




Testing, Crafting and Developing a Brand New Powertrain Software in an Agile Environment

A joint Development around the World 

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Qtronic User Conference, Dec.2nd 2019



A woman with braided hair is smiling and looking out a window. The window has several teal sticky notes and white balloons attached to it. In the background, another person is visible, looking thoughtful. The scene is brightly lit, suggesting an indoor office or meeting space.

Who are we and what do we do?

Can the SW be ready for what comes next?



The Story

Why?

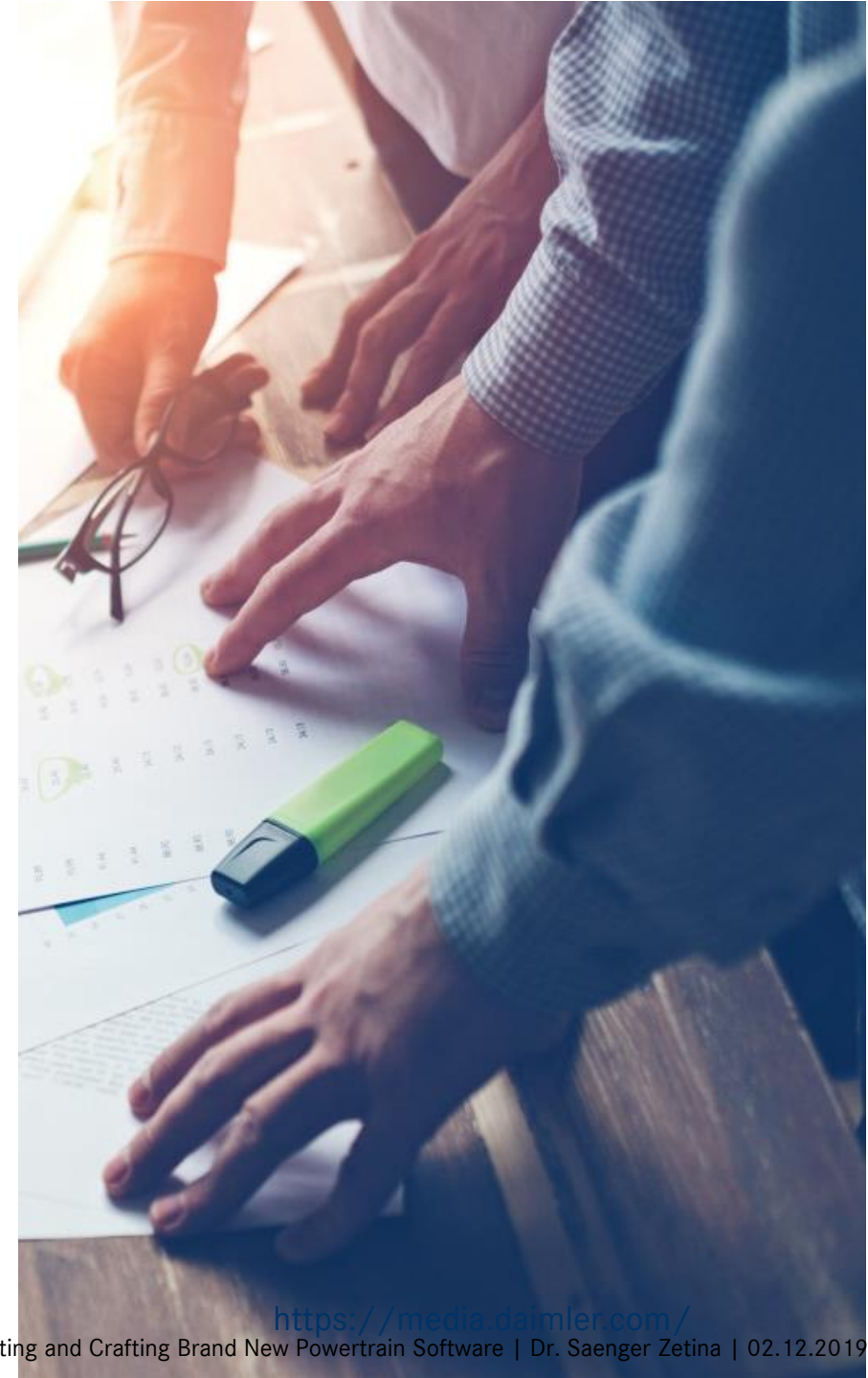
- Fit multiple powertrain variants
- Higher information quality and quantity

What?

