

# Process and Data Management in Powertrain Development, Simulation and Test

PDiM – Workshop – November 29<sup>th</sup>

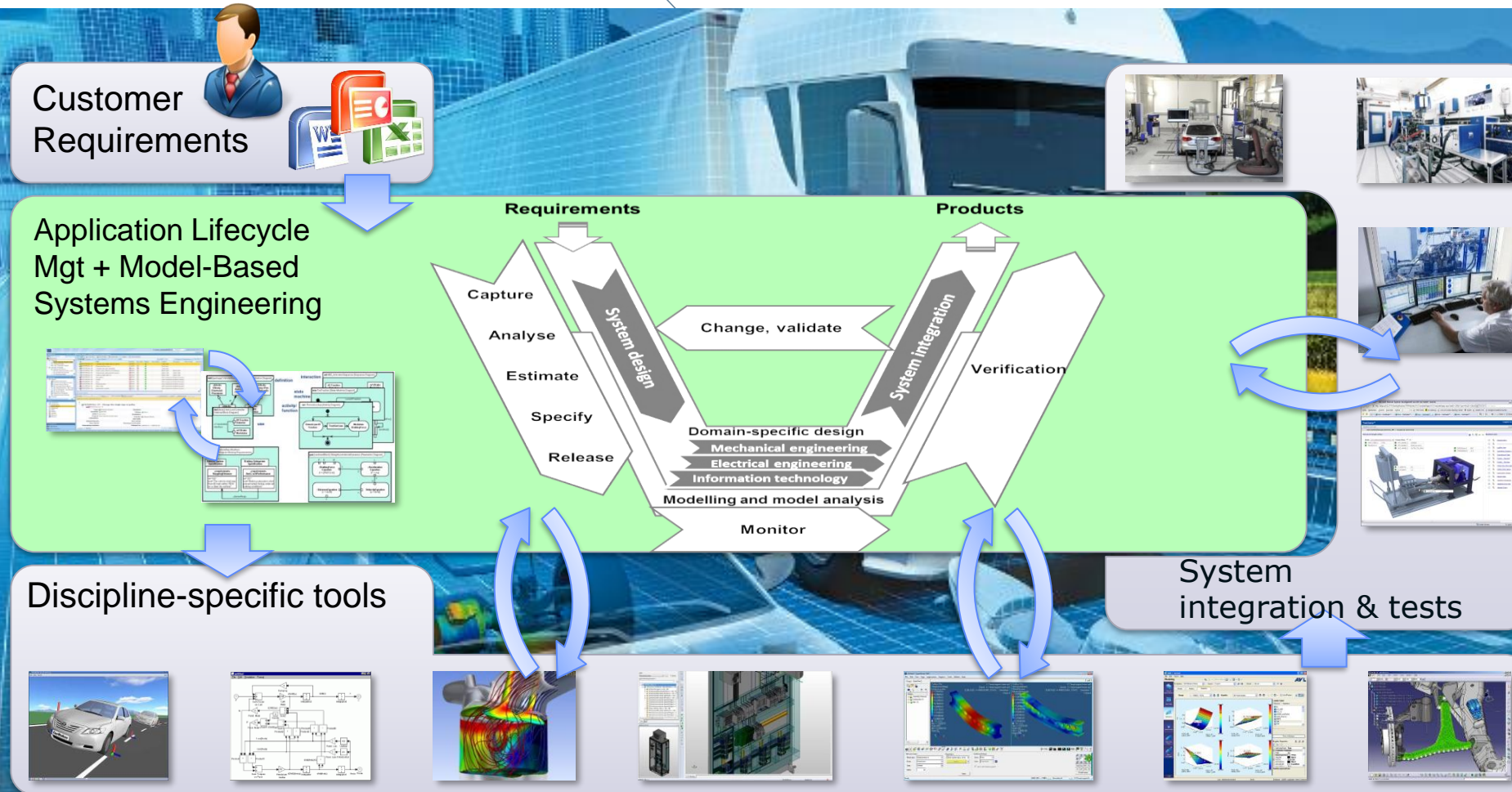
Software is guiding function development, data flows and process, materials etc. Best practices are shared how IT support ties in and ensures an efficient daily operation.

