

# **SCALING AGILE IN MECHATRONICS-DRIVEN COMPANIES**

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# STUDY

## Goal

Systematically investigate expectations and challenges from scaling agile beyond pure software development

## Industrial Partners

Volvo Cars

AB Volvo

Grundfos

SAAB EDS

Axis

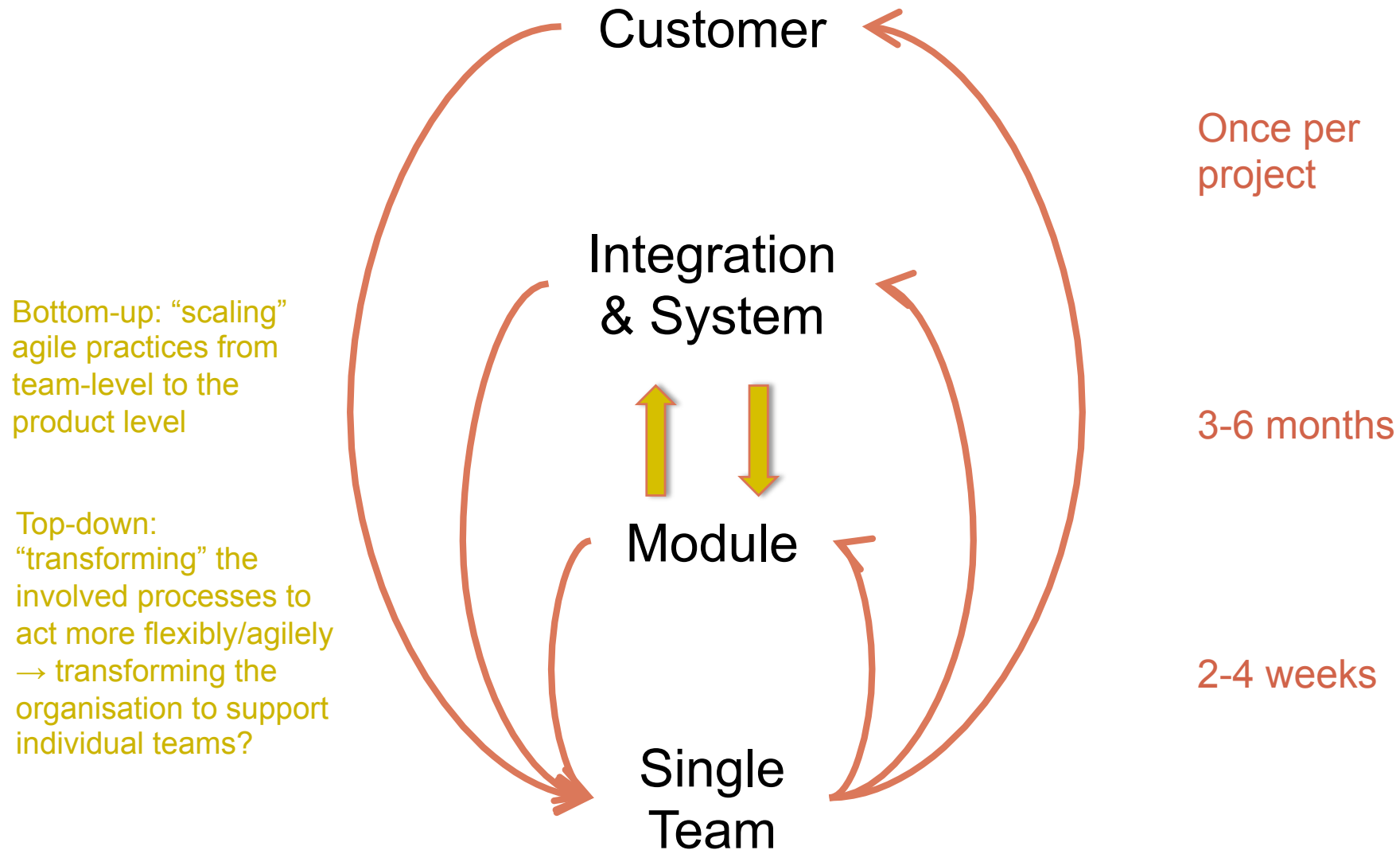
# **CASE STUDY: DATA COLLECTION**

1. Individual and separate on-site workshops at each company
2. Survey with online questionnaire
3. Joint workshops with representatives from all companies

# **TOP EXPECTED BENEFITS OF SUCCESSFULLY SCALING AGILE DEVELOPMENT**

- 1. Higher quality**
- 2. Faster time-to-market**
- 3. Shortening lead-times**
- 4. Maximize output from existing development resources**
- 5. Minimize risk to develop wrong things**

