# Researchers and Software Licenses

**The story of what we are doing at the German Aerospace Center to prevent licensing disasters**

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Cologne, Berlin

FOSDEM 2018, Brussels

# DLR
# German Aerospace Center

- Research Institution
- Space Agency
- Project Management Agency

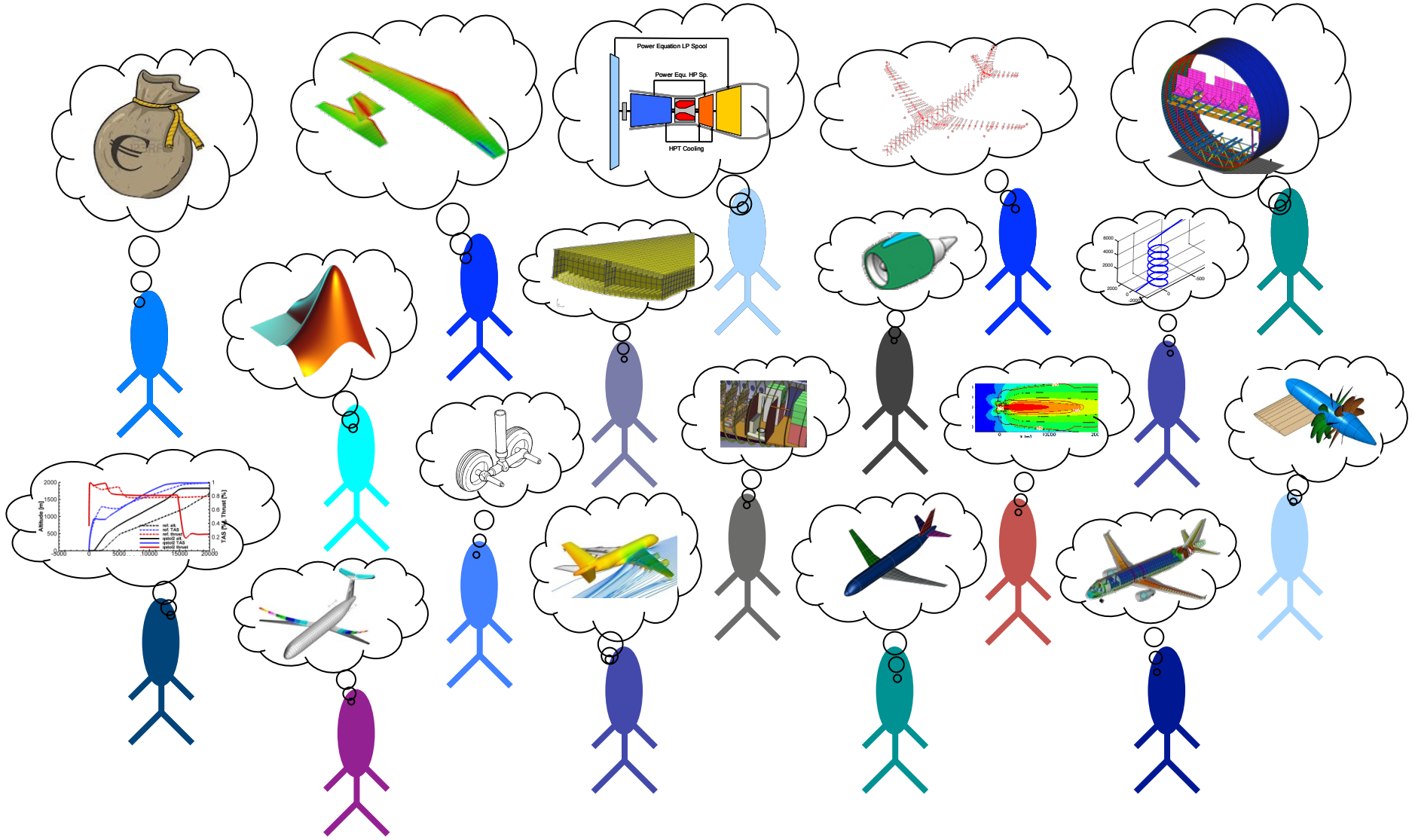
# Locations and employees

Approx. 8000 employees across
40 institutes and facilities at 20 sites.

Offices in Brussels, Paris,
Tokyo and Washington.