- Create new features
- Migrate old features

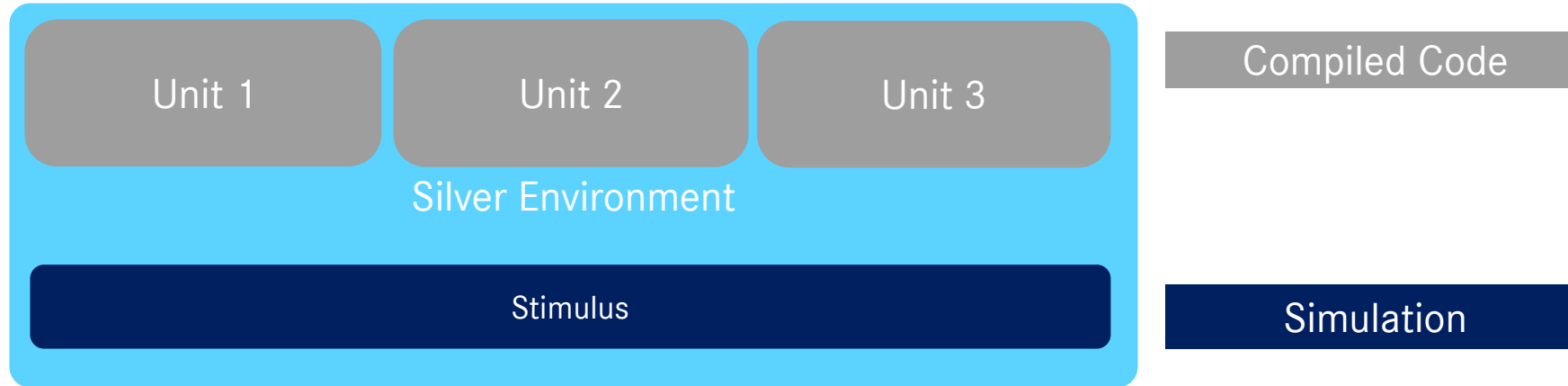
How?

- Inventors, developers, testers and sponsors
- 2-3 years

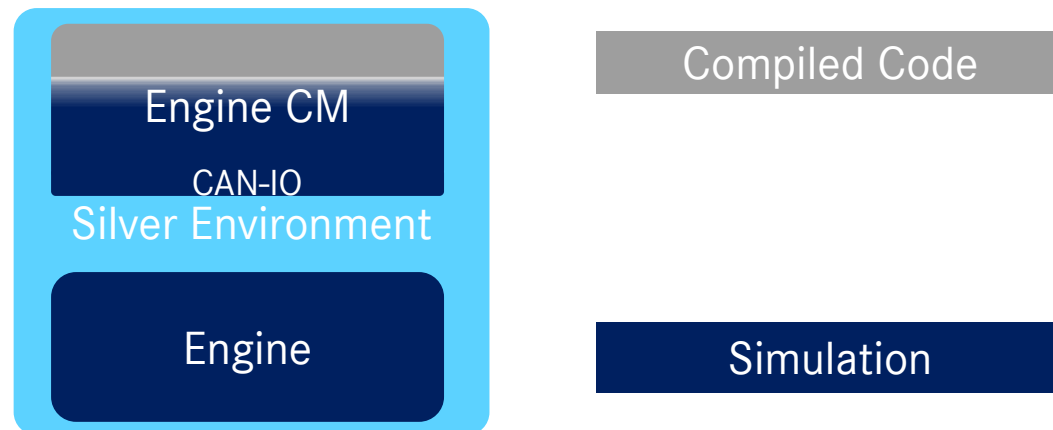


SWE-Level (Software)

MULTI-MODULE SIL



MINI COMPONENT SIL



SYS-Level (System)

