Analyse Best Practice Parameter Setting to Effectively Programme Robots To Meet Manufacturing Specifications

29th-30th November, Birmingham, UK

LEADING
INNOVATIONS

WWW.PROFACTOR.AT

Topics to be adressed

↗ From EU funded research to Industrial Application

↗ Robotic Co-worker Technologies development for industrial applications

↗ Workflow-based robot process design and execution

↗ Onboard process planning and configuration tools

↗ **Symbiotic** human-robot collaboration for multimodal Human Robot Interaction

PROFACTOR Profil

- ↗ Austria's no. 1 in **applied production research**

- ↗ Multidisciplinary team with **74 employees**

- ↗ Business locations in **Steyr** and **Vienna**

- ↗ **6 Mio. EUR turn-over** (2015)

- ↗ Since 1995 **over 1,700 (inter-)national projects** in **industry (1,360)** und **research (350)**

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Research Area- Industrial Assistive Systems

↗ Increasing the competitiveness!

↗ Aim: to support human beings in a in a volatile, richly varied and highly flexible production

   ↗ Decision-making competence, knowledge and experience of workers

   ↗ Precision, endurance, speed or the power of the machine

↗ Intelligent Automatization for Mass Customization.
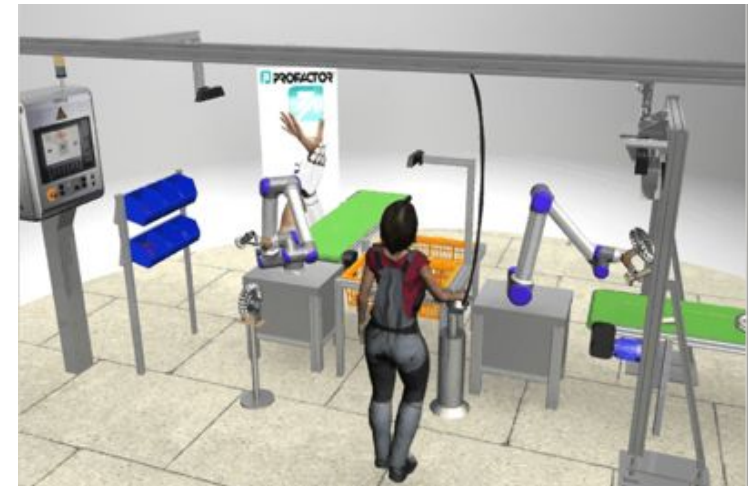
Ergonomic Collaboration Human & Machine (LOCOBOT)

↗ **Initial situation**

  ↗ Reduction of "red" work places

↗ **Research approach**

  ↗ Solutions for practical division of work between human and machine, which is realizable with adequate use of resources

↗ **Results**

  ↗ **Improvement of ergonomics** through **development of assistant systems**

  ↗ Modular design of **intelligent hard- and soft-ware components** (e.g. compliant robot arm)

