

# Wie wir aus Forschern RSEs machen

## Die Software Engineering Initiative des DLR

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de-RSE Workshop @ FrOSCon



# German Aerospace Center (DLR)

## Numbers

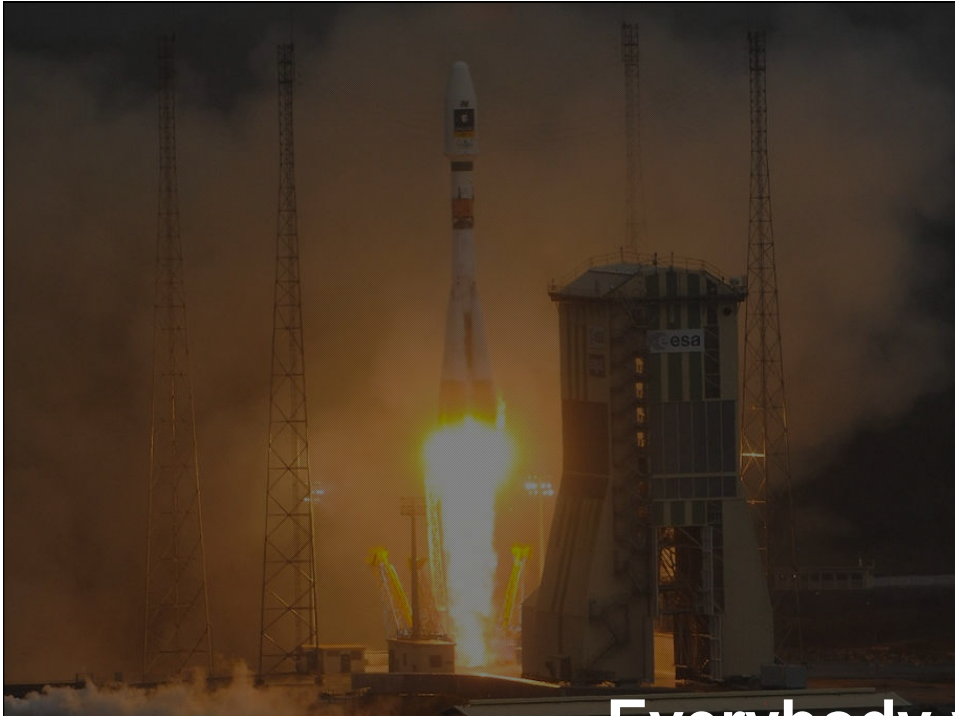
- More than 8000 employees
- 20 locations
- 40 institutes and facilities

## Fields

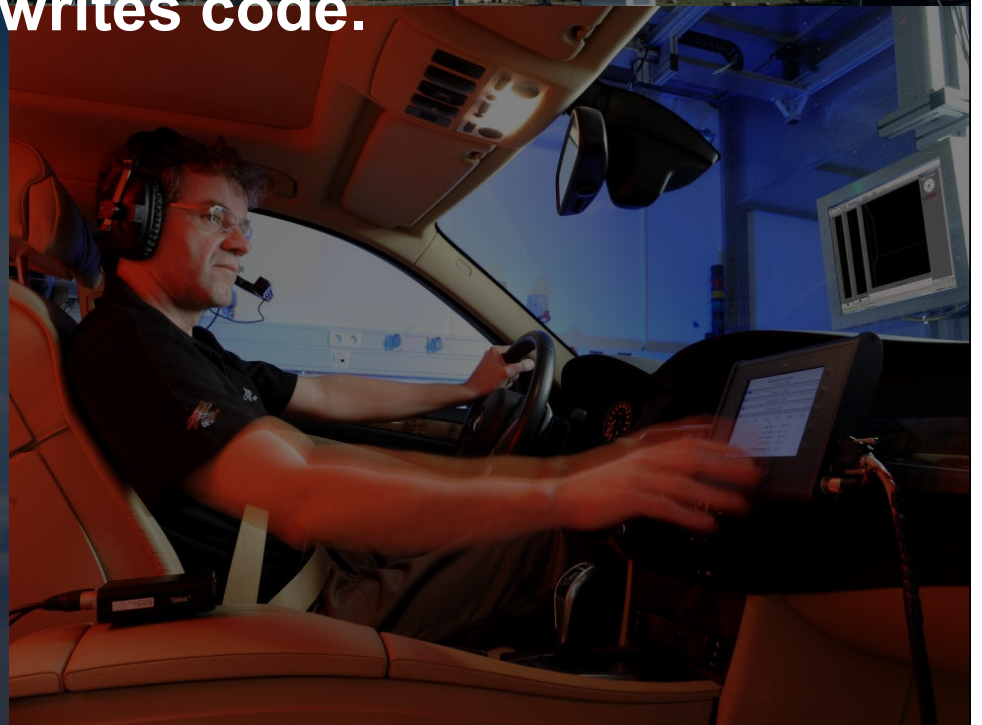
- Space
- Avionics
- Transportation
- Energy
- Safety