POWERTRAIN SIL

OPTIONAL WITHOUT ENGINE INHOUSE SOFTWARE



Powertrain SIL in the physical Domain for

- Torque & speed
- Current & voltage

Agile Software Development

through Requirements
Engineering
Focus Today: Testing

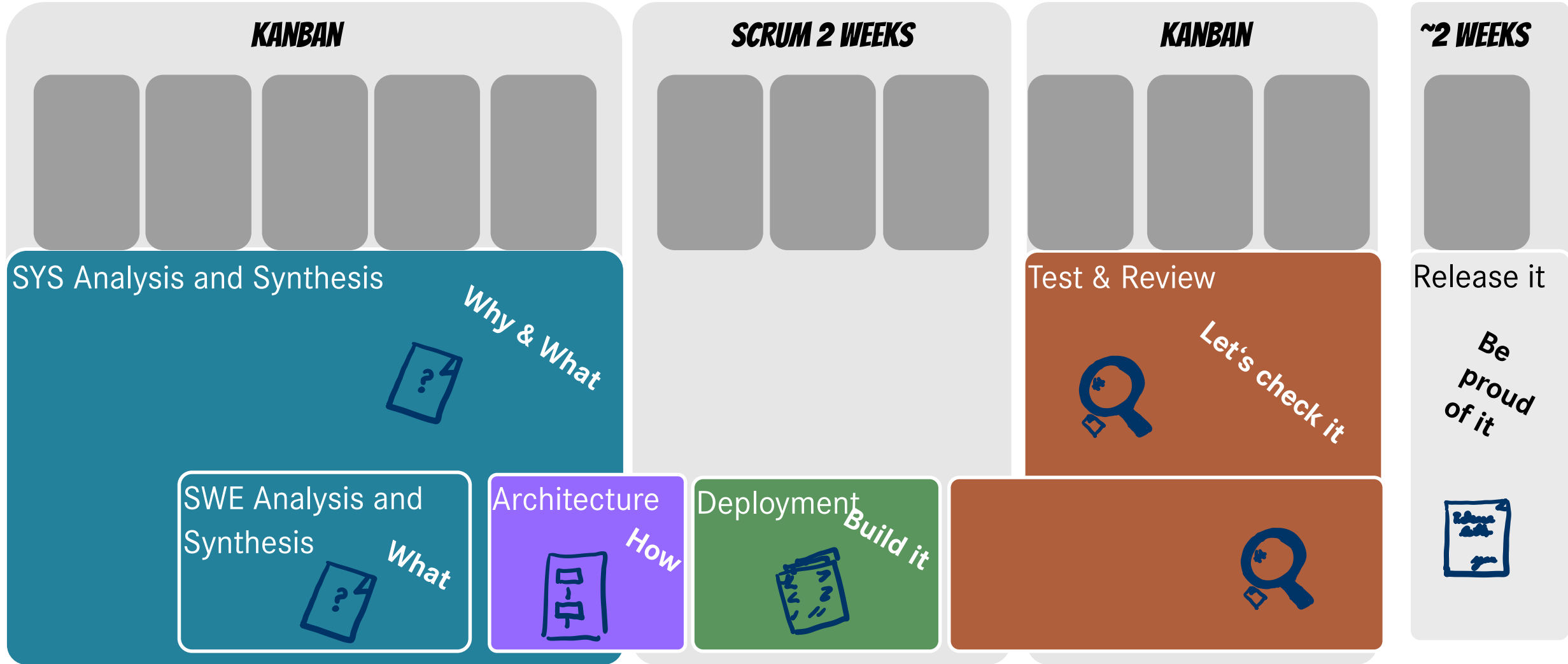


How to build up awareness for testing?

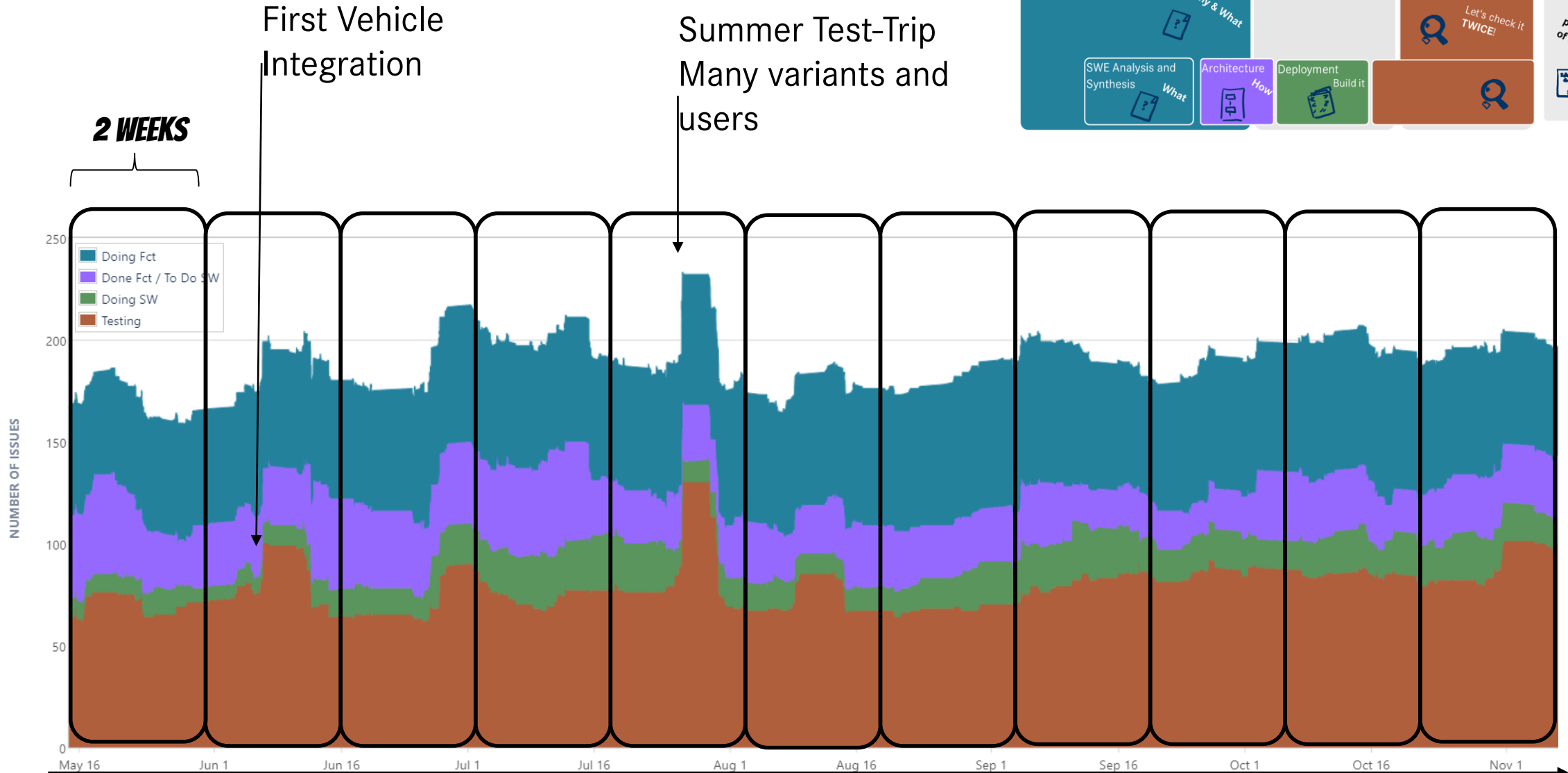
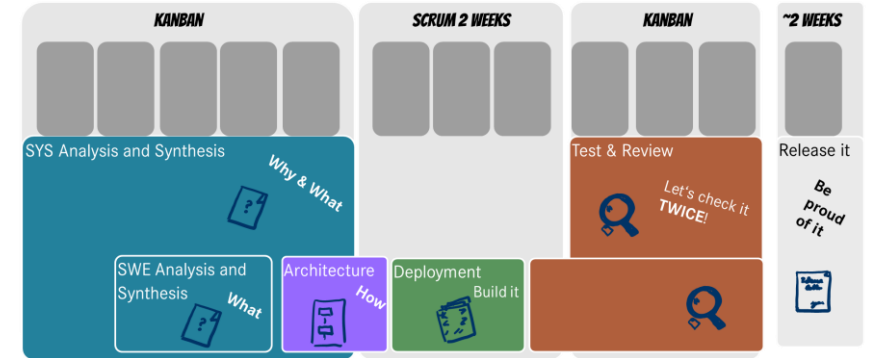
1. Find the team flow
2. Start with small steps
3. Designate test-managers
4. Organize and iterate
5. Build the test concept
6. Automate everything
7. Go full variants



