

## **Service robotics: towards open standards**



ROS-Industrial Conference 2018, Stuttgart  
Thomas Pilz, Managing Partner Pilz GmbH & Co. KG

## ► Before 2004

- Service robots existed only in science fiction



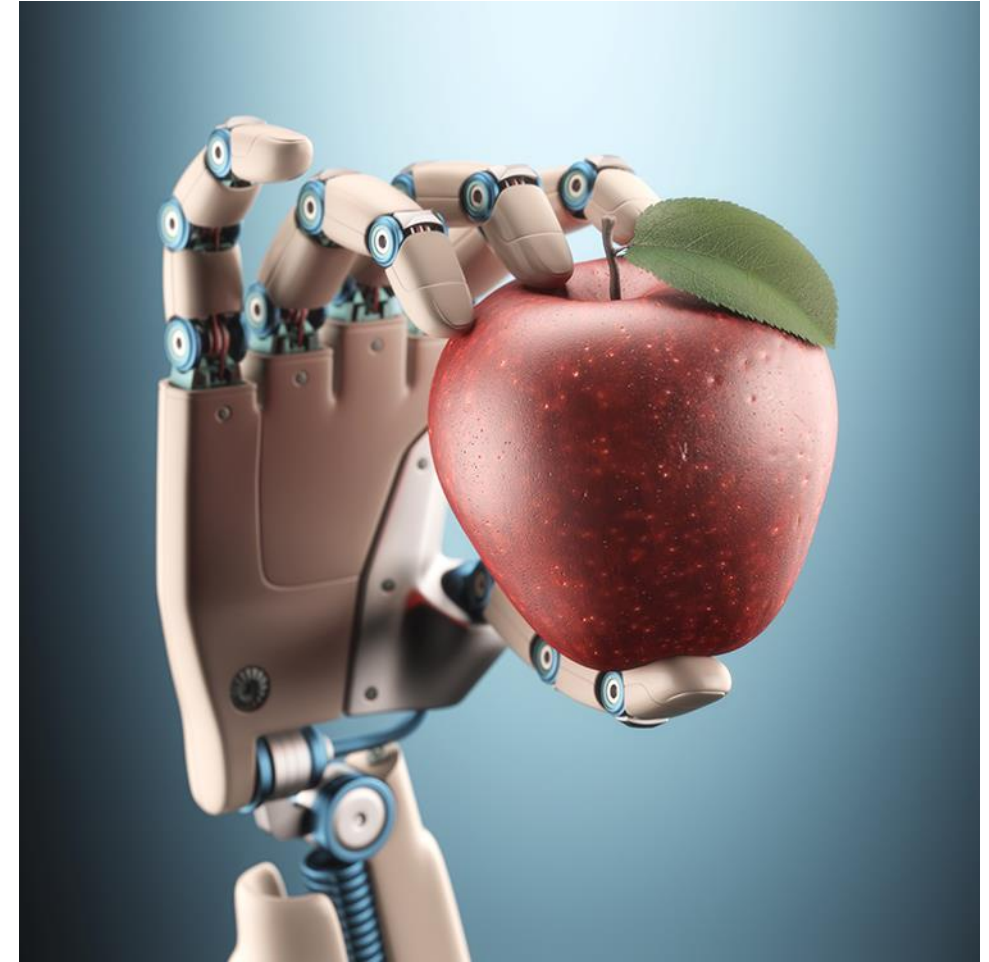
Darryl W. Moran Photography

- Industry approach:  
Supplement to human labour
- Uniform safety standard  
for robots of all loads and tasks in industry



## ► The Fall in 2004

- Attempt from Asia:  
Standardisation of service robots
- Reluctant attitude from industry
- Additional standardisation branch and differing views on safety of robots, depending on the sector  
(health, care, public sector, industry)
- The consequence:  
Service robot cannot be used in industry,  
and industry robot cannot be used outside  
the factory halls



## ► Until 2018

- Projects of industry with the target of opening up markets outside the industry
- Uncontrolled growth of the term "robot", the old definitions and normative limits no longer work
- Trend towards compact, versatile assistants instead of massive assembly robots
- Attractiveness of robotics for new players (e.g. research, universities)





