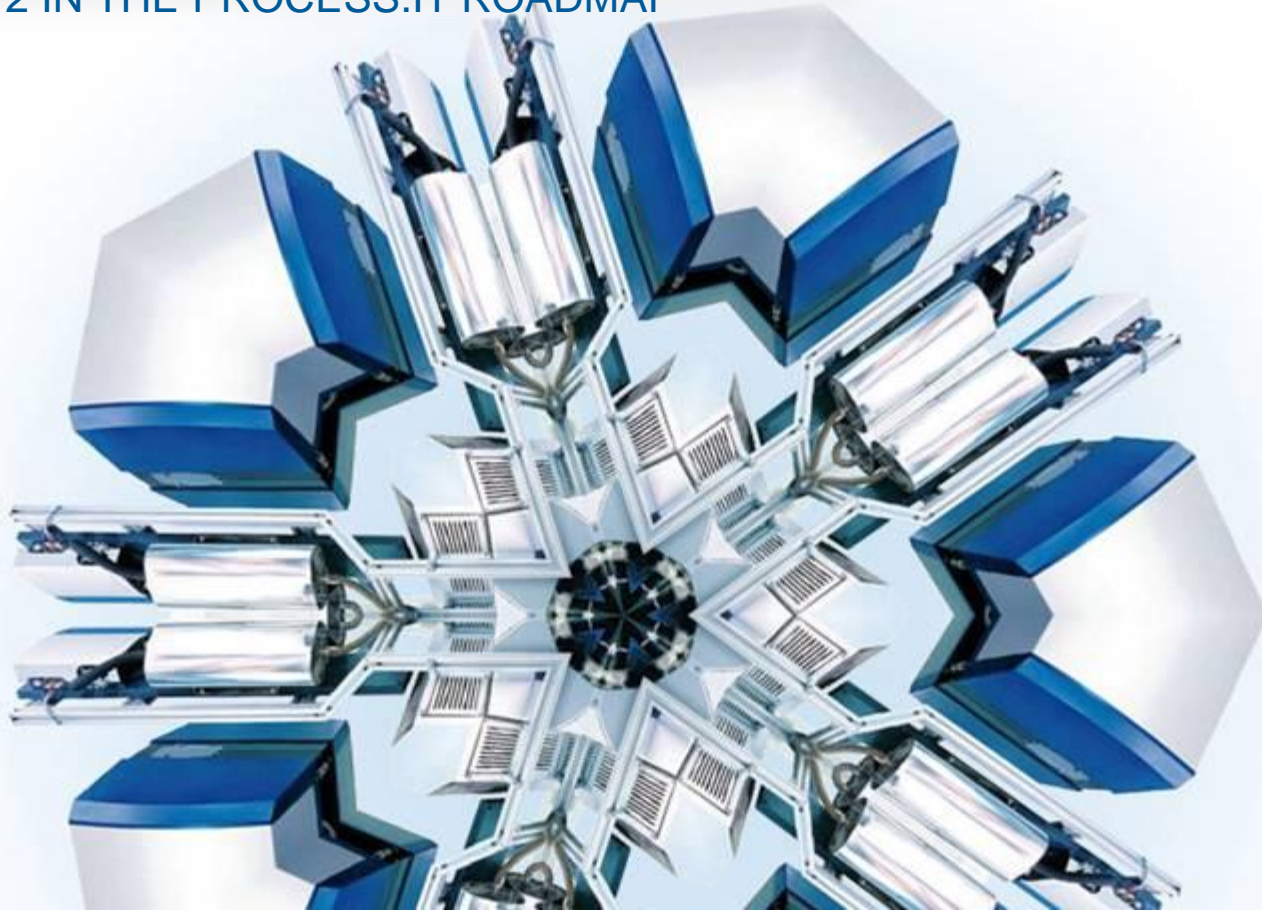


ARROWHEAD AND INCREASED INFORMATION TRANSPARENCY BETWEEN FIELD DEVICES AND ERP



ARROWHEADS CONTRIBUTION TO THE IDEAL
CONCEPT 2 IN THE PROCESS.IT ROADMAP



CONTENT

- AVL List GmbH
- Initial situation
- Problem
- Motivation to join ArrowHead
- Findings in the first year
- Outlook

