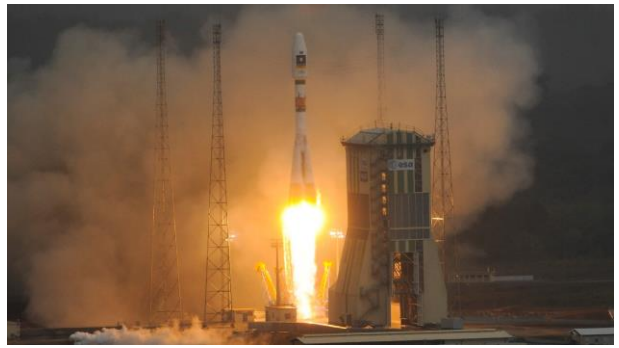
(RESEARCH) SOFTWARE ENGINEERING FÜR NON-IT‘LER

Die Software Engineering Initiative des DLR

Softwareentwicklung in der Forschung



(Fast) jeder schreibt code

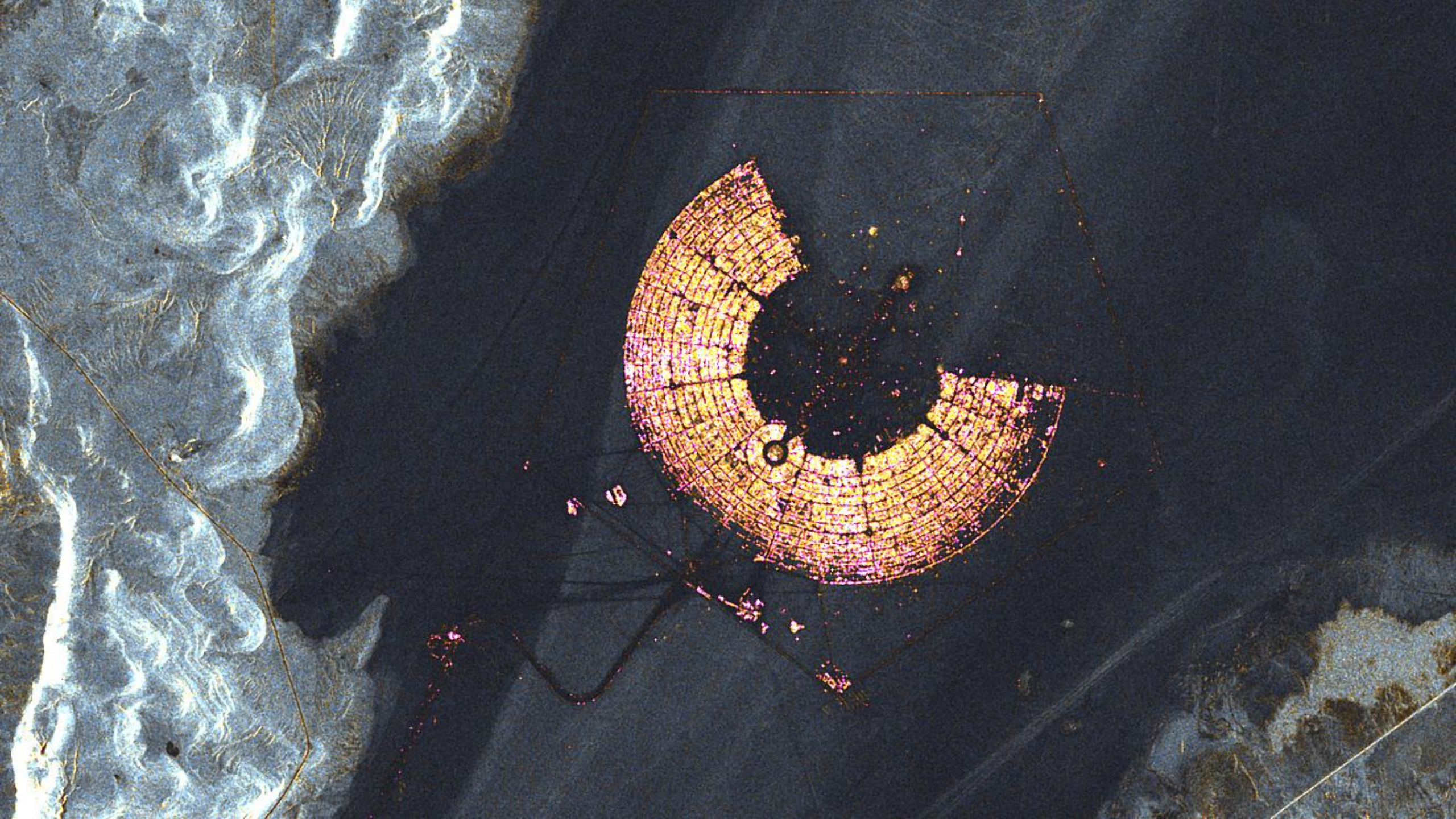
…aber die meisten Entwickelnden sind keine SoftwareentwicklerInnen!

Deutsches Zentrum für Luft- und Raumfahrt (DLR)

In Zahlen

- 10.000 Mitarbeitende
- 55 Institute und Einrichtungen
- 35 Standorte und Büros

esa



DLR
D-CMET

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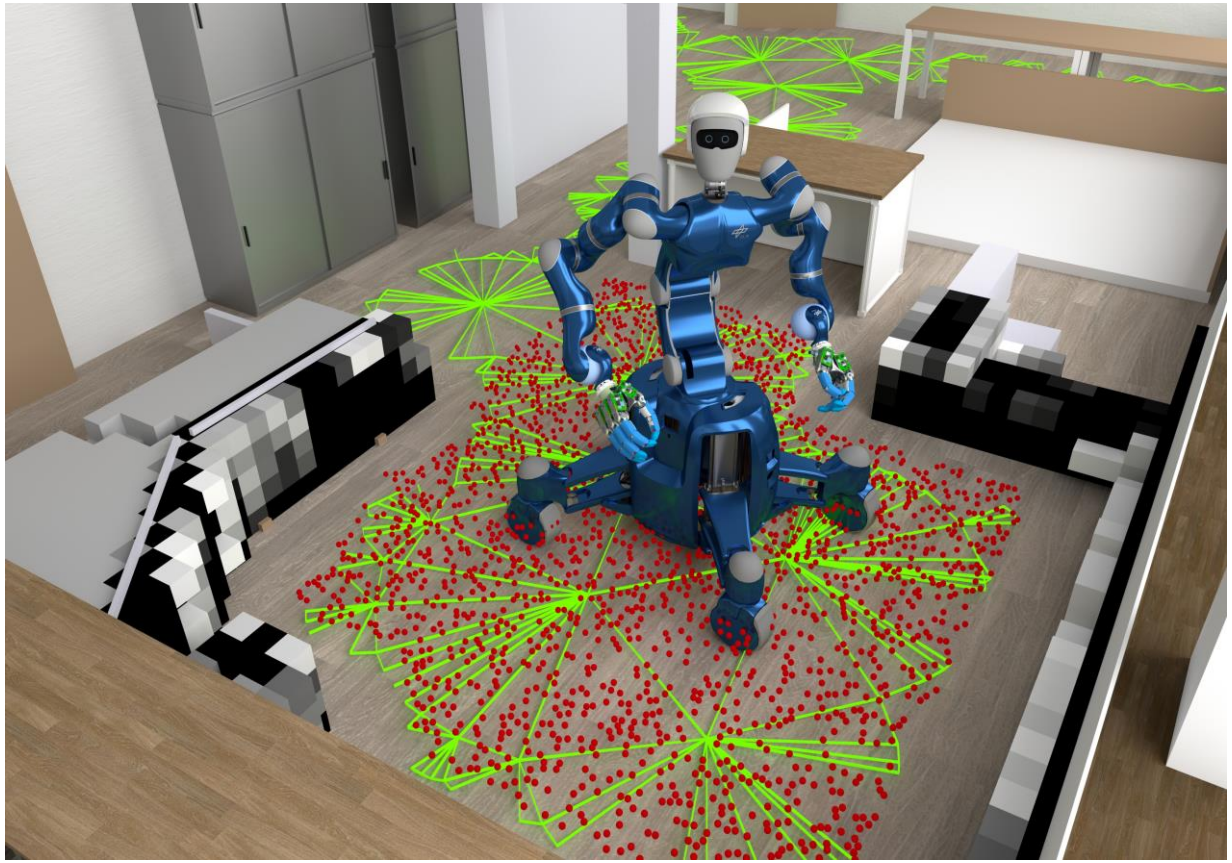
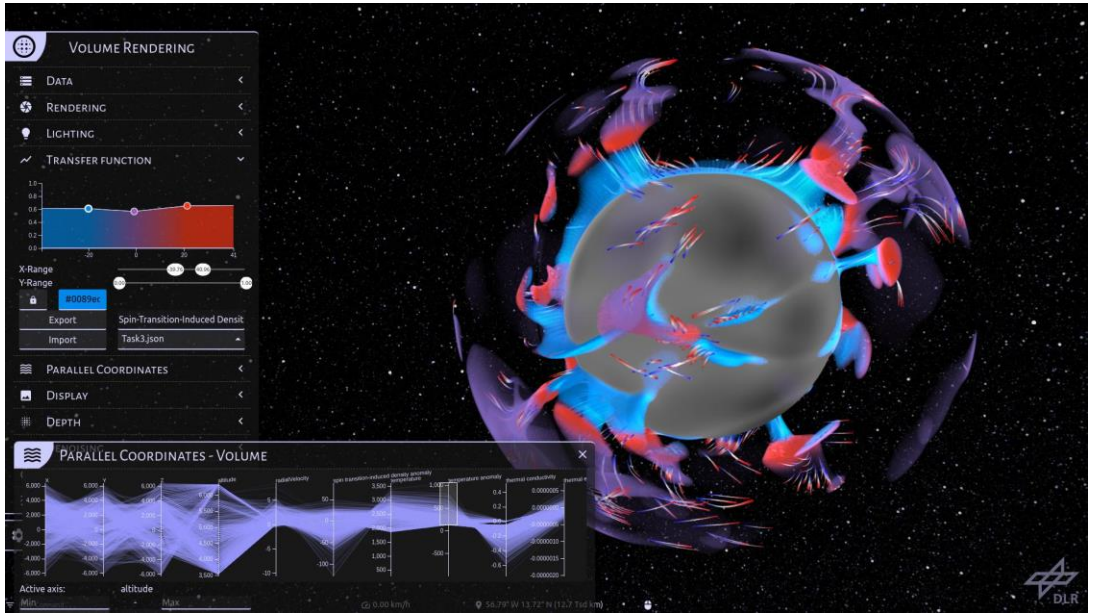
robomobil@dlr.de