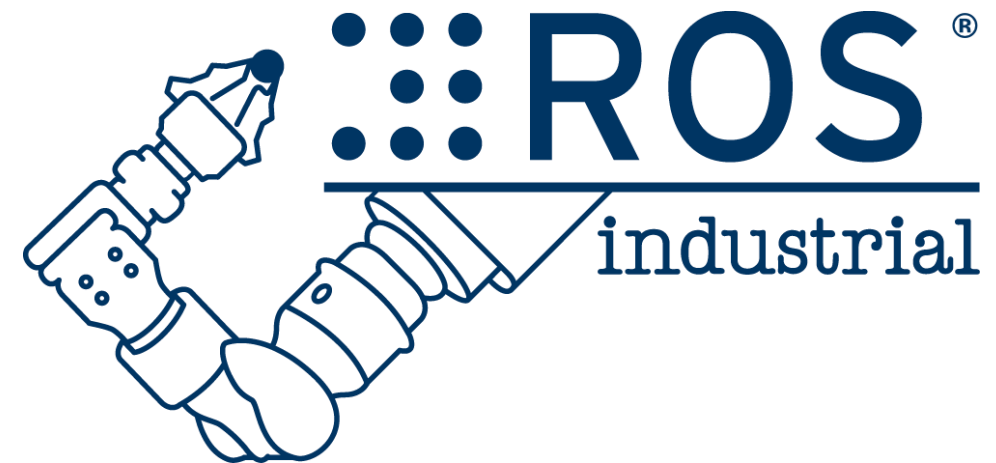
## ► New opportunities for robotics

- Science fiction shows what will be possible
- The laws of robotics must be observed!
- Ethical questions are important for further development of robotics
- New application areas outside the cage
- Mobility as key role
- Easier interaction, control and use of robots
  - Gesture control
  - Intuitive teaching
  - Deep learning and artificial intelligence
  - ROS for Programming



## ▶ ROS: Success factor for service robotics

- ▶ Modular design of ROS provides flexible solutions
- ▶ Standardisation across manufacturers
- ▶ Additional flexibility through programming languages
- ▶ Networked, interoperable system in line with Industry 4.0



## ► ROS as essential part of Pilz's service robotics package





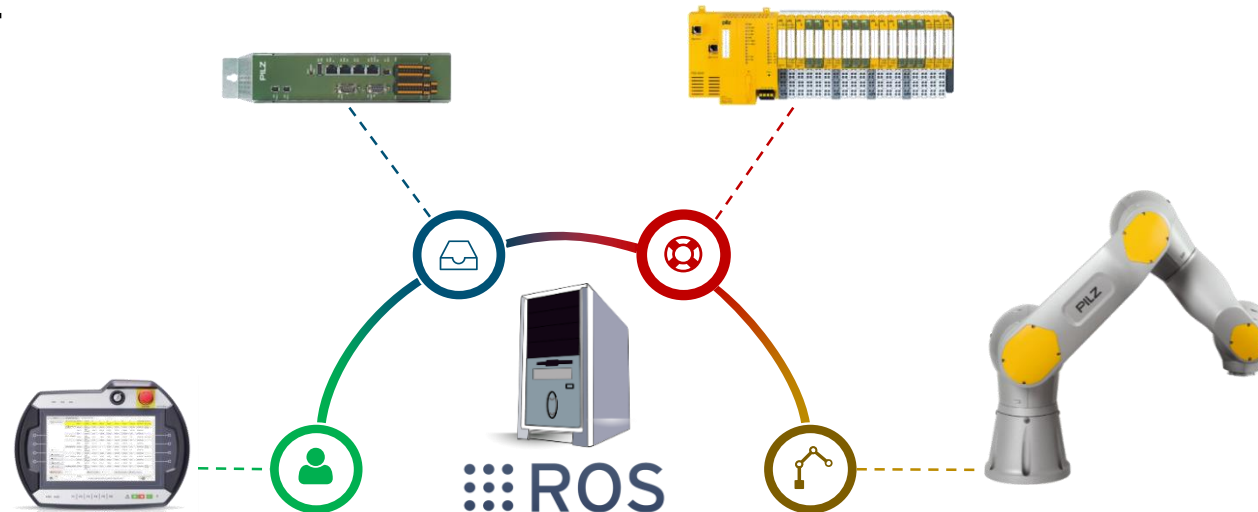
## ► ROS as essential part of Pilz's service robotics package





## ► Motivation

- An EN ISO 10218-1 compliant system with ROS
- Integration of - industry relevant - motion commands in ROS
- Simple programming via a Python API or the control panel
- Direct access to our industrial components such as motion control systems PMCPrimo MC or PLCs of Automation System PSS 4000...