Everybody writes code.





# DLR is one of the biggest „software houses“ in Germany







**Most developers have no training in software development**

**How to teach them software engineering?**



# Not so fast!

## The Obstacles

### Lack of Resources

- Project-based funding
- Hard accessible long-term funding
- Missing infrastructure

### Lack of Motivation

- Unmotivated scientist
- Unmotivated management
- Missing incentives

### Lack of Knowledge

- Missing knowledge
- Missing strategy



## Current status of our approach for DLR

Goal: Improve sustainability  
and quality of software  
products

### Software Engineering Initiative of DLR

Guidelines

Trainings

Knowledge  
Provision

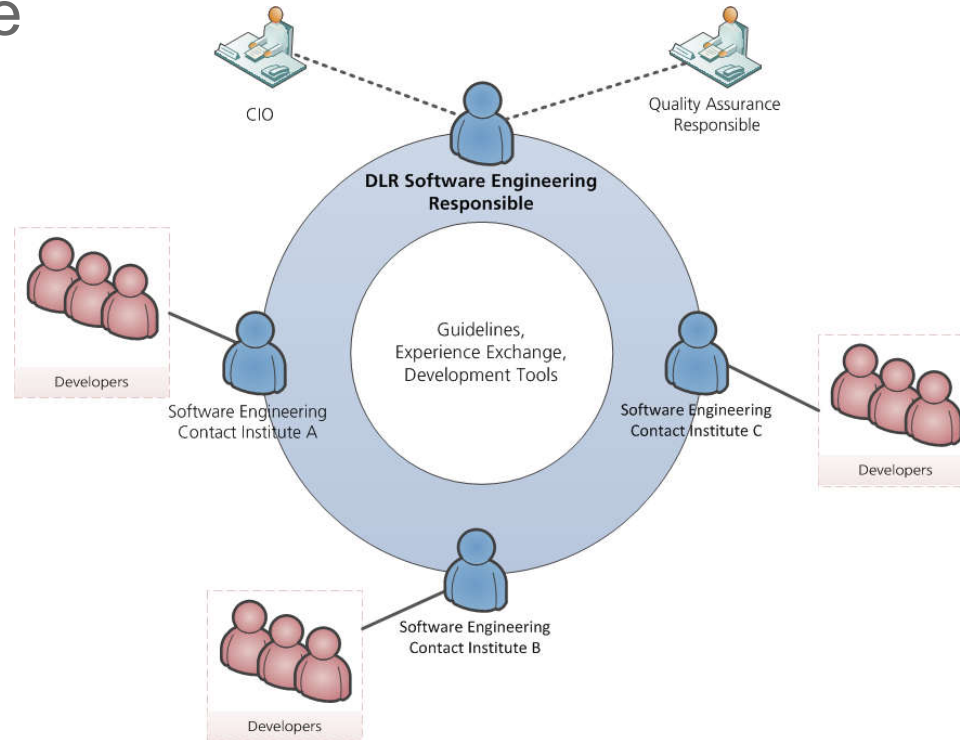
Collaboration

Experience  
Exchange



# Software Engineering Network

## The Backbone



- Network consists of **representatives from all DLR institutes** concerned with software development.
- Representatives further organize software engineering activities in **their institutes**.