  ↗ Software environment for **user-friendly development of solutions and coordination** of component interaction
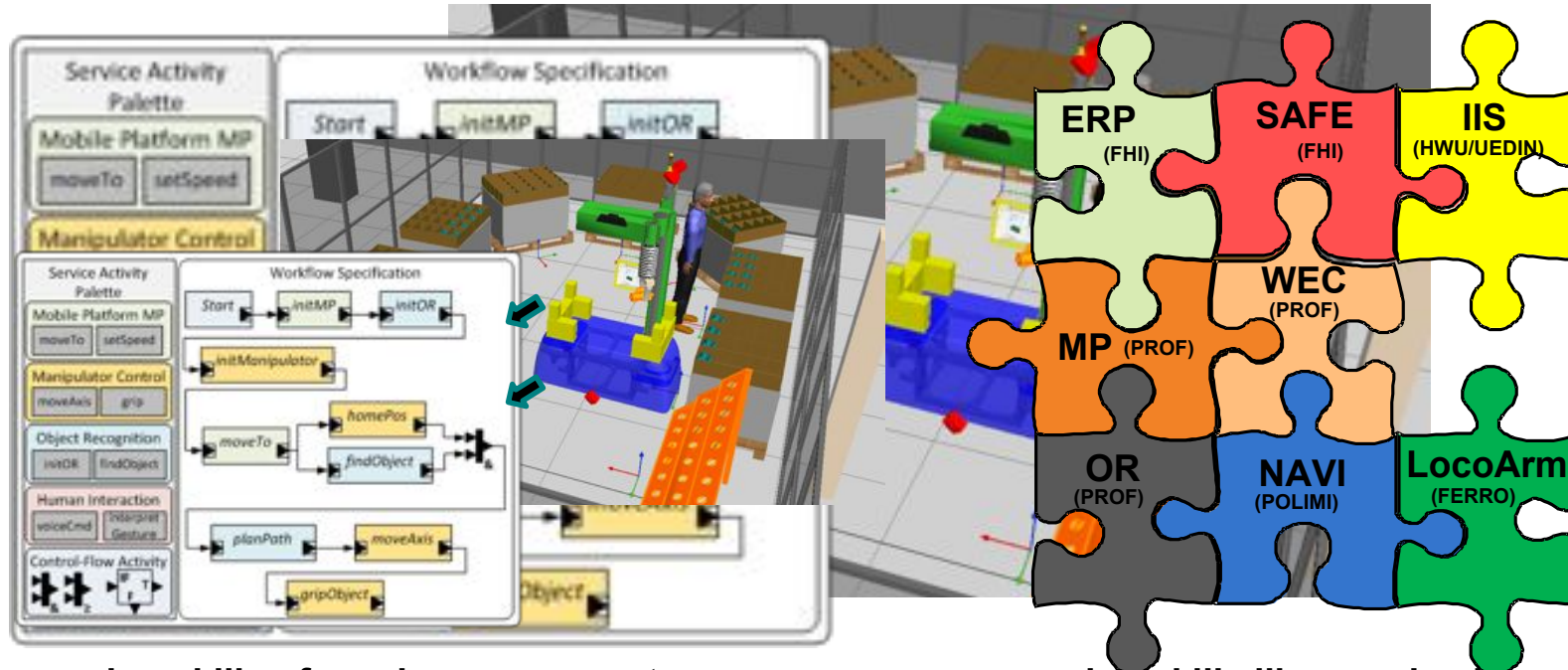
Locobot's application development

Modeling application logic

- user-friendly workflow modeling environment (WME)

Supervisory control is generated

- ‚workflow execution control' (WEC)

using skills of service components

= using skills like puzzle pieces for the application logic

Results – EuroNews Report

„A robot for every work shop"

Easy to use

Fast Setup

Fast programming

Versatile

Small lotsizes

Ad-hoc usage

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Challenges for flexible robotic systems

↗ Reduction of Invest

↗ Cover a wide area of use

↗ Shortest ramp up periods for on-demand applications

↗ Lower training, operating- and maintenance costs

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A robot for each working place (each garage) - features

- ↗ Movable, modulare Systems

- ↗ Short Ramp up (few hours)

- ↗ Modification in a few minutens

- ↗ Process execution also by Non Experts using only one Interface (HMI)

- ↗ Communication / Data Input using an intuitive HMI System with automatic functions

- ↗ Adaptive process execution

XROB
EMPOWERING ROBOTS

Solution– Software/Hardware construction kit

↗ Sensors & Tools

+

↗ Robots (UR, KUKA, nn)

+

↗ Control system (IPC, PC) + Software

XROB EMPOWERING ROBOTS

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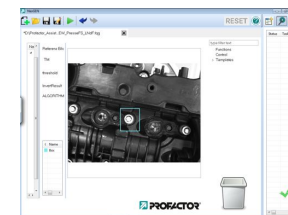
XRob – Features

↗ **Workflow – based,** intuitive und integrated **process mapping** and **execution** in **only one user Interface**

↗ **Consolidation of existing Input tools of the sub components** (Robot, Vision, Tool, usw…)

↗ **Intelligent, semi automatic tools** for process planning

↗ **Use of standardized IT Interfaces** (TCP/IP, DIO, ProfiNet,…) – fast integration to the Enviroment