OUR EXPERIENCE FOR YOUR SUCCESS



AVL is world's largest privately owned company for development, simulation and testing of:

- Hybrid electrical vehicles
- Combustion engines
- Transmissions
- Electric drives
- Batteries
- Fuelcell Systems
- xCU software
- Passenger cars,
- Trucks
- Large engines
- Offroad engines

- AVL – more than 65 years' experience
- Involved in more than 2000 engine development projects
- More than 4000 engine, powertrain and battery test bed installations

AVL SERVES ALL AUTOMOTIVE SEGMENTS



passenger cars

2-wheelers

racing



construction

agriculture

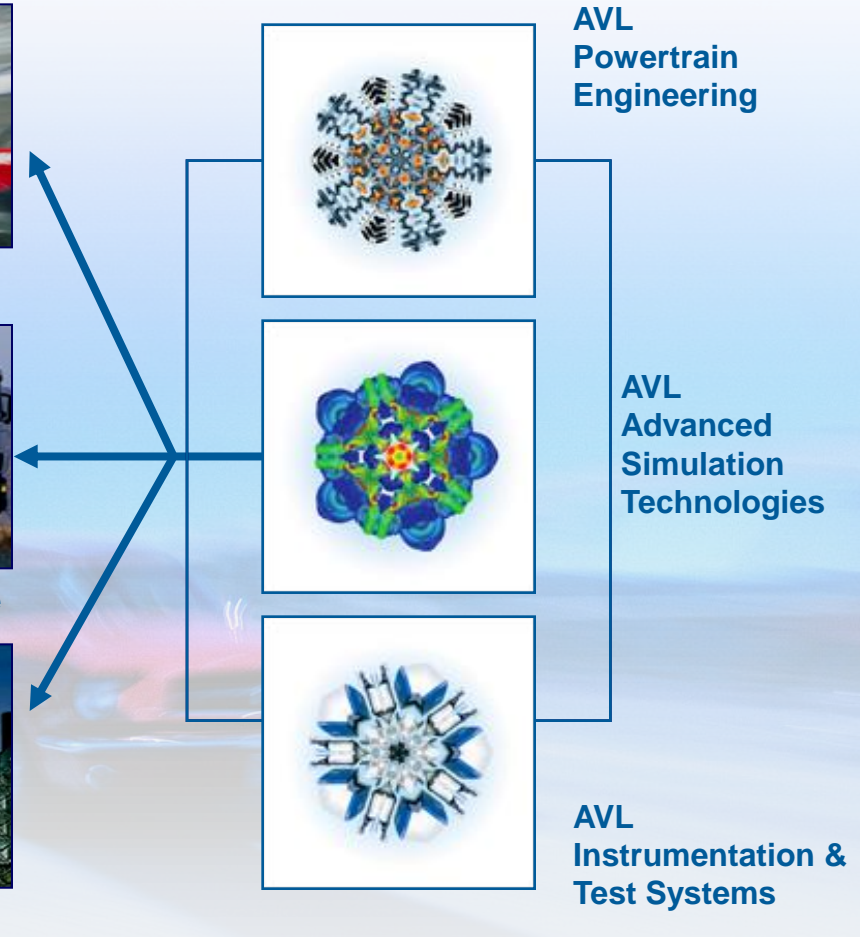
commercial vehicle



locomotive

marine

power plants

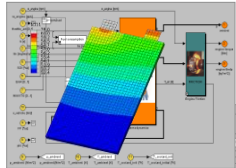


AVL PRODUCT PORTFOLIO FOR SUCCESSFUL POWERTRAIN DEVELOPMENT

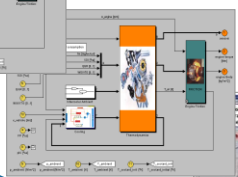


AVL Instrumentation & Software for Systemvalidation & Optimization

Component
(Battery/ Engine)
Simulation



Powertrain
Simulation



Vehicle
Simulation



Battery/Motor
Testing / HIL



Engine Test
Systems



Driveline Test
Systems



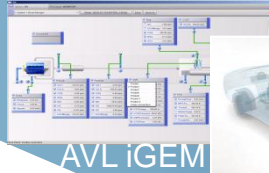
Chassis
Dyno



Vehicle
Development



Vehicle Validation
Prod. Signoff



AVL iGEM



AVL CAMEO



AVL PUMA,
LYNX



E-Storage
Tester



Instruments
(emissions,
consumption)