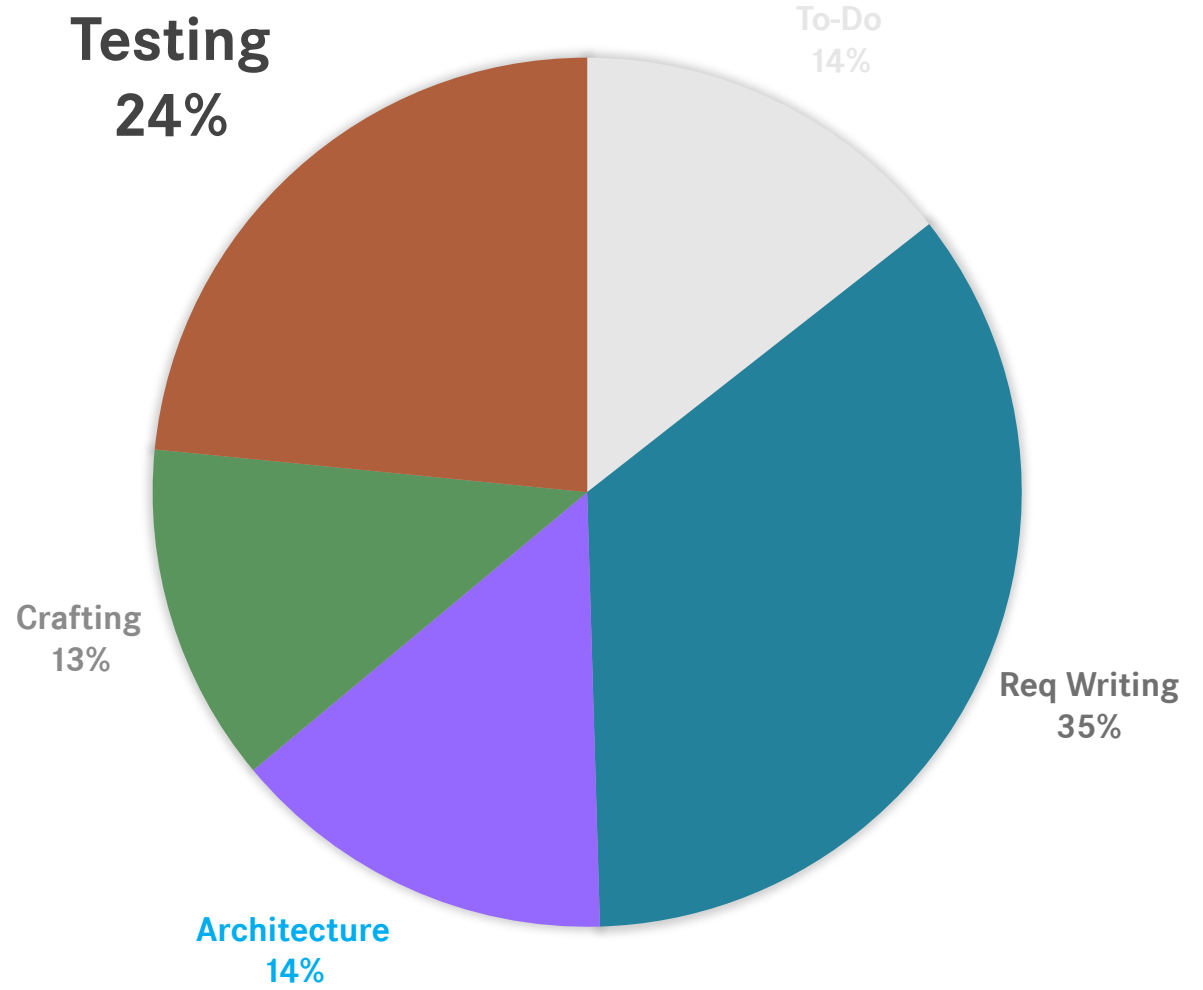
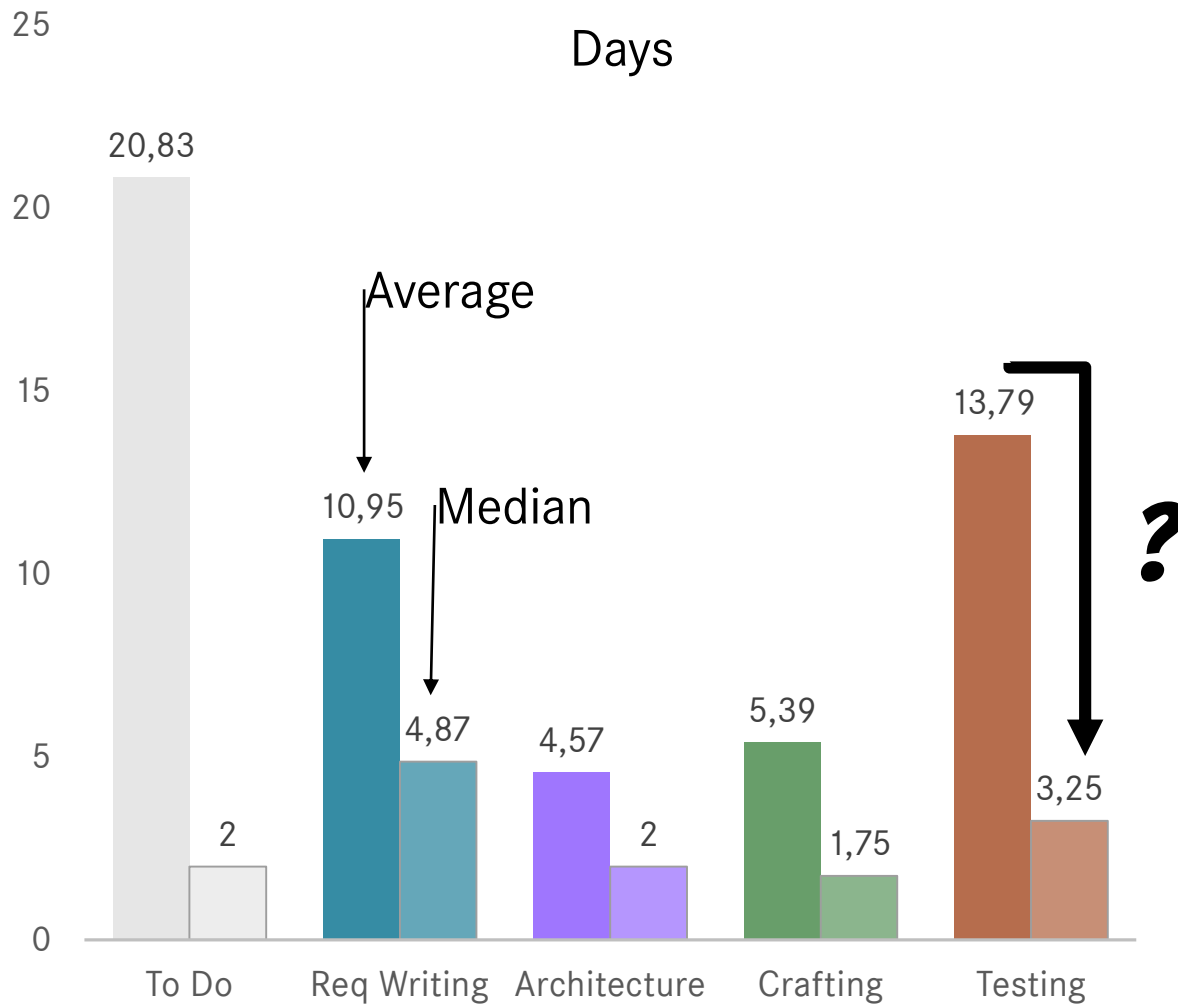
1. Find the Flow



