

# Tasking Framework: An open-source software development library for on-board software systems

Embedded System Week 2020

Zain Hammadeh



Knowledge for Tomorrow



# Agenda

- Introduction to the tutorial and agenda (pre-recorded)
- Tasking Framework in a nutshell: motivation and basic features (pre-recorded)
- Tasking Framework from A to Z (pre-recorded)
- Tasking Framework in practice: clone from github + build + write your first example (pre-recorded)
- Outlook on development process and invitation to contribute (pre-recorded)
- Discussion and closing (on-line session)



# Speakers



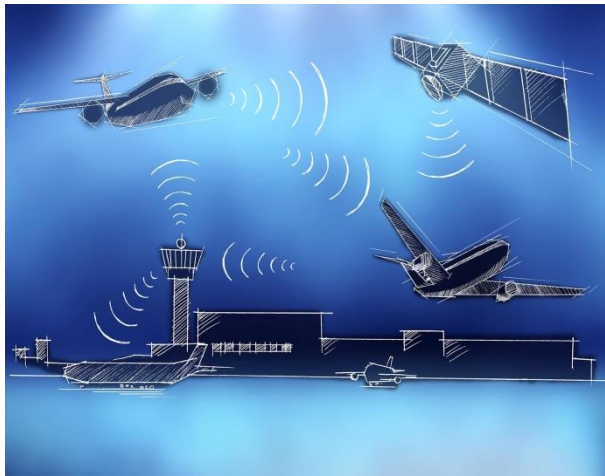
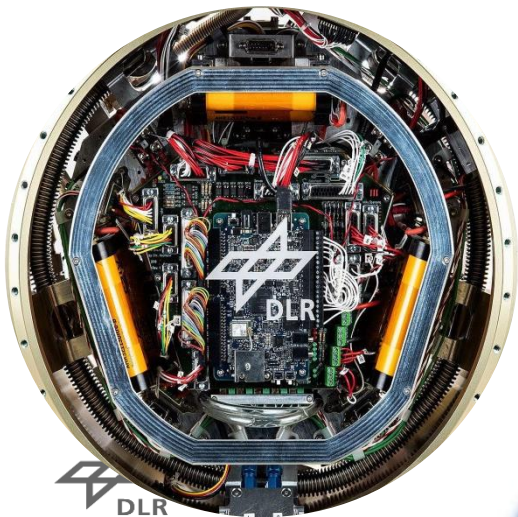
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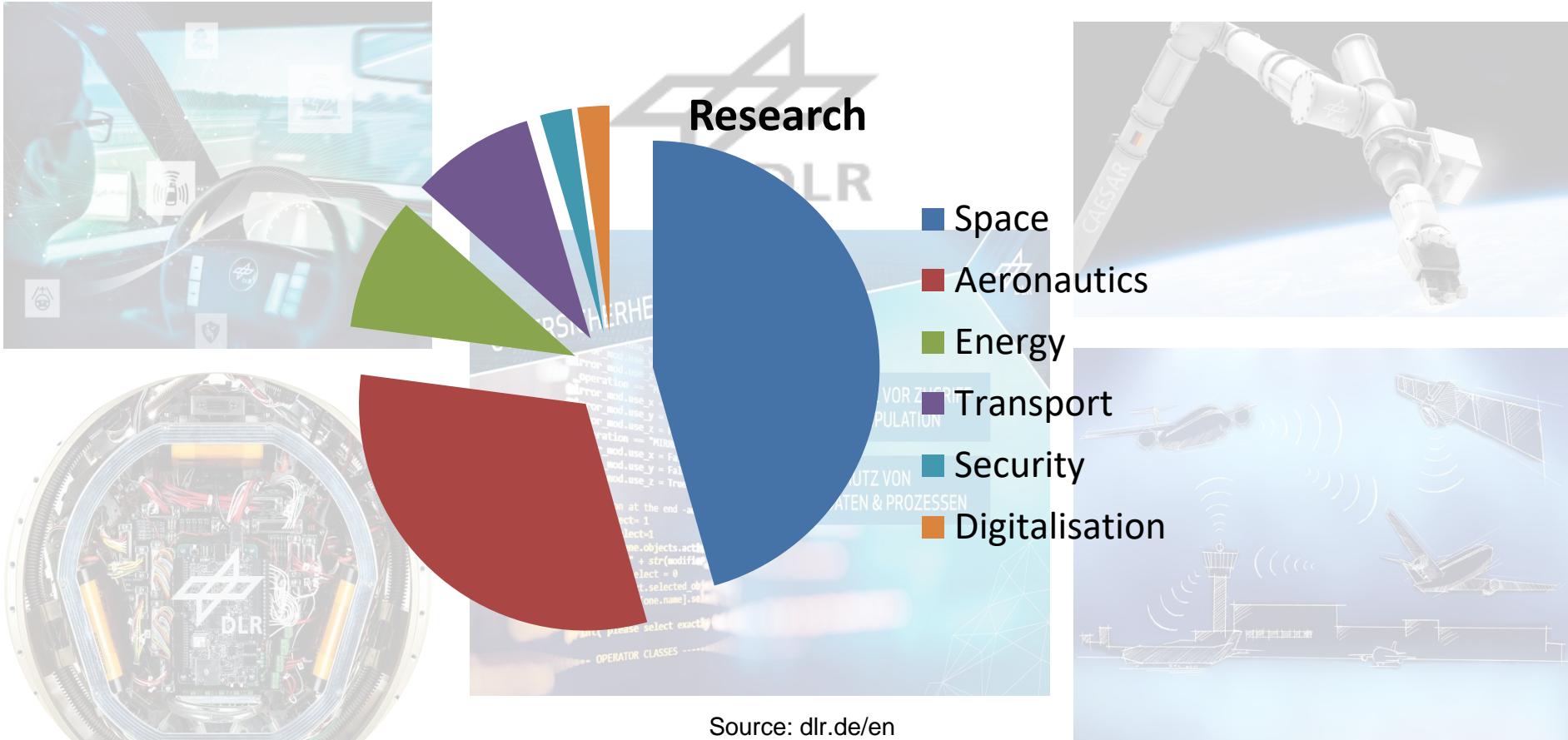
# German Aerospace Center (DLR)