# Software Engineering Guidelines

**Guidelines support developers to self-assess their software concerning good development practices.**

- Joint development with focus on **good practices, tools, and essential documentation**
- **Three maturity level** available as checklists in **different formats** to ease practical usage

## Checklists for different maturity levels

Change Management		
Recommendation	Comment	Status
<b>EÄM.2:</b> The most important information describing how to contribute to development are stored in a central location. <i>(from application class 1)</i>	Build steps are missing	todo
<b>EÄM.5:</b> Known bugs, important unresolved tasks and ideas are at least noted in bullet point form and stored centrally. <i>(from application class 1)</i>		
<b>EÄM.7:</b> A repository is set up in a version control system. The repository is adequately structured and ideally contains all artifacts for building a usable software version and for testing it. <i>(from application class 1)</i>		ok
<b>EÄM.8:</b> Every change of the repository ideally serves a specific purpose, contains an understandable description and leaves the software in a consistent, working state. <i>(from application class 1)</i>		ok

## Reasoning and further advice

The repository is the central entry point for development. Main artifacts are stored in a safe way and are available at a single location. Each change is comprehensible and can be traced back to the originator. In addition, the version control system ensures the consistency of all changes.

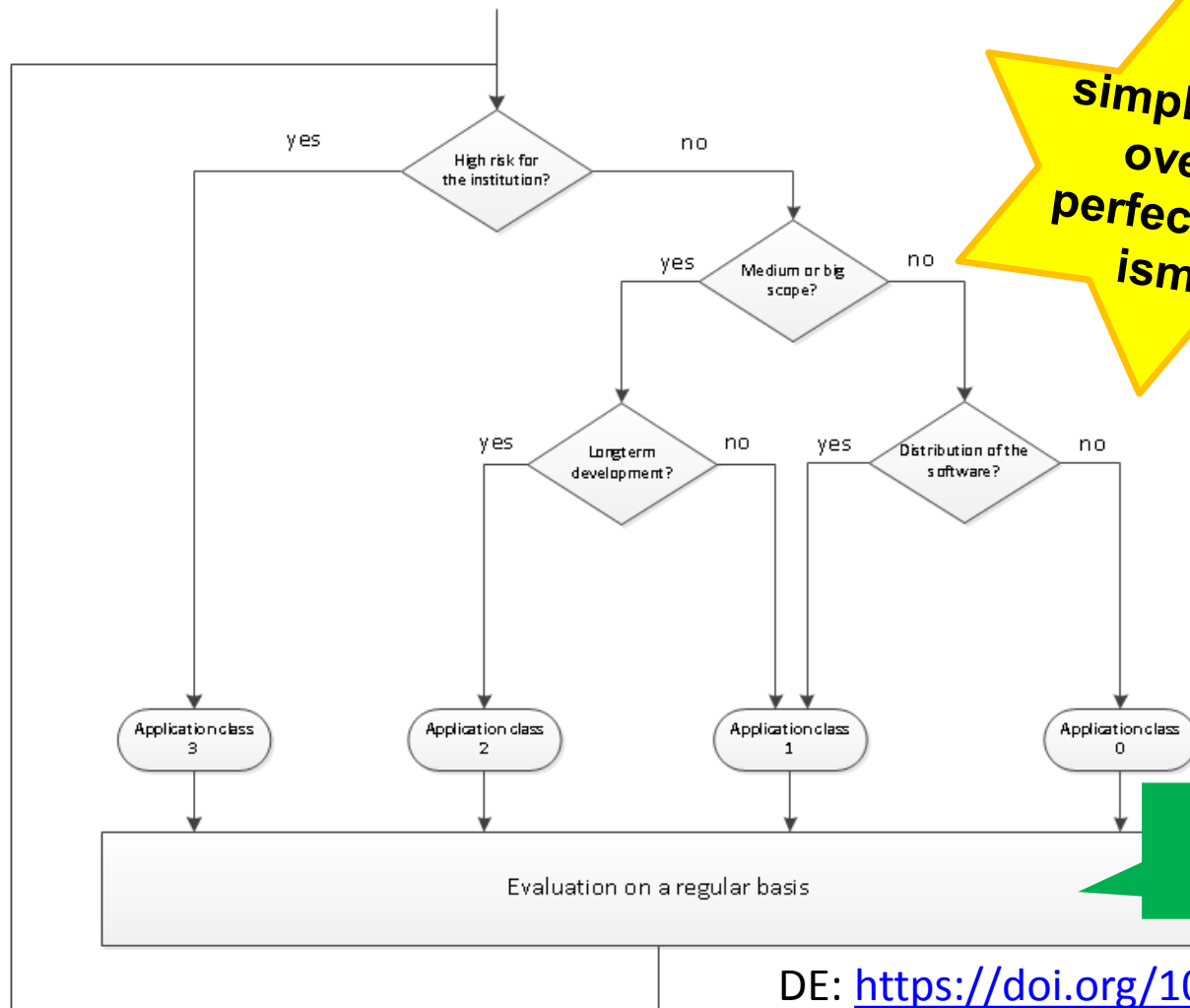
The repository directory structure should be aligned with established conventions. References are usually the version control system, the build tool ([see the Automation and Dependency Management section](#)) or the community of the used programming language or framework. Two examples:



