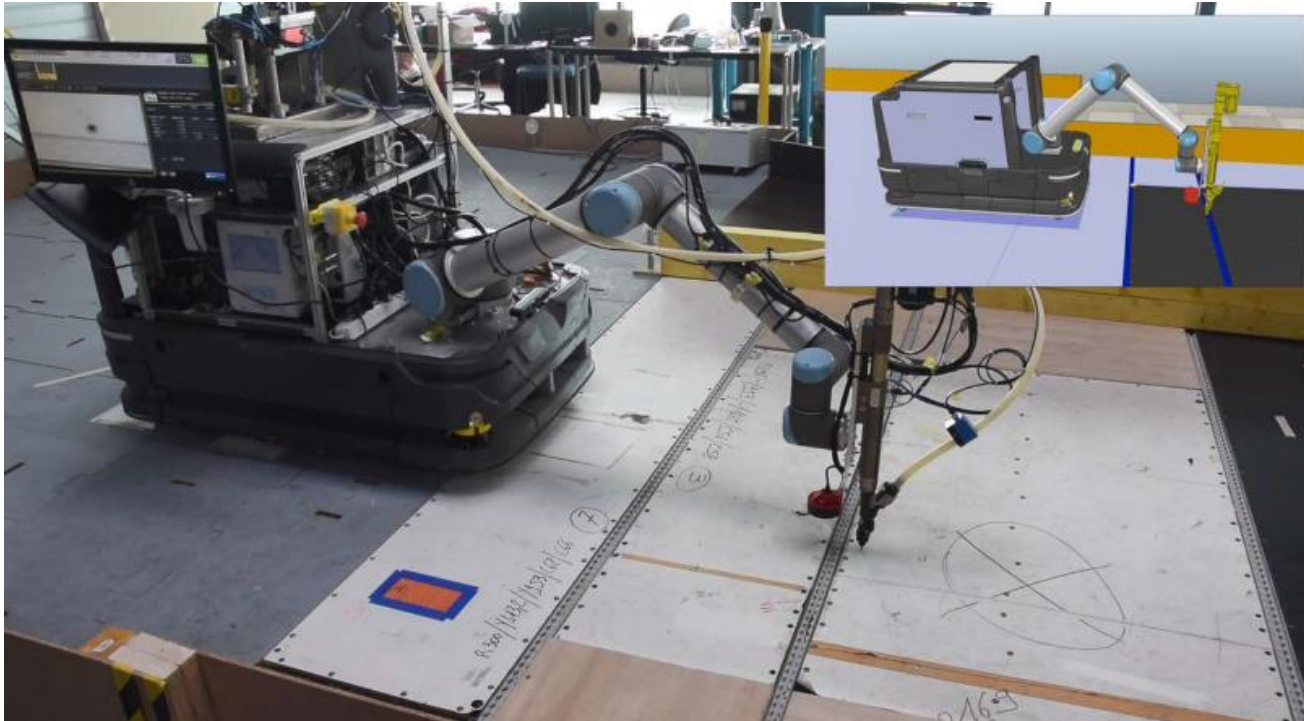
- Research institutes: best way to transfer their key competences
- System integrators + startups: “Swiss army knife” for integration projects & new products
- Power users & OEMs: tool for exploratory R&D, tech to invest on in the long-term
- Funding agencies: platform on which to consolidate results across projects and funding programs

(some of) the stakeholders



platform on which to consolidate results across projects

example 1 - Airbus



Open Source as an appealing way to transfer results from R&D to the factory floor through third parties (e.g., system integrators)

platform on which to consolidate results across projects example 2 – EU-funded research



ROSIN – ROS-Industrial Quality Assured Robot Software Components

An EU digital industrial platform for robotics

rosin-project.eu



This project has been funded by the European Union's Horizon2020 research and innovation programme under grant agreement No 732287



ROSIN in a nutshell

Make ROS-I **better** (in terms of software quality)
business friendly (components, licensing)
accessible (widely taught, easy for everybody)

Software Quality

ROS-I best practices and tools: continuous integration, unit testing, code reviews

ROSIN further improves on them with code scanning, automated test generation, model-in-the-loop testing

New components + path for exploitation

3+ Million € available to third parties for ROS-Industrial development

Develop missing components or improve existing ones

Commercial release template (licensing, etc)

Education

Educate students:
summer schools

Train professionals:
ROS-I academy

Open Call to fund your ROS education initiative

Why a ROS-Industrial Consortium and why joining it?