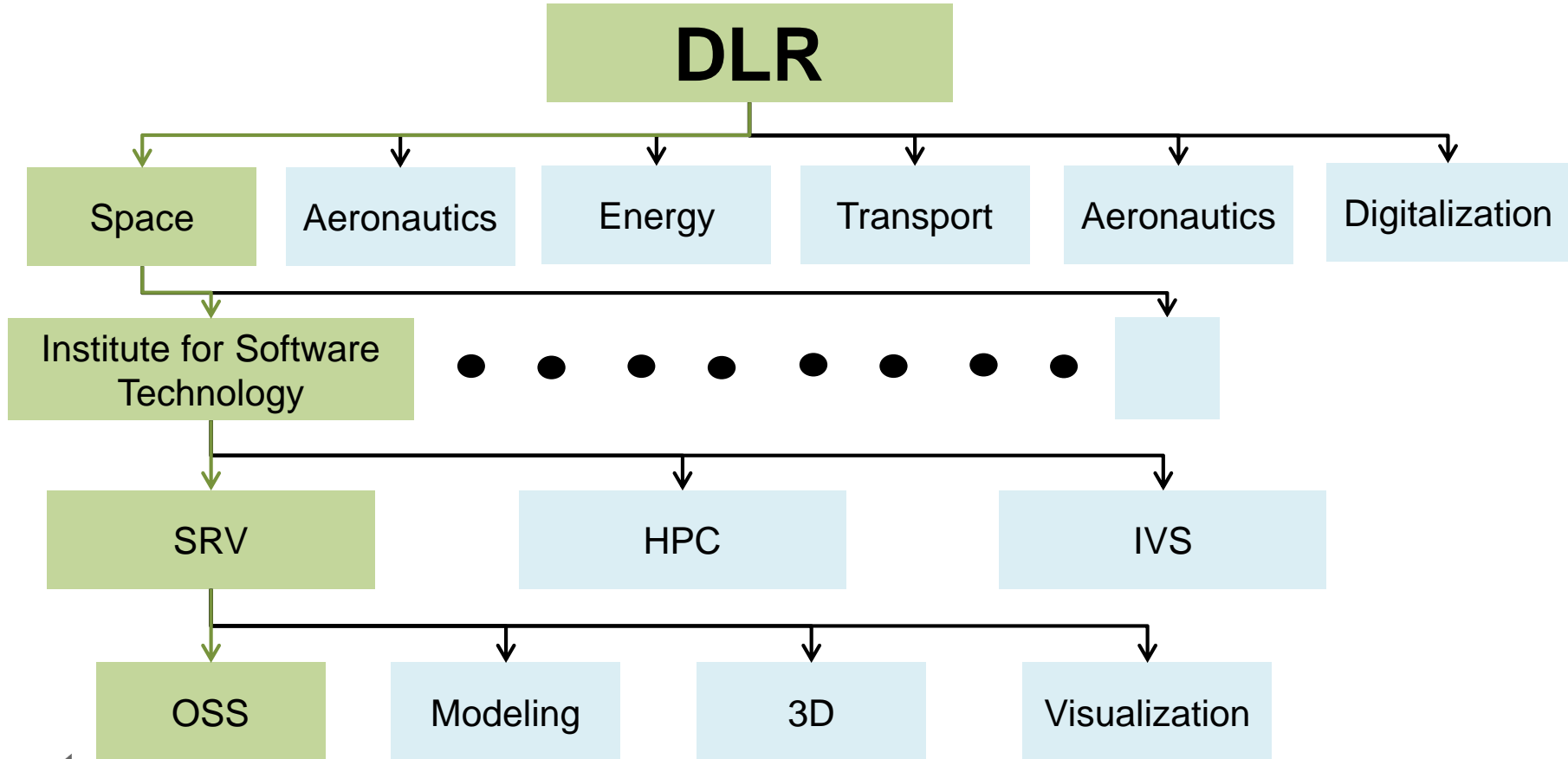
Source: [dlr.de/en](http://dlr.de/en)