## Target of the Workshop - Goal

**How to create and manage best the IT landscape and its support to enable and monitor the powertrain development process including test and simulation**



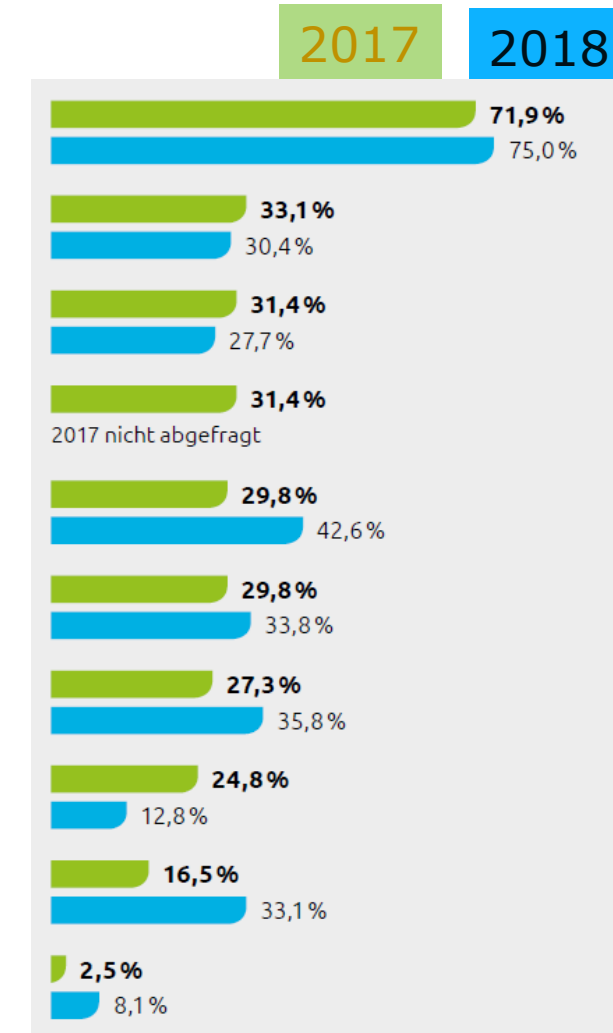
# Powertrain Development Process



The Powertrain Development is organized in consecutive generations with increased maturity of the powertrain in each generation enabled and monitored by a variety of SW tools

# IT trends – CAPGEMINI Study

- Extension of digitalization
- Development of new, innovative IT products and services
- Increase of end user satisfaction
- Increase of agility and flexibility
- Increase of efficiency
- Increase of data security
- Reduction of costs
- Shorten time-to -market (e.g. shortened release cycles, faster provisioning of IT, ...)
- Improvement of information analysis and usage
- Close technological gap compared to competition







