Wie wir aus Forschern RSEs machen
Die Software Engineering Initiative des DLR

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de-RSE Workshop @ FrOSCon
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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

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### Checklists for different maturity levels

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Comment</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>EAM.2</td>
<td>Build steps are missing</td>
<td>todo</td>
</tr>
<tr>
<td>EAM.3</td>
<td>Known bugs, important unresolved tasks and ideas are at least noted in bullet point form and stored centrally.</td>
<td>ok</td>
</tr>
<tr>
<td>EAM.4</td>
<td>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.</td>
<td>ok</td>
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<tr>
<td>EAM.5</td>
<td>Every change of the repository ideally serves a specific purpose, contains an understandable description and leaves the software in a consistent, working state.</td>
<td>ok</td>
</tr>
</tbody>
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### Reasoning and further advice

The repository is the central entry point for development. Certain 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

Selection:
- High risk for the conclusion?
  - yes
  - no
- Medium or big stopper?
  - yes
  - no
- Long term development?
  - yes
  - no
- Distribution of the software?
  - yes
  - no

Application class:
- Application class 1
- Application class 2
- Application class 3
- Application class 4

Evaluation on a regular basis

Classification may change over time!

DE: https://doi.org/10.5281/zenodo.1344608
EN: https://doi.org/10.5281/zenodo.1344612
Trainings

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

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
Consulting

Concept

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

#### Resource
- **Project-based**
- **Longterm**
- **Infrastructure**

#### Motivation
- **Scientist**
- **Management**
- **Incentives**

#### Knowledge
- **Basics**
- **Strategy**

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**Biggest problems**

- Most effective, most effort, smallest influenced group

- Effective, acceptance difficult
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?