DLR SOFTWARE

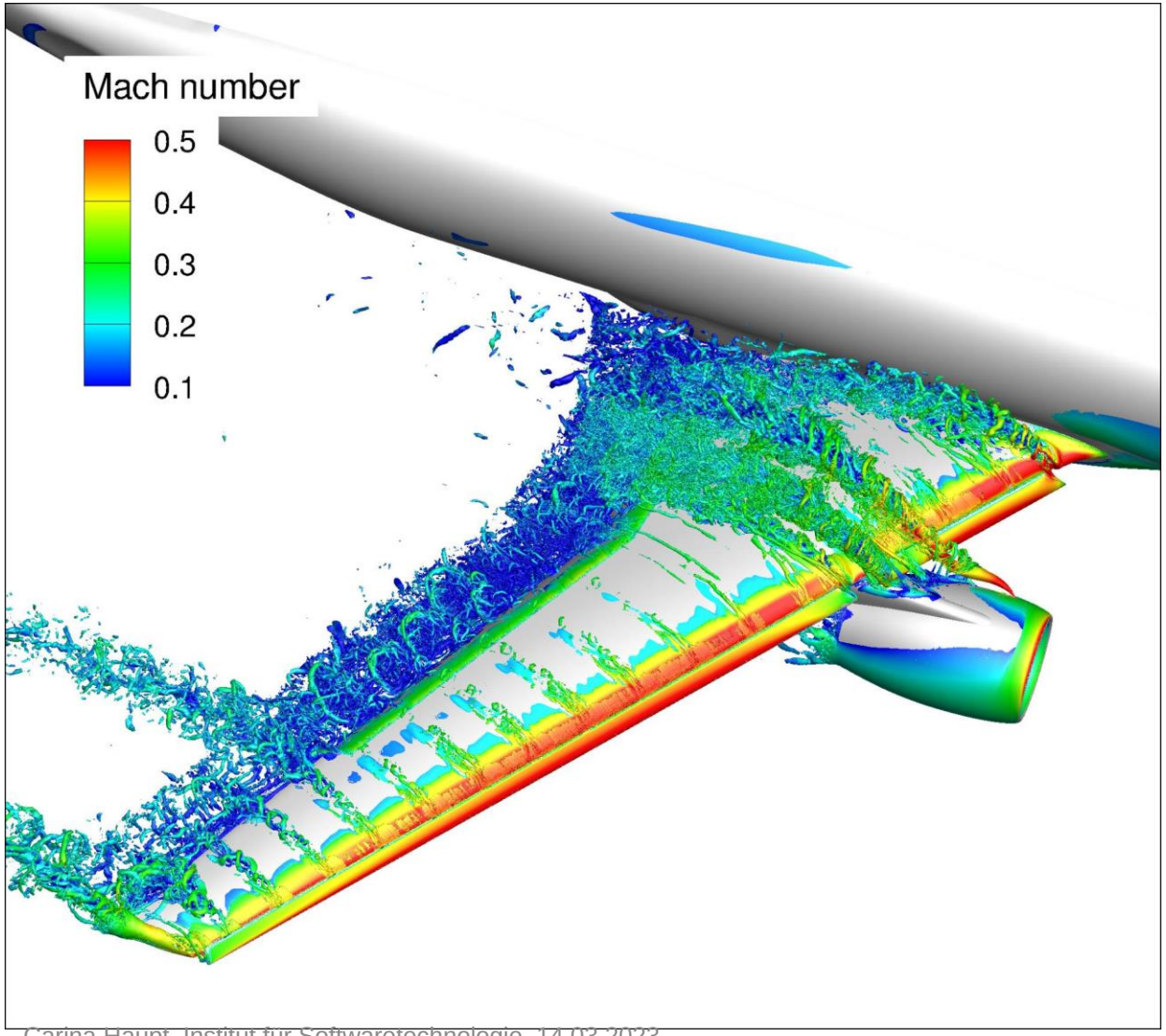
Carina Haupt, Institut für Softwaretechnologie, 14.03.2023