Tune the Flow



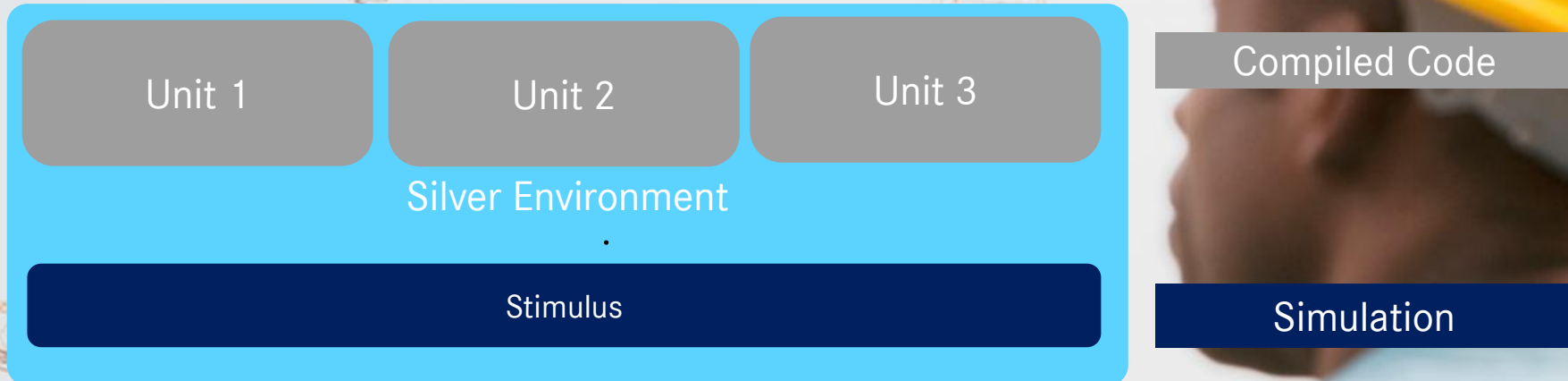
Statistics



2. Start with Small Steps



MULTI-MODULE SIL



3. Designate Test-Managers

The Test-Manager works in the Agile – Team as a:

- Developer
- Product Owner
- Scrum-Master

Tasks

- Organizes Silver Hackathons
- Keeps Track of the Test-Status
- Owns the Test-Strategy
- Gets Help



Bangalore, India



Sindelfingen, Germany

4 Organize and Iterate

Test Strategy

- **As efficient and as digital as possible**
- **Stay in one Eco-System**
- **Automate as much as possible**

Test-Concept

- **Non-Functional in Unit-Testing**
- **Functional in SYS-Area**
- **Reviews where it makes sense**

Test-Tools

- **SILver, Testweaver....**

Decide and start testing!