# Free and Open Source Software

# Software at DLR



# Software Development at DLR

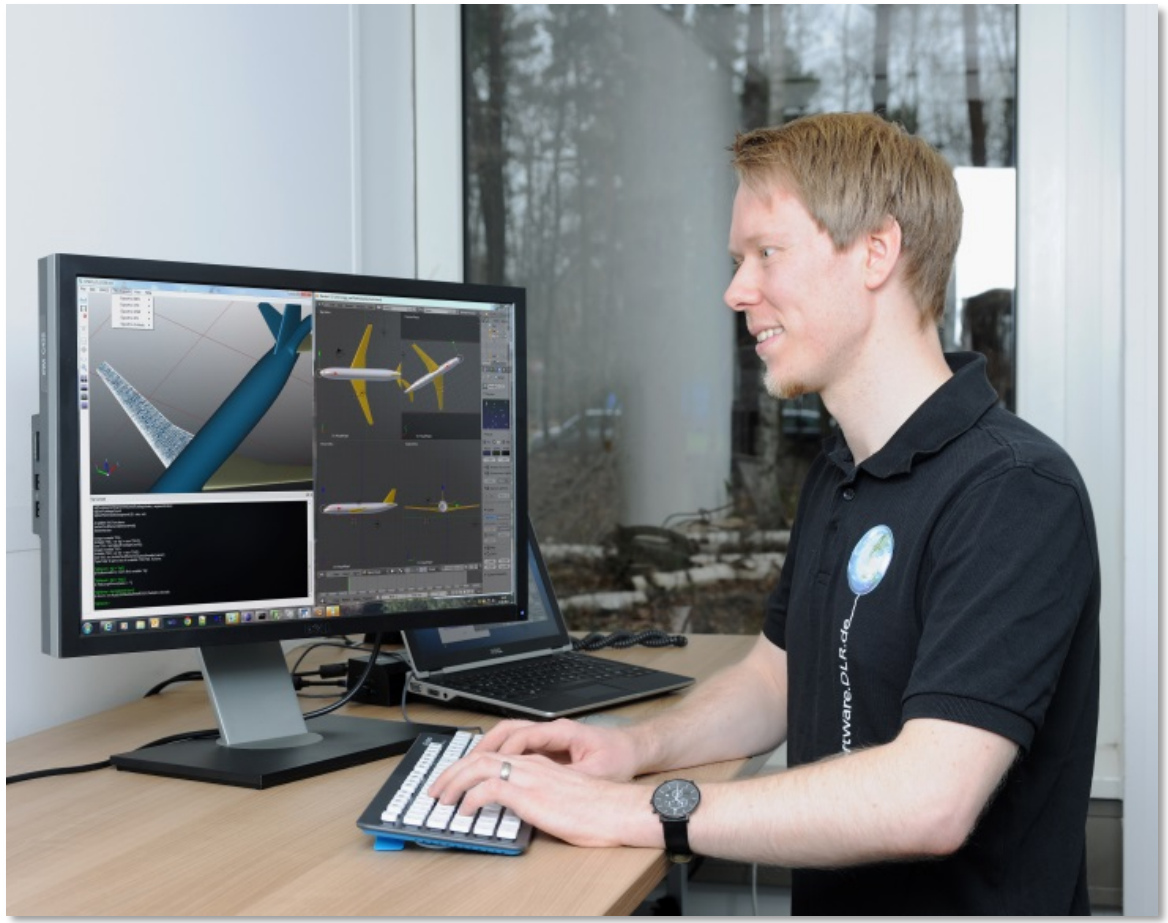
## Some numbers…

- More than 1500 employees develop software
- More than 150 Mio EUR personnel costs per year for software development
- DLR is one of the largest „software company“ in Germany

# Software Development at DLR

## Characteristics

- „Developer“ often do not have any training in software development
- Huge amount of software projects
- Variety of used software technologies



# Software Development at DLR

## Variety

- Many different software technologies used
  - For example,  more than 30 programming languages
- Open Source Software as well as proprietary software
  - Many different licenses
- Huge number of software projects
  - Overview about existing projects is ~~hard~~*not possible*

# Open Source at DLR

# Examples for Open-Source-Software from DLR

Development and usage together with external partners

## ESMValTool

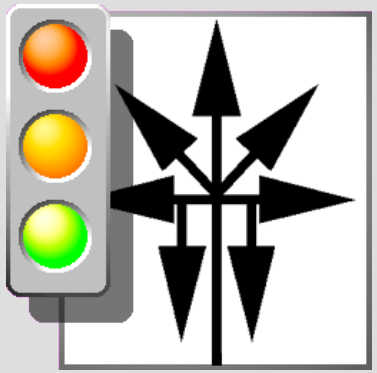
- Earth System Model eValuation Tool
- www.esmvaltool.org

ESMValTool
Earth System Model eValuation Tool

CMIP
The World Climate Research Programme's Coupled Model Intercomparison Project

## SUMO

- Simulation of Urban Mobility
- www.sumo.dlr.de



## RCE

- Remote Component Environment
- rcenvironment.de

RCE

# Problems of the Past

- Software with license issues was published
- License compatibility of used software was not fulfilled
- Colleagues did not know which open source license would suit best
- Colleagues did not know which requirements for the source code had to be fulfilled

# Warnings and Tips for Open Source (2012)

1. Open-Source-Lizenzbedingungen haben grundsätzlich Rechtsgültigkeit, d.h. ein Verstoß gegen diese Bedingungen stellt eine Urheberrechtsverletzung dar.
2. Die unbefugte Weitergabe von Open-Source-Software an Dritte (z.B. i.R.v. Aufträgen) kann zu gravierenden Haftungstatbeständen führen. Das gleiche gilt, wenn im Rahmen von Drittmittel-Projekten verschwiegen wird, dass vom DLR entwickelte Software Open-Source-Komponenten enthält.
3. Open-Source-Software wirkt in der Regel infizierend: Abhängig von den Lizenzbedingungen (z.B. GPL) kann bei einer engen Koppelung von selbst entwickelter Software mit von Dritten entwickelter Open-Source-Software der Effekt eintreten, dass die Lizenzbedingungen der Open-Source-Software für die gesamte Software gelten müssen.
4. Open-Source-Lizenzbedingungen sind untereinander teilweise inkompatibel, d.h., bestimmte Open-Source-Komponenten können nicht miteinander kombiniert werden, ohne gegen eine der Lizenzbedingungen zu verstoßen.

# Developer vs. Licenses

Results of a recent study:

*"… we conducted a survey that posed development scenarios involving three popular open source licenses (GNU GPL 3.0, GNU LGPL 3.0 and MPL 2.0) both alone and in combination. The 375 respondents to the survey, who were largely developers, gave answers consistent with those of a legal expert's opinion in 62% of 42 cases.* ***Although developers clearly understood cases involving one license, they struggled when multiple licenses were involved****."*

Daniel A. Almeida, Gail C. Murphy, Greg Wilson, and Mike Hoye. 2017.
**Do software developers understand open source licenses?.**
In *Proceedings of the 25th International Conference on Program Comprehension* (ICPC '17).
IEEE Press, Piscataway, NJ, USA, 1-11. DOI: https://doi.org/10.1109/ICPC.2017.7