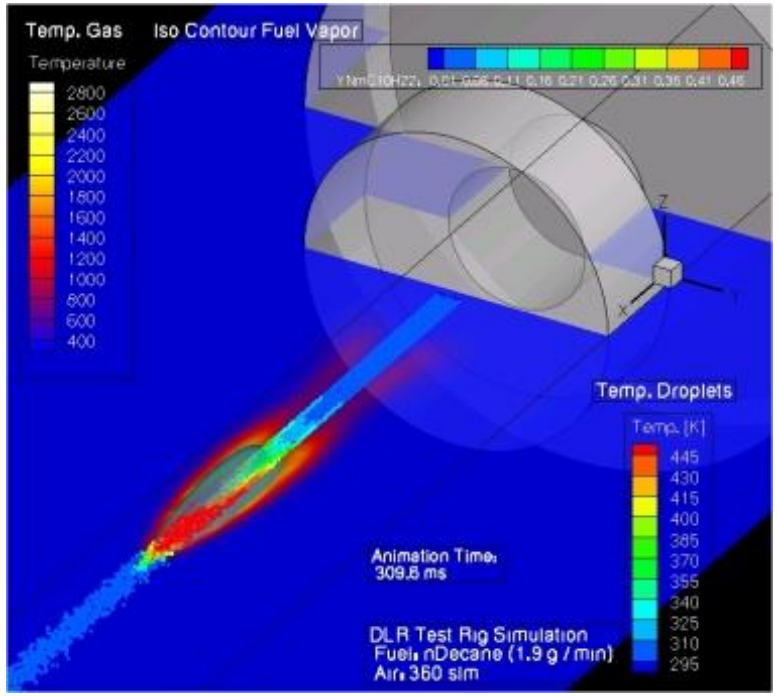
Beispiele für DLR Software



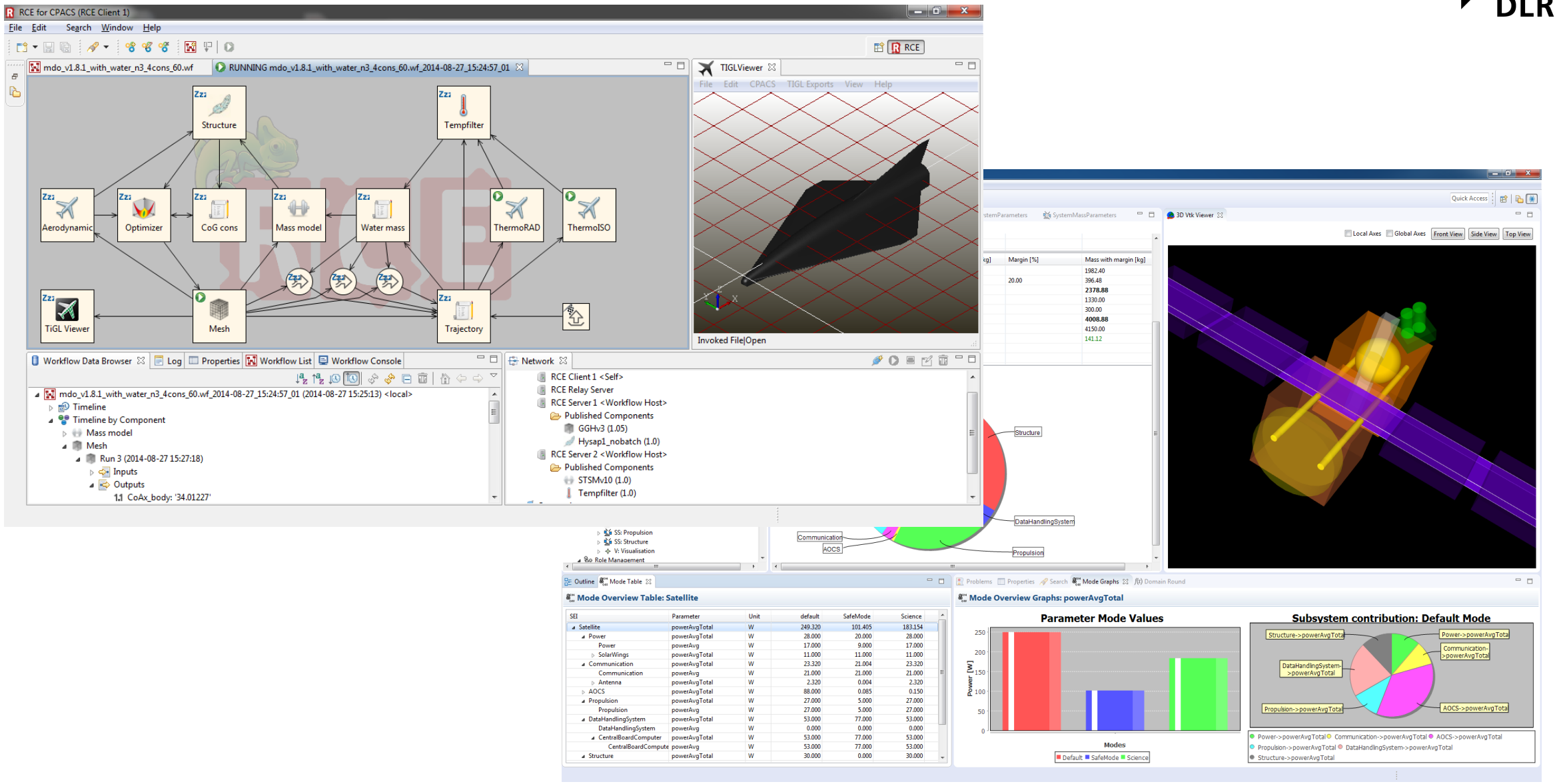


Beispiele für DLR Software





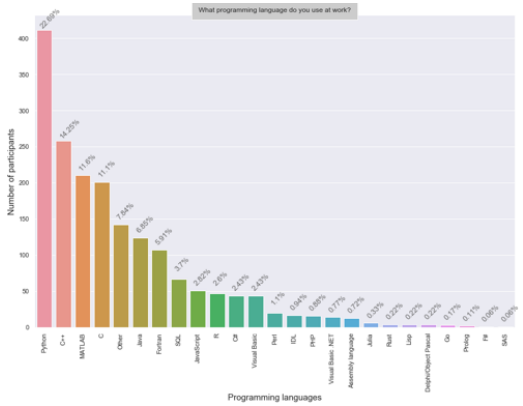
Beispiele für DLR Software



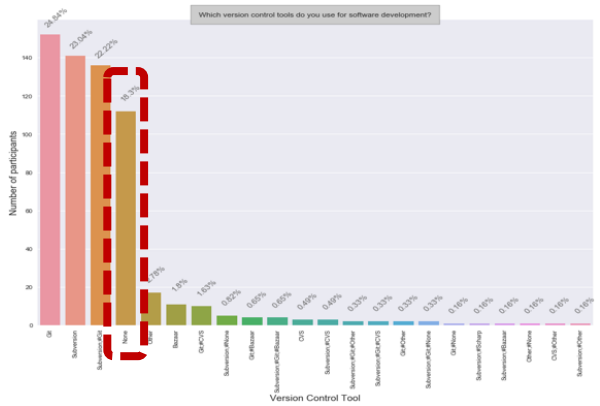
Softwareentwicklung im DLR

Softwareprojekte

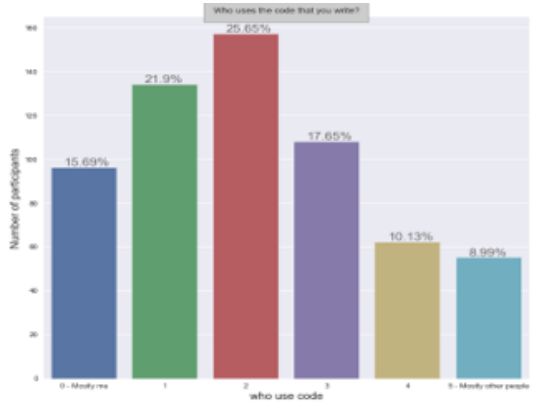
Programmiersprache



Technologien (VCS)