5. Build the Test Concept

#Functional Reviews #Acceptance Tests

SYSTEM AREA

#SIL SANITY TESTS

#SIL SMOKE TESTS

#Vehicle Tests
#HIL
Regressiontests

#SIL-TESTWEAVER
REGRESSIONTESTS

#Functional Architecture Reviews

#UML-Review

SOFTWARE AREA

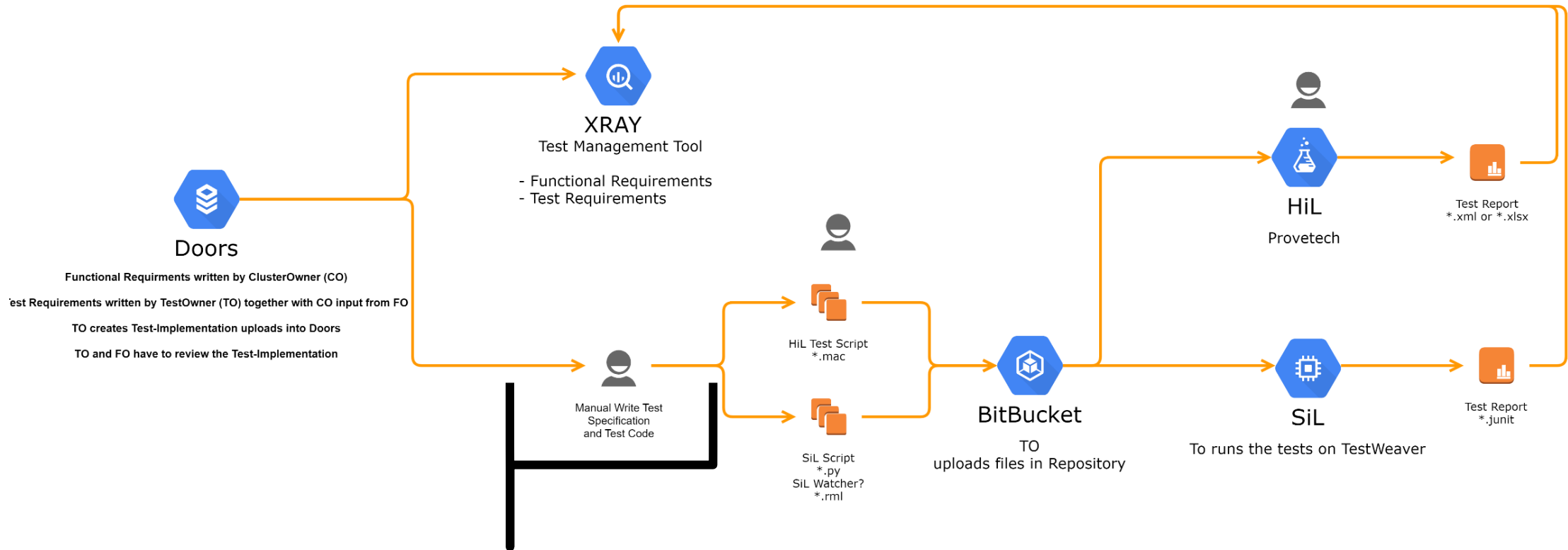
#Acceptance Criteria

#FUNCTIONAL SIL-UNIT TESTS

#NON FUNCTIONAL TESTS SIL CODE COVERAGE

#Integration Tests
#FUNCTIONAL SIL MULTI MODULE
#Integration Tests

Testconcept 1.0



Coding test scripts from test specification is still a Manual Process

Example: Writing one Test and Matching to Requirement

```
#####  
#####  
# ControlUnit: CPC3-RG  
# Software Group: MoKo  
# Cluster: TqCoor  
# Jira Key: MOKO-4058  
# Request: a coordinated ESP request shall acknowledged to the ESP  
# TestCase: if ESP request on WP#10 is confirmed, the Ack-Signal is set  
to EXECUTED or SUPPRESSED  
# Defect:  
#####  
#####  
requirement_watcher("W_CPC3_RG_TqCoor_EspReqAck_01"):  
    during(Ign_Mode == 1 && Whl_StLimTq==16 && Esp_StTyp > 0):  
        expect_throughout(Ptcoor_TqReqEspAck > 0 && Ptcoor_TqReqEspAck  
<3)
```



```
# Script to get a car  
started, to max  
speed and stop  
#####  
# Script to change  
the powertrain  
configuration
```


6. Automate everything



Automatize the Test-Scripts

Team Mercedes-Benz RD India developed the idea 💡

Scrip-Tick

Automatically generates the test scripts from test specification for various testing tools such as Testweaver, Provetech, Vector CAPL.