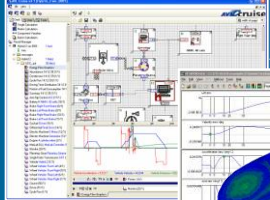


AVL-INDICOM

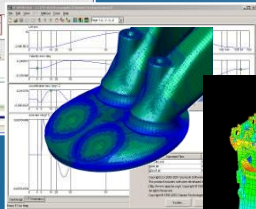


AVL M.O.V.E.

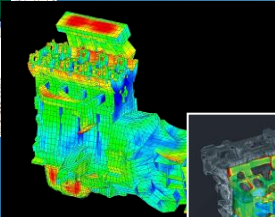
AVL-CRUISE



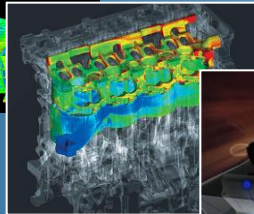
AVL-BOOST



AVL-EXCITE



AVL-FIRE



AVL-DRIVE



AVL Software Tools for Powertrain Development

INITIAL SITUATION

- AVLs product portfolio consists of a large number of systems (SW and HW) such as stand-alone instruments or system of systems called test beds or test fields
- Nearly every system is individual (due to customer requirements, differences in legislation, technical boundaries, ...)
- The individuality and the large number of different products are drivers for complexity and a challenge to our service offerings



PROBLEM STATEMENT

- ▶ Rising demands of customers require reduction of downtimes, improved planability of service activities, increase in product stability and tracking of status of all activities
- ▶ These demands require the manufacturer and/or service provider collect and analyze real world data of the installed base
- ▶ The majority of current products have been designed for highly secured environments, usually none-internet zones



MOTIVATION TO PARTICIPATE IN ARROWHEAD



All stated problems require additional information from the installed base:

- ▶ **Reduce downtimes**

- proactive knowledge on required future service activities (e.g. next maintenance, next refill, ...)

- ▶ **Improve planability**

- reduce provision effort and act rather than react to save resources & energy

- ▶ **Product stability**

- systematically learn along the life cycle of products while they are in use

- ▶ **Tracking**

- real-time acquisition of system states and activities in the work flow along the life cycle



ARTEMIS PROJECT ARROWHEAD „AHEAD OF THE FUTURE“



- ▶ EU ARTEMIS AIPP Project
- ▶ Coordinator: Lulea University of Technology
- ▶ 75+ partners
- ▶ 03/2013 – 02/2017
- ▶ Domains: smart buildings, smart cities, industrial production, energy production and virtual market, electro-mobility, automotive development service
- ▶ Scope
 - Enable collaborative automation by networked embedded devices
 - Provide technical framework and standardization
 - Develop solutions how to integrate legacy systems
 - Implementation and evaluation of cooperative automation

MOTIVATION FOR AVL TO JOIN ARROWHEAD



... we want to achieve a way in the future to ...