Zielgruppe

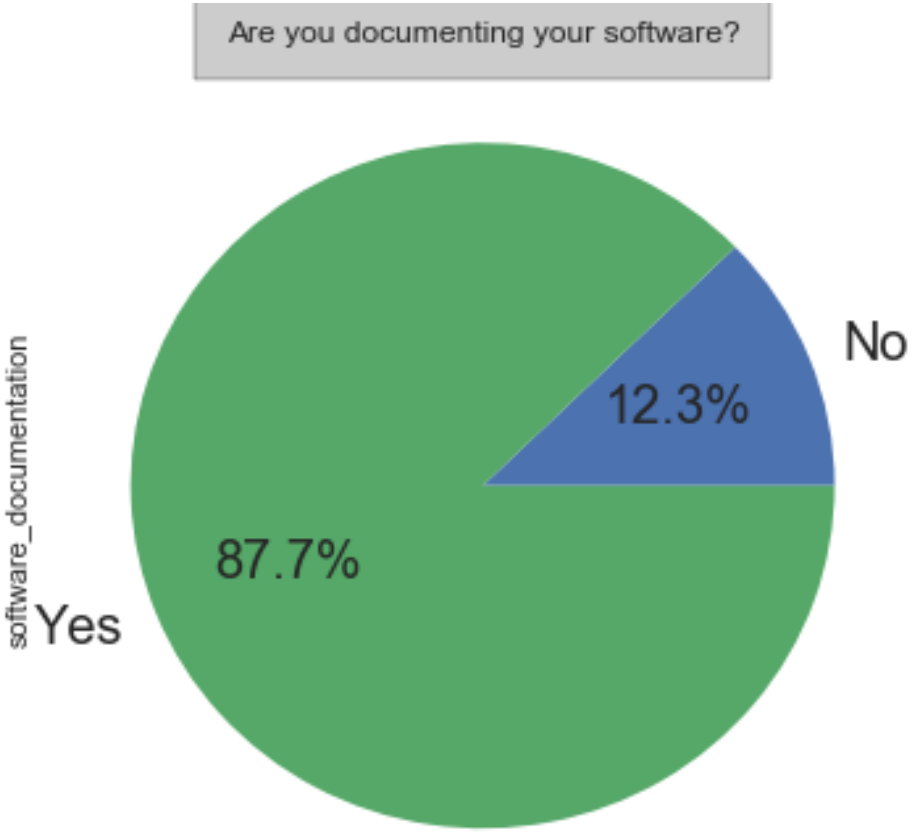


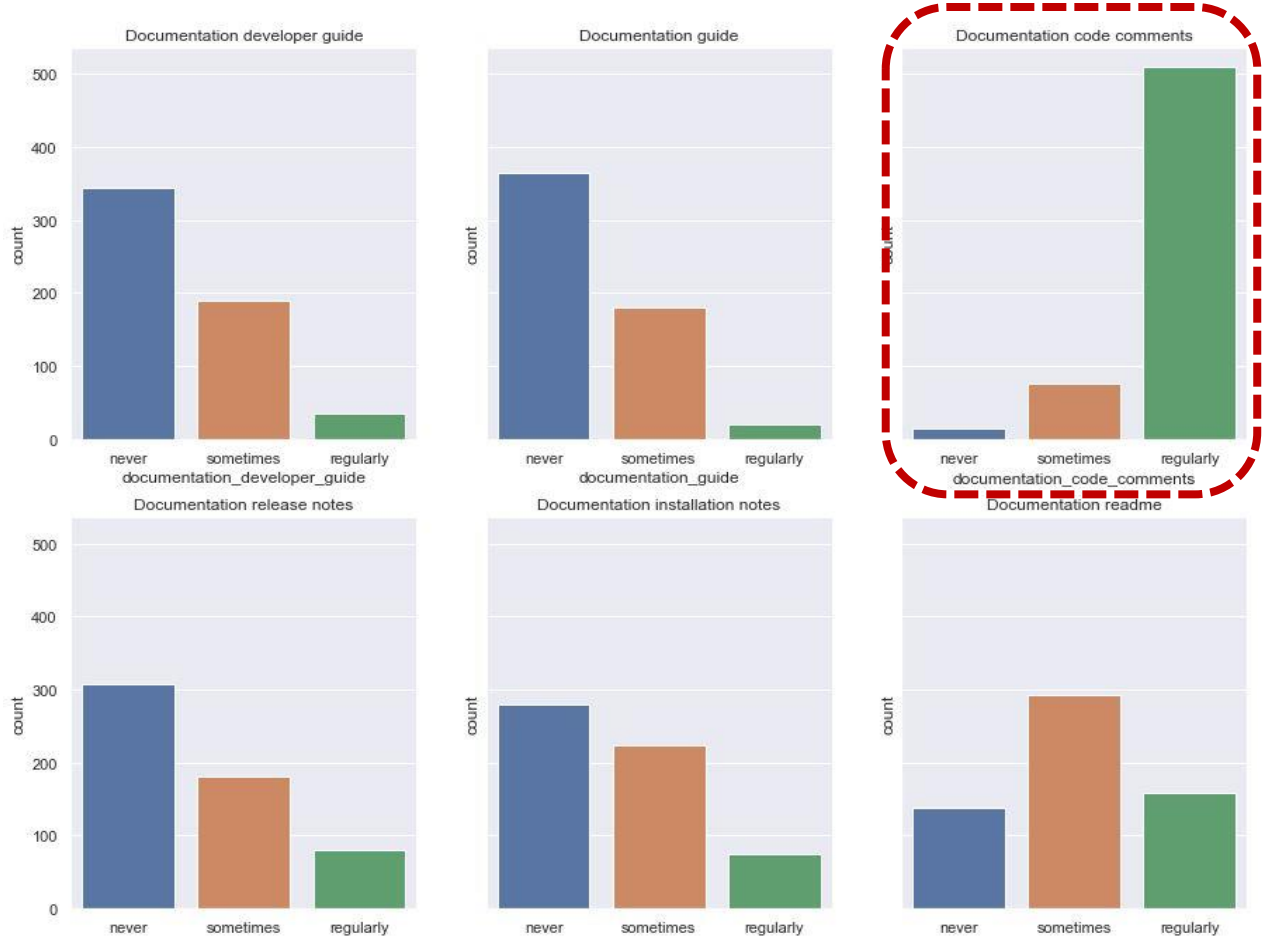
Die Softwareprojekte des DLR sind in vielerlei Hinsicht vielfältig

…die Probleme sind jedoch eher klassisch.