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XRob – Software Tool Kit

XROB EMPOWERING ROBOTS | **Workflow -Manager**

Robotcontrol	**Tooling control**
Safety control	**Interfaces**
2D/3D-position detection	**Processsimulation**
Automatic path planning	**3D-Workspace scanning**

HMI-System

Cognitive Function	**Online - Tacking**

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XRob – Technologies

Tool kit for quick setup and safe operation

↗ 3D scanning of the workspace

↗ Semi automatic creating of a collision model

↗ Inline - 2D/3D position detection

↗ Collision avoidance through automatic path planning

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XROB EMPOWERING ROBOTS

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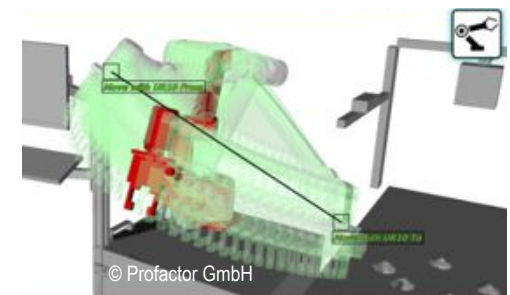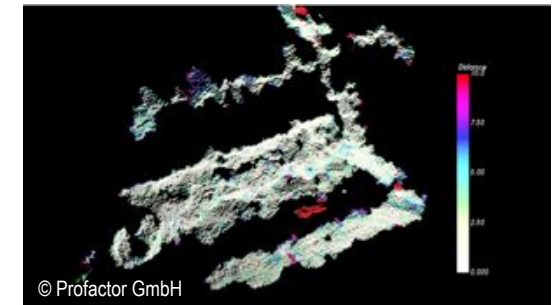
XRob – Technologies

Tool kit for quick setup and safe operation

↗ Configuration all involved components via a user interface

↗ Workflow-based process

↗ Process status and progress mapping

XROB
EMPOWERING ROBOTS
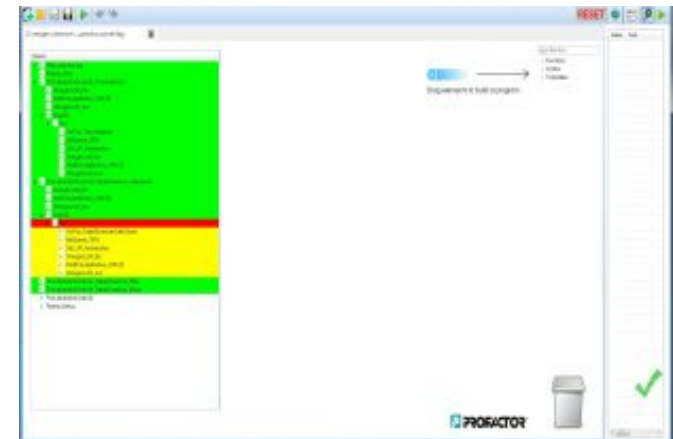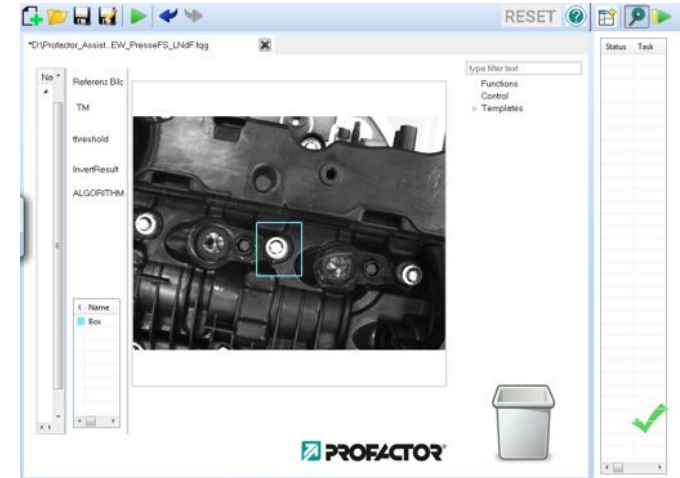
XRob