# Measures at DLR

## Information and trainings

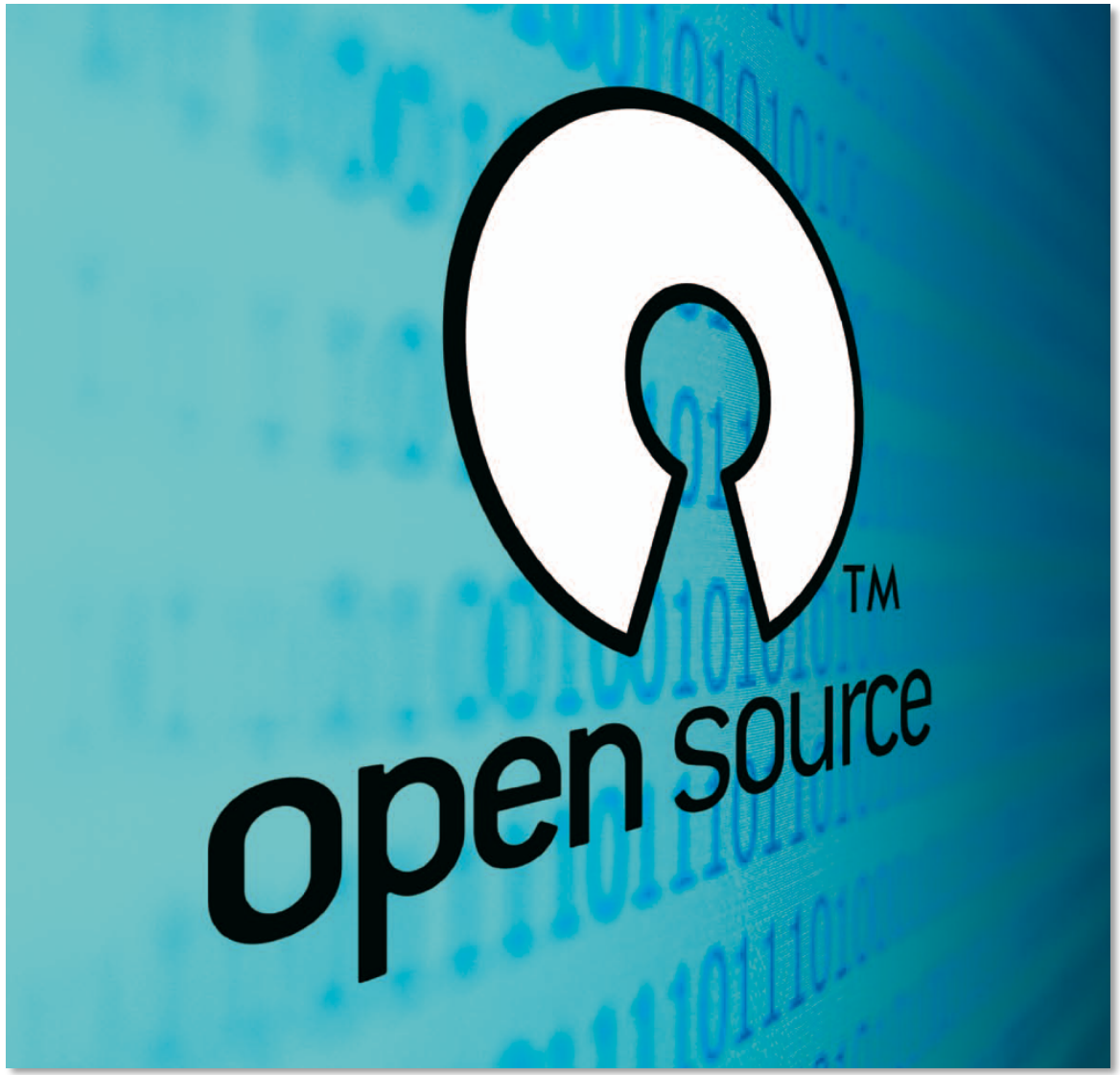
- Training on licenses
- Brochure

## Knowledge exchange

- Wikis
- Knowledge-Exchange-Workshops

## Consulting and support

- Recommended licenses
- Support



# Information and Trainings

DLR

# Training on Open Source Licensing

## „Legal aspects of open source usage“

- Official and regular training in the DLR education program
- Every DLR employee can participate
- Short training (currently about 4 hours)
- Run by two persons
  - Legal expert of DLR technology marketing (Dep. licenses and patents)
  - Software engineer of DLR facility simulation- and software technology