# Tailoring Checklists

- ✓ Lack of Resources
- ✓ Lack of Motivation
- ✓ Lack of Knowledge

**simplicity  
over  
perfection  
ism**



**Classification may  
change over time!**

DE: <https://doi.org/10.5281/zenodo.1344608>

EN: <https://doi.org/10.5281/zenodo.1344612>





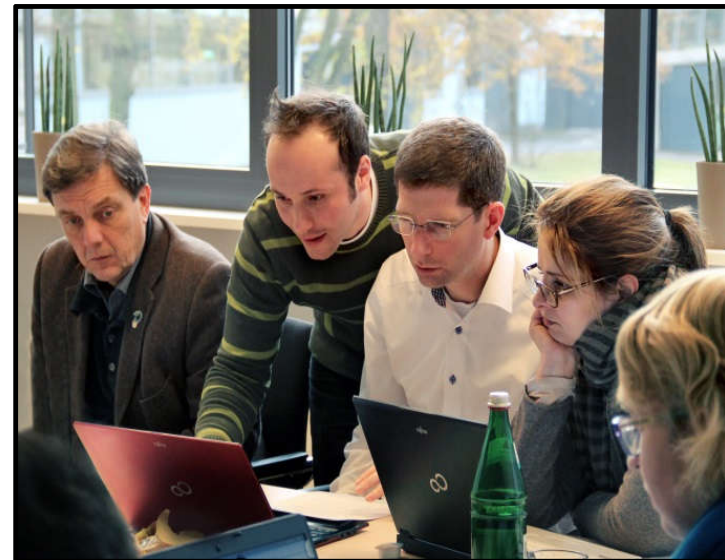
# Trainings

- ✓ Lack of Motivation
- ✓ Lack of Knowledge

**Regular trainings are offered to provide hands-on experience in applying the guidelines and the DLR development tools.**

## Concept

- Intensive two-day course
- Small groups with up to 15 participants
- Hands-on experience on the basis of a complete example project
- Trainings are offered on a yearly basis at different DLR locations across Germany