Softwareentwicklung im DLR

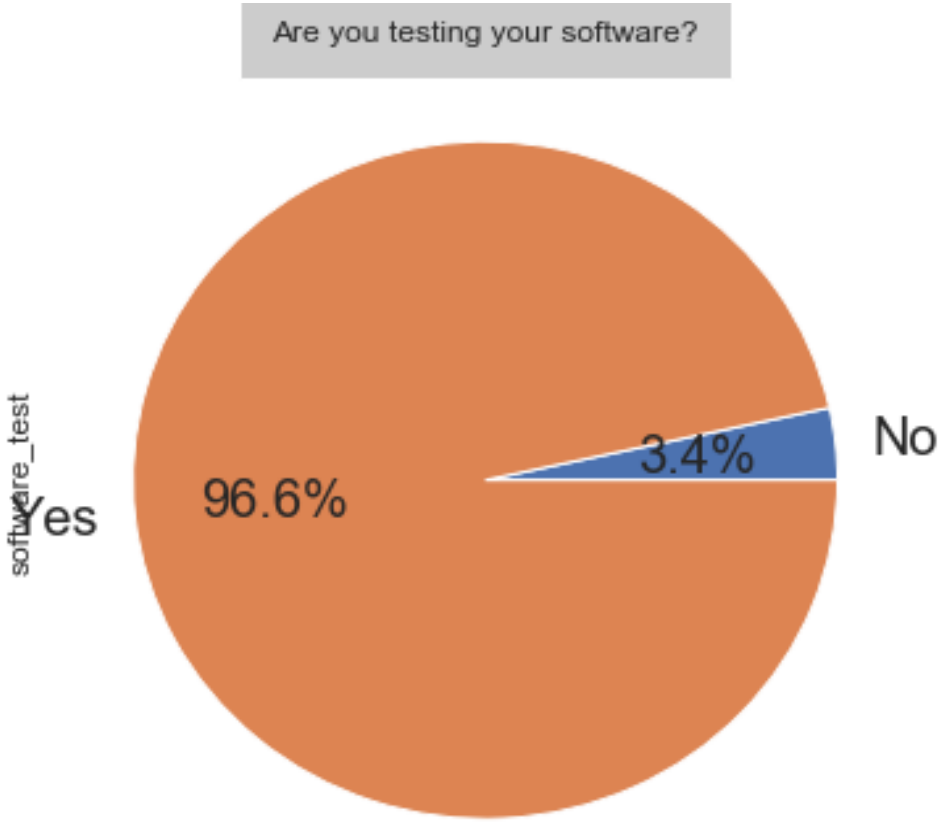
Dokumentation

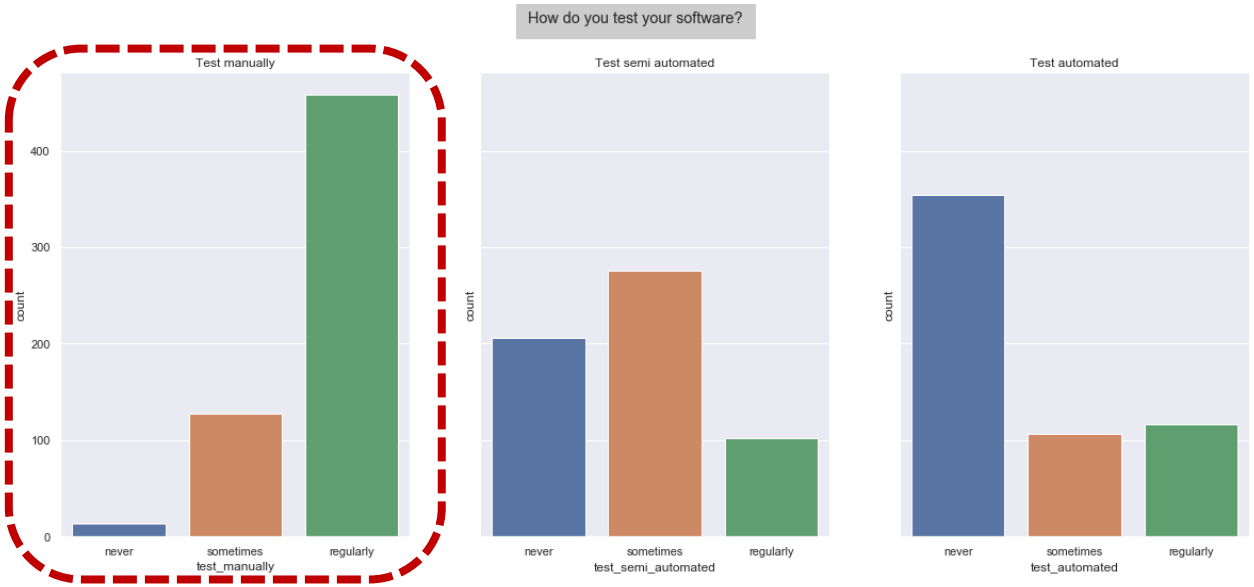




Softwareentwicklung im DLR

Testing



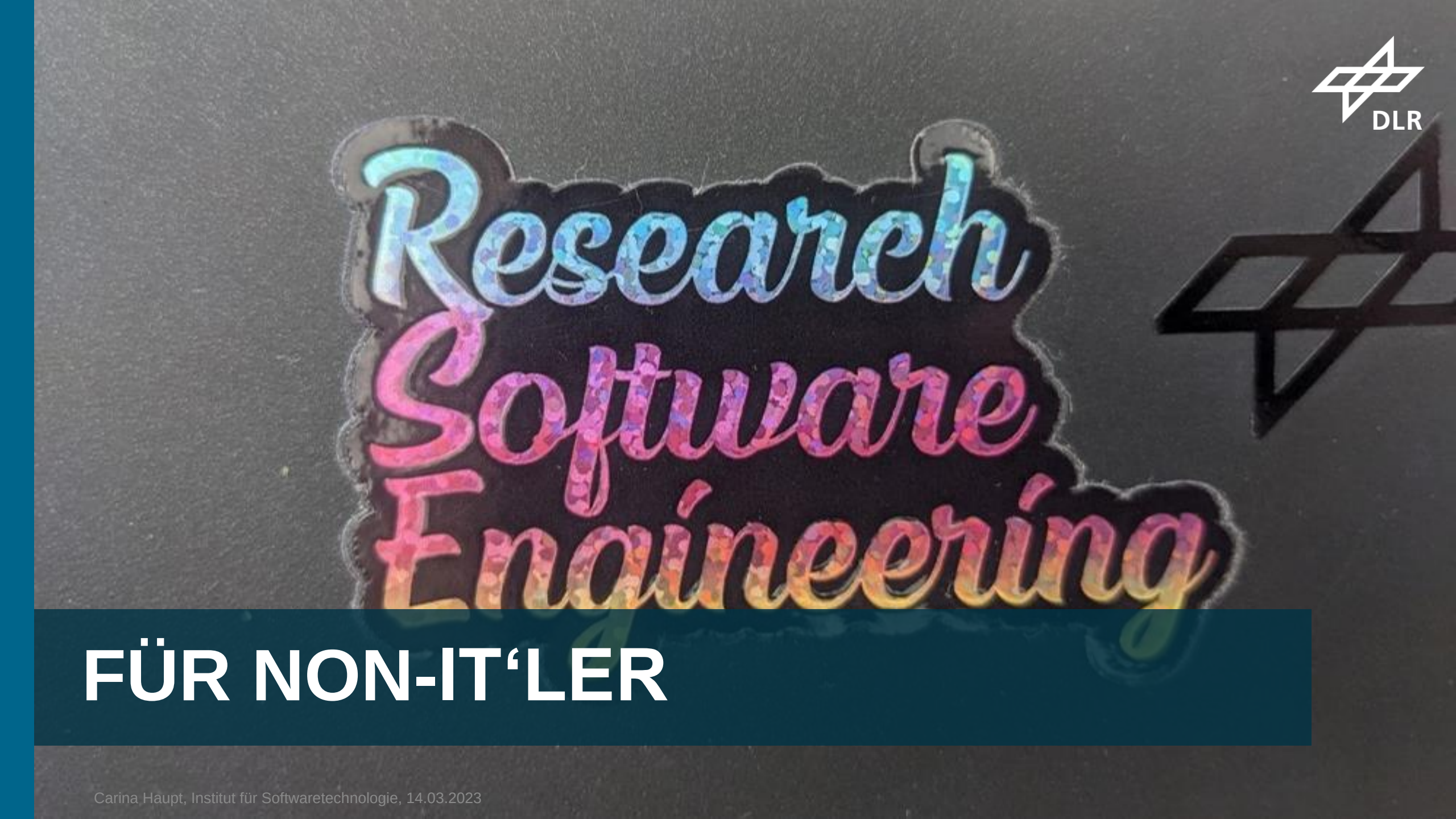


Softwareentwicklung im DLR

Es fehlt an…

Ressourcen	Motivation	Wissen

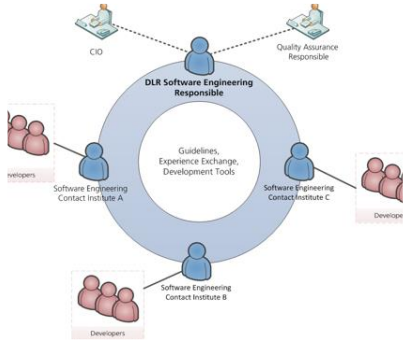
Es braucht Personal & Infrastruktur, Incentives & Erfolgsgeschichten sowie Schulungen & Beratung.



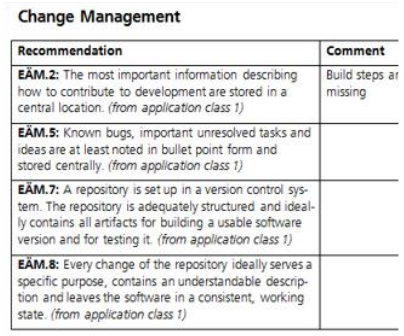
FÜR NON-IT‘LER

Carina Haupt, Institut für Softwaretechnologie, 14.03.2023

Software Engineering Initiative des DLR



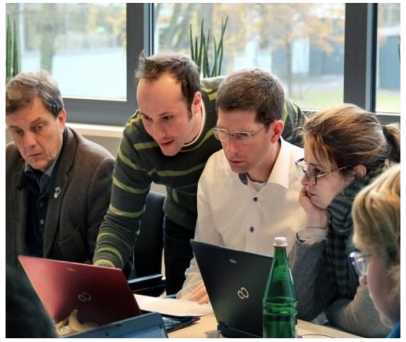
Community Building & Erfahrungsaustausch



Change Management

Recommendation	Comment
EAM.2: The most important information describing how to contribute to development are stored in a central location. *(from application class 1)*	Build steps ar missing
EAM.5: Known bugs, important unresolved tasks and ideas are at least noted in bullet point form and stored centrally. *(from application class 1)*	
EAM.7: 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. *(from application class 1)*	
EAM.8: Every change of the repository ideally serves a specific purpose, contains an understandable description and leaves the software in a consistent, working state. *(from application class 1)*	

Guidelines & Tools



Trainings

Consulting

- 2005 gestartet
- 2017 Fokussierung auf Entwicklung von Forschungssoftware
- Angetrieben durch Institut für Softwaretechnologie, finanziert durch DLR IT