**Introduction to open source**

**Legal basics**

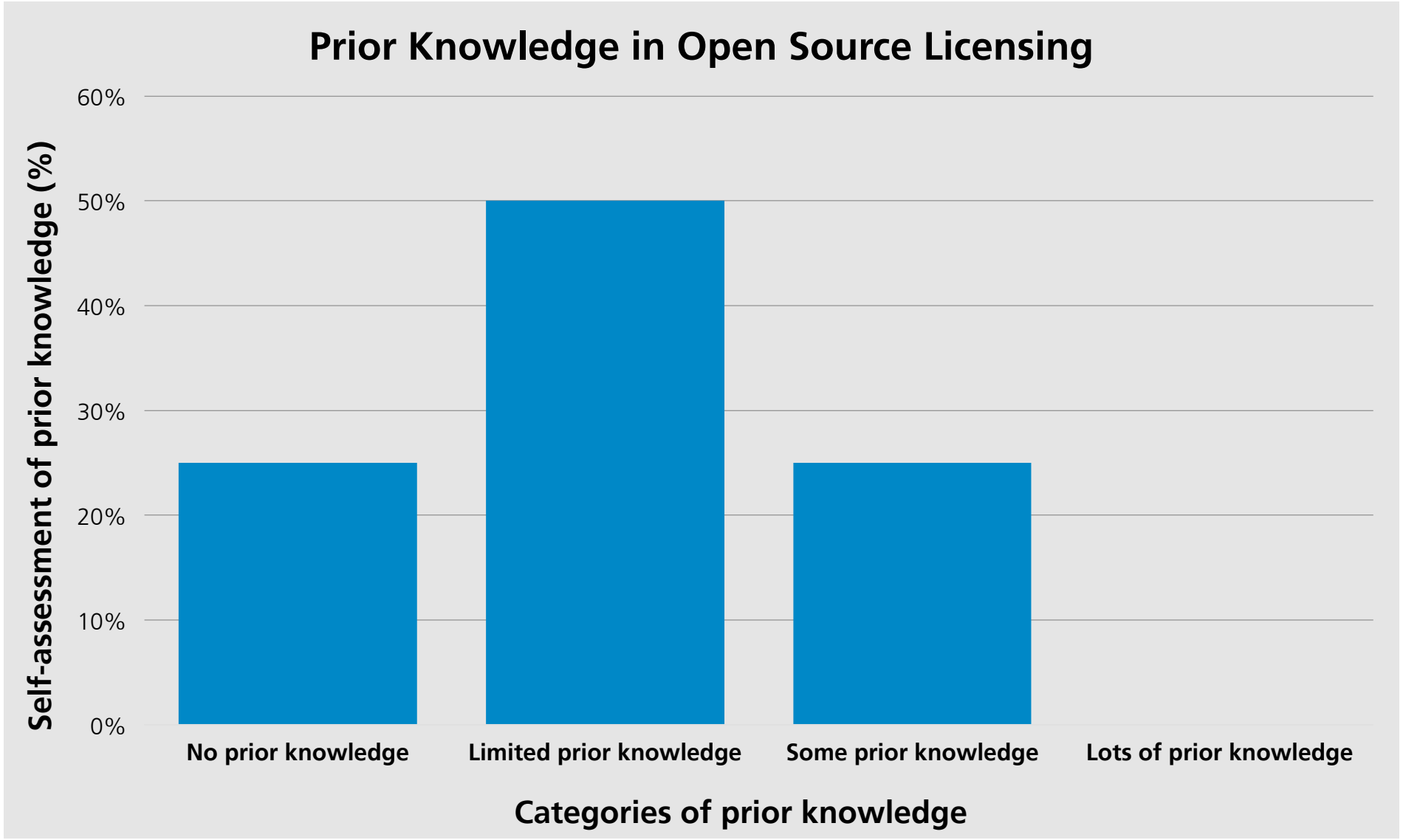
**Open source software**

**Selected open source licenses**

**Usage of open source software**

# Training Participants

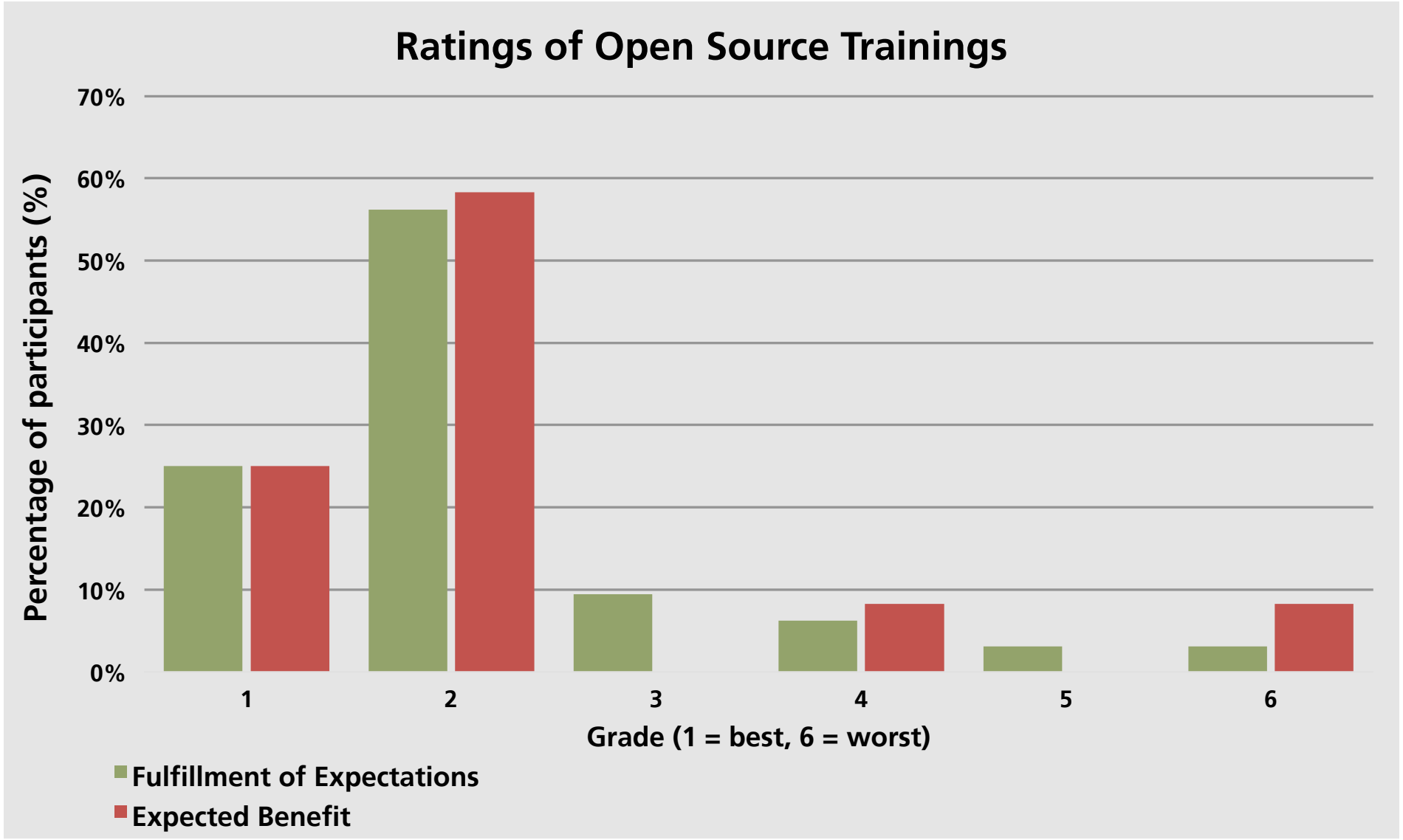
| Year | Participants | DLR Site |
|---|---|---|
| 2012 | 32 | Oberpfaffenhofen |
| 2013 | 23 | Berlin, Köln |
| 2014 | 12 | Stuttgart |
| 2015 | 9 | Berlin |
| 2016 | 14 | Köln |