Advantages

- Quick Implementation
- Automated Checks on Test specifications
- Coding Tester Independent
- Standardized test specification
- Seamless integration between Test specification and test scripts

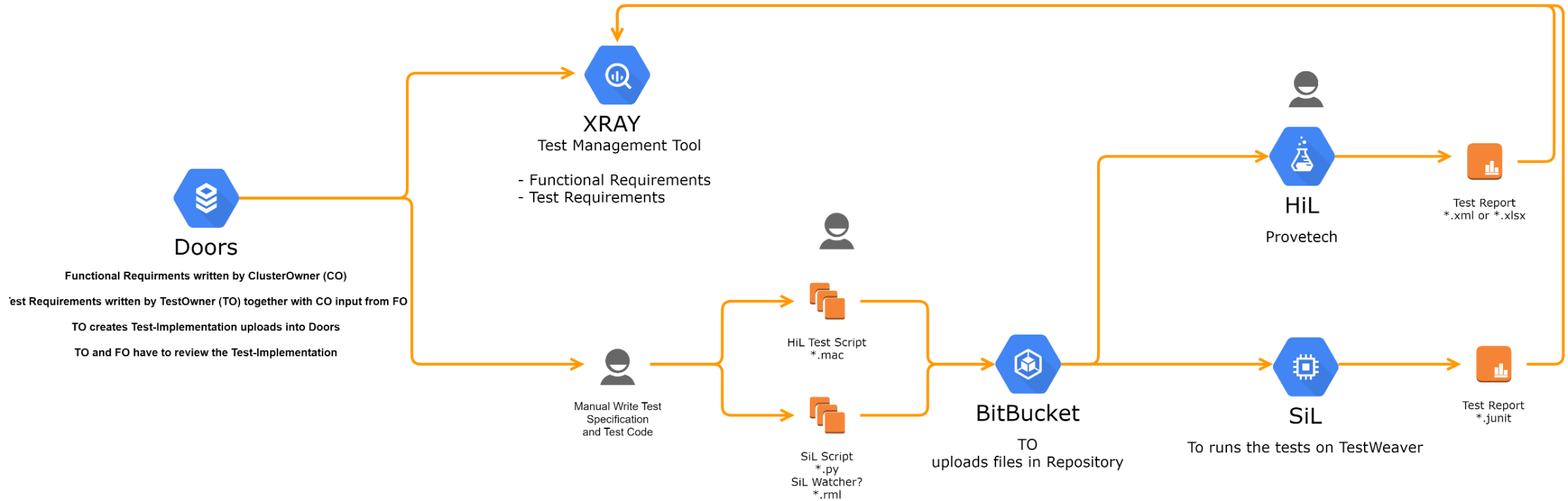
Test Specifications



MAGIC ☆ needed

Now, how does it look?

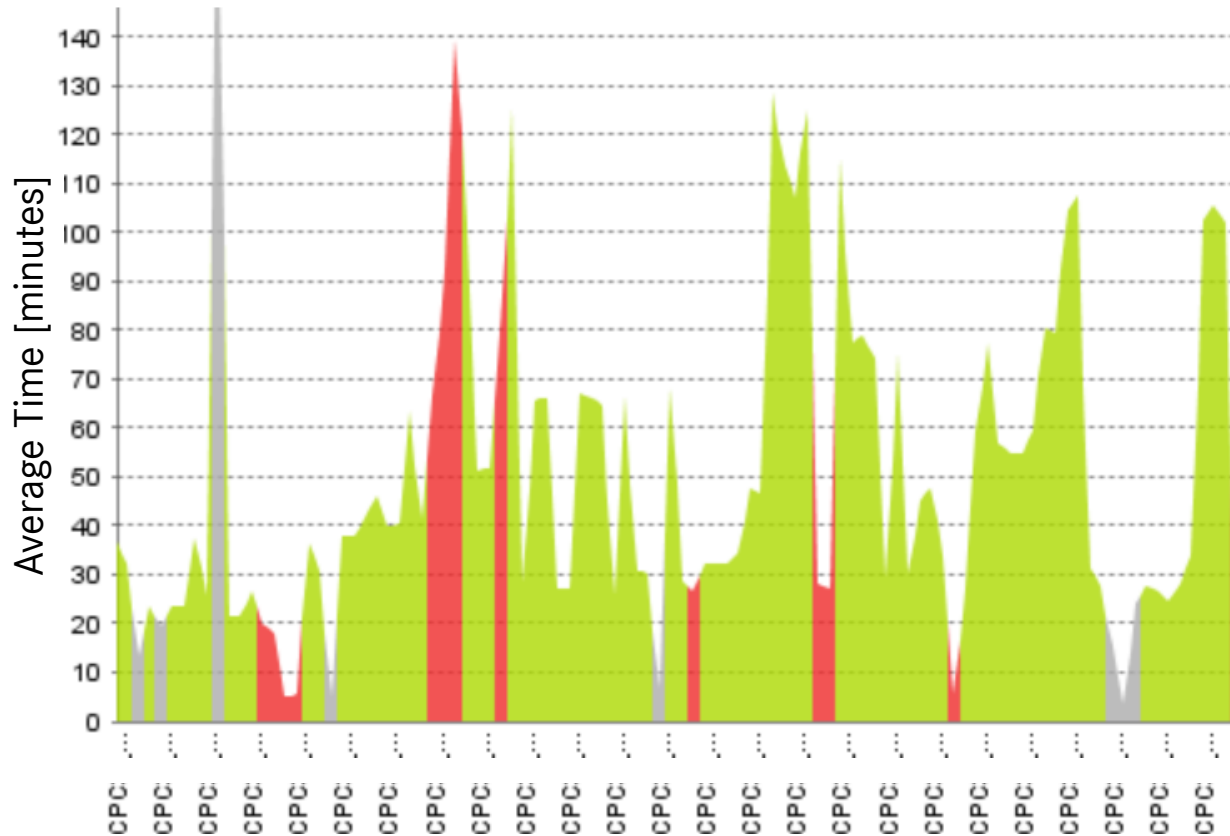
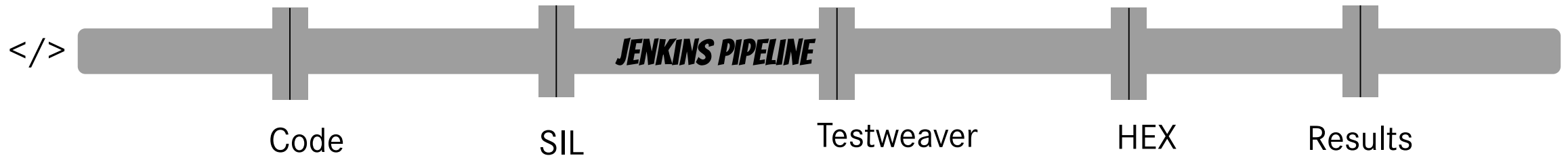
Testconcept 2.0