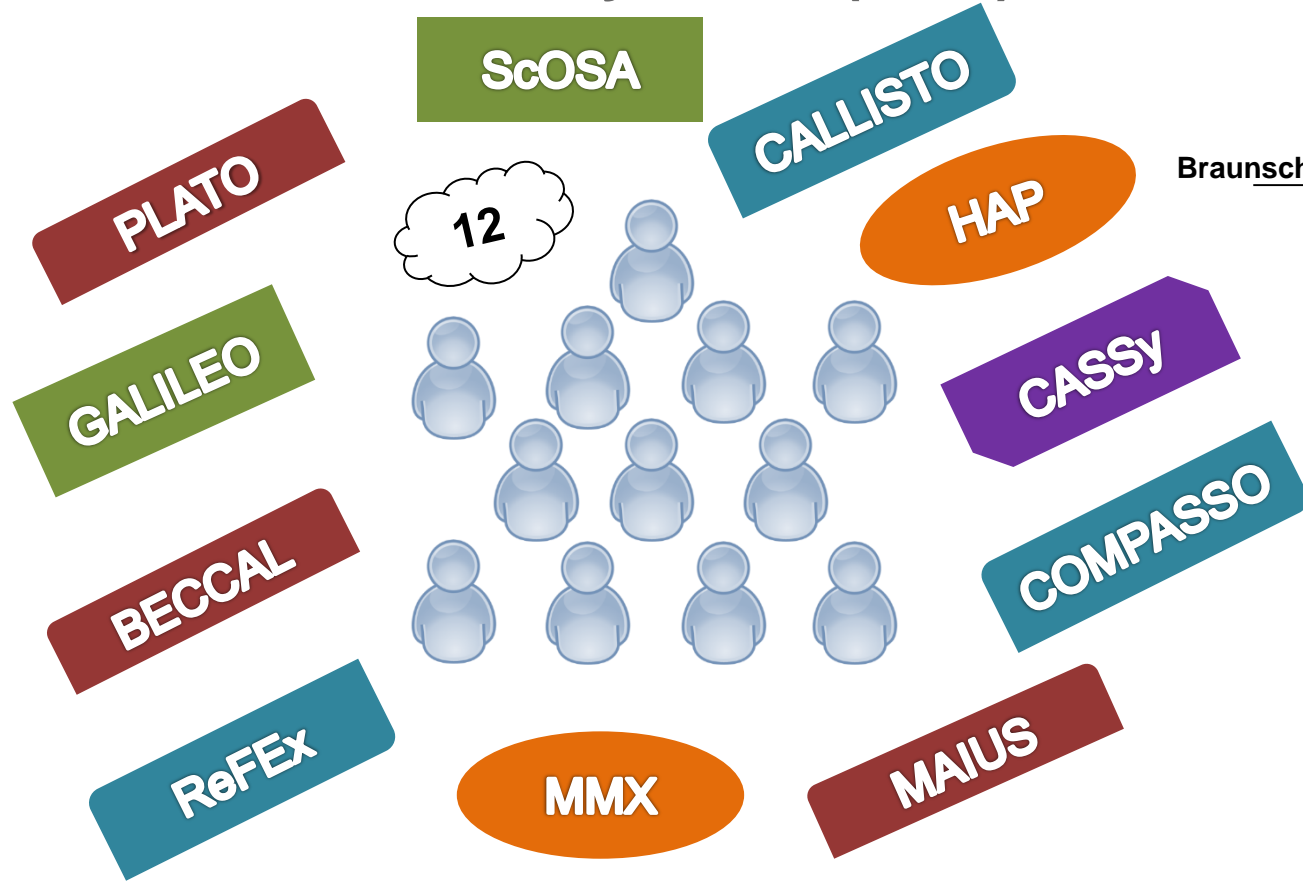
# German Aerospace Center (DLR)