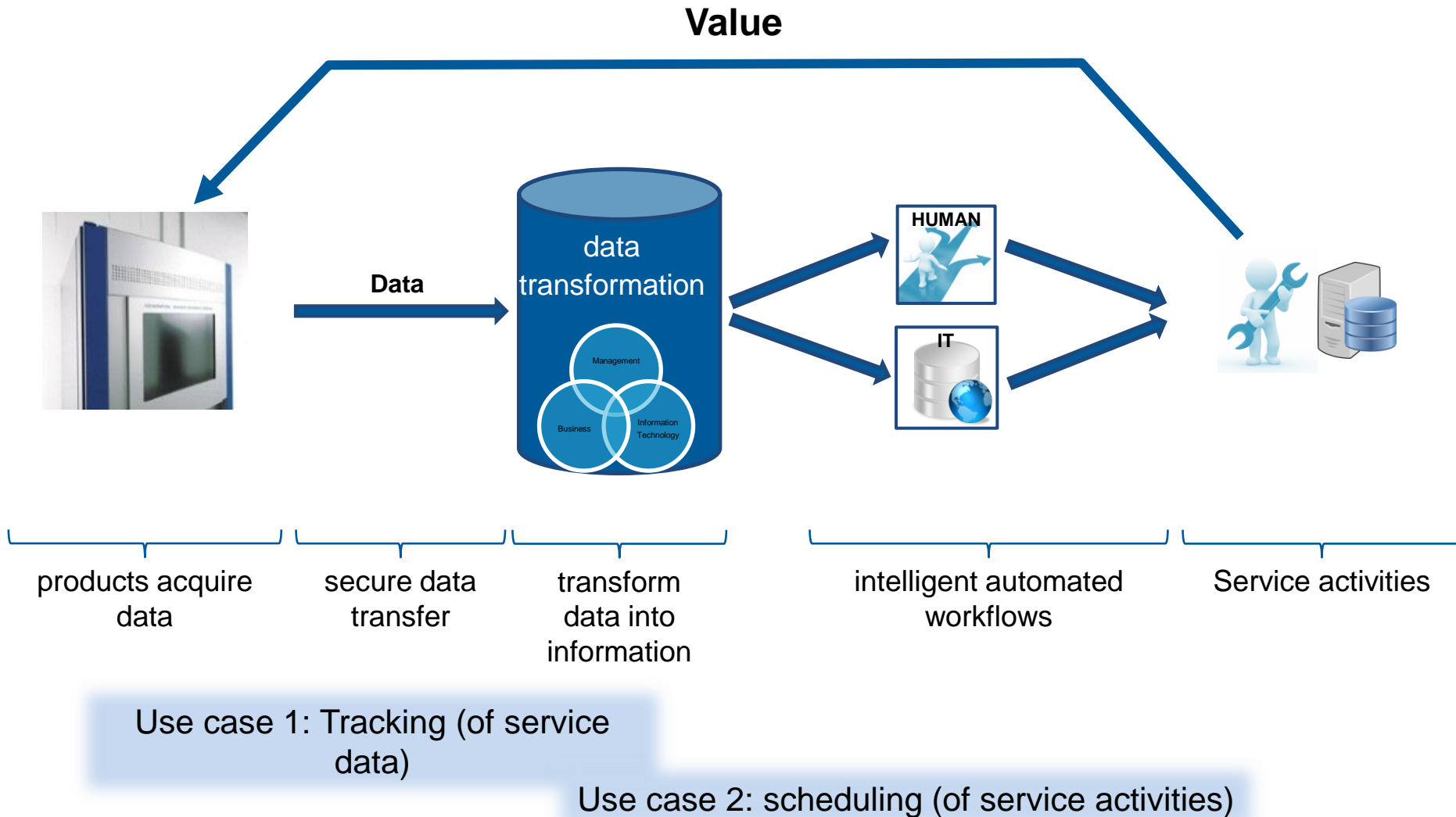
- ▶ get our products connected with us in a secure way by keeping the configuration effort at a minimum
- ▶ provide excellent service and product quality
- ▶ integrate customers and products into future oriented, highly intelligent and automated workflows

... we call it Smart Service

... Devices go social ...

Arrowhead delivers a significant contribution

SMART SERVICE USE CASES IN ARROWHEAD



RESULTS IN FIRST YEAR

- ▶ It is necessary to make our products secure internet compliant to support the Smart Service approach
 - **Procedural model** how to manage threats and vulnerabilities → base for future ArrowHead iterations (developed together with AIT and TU-Graz)