Update 1 : ONE Language for Scripting

Update 2 : Jenkins Pipeline

Sit-back and see the computer run tests



for each

SW-Release-Train the user gets a fully

- SIL-Build
- Test-Weaver Tested
- HEX-Build

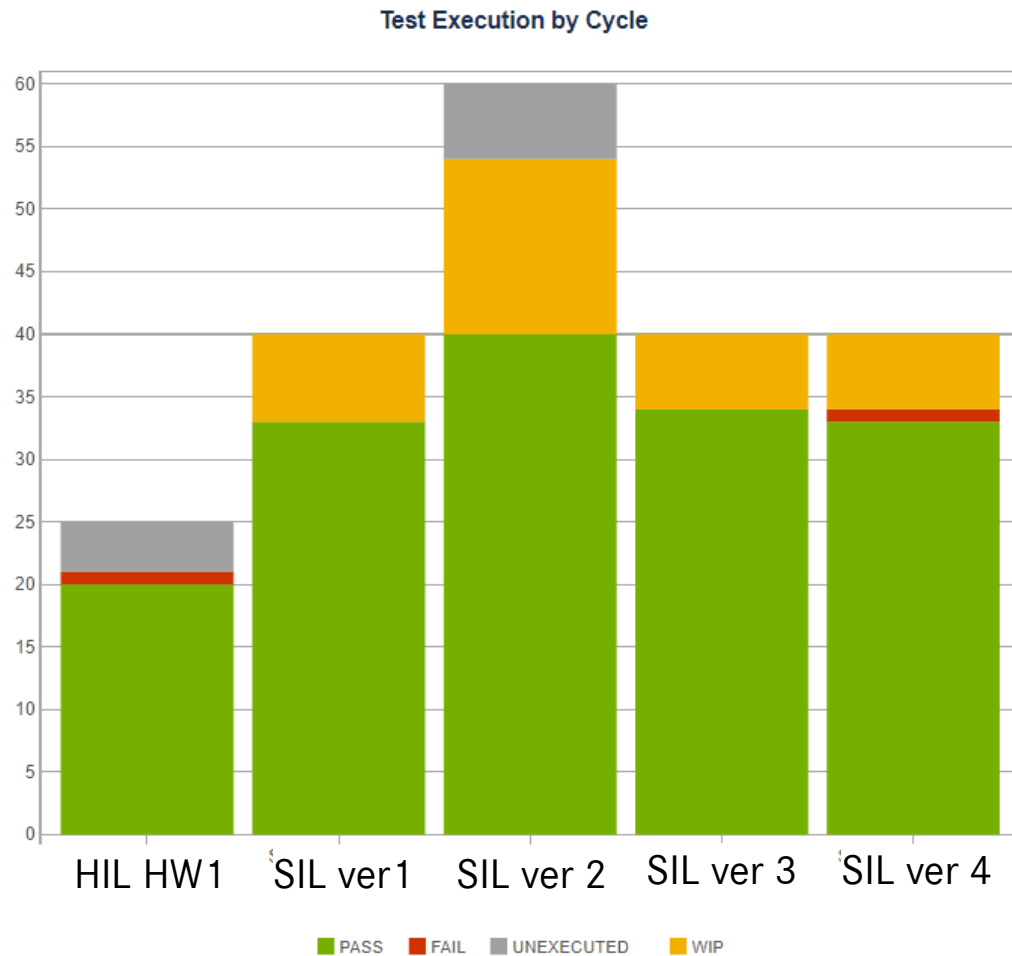
7. Go full variants

Focus on 6 Main Powertrain-Release Trains
(Lead Plattformen)

- Gasoline, Diesel, Mild-Hybrids ,
Performance Hybrids, Plug-In Hybrids,
and EVs
- 4x4 and 4x2 Variants in Addition



Test-Management Today



1. Well balanced diet between SIL- and HIL-Testing
2. Manual Testing in SIL still needed for Sanity-Checks of new Features
3. Next-Step: Migration of Regression Unit-Testing in SIL

- Smoke-Testing in Silver per Build
- Sanity-Testing in Silver
- Regression Testing in Testweaver
- HIL Testing

EVERY 2 WEEKS



Project Time From Start:
2 years, 10 months, 15 days

SW-Builds
released and
tested to users
602

Thank you very much for your attention



Danke!

<https://media.daimler.com/>

Testing and Crafting Brand New Powertrain Software | Dr. Saenger Zetina | 02.12.2019