Prior Knowledge in Open Source Licensing
Self-assessment of prior knowledge (%)
60%
50%
40%
30%
20%
10%
0%
No prior knowledge
Limited prior knowledge
Some prior knowledge
Lots of prior knowledge
Categories of prior knowledge

# Expectations of Participants

## Query of expectations bevor the training (*extract*)

- To learn which aspects have to be taken in account in a project
- Get an overview over open source license models
- Learn how to use open source software in closed source projects
- Get to know examples from within DLR
- Learn the legal basics
- To learn and understand personal consequences for license violations


Ratings of Open Source Trainings
70%
60%
50%
40%
30%
20%
10%
0%
Percentage of participants (%)
1
2
3
4
5
6
Grade (1 = best, 6 = worst)
Fulfillment of Expectations
Expected Benefit

# Open Source Brochure

## Information about legal basics

- Basics about open source license law
- Developed by a law firm
- Funded and published by
  DLR Technology Marketing

# Open Source Brochure – Content

**Two main chapters**

- Distribution of *unmodified* code
- Distribution of *modified* code

**In both chapters: Lists of all liabilities for licenses, which are widely used at DLR**

- BSD, Apache, GPL, MIT, …

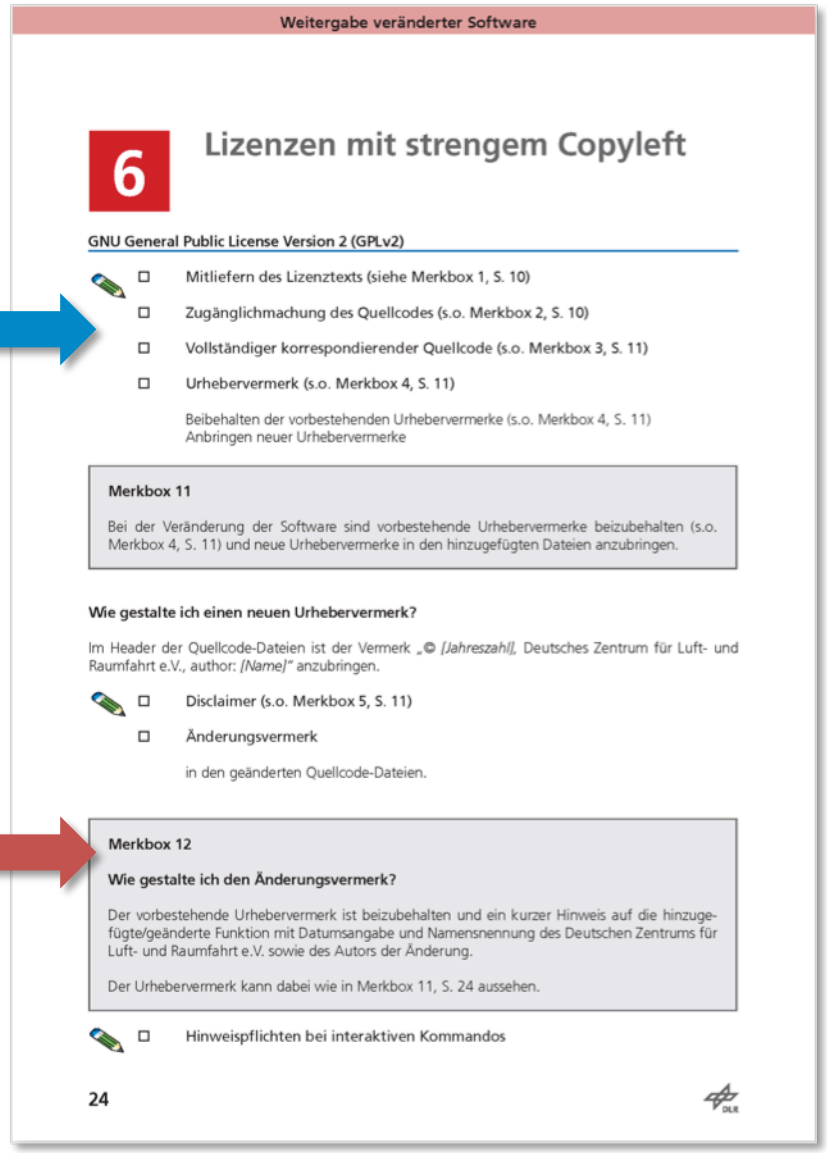
**Licenses**

- with strong copyleft
- with weak copyleft
- without copyleft
- with special rights

# Open Source Brochure
## Practical Information

**Check lists**

**Information**



Weitergabe veränderter Software

6 Lizenzen mit strengem Copyleft

GNU General Public License Version 2 (GPLv2)

- ☐ Mitliefern des Lizenztexts (siehe Merkbox 1, S. 10)
- ☐ Zugänglichmachung des Quellcodes (s.o. Merkbox 2, S. 10)
- ☐ Vollständiger korrespondierender Quellcode (s.o. Merkbox 3, S. 11)
- ☐ Urhebervermerk (s.o. Merkbox 4, S. 11)

  Beibehalten der vorbestehenden Urhebervermerke (s.o. Merkbox 4, S. 11)
  Anbringen neuer Urhebervermerke

**Merkbox 11**

Bei der Veränderung der Software sind vorbestehende Urhebervermerke beizubehalten (s.o. Merkbox 4, S. 11) und neue Urhebervermerke in den hinzugefügten Dateien anzubringen.

**Wie gestalte ich einen neuen Urhebervermerk?**

Im Header der Quellcode-Dateien ist der Vermerk „© *[Jahreszahl]*, Deutsches Zentrum für Luft- und Raumfahrt e.V., author: *[Name]*" anzubringen.

- ☐ Disclaimer (s.o. Merkbox 5, S. 11)
- ☐ Änderungsvermerk

  in den geänderten Quellcode-Dateien.