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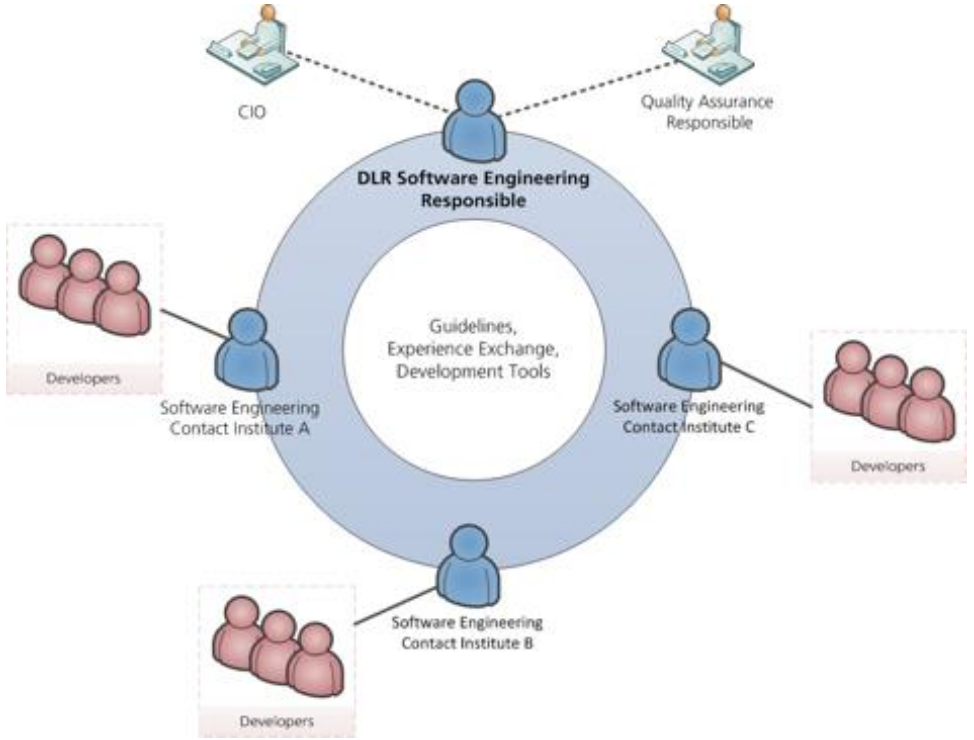
Community Building & Erfahrungsaustausch

- SE Netzwerk
- Wissensaustauschworkshops
- DLR Software Mattermost Team
- SoftwareEngineering.Wiki



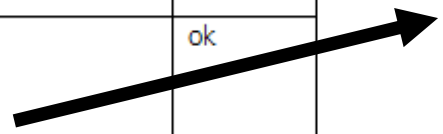
Checkliste

Richtlinie

Empfehlungen für Entwickelnde

Change Management

Recommendation	Comment	Status
EÄM.2: The most important information describing how to contribute to development are stored in a central location. *(from application class 1)*	Build steps are missing	todo
EÄM.5: Known bugs, important unresolved tasks and ideas are at least noted in bullet point form and stored centrally. *(from application class 1)*		ok
EÄM.7: 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. *(from application class 1)*		ok
EÄM.8: Every change of the repository ideally serves a specific purpose, contains an understandable description and leaves the software in a consistent, working state. *(from application class 1)*		ok



The repository is the central entry point for development. All 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:

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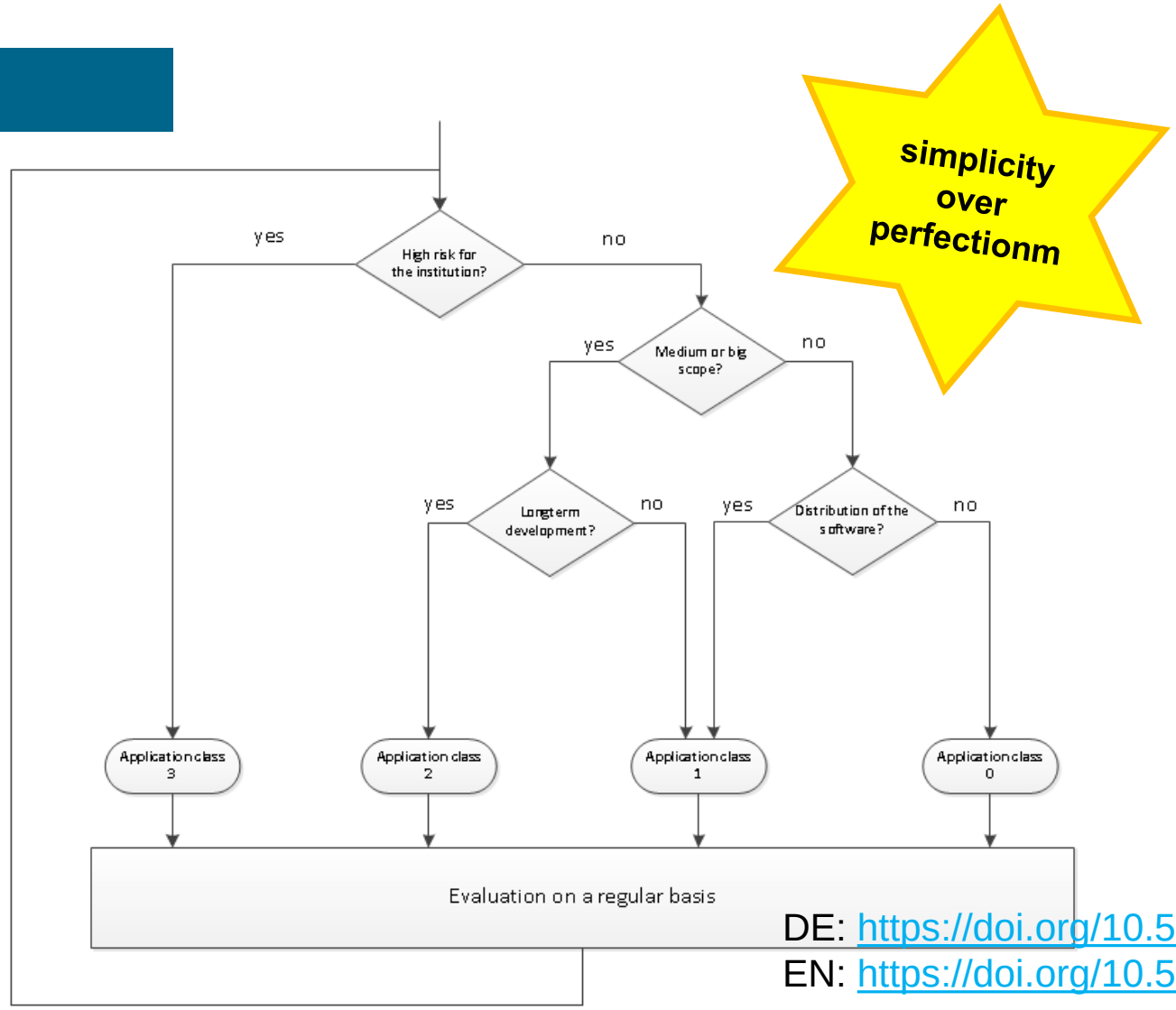
Tailoring