# COLLABORATION & FEEDBACK



# **TOP CHALLENGES TO ACCOMPLISHING SCALED AGILITY**

- 1. Better collaboration between all disciplines**
- 2. Changing the mindset in the organization**
- 3. Differentiate lead-times**

# SURVEY RESULTS ON CHALLENGES



# TOP CHALLENGES TO ACCOMPLISHING SCALED AGILITY

- **Missing flexibility in current *test facilities***
- **Adopting Agile in an organization's *mindset***
- **Collaboration between *all disciplines***
- **Differentiate *lead-times***



# RESULTS

**Identified 27 challenges when scaling agile,  
in 4 areas:**

- Leadership
- Collaboration
- System/product focus
- Customer focus

**Where only the third area is unique for  
mechatronic systems**

# MISSING FLEXIBILITY IN TEST FACILITIES

**Integration & system tests require  
mechanics, hardware and software**

**How to automate build and test, when  
build actually means *physical*  
building?**

How to do incremental and regression  
testing on mechanics?

# CHANGING THE MINDSET IN THE ORGANIZATION

**Companies with  
a long history**

**Manufacturing  
setup for a new  
car model cost  
more than entire  
R&D budget**



# **COLLABORATION BETWEEN DISCIPLINES**

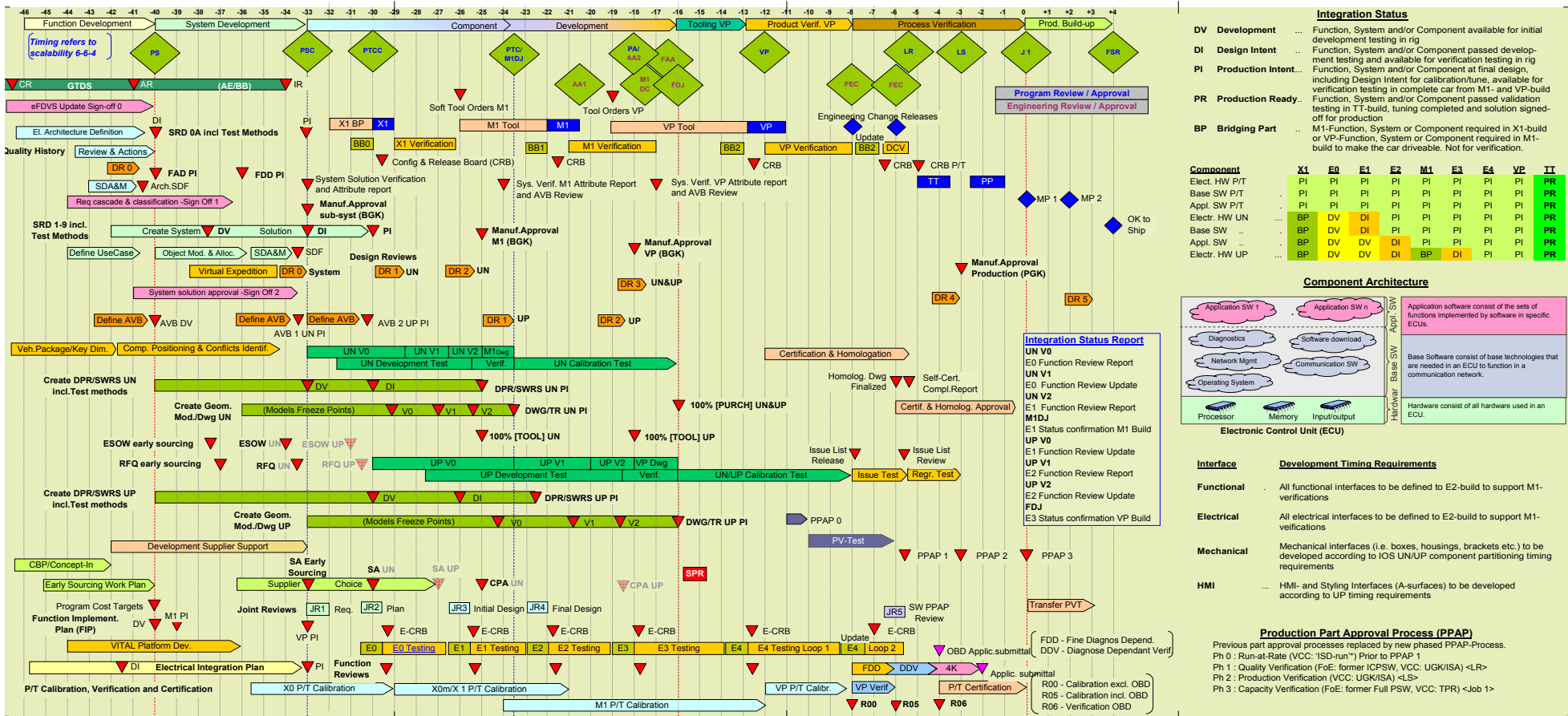
**The profession of mechanical, control and software engineers is formed already at university**