## ► Programming of a Dual Arm Robot with ROS







modular

ROS community

ROS

path/grasp  
planning

enables the  
application

ROS

robotic planning  
interfaces

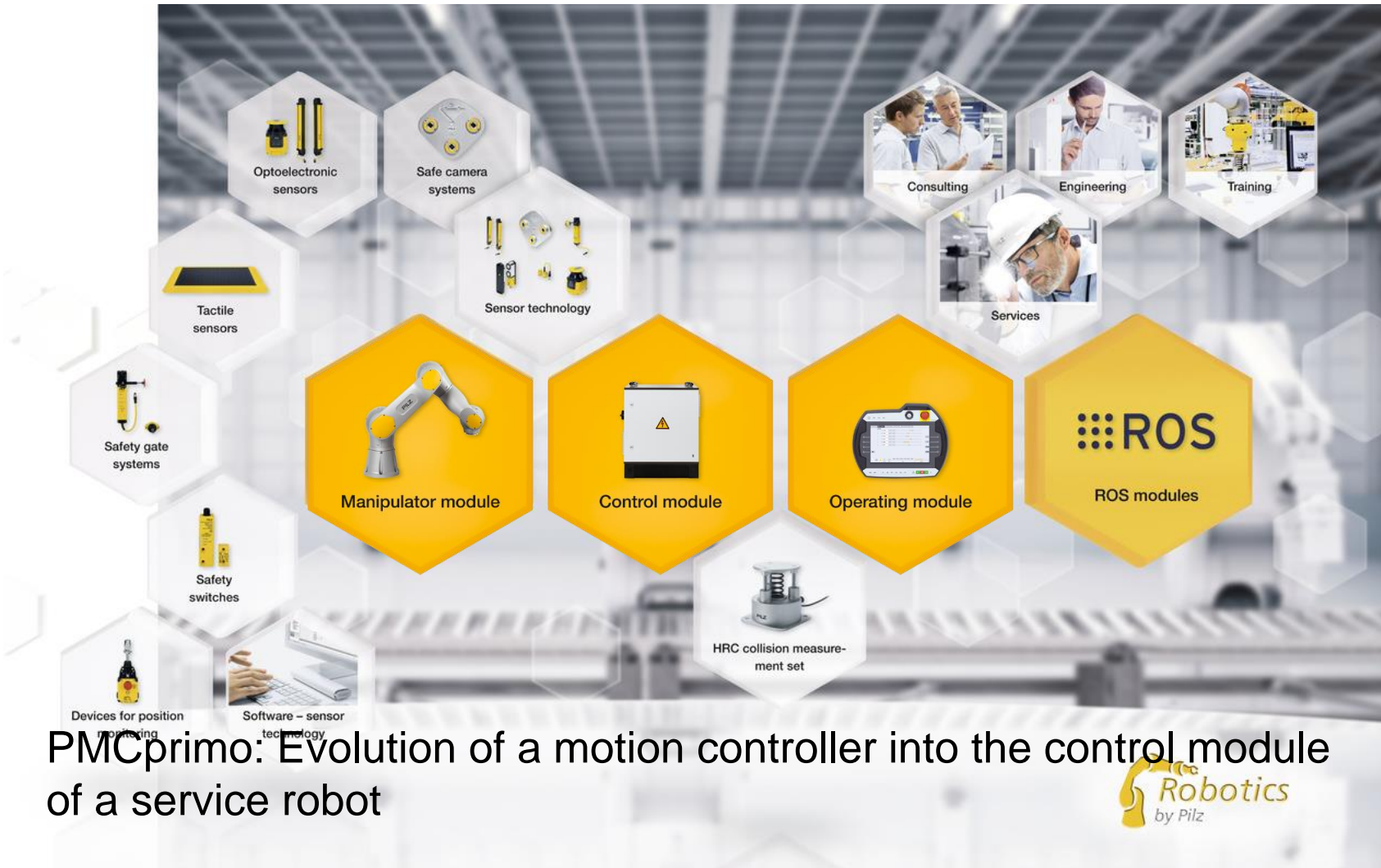
robotics



Control module

ROS

## ► Conventional automation





AL ROBOTS  
WERING PEOPLE

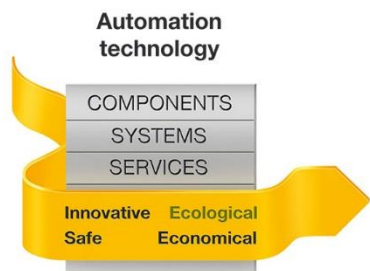
PILZ



## ► Outlook

- Consideration of safety requirements
- Industrial suitability of ROS components
- Further dissemination of ROS in the private and service sector as well as in the industry sector ?!
- Pilz products based on ROS for service robots suitable for all sectors





Thomas Pilz

Pilz GmbH & Co. KG  
Felix-Wankel-Straße 2  
73760 Ostfildern, Germany  
Tel.: +49 711 3409-0



**Keep up-to-date on Pilz**  
**[www.pilz.com](http://www.pilz.com)**

**PILZ**  
THE SPIRIT OF SAFETY

COMSE® InduraNET p®, PAS4000® PAScal® PAScorrig® Pilz® PITT® PLID® PMCprimo® PMCCorplex® PMCtendo® PMD® PMM® PMOZ® Primo® PSEN® PSS® PVIS® SafetyBUS p®, SafetyEYE®, SafetyNET p®, THE SPIRIT OF SAFETY® are registered and protected trademarks of Pilz GmbH & Co. KG in some countries. We would point out that product features may vary from the details stated in this document, depending on the status at the time of publication and the scope of the equipment. We accept no responsibility for the validity, accuracy and entirety of the text and graphics presented in this information. Please contact our Technical Support if you have any questions.