## Examples for IT tools in PT Engineering

### AVL SW LANDSCAPE

**AVL CONCERTO™**  
Data Analysis & Reporting

**AVL CAMEO™**  
Automatic Calibration

**AVL DRIVE™**  
Objective Assessment of Vehicle Attributes

**AVL CRUISE™**  
Powertrain Simulation

**AVL EXCITE™**  
Multi-body Engine Dynamics and Acoustics

**Model.CONNECT™**  
Model Integration

**AVL FIRE™**  
Physics Simulation

**AVL SANTORIN MX™**  
Test Data Mgt

**AVL TFMS™**  
Test Factory Mgt

**AVL VSM™**  
Maneuver Simulation

**Testbed.CONNECT™**  
SW/HW Integration

**AVL CRETA 4™**  
Calibration Data Mgt

Vehicle Integration  
Test and Optimization

AVL-M.O.V.E./DRIVE

### Engineering

Component Simulation, Design and Test

MIL/SIL/HIL

Virtual TB

Battery TB

Inverter TB

Starter TB

E-Drive TB

Fuel Cell TB

Hybrid ICE TB

E-Integration TB

Powertrain TB

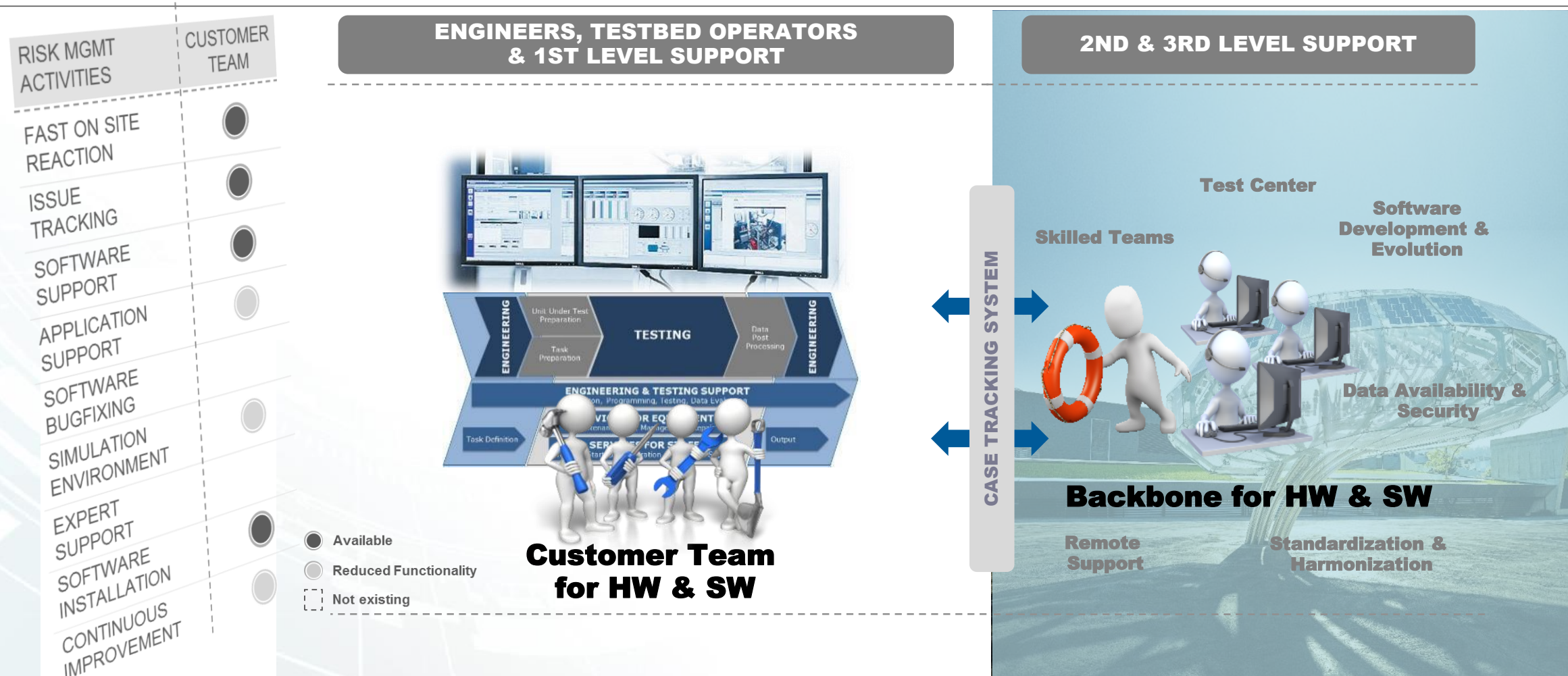
Vehicle TB

### Test Systems



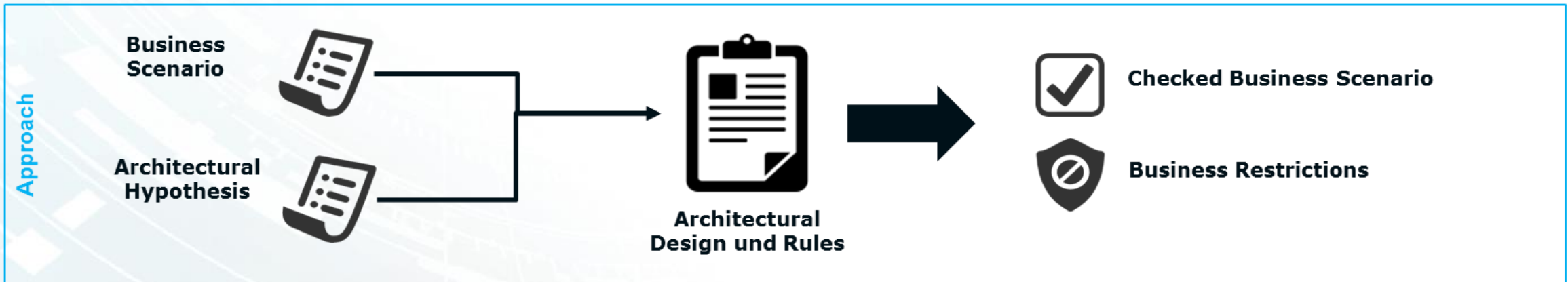
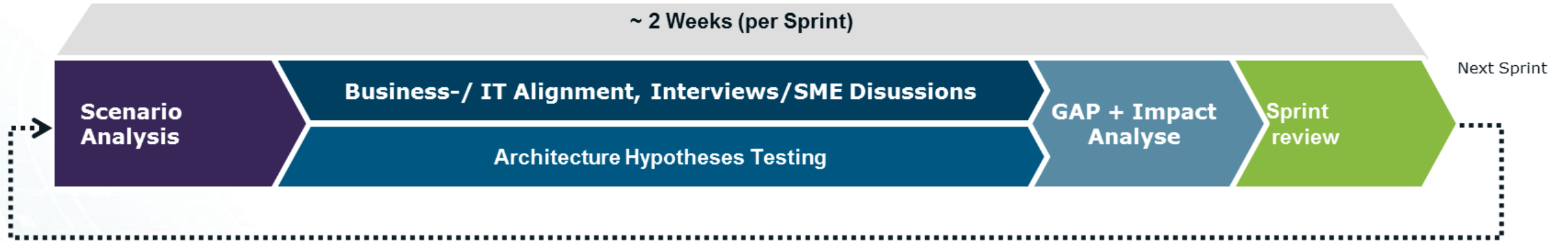
# Support & Maintenance Models to Reduce Operational Risk