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

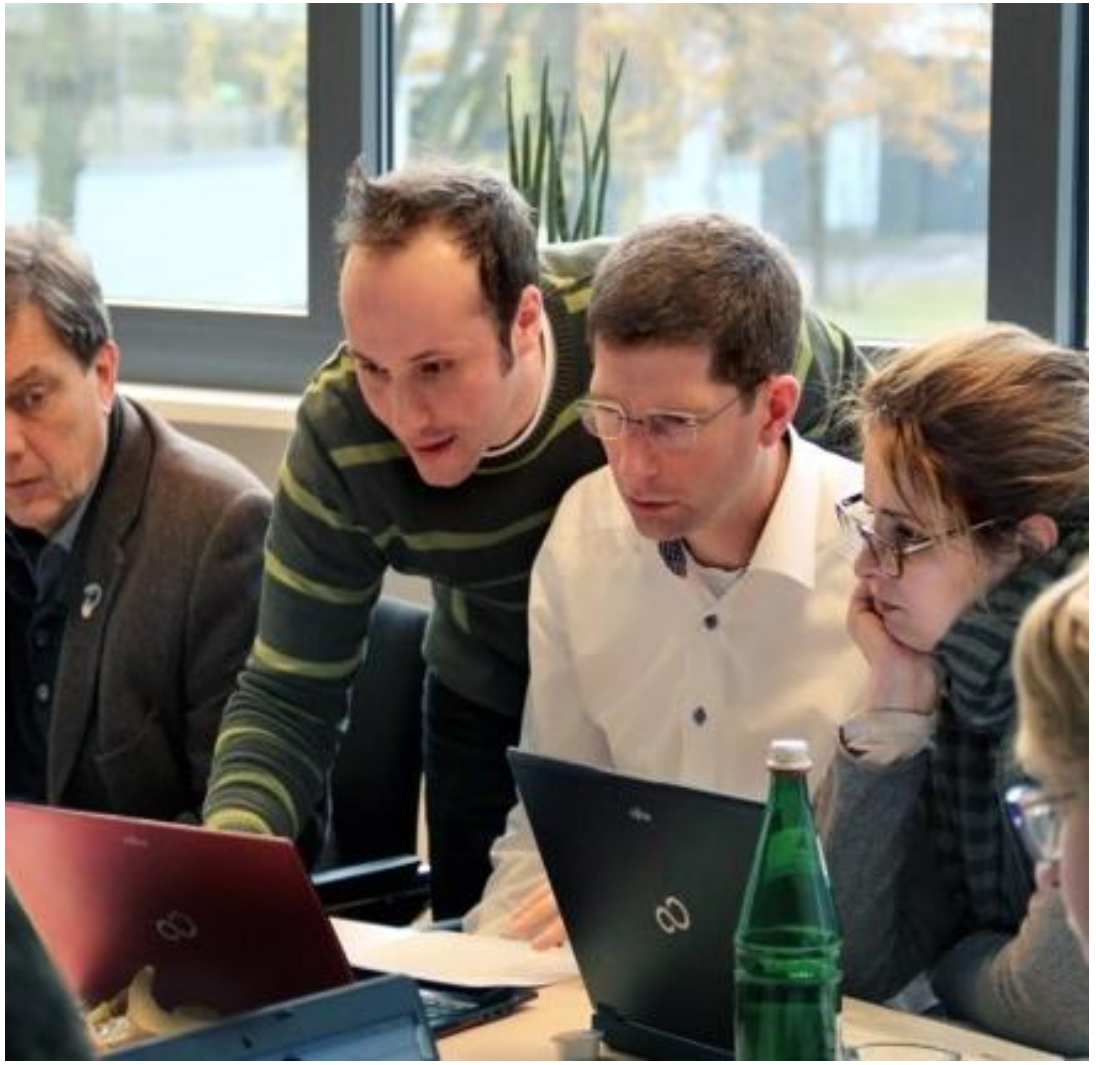
Tools

Tools um Empfehlungen umzusetzen

Software Engineering Initiative des DLR

Trainings

- Introduction to Git and Gitlab
- Foundations of Research Software Publication
- Gitlab for Software Development in Teams



https://codebase.helmholtz.cloud/hifis/software/education/hifis-workshops

CONSULTING

Carina Haupt, Institut für Softwaretechnologie, 14.03.2023

Autonome optische Qualitätskontrolle von CSP Kraftwerken

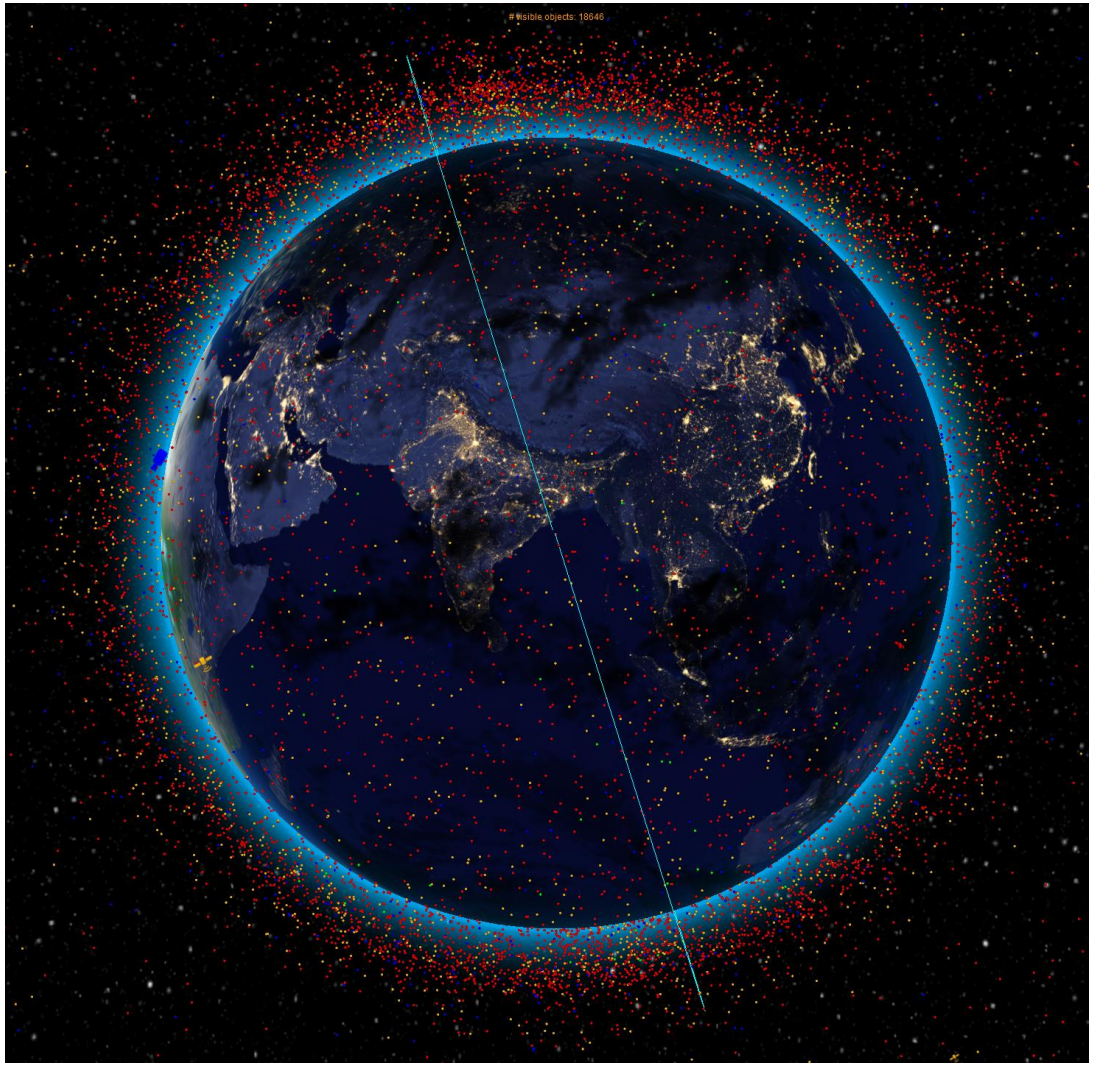
QFly

- Entwicklungsumgebung aufsetzen
  - Git
  - Issue Tracker
  - CI
  - Testing Infrastruktur
- Testkonzept einführen und beispielhaft umsetzen
- Entwicklungsprozess entwickeln und implementieren (iterativ)
- ProjektmitarbeiterInnen schulen

Sammlung und Verarbeitung der Orbit Informationen von Objekten im Weltall

Bacardi

- Requirements Engineering (nach ECSS)
- Unterstützung bei Design- und Architekturentscheidungen
- Administrationsstrategien für die Produktivmaschine
- Unterstützung bei der Suche und Behebung komplexer Fehler
- Code Reviews
- Paketierung