# Knowledge Provision and Collaboration SoftwareEngineering.Wiki

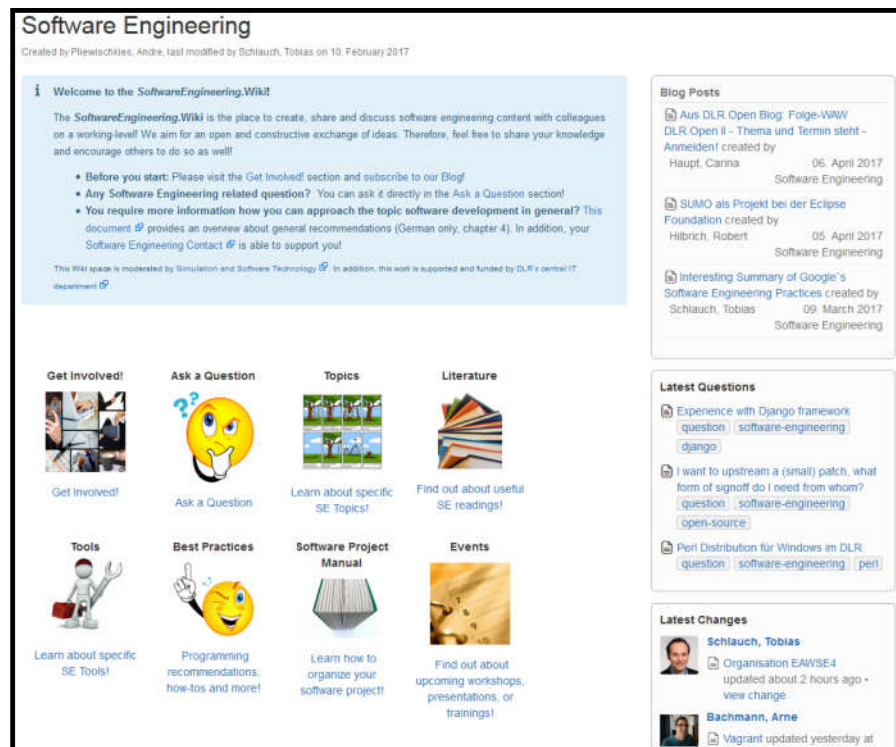
- ✓ Lack of Motivation
- ✓ Lack of Knowledge

**Internal Wiki space to share software engineering knowledge and experiences.**

- Open to contributions of all DLR employees
- Moderation by a small central group

## Main content categories

- News
- Information about topics like architecture, testing, etc.
- Official programming guides
- Experiences concerning dev. tools
- Questions & Answers





# Experience Exchange Workshops

**Regular knowledge exchange workshops are held to actively involve DLR scientists and to foster exchange.**

## Concept

- Intensive 1.5-day workshop
- Knowledge, experience exchange and networking opportunities
- Active involvement of the participants
- Results are shared via the SoftwareEngineering.Wiki
- 50 participants
- 2018 → EAW SE V



**Erfahrungsaustausch**  
Fallstricke bei der Software-  
15. - 16. Mai 2018 in Bremen

✓ Lack of Motivation  
✓ Lack of Knowledge

**Embedded Systems & Software Engineering**  
Call for Talks geöffnet!  
Mehr unter [s.dlr.de/1r27](http://s.dlr.de/1r27)

Kontakt:  
Tobias Schlauch  
[tobias.schlauch@dlr.de](mailto:tobias.schlauch@dlr.de)

Anmeldung über das  
Bildungsprogramm im  
Intranet

Mehr Details unter:  
[s.dlr.de/7xt5](http://s.dlr.de/7xt5) (Wiki)

The poster features a background image of a green printed circuit board (PCB) with various electronic components. A white notepad graphic is overlaid on the left side of the poster. The DLR logo is visible in the top right corner of the poster's image area.