**How about sales engineers? Marketing?**

**All disciplines are optimising their WoW**

**But not necessarily with the same objectives**

**Joint planning is the current solution**



# VOLVO PRODUCT DEVELOPMENT SYSTEM

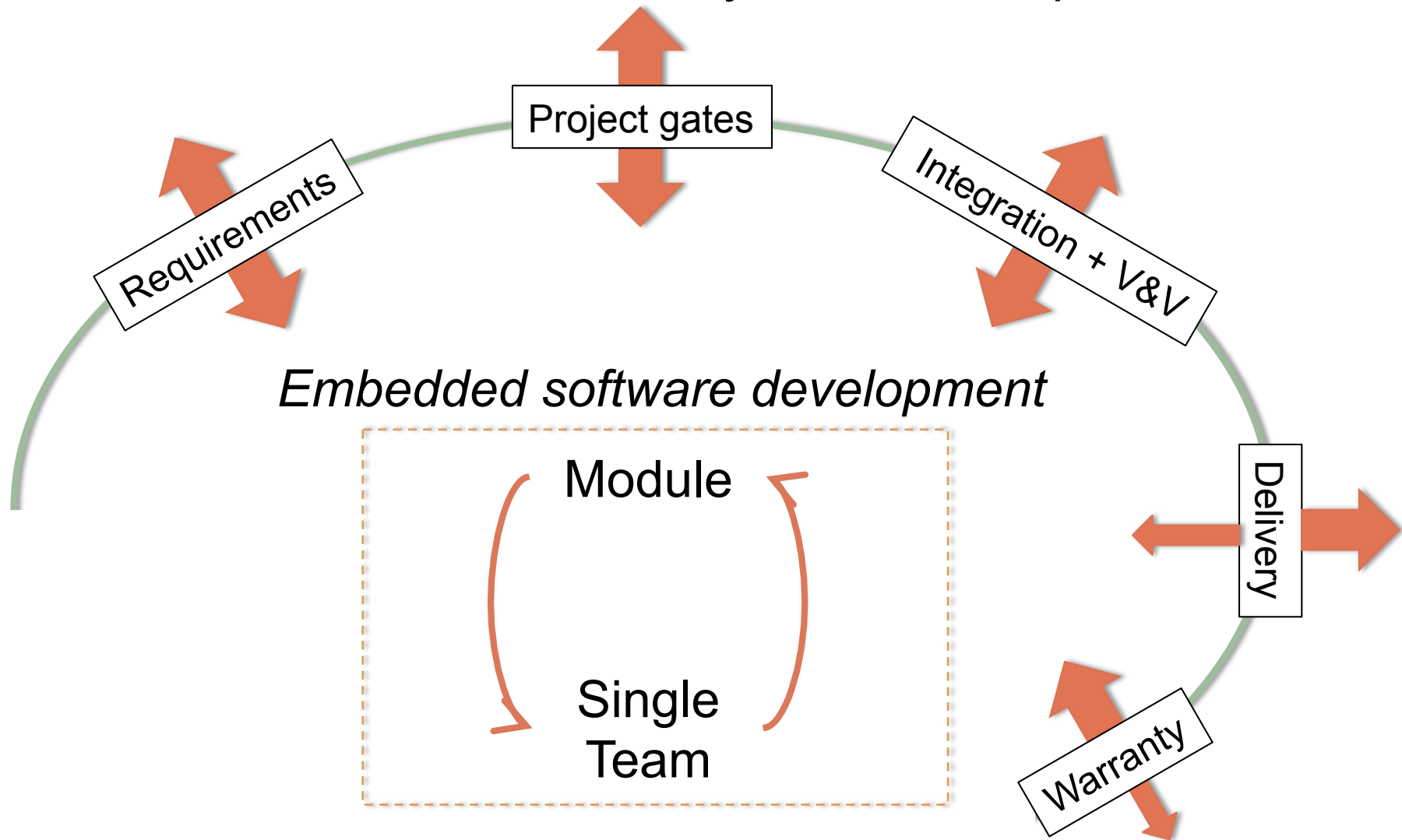
Overview of Volvo Cars stage-gate planning omitted on purpose!