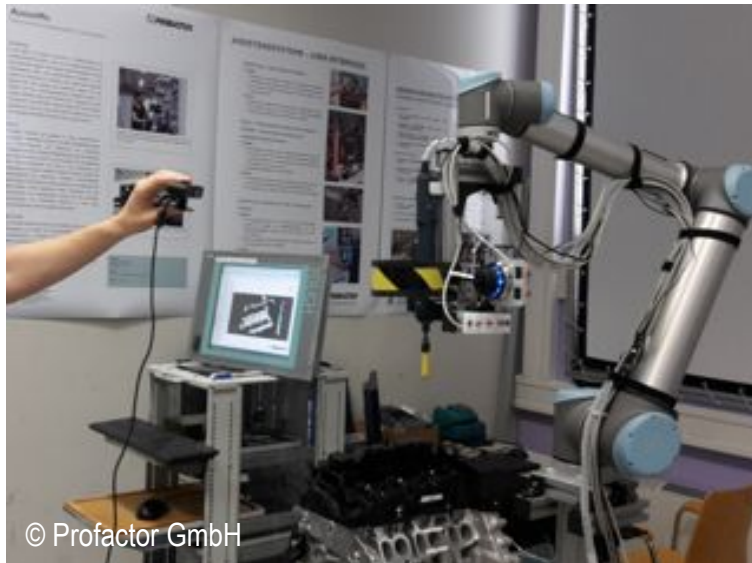The Software system X Rob allows the creation of complex robot application within a few minutes

Screwing Assistant

↗ Screwing of covers and mouting parts on mobile workpiece holder in the assembly line

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R&D Project AssitMe BMW Steyr 2015

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Pilotsytem   Flexible Screwing Station BRP Rotax 2016
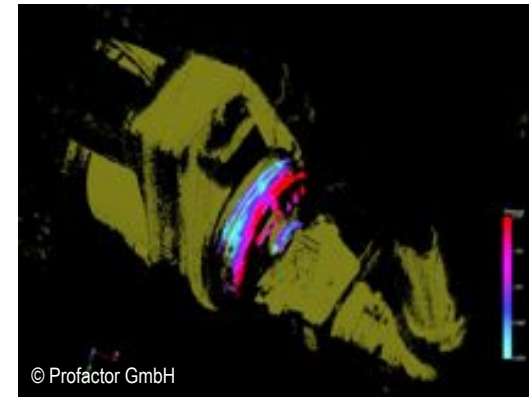
XRob – Anwendungen

Screwing Assistant

↗ Screwing of accessories / Covers

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© Profactor GmbH

Inspection Assitant – Flexible Quality Gate

↗ 3D-Inspection of des locking conditions of plugs and oil cover plates (since autuum 2013)

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IO / NIO Auswertung der 3D-Daten

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Inspection Assistant

↗ 3D Inspection of Plugs and Oil cap on the engine

↗ Acustic Testing System for vehicel body parts

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Pilotproject Flexible Quality Gate BMW Steyr 2013

Flexible Acustic Inspection Systems 2015

Assembly Assistent

↗ 3ʳᵈ Hand Support
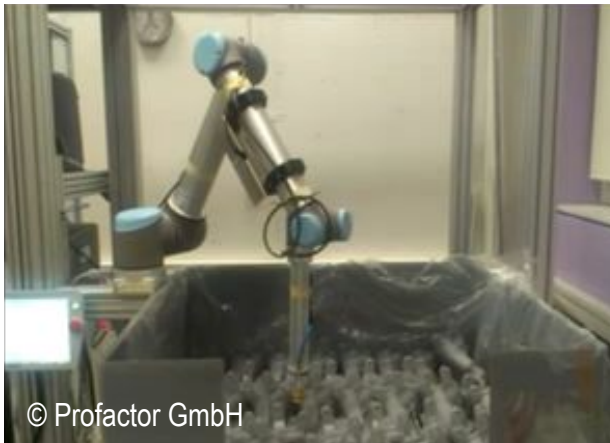

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R&D-Project 3rd -Hand Support 2016

XRob – Application

Handling Assistant

↗ Pin Picking (since 2009)

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© Profactor GmbH

New: Selective Handling (AR-based)