## OVERALL CUSTOMER DEVELOPMENT PROCESS



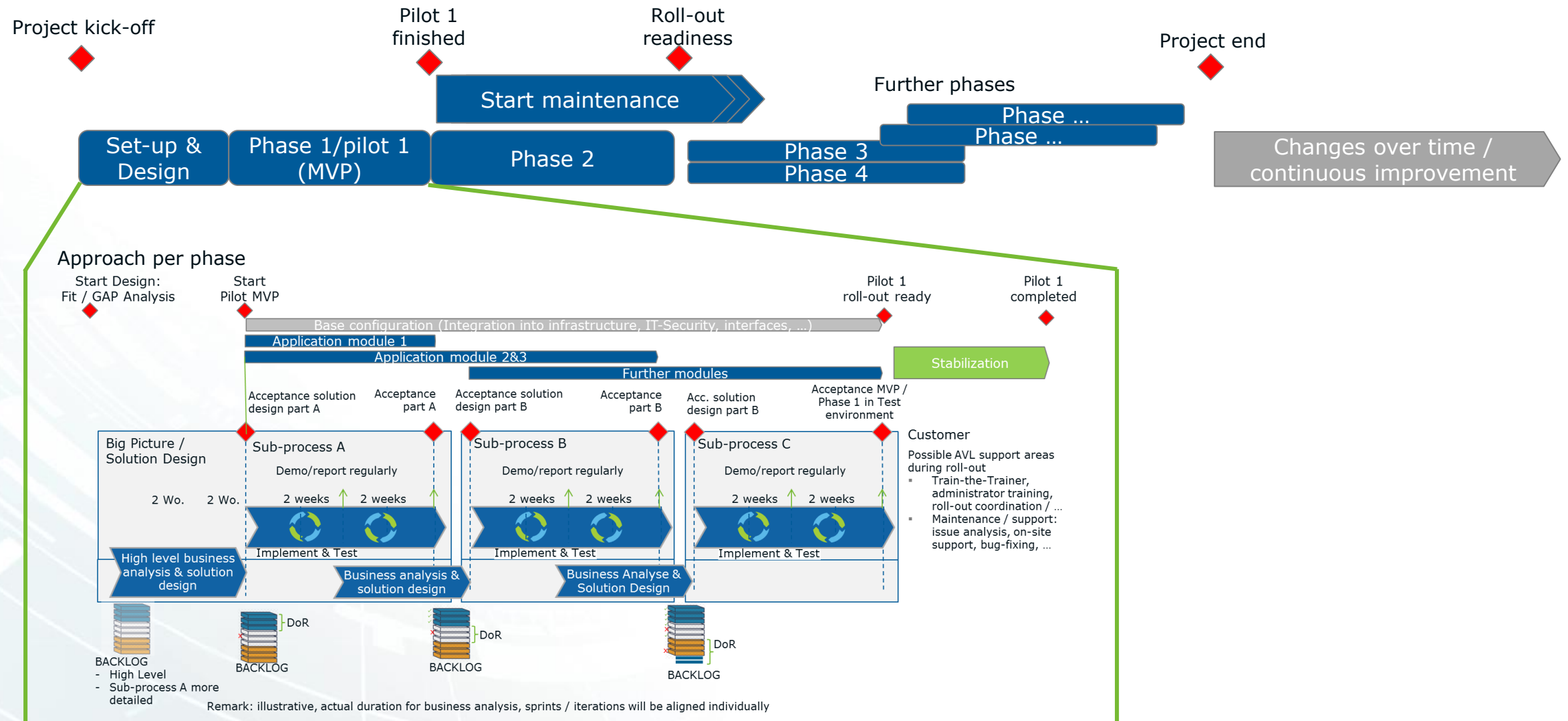
Supported by **CUSTOMER IT SOLUTION CHAIN** from **CONCEPT** to **TESTBED**