- “Founded in 2000, The Linux Foundation today provides **tools, training, and events to scale any open source project**, which **together deliver an economic impact not achievable by any one company.**”: same philosophy!
- Tools -> <https://github.com/ros-industrial/>
- Training -> regularly organized by RIC managing institutions (rosindustrial.org)
- Events -> both for outreach and to “meet the experts” in legal matters, safety, etc

SAFETY REQUIREMENTS AND STANDARDISATION FOR ROBOTS: SOFTWARE DO'S AND DON'TS

Dipl.-Ing. Theo Jacobs, theo.jacobs@ipa.fraunhofer.de

Fraunhofer Institute for Manufacturing Engineering and Automation IPA



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Fraunhofer
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Understanding License Compatibility
and Compliance Risks & Processes
in Free and Open Source Software

Dr. Catharina Maracke
Software Compliance Academy

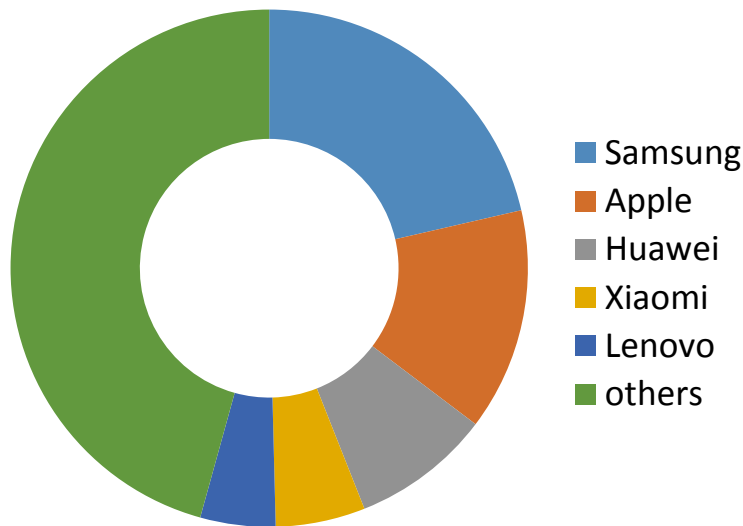


www.scompliance.com

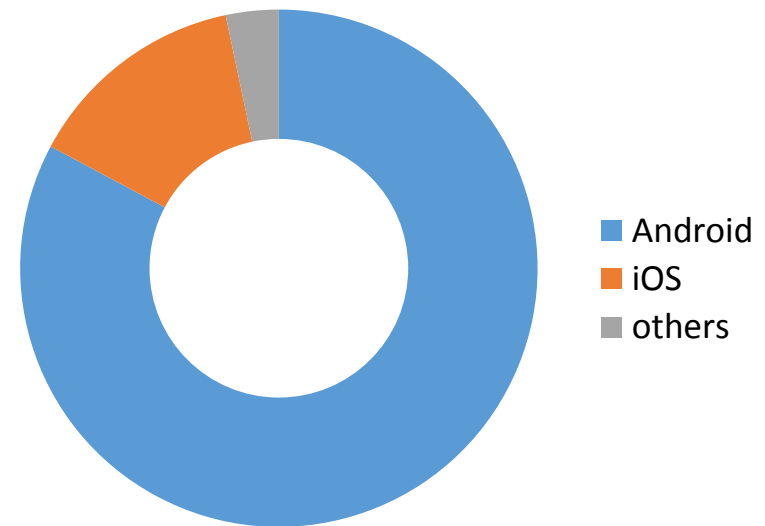
Economic impact: a tremendous opportunity to grasp!

The smartphone market as of August 2015 (source: IDC Research)

Who makes the devices



What powers the devices



A similar revolution is possibly happening in robotics & automation!

**Mark your calendars for
the next edition of the ROS-Industrial Conference:**

December 12-14 2017, Stuttgart - Germany

Contact Info



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