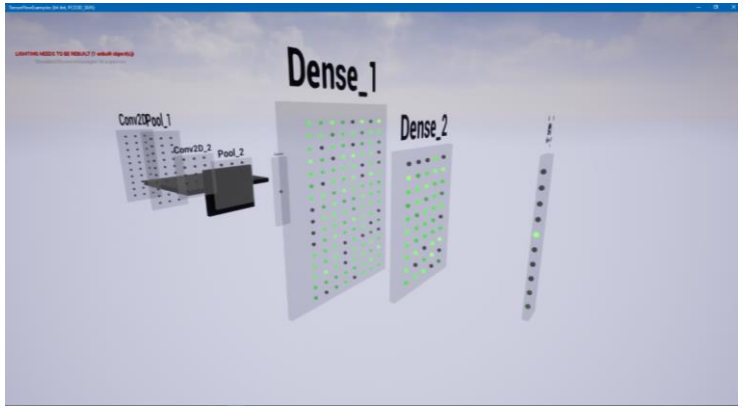
(R)SE SOFTWARE PROJEKTE

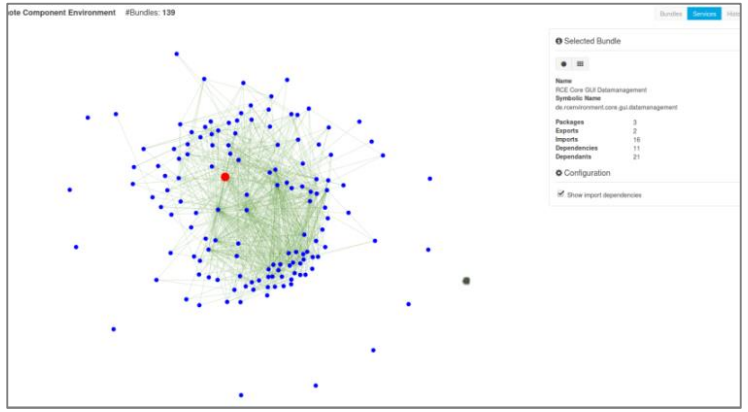
Carina Haupt, Institut für Softwaretechnologie, 14.03.2023

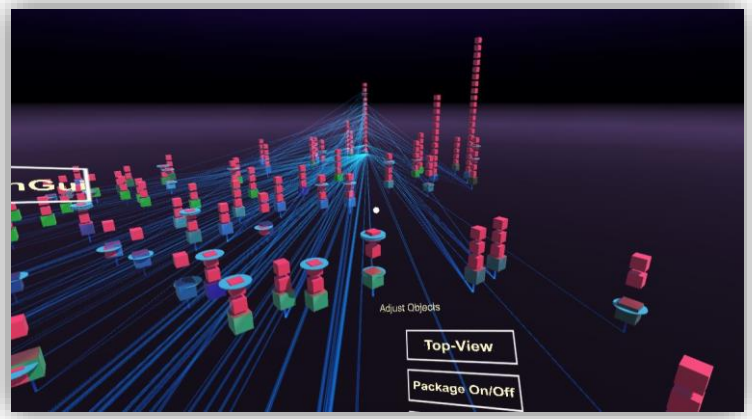
Software Visualisierung

Für Non-IT‘ler

Explainable AI	Architektur 2D	Architektur 3D





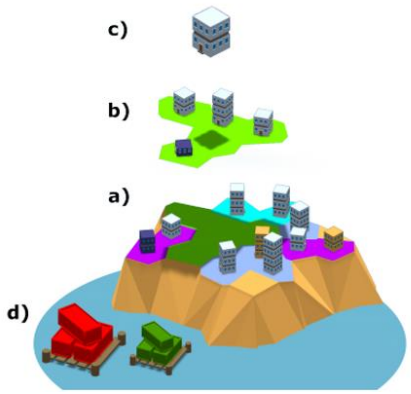


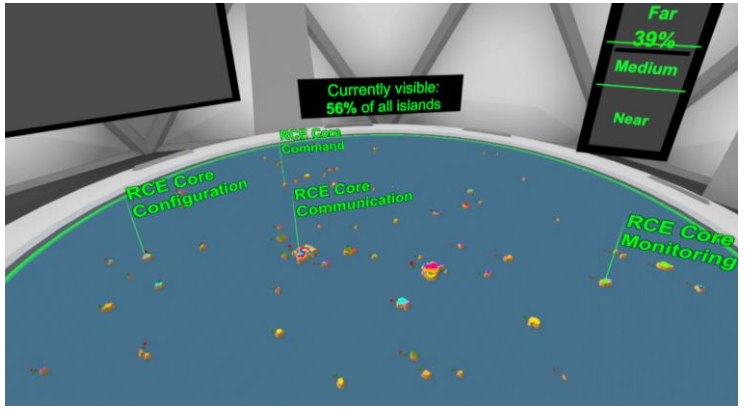
- Software sichtbar machen
- Graphen sind nicht immer die ideale Darstellungsform

Software Visualisierung

IslandViz

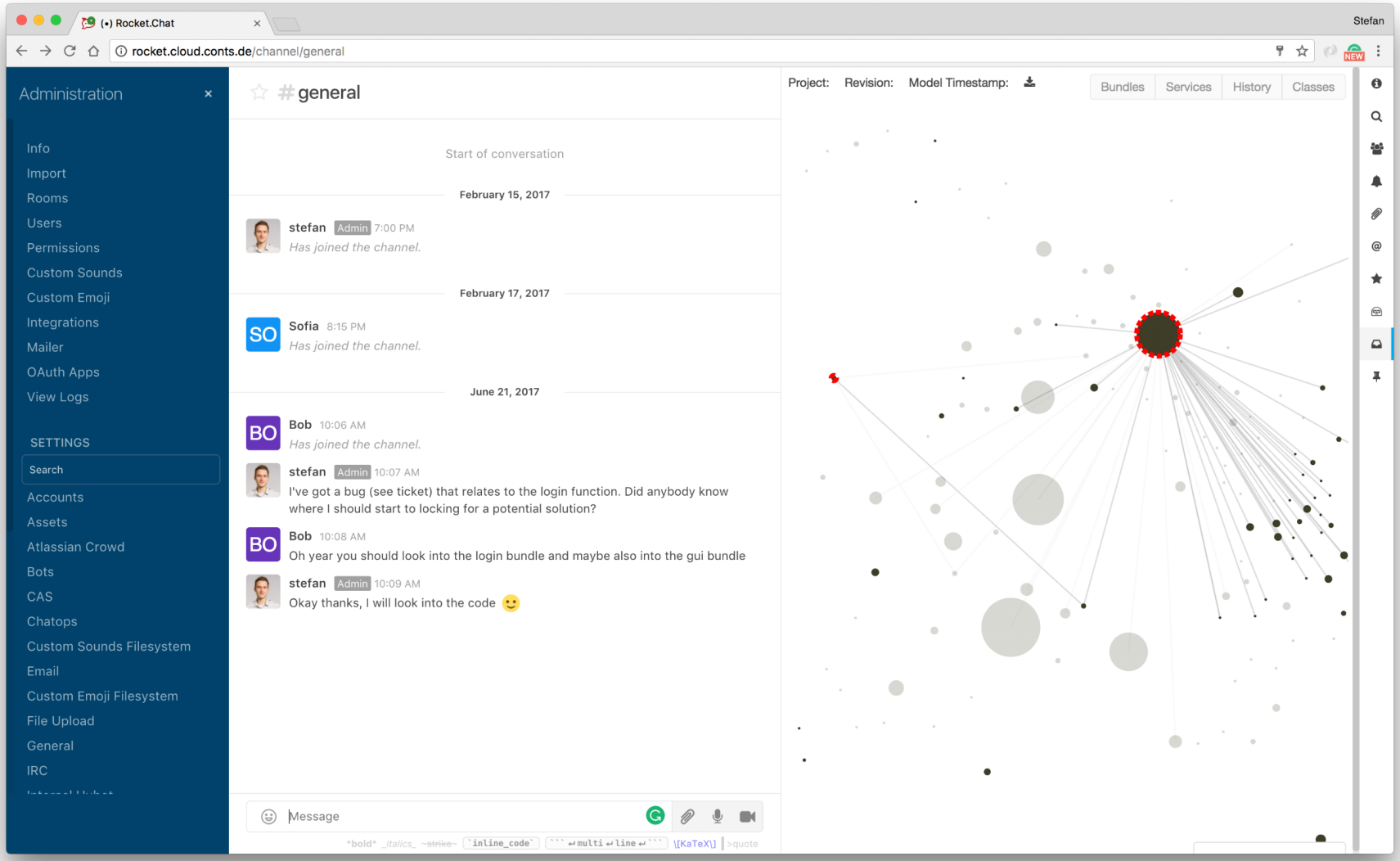
Elemente	Beziehungen	Assistenten





- Darstellung von Softwareprojekten mittels Insel-Metapher
- Interaktiv und Explorativ
- Assistentzsysteme (Sprache, Chat, …)

Assistenzsysteme



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