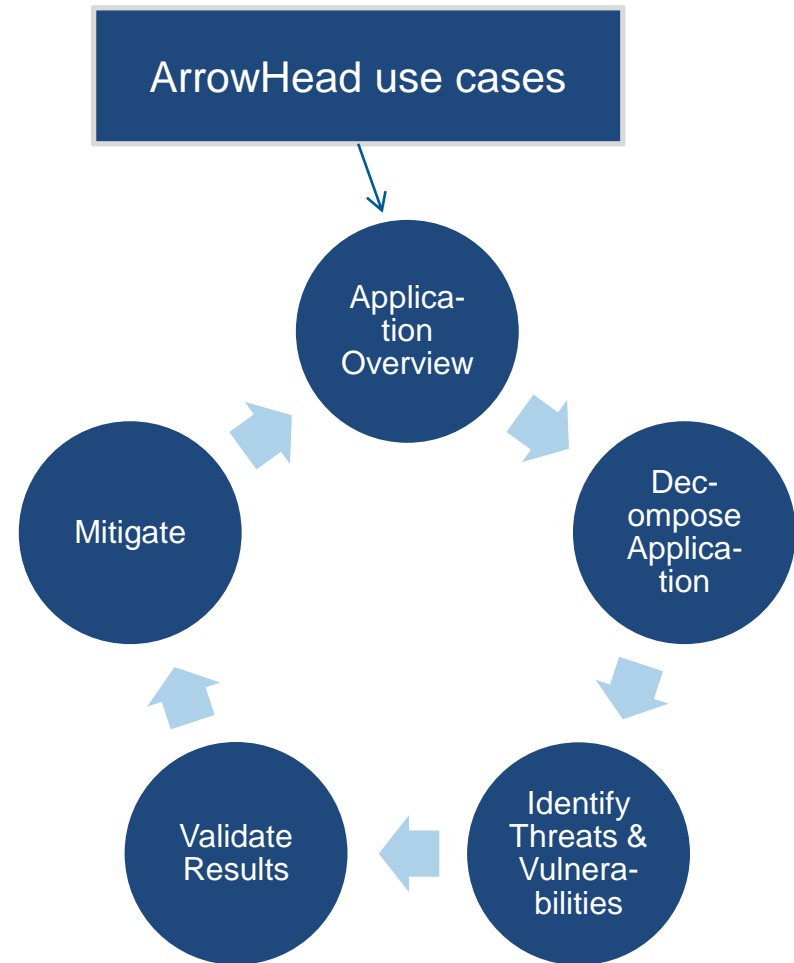


APPROACH TO DEVELOP SAFE & SECURE INSTRUMENT COMMUNICATION FRAMEWORK

1. Describe the application
2. Decompose the application
3. Identify the threats & vulnerabilities