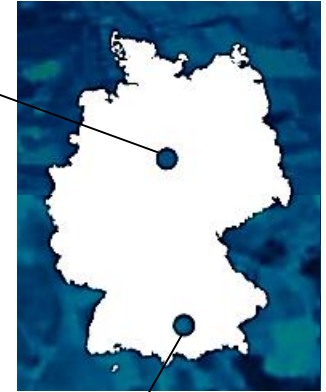
# Onboard Software Systems (OSS)



# Onboard Software Systems (OSS)



Braunschweig



Oberpfaffenhofen



# Research and development for on-board software

## Mission:

*Provide dependable real-time software for space systems*

## Research focus:

- Model-driven software development
- (Real-time) execution platforms
- Reconfigurable distributed on-board systems
- Verification/Validation and Software Quality Assurance



FireBird



Eu:CROPIS



On-board  
Applications



Middleware



(Real-time)  
Operating Systems



Embedded  
Programming / Driver



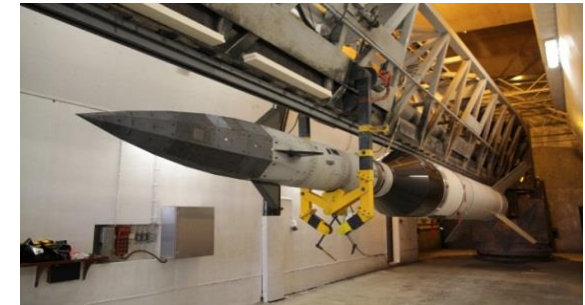


# Our use cases

- New On-board Computer Architectures
  - OBC-NG / ScOSA / **ScOSA Flight Experiment**
- Guidance, Navigation, and Control Software
  - **BIRD**
  - **OOV-TET** and **BIROS**
  - **Eu:CROPIS**
  - **SHEFEX II**
  - **CALLISTO** and **ReFEx**
  - **ATON**
  - **MMX**
  - **HAP**
- Command & Data Handling
  - **Eu:CROPIS**
  - **MAIUS 1, 2, 3 / BECCAL**
  - **Compasso**
- Payload Software
  - **MAIUS 1, 2, 3 / BECCAL**
- Software Product Assurance
  - **PLATO, GALA & JANUS (JUICE)**
  - **GALILEO**



Launch Eu:CROPIS at GSOC



SHEFEX II



ScOSA

# Our capabilities w.r.t. on-board software engineering

- Software engineering and development for space systems
- Software quality / product assurance
- Base software development
- Software integration
- Model-driven software development
- Design of dependable software systems

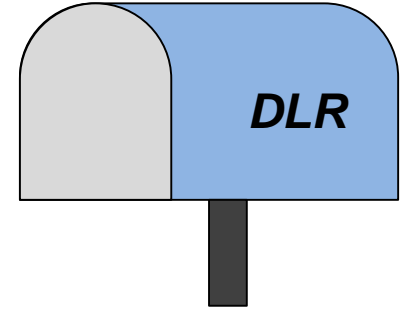
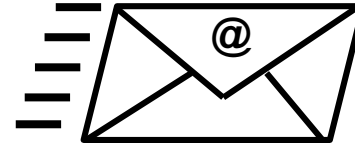


# Are you interested to know more?

Projects

Publications

Collaboration



Website: <https://www.dlr.de/sc/srv>

ResearchGate: OSS



# Live Q&A session

Sunday 20.09.2020

11:00am

at 11:00 – 12:00 am EDT

at 05:00-06:00 pm Berlin

See you  
later!



## Tutorial 4: Tasking Framework: An open-source software development library for on-board software systems



11:00am - 12:00pm, Sep 20

Tutorials

\* This tutorial is a **live Q&A session** with **pre-recorded videos made available before the event.**

Tasking Framework is a C++ software development library and an event-driven multithreading execution platform. It is developed by the Institute for Software Technology, German Aerospace Center (DLR). Tasking Framework is dedicated to improve the reusability in developing embedded software systems and to reconcile the embedded software with model-driven software development. It can be used to develop, but not dedicated for, critical as well as non-critical embedded software on single-core as well as parallel architectures. Tasking Framework gives software developers the ability to implement their applications as task graphs with arbitrary activation patterns (periodic, aperiodic and sporadic) using a set of abstract classes with virtual methods. It is compatible with the POSIX-based operating systems, mainly Linux and RTEMS. The Tasking Framework was successfully used in, for instance, the attitude orbit

[Read more](#)