For a very high level overview see e.g:

[http://www3.volvo.com/investors/finrep/sr11/en/enviromentalrespons/productdevelopment/globalproductdevelo/pdf/Global\\_product\\_development\\_process.pdf](http://www3.volvo.com/investors/finrep/sr11/en/enviromentalrespons/productdevelopment/globalproductdevelo/pdf/Global_product_development_process.pdf)

# COLLABORATION & FEEDBACK

*Mechanical, hardware and systems development*

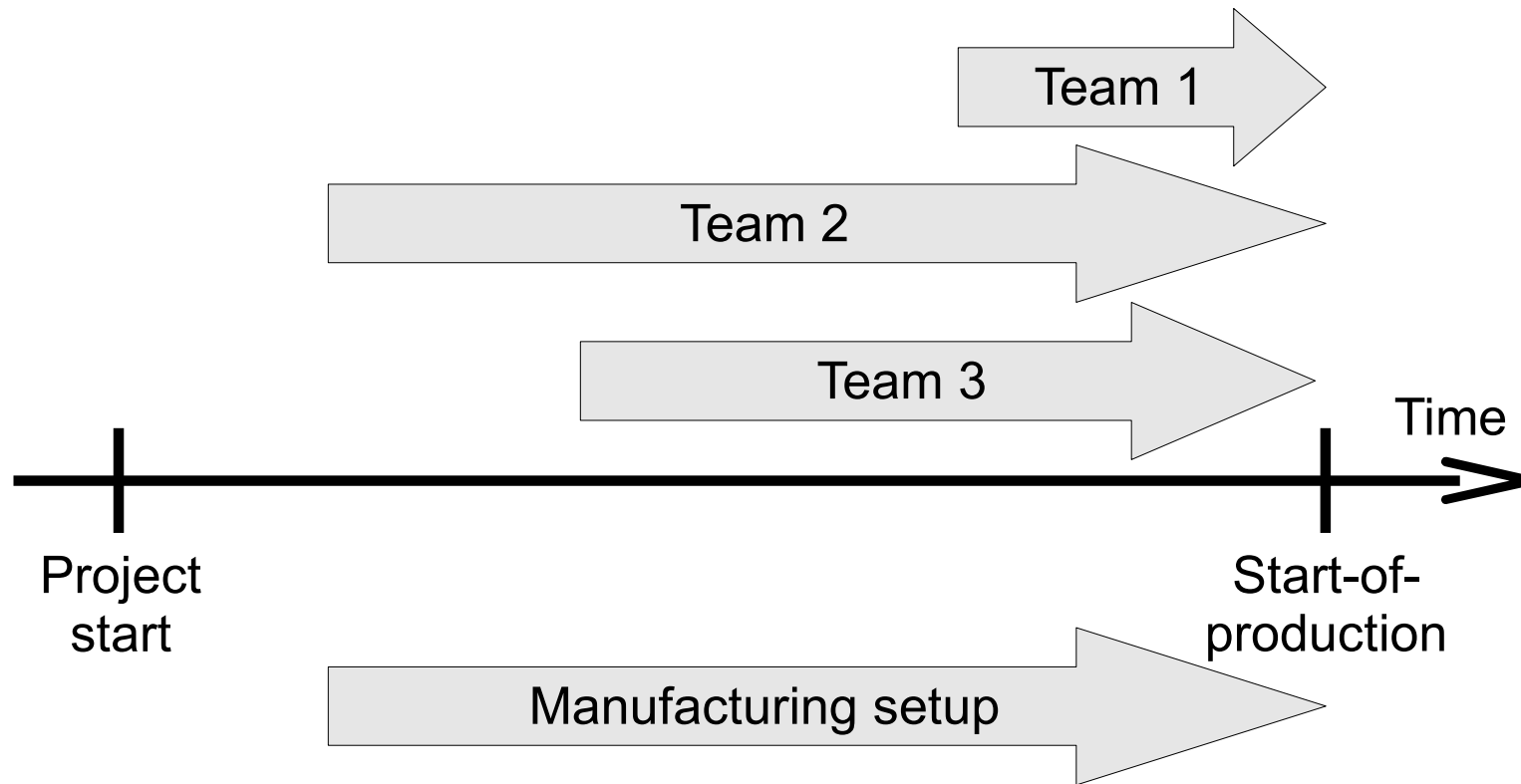


# **DIFFERENTIATE LEAD-TIMES**





# DIFFERENTIATED LEAD-TIMES



# CONCLUSIONS

**The most important challenges are not special for mechatronics industries**

**But some be different compared to other domains:**

- Integration and system testing
- Complicated value chain
- How often manufacturing can handle deployment of new software
- Deep domain knowledge

# NEXT STEPS

**Further analysis of all data collected so far**

**Going from *descriptive* hypotheses to *prescriptive* models for large-scale agile development**