4. Validate results
5. Define mitigation measures

Output:

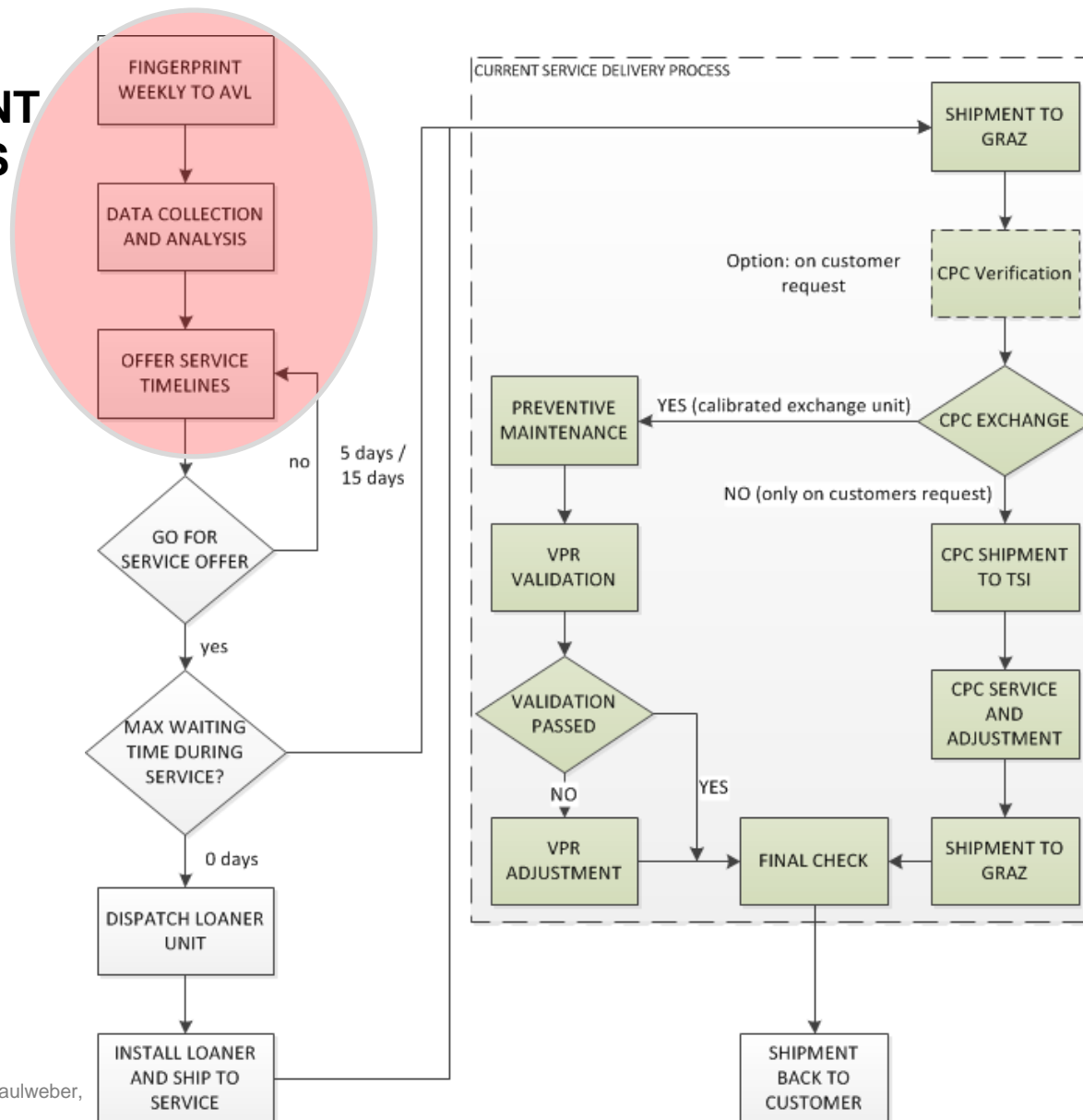
- Document describing an architecture of the application
- List of threat scenarios
- Appropriate counter measures