**Merkbox 12**

**Wie gestalte ich den Änderungsvermerk?**

Der vorbestehende Urhebervermerk ist beizubehalten und ein kurzer Hinweis auf die hinzugefügte/geänderte Funktion mit Datumsangabe und Namensnennung des Deutschen Zentrums für Luft- und Raumfahrt e.V. sowie des Autors der Änderung.

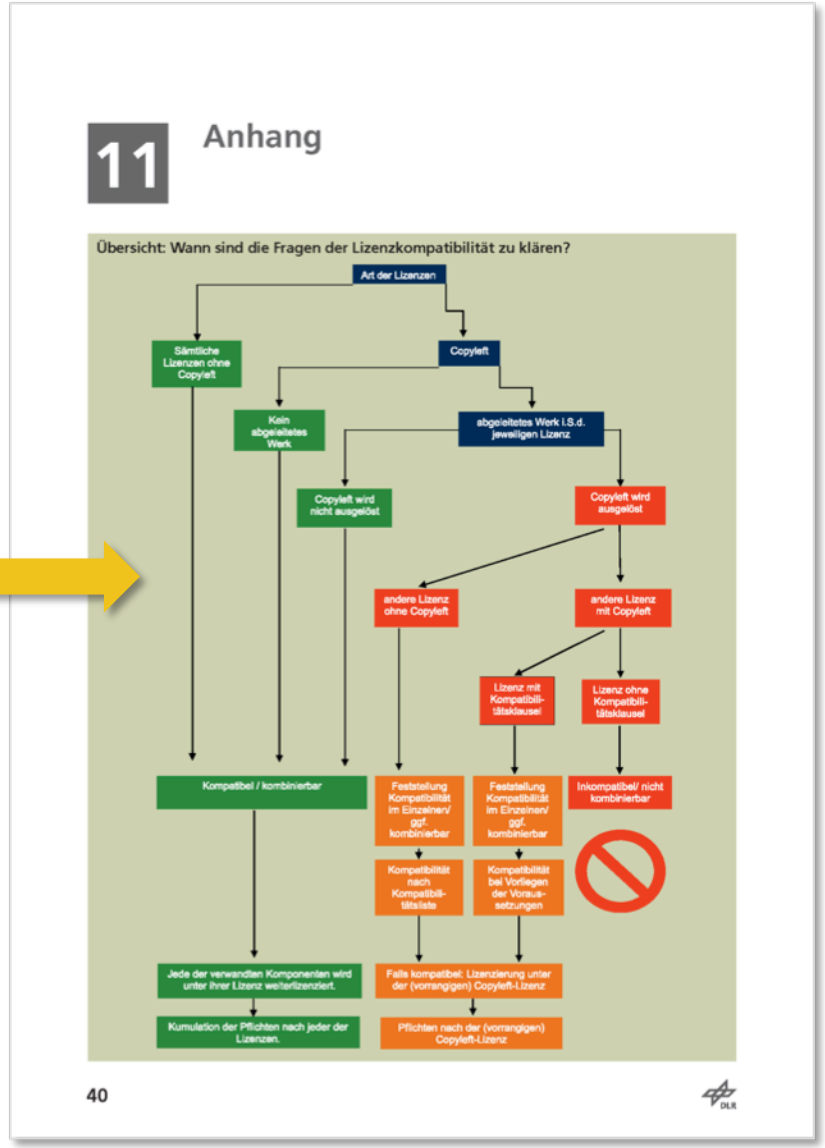
Der Urhebervermerk kann dabei wie in Merkbox 11, S. 24 aussehen.

- ☐ Hinweispflichten bei interaktiven Kommandos

24

# Open Source Brochure
## Help for Decisions

**Decision trees**



11 Anhang

Übersicht: Wann sind die Fragen der Lizenzkompatibilität zu klären?