# Work on Business Needs & Deliverables





# Sample Project Outline Details for Start-up & Phase 1



# Example 1 / Global acting OEM



## Contract scope (global)

333 engine / powertrain / component TB automation systems  
Office software products  
8 locations / 5 countries  
Over 2000 users  
5 year frame agreement

## Contract targets

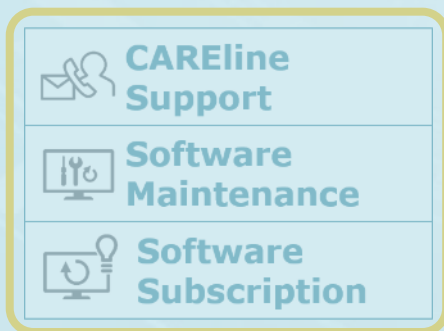
Manage all AVL software globally  
Sustain high software quality  
Comply with future technology requirements

## Activities

Software support with a dedicated global team  
Software validation incl. customer applications  
Implementation of customer-influenced product evolutions  
Performance reporting  
Productivity and utilization monitoring

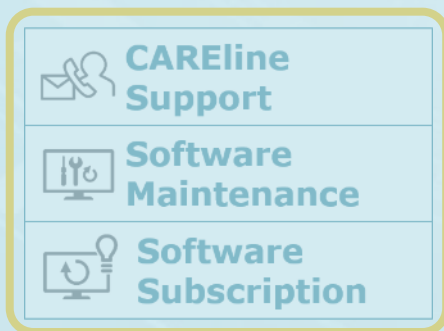
## Impact

10% point utilization increase  
Globally standardized software platform





## Example 2 / Global acting TIER 1



### Contract scope

54 engine TB automation systems  
26 emission applications  
Office software products  
9 locations / 8 countries  
4 year duration

### Contract targets

Reach optimal software stability  
Ensure global data compatibility  
Leverage of global synergies  
Achieve smooth migration to new software generation

### Activities

Software maintenance  
Case management (incl. global consolidation) & processing via priority lane  
Remote support  
Global release upgrades  
Realization of enhancement requests  
Global performance reporting

### Impact

Downtime Reduction  
Utilization Increase

## Example 3 / Local acting OEM

### Contract scope

115 engine & powertrain TB automation systems

3 sites / 1 country

10 year duration

### Contract targets

Controlled software harmonization and evolution over time

Defined issue resolution cycles (KPI-based)

Access to AVL HQ developer competences

### Activities

Software maintenance

Case management & processing via priority lane

Remote support

Regular expert workshops

Provision of new software releases

Performance reporting

### Impact

>90% KPI achievement

High customer satisfaction



**CAREline  
Support**



**Software  
Maintenance**



**Software  
Subscription**



## Example 4 / Racing



### Contract scope

2 engine TB automation systems  
(Software & Hardware)

1 site

Contract since 2011

### Contract targets

Risk reduction with application-specific  
equipment support

Quick recovery in case of TB standstill

### Activities

Software maintenance

Case management & processing  
via priority lane

Remote support

Expert workshops

Performance reporting

### Impact

No major downtime of AVL equipment  
over the last 24 months

Next-day-implementation of work-  
arounds in 9 out of 10 cases



**CAREline  
Support**



**Software  
Maintenance**



**Software  
Subscription**

## Conclusions (source: McKinsey)

# Transforming IT infrastructure organizations using agile

- Agile approaches can enable IT infrastructure groups to **boost their productivity by 25 to 30 percent** in six to 18 months, depending on the size of the organization.
- Improved infrastructure service delivery and **shortened time to market for digital products and features.**