# Consulting

- ✓ Lack of Resources
- ✓ Lack of Motivation
- ✓ Lack of Knowledge

## Concept

- Experienced software engineer
- Analyzing situation in institute / project
- Actions
  - SE-Guideline
  - Tooling
  - Trainings
  - Individual process
  - Individual support
  - (Feature development)





# Overview

Effective, acceptance difficult

Most effective, most effort, smallest influenced group

Biggest problems

		SE Guidelines	Infra-structure	Trainings	Exchange	Consulting
Resource	Project-based					
	Longterm	x				x
	Infrastructure		x			x
Motivation	Scientist		x	x	x	x
	Management	x			x	x
	Incentives	x				
Knowledge	Basics	x		x	x	x
	Strategy	x		x		x



# Summary and Outlook

**First steps have been taken to build a self-reliant RSE community at DLR.**

## Key success factors

- Wholesome support of domain scientist and DLR institutes
- Raising management awareness and achieving management support
- Establishment of a vital core community

## Next steps

- Strengthen community (external exchange, inner and open source)
- Introduce term RSE





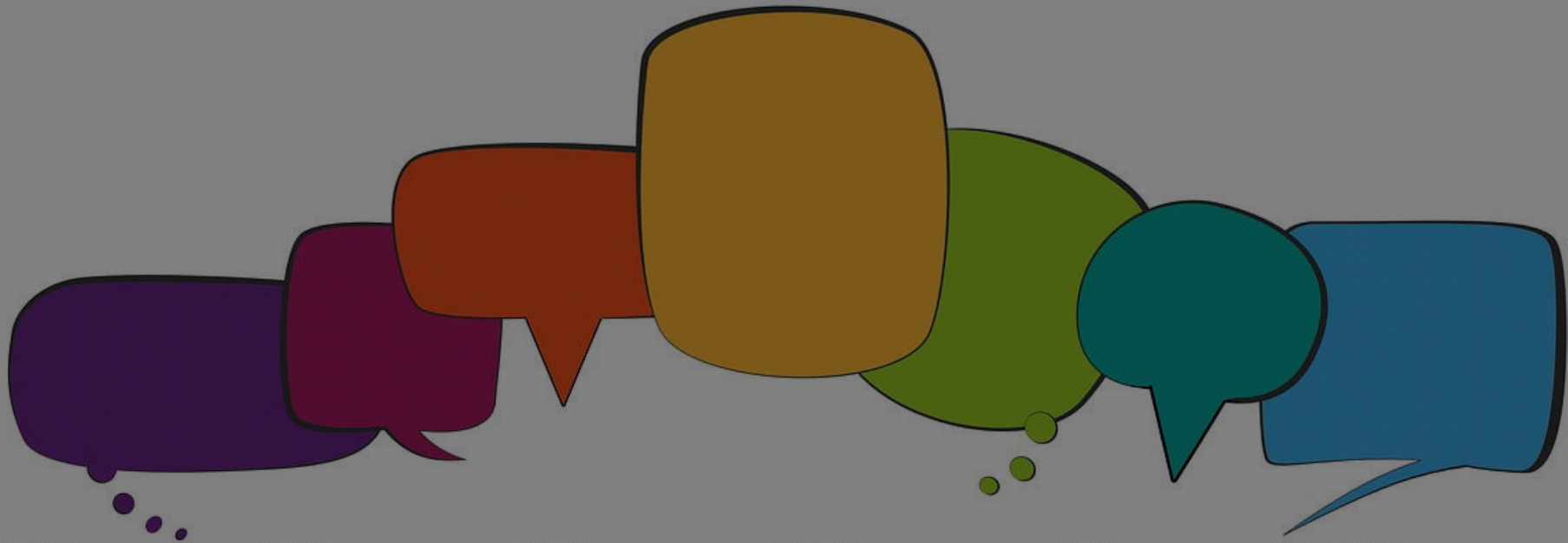
## Lessons learned

**Find a way to talk to your community**

**“The whole is more than the sum of its parts”**

**Other face the same problems – talk to them**

**You are never done...**



**Questions / Feedback?**