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# Knowledge Exchange

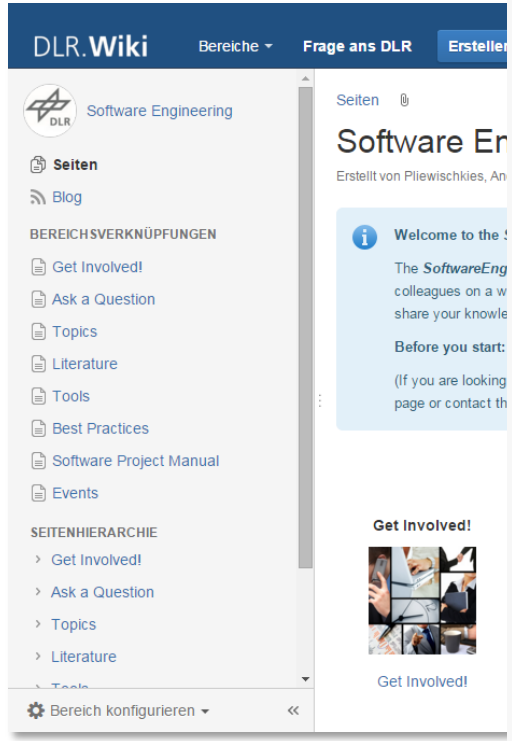
# Wikis

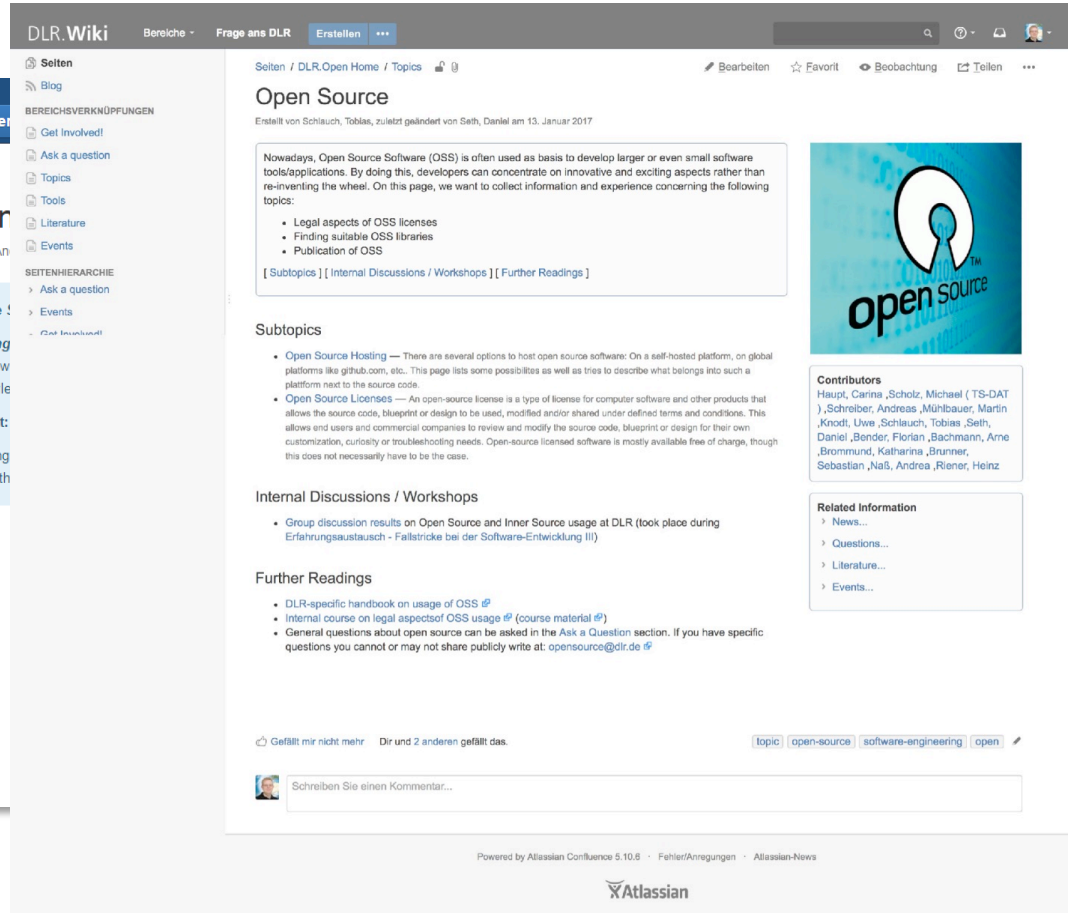
## Central DLR.Wiki based on Atlassian Confluence

- Wikis for
  - Software Engineering
  - Events
  - …

## Open Source Wiki

- Single-Point-of-Information at DLR



# KnowledgeExchangeWorkshops

## *WissensAustauschWorkshops (WAWs)*

**Workshops for knowledge exchange between DLR employees (peer-to-peer)**

**We have KnowledgeExchangeWorkshops for many topics**

- Software Engineering
- Visualization of huge data sets
- Autonomous flying
- Photonic systems
- DLR.**Open** (incl. Open Source)

# KnowledgeExchangeWorkshops

## Open to any DLR employee

- Up to 60 participants

## Interactive program

- Short impulse lectures
- Personal introduction
- Lightning talks
- Discussions / working in small groups

Coding Hours

Biete

Software Engineering

Hose

Python

Open Source

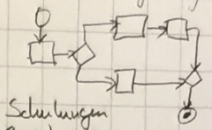
Suche

DLR

Michael Meinel , Simulations- und Softwaretechnik · Software-Engineering

Biete

Software-Engineering / Prozesse / Werkzeuge } Schulungen Beratung



Python ... auch mit anderen Sprachen (F2x)

↳ Fortran ... github.com/DLR-SC/F2x

Continuous Integration

Software-Tests — Werkzeuge und Methoden

Suche

Werkzeuge f. Workflow-Überwachung und -kontrolle (Wo hakt es?)

- Bewertung (Was hilft?)

Sicherheit Welche Gefahren gibt es? Wie Entwickel ich sichere SW?

Projekte f. Fortran-Anbindung an ... Python, Java, C#, ...

lyreco

DLR

DAS KANNICH!
MBSE
Betrieb
DAV
PLANUNG
EMF
Eclipse
4.0
4.X
Space!!!
Open Source!
Philipp Martin Fischer

Expectations on Topics
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Networking
Open Source Process
Legal information
Exchange knowledge
Visibility
Specific actions
Repl. of prop. Software
Expected Topics (%)
Degree of fulfillment (%)

# Lessons Learned from the KnowledgeExchangeWorkshops

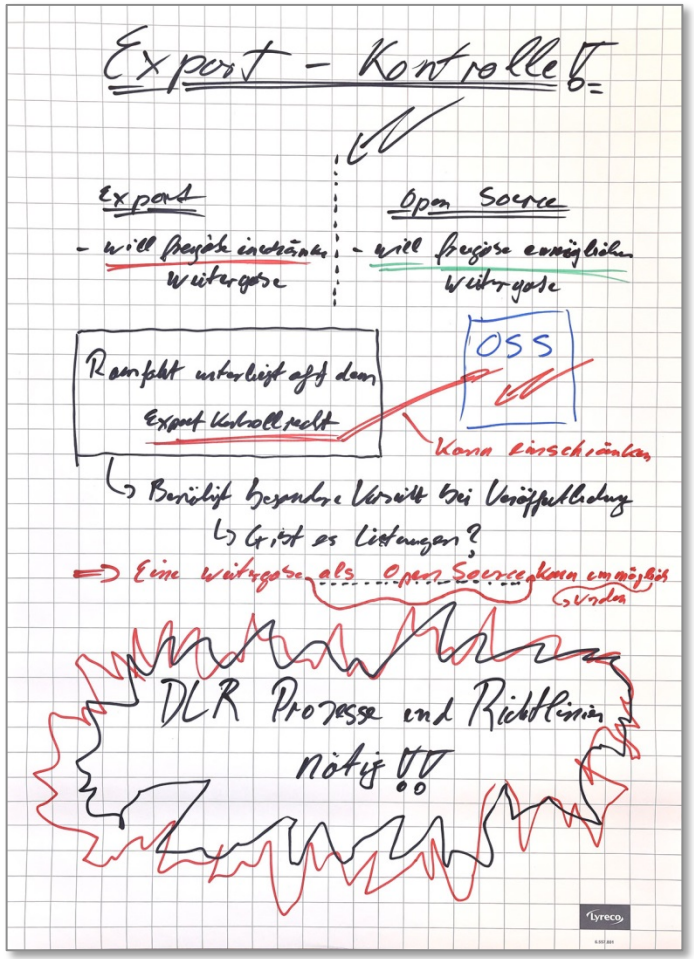
## General findings

- Open source software is already widely spread at DLR
- Open source software mainly is used in the form of open tools and libraries
- Own research software still mainly closed source
- Eager interest to publish own software