XRob – Application

Paint Assistant

↗ Painting of 3D-Objects

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Printing on 3D Surfaces

Research projects

↗ Cognitive interaction- robot knows user requirements
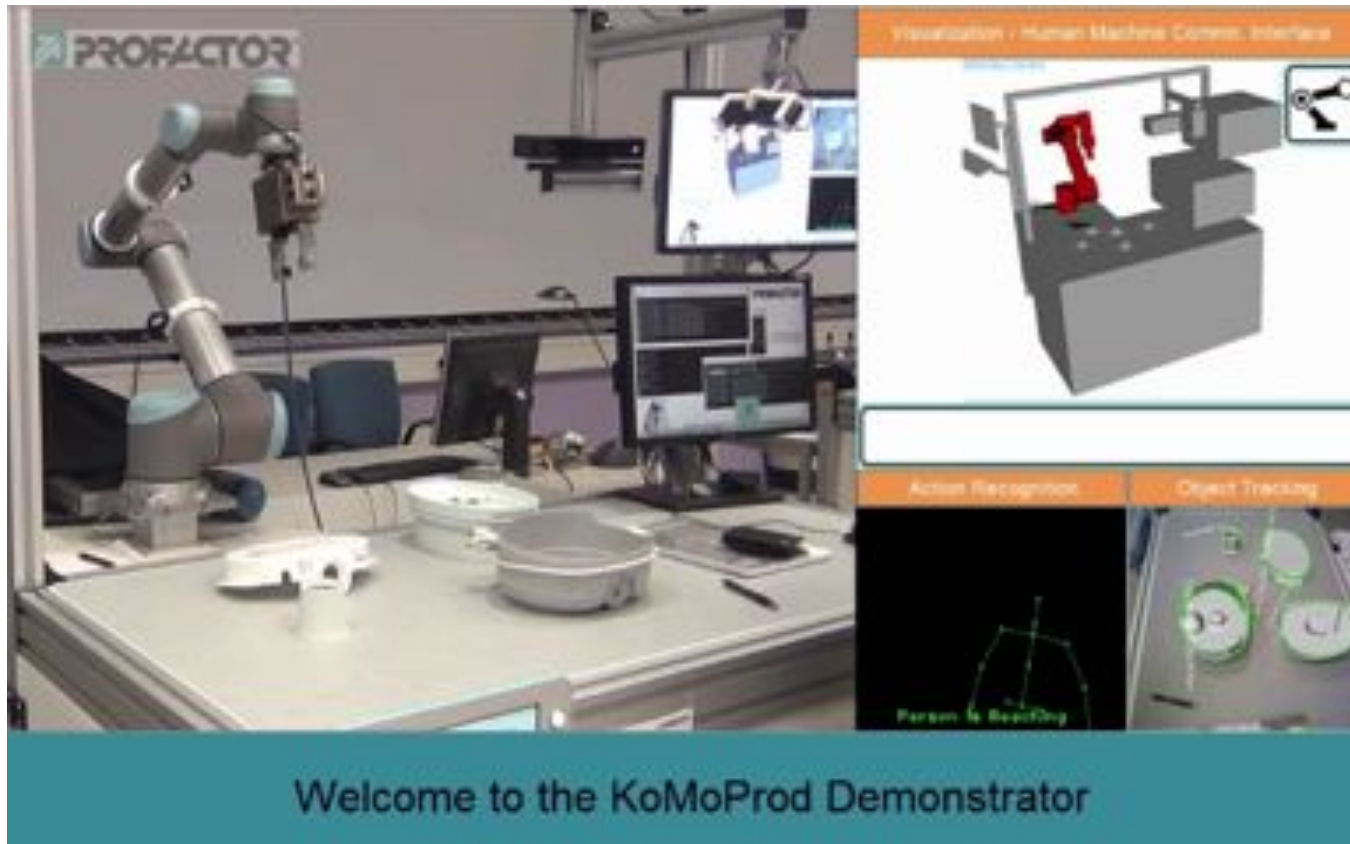
Welcome to the KoMoProd Demonstrator

Symbiotic human-robot collaboration for safe and dynamic multimodal manufacturing systems
(SYMBIOTIC)