APPLICATION EXAMPLE: SERVICE WORKFLOW



CURRENT FOCUS

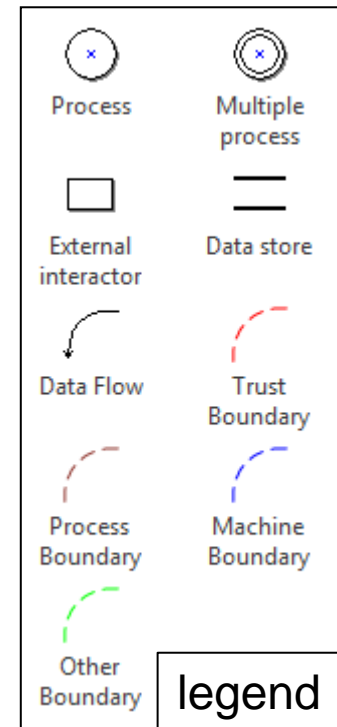
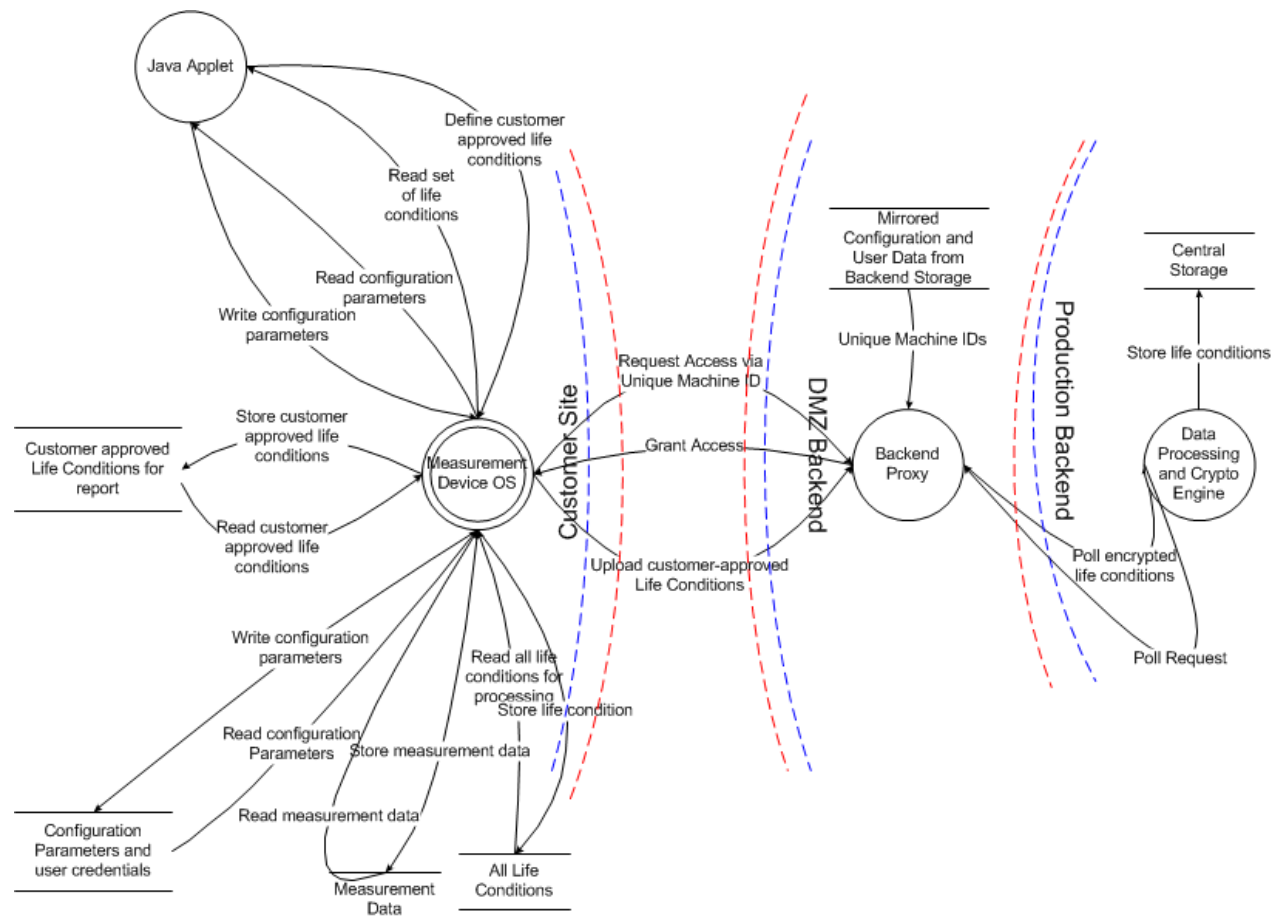
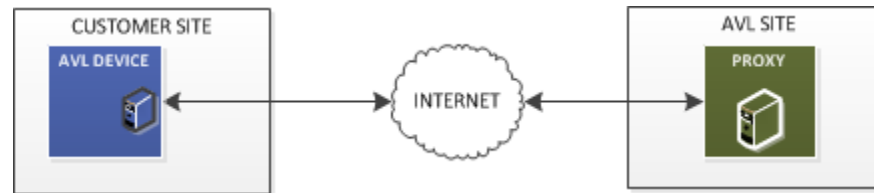


GREY:
PARTLY OR FULLY
AUTOMIZED
WORKFLOW

GREEN:
CLASSIC
ACTIVITIES

DECOMPOSITION EXAMPLE: PROCESS OF SECURE DATA TRANSFER

Draft architecture:



NEXT STEPS

- to support the Smart Service approach it is necessary to make our products internet compliant in a safe & secure manner
 - to manage threats and vulnerabilities we defined a procedure model that we follow in future ArrowHead iterations (together with the Austrian Institute of Technology, TU-Graz)
- by adding intelligence to our products we make them able to reveal how they are being used by creating a concept to
 - extend existing products with adapted/additional HW and SW using communication ARROWHEAD framework
 - define a proper back-end infrastructure as a data concentration point for processing
 - interlink the data concentrator with our ERP systems to trigger pre-defined workflows and provide tracking capabilities
 - develop a common approach to enable our customers to observe and control every data exchange and to display which information we can derive out of data and determine the trust level

MORE TO COME SOON

THANK YOU FOR YOUR ATTENTION!