## Critic of Open Source

- Missing opportunity to earn money
- Community build up is resources consuming
- Additional burden of time is demotivating

## DLR process description to handle open source now available



# Consulting and Support

DLR

# Help on Licensing Issues

## Individual help and support

- General license questions, property rights
  → DLR technology marketing
- Legal support for copyright or further legal questions
  → DLR legal department
- License compatibility, license selection, development
  → DLR simulation and software technology

## Typical Topics

- Criteria for choosing an Open-Source-Software
- Best-Practices for own Open Source projects
- Migration from commercial and proprietary software to Open Source software

**Email as central point of contact: opensource@dlr.de**

# Recommended Licenses

## Default licenses, approved by DLRs legal department

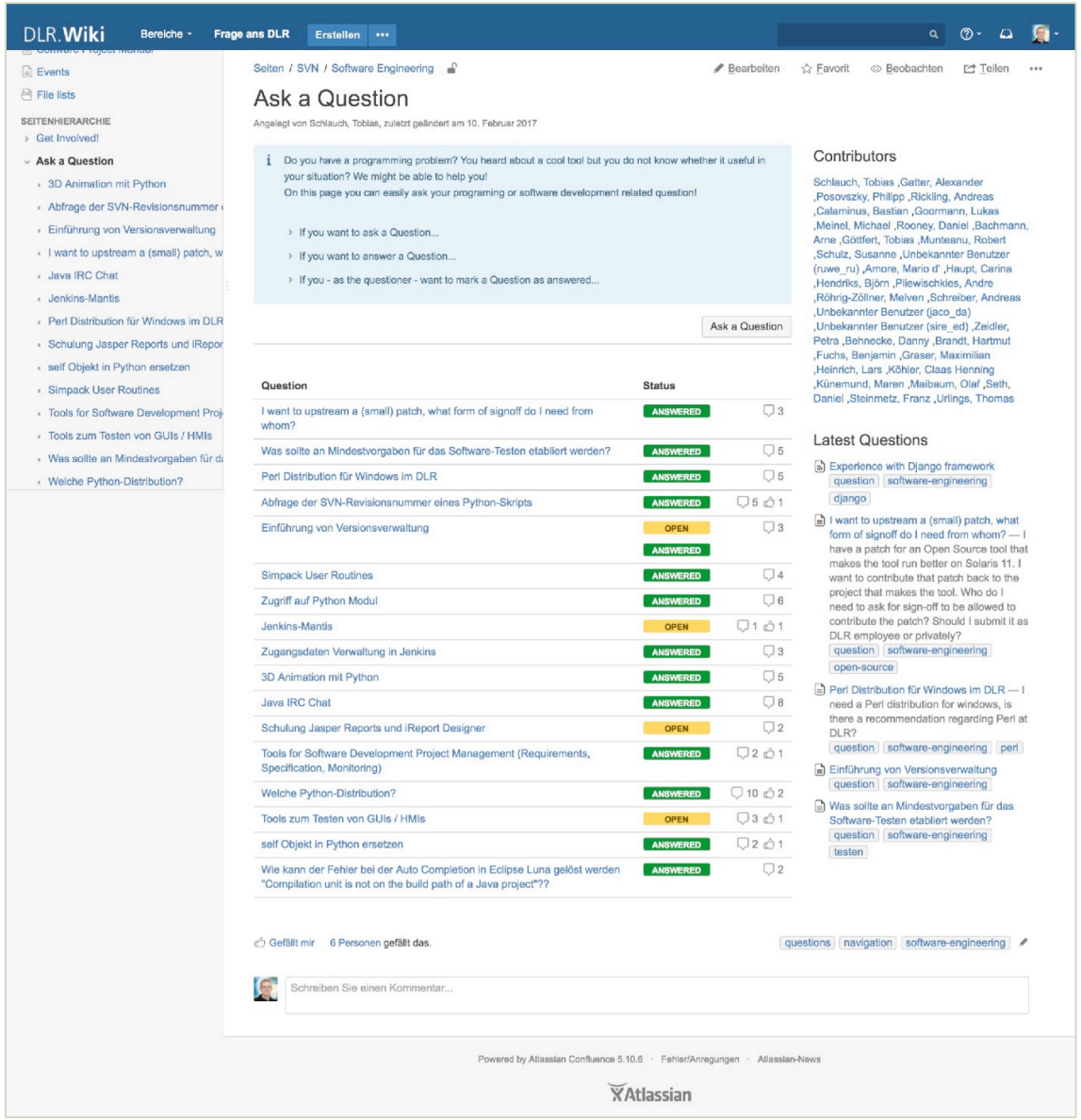
- Simplified BSD License
- Apache License 2.0
- Eclipse Public License 1.0

## DLR will not develop its own Open Source license

- In contrast to related organizations (NASA, ESA, …)

# Wiki

## Q&A section of the DLR.Open wiki



# Key Messages

## Our approach at DLR is based on

1. First offer targeted information to the employees
2. Afterwards provide time and space for peer to peer discussions and knowledge exchange
3. Only afterwards rely on a formal process and directions given „from above“

## Feedback

- Positive evaluation of current actions
- Tips, hints and specific *action items* for further steps

## Our approach is copied by others (Helmholtz-Community etc.)

# Thank You!

## Questions?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DLR Intelligent and Distributed Systems

`http://www.DLR.de/sc/ivs`


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