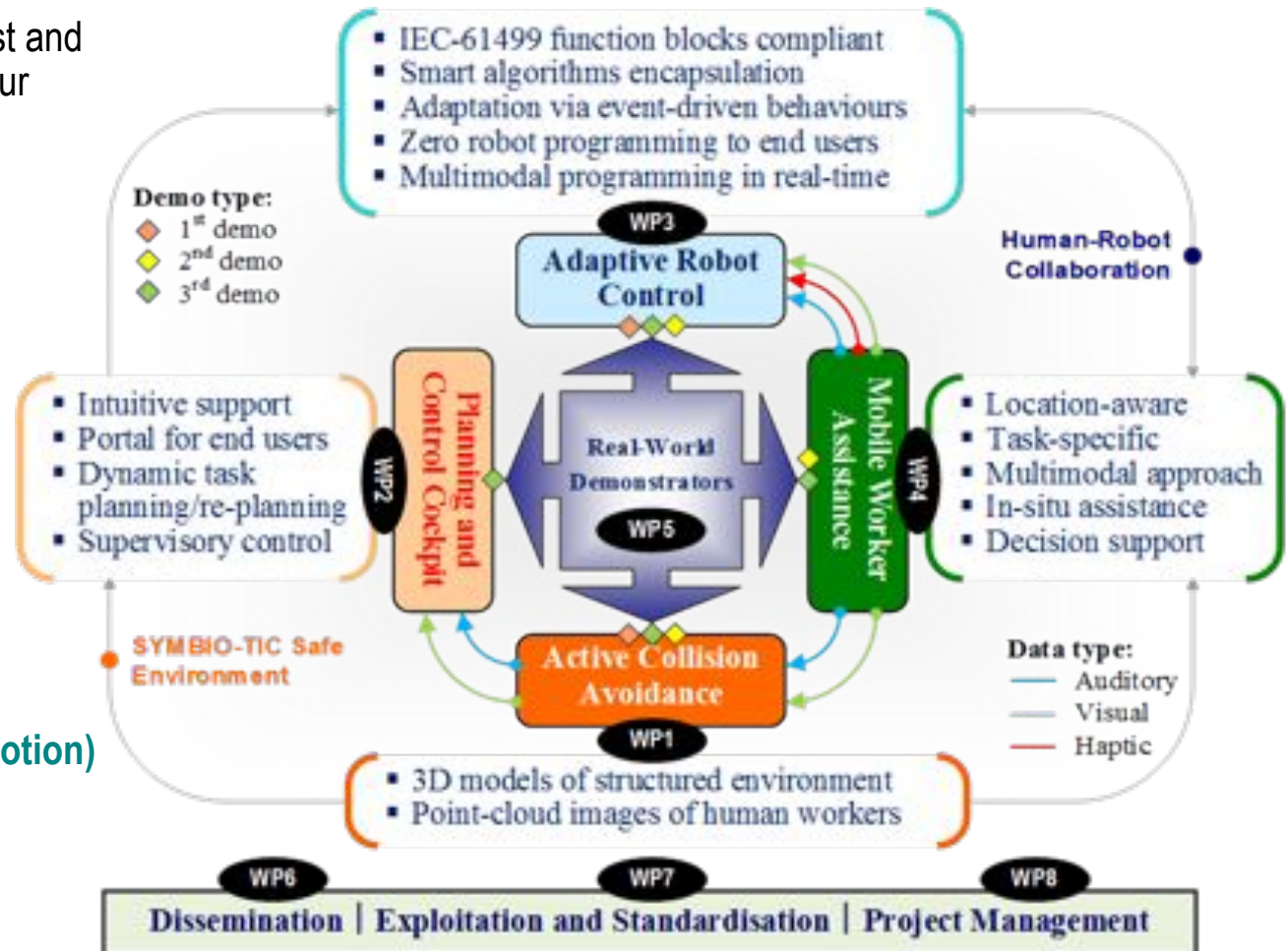## Early results and outlook for human robot symbiosis

Project Overview

- The project's final goal is to test and quantify the aforementioned four objectives in terms of:

  ➢ Safety

  ➢ Feasibility

  ➢ Intuitiveness
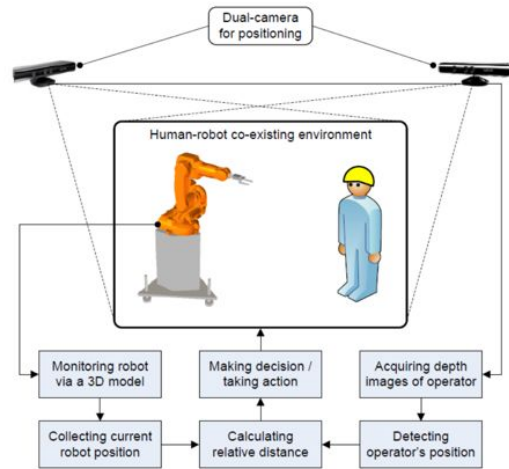
  ➢ Adaptability

  ➢ Scalability

- **Three demonstrators:**

  ➢ **Food-processing (Robomotion)**
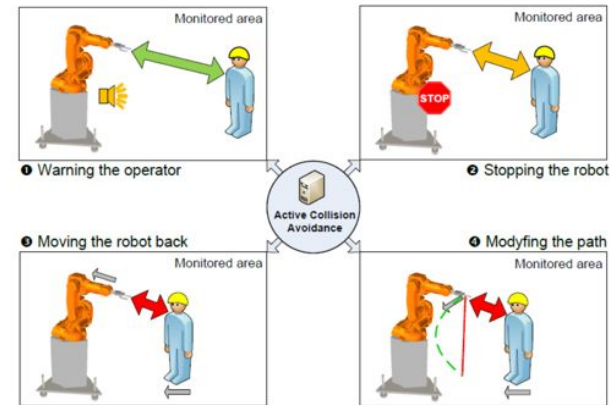
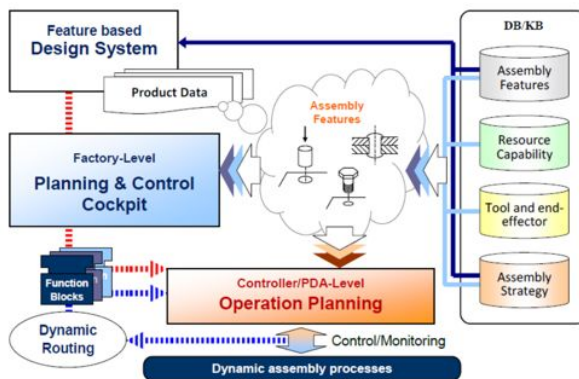 ➢ **Aeronautics (Aciturri)**

  ➢ **Automotive (Volvo Cars)**

Project Objectives

**Active collision avoidance for safe human robot collaboration in real time.**

Dynamic adaptation to changes in the shop-floor environment with zero programming for the robot users.

Adaptive task plan generation for robots and human workers allowing collaboration.

Instructions generation for supporting human workers on what and how to do.

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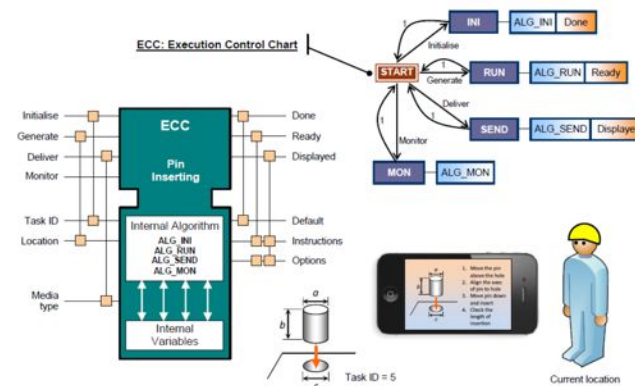
Thank You !

Contact

Dipl. Ing. Christian Wögerer, MSc
International Networks
PROFACTOR GmbH
Graumanngasse 7 | Top C3-1 | 1150 Wien |
Mobil +43 (0)664 6207675
christian.woegerer@profactor.at
www.profactor.at

Visit X - Rob on HMI In Hannover

Hall 2, Booth A44 - 24.-28. April, Hannover