



## Industry Profile Space



### Spectacular and Geared to the Future

Space projects are extraordinary in every respect. Usually these are international projects with a huge investment volume. Rather than using standard series products, extremely high requirements must be met with regard to reliability, robustness and durability.

The systems must perform highly complex functions precisely, reliably and under extreme ambient conditions. This requires the use of state-of-the-art engineering tools and know-how as early as in the development phase of such systems.

### Space Technology is a World of its Own

An essential task in the development of space systems consists in testing all components for proper function within subcomponents and within the overall system under different ambient conditions.

Specifically developed simulators reflect the behaviour and interaction of payload components among each other and with the satellite platform. In this way, a simulation environment is created in parallel to the implementation of the instruments and can be used for the verification of interfaces and real components already in an early stage of assembly of the satellite.

### Scope of Services

- Simulation of payload components
- Development of on-board software (ECSS)
- Software development for ground control segments
- Model-based software development
- Development of test systems
- Integration on target systems with real-time capability
- Check-out
- Quality management
- Verification and validation

### Systems of a Different Kind

Konzept Informationssysteme GmbH has been active in the space industry for more than 20 years, developing systems in compliance with the ECSS standards. Our customers can therefore benefit in their projects from our long-term know-how ranging from the development of on-board software through test systems to payload data processing. Of course, we also meet the high requirements for these systems regarding quality and performance.



## Specific Project Experience

- Development of software modules for real-time simulators (RTS)
- Development of software modules for on-board computer simulators (OBC)
- Driver development for real-time test bed interfacing
- On-board software development
- Payload data processing (Lo-L2)
- Check-out
- Assembly, integration and test (AIT)
- Functional verification (FV)
- Spacecraft operation procedures
- Position control of parabolic antenna
- Control algorithm optimization
- Development of test automation software
- Data simulation, e.g. in the domain of Synthetic Aperture Radar (SAR)
- Application software for Mission Operations Centres
- PERIGEE —Design software for space missions
- SCOE Software



## Software Development

- Requirements management and engineering
- Software architecture
- Module design
- Implementation

## Verification and Validation

- Preparation of module and unit tests
- Software integration and system testing
- Preparation of the test documentation for module, integration and system tests
- Test automation at module, integration and system level
- HIL tests
- Analyses (Static and dynamic code analyses, Compiler analyses, Floating point arithmetic analysis, Coverage analyses (MC/DC etc.), Code reviews)
- Validation of system requirements and their implementation

## Support Processes

- Preparation of process plans and carrying out process analyses
- Project management
- Quality assurance
- Configuration management
- Problem and change management
- Tool development
- Development of simulation environments
- Development of test tools
- Documentation

## Systems Engineering

- Requirements management and engineering at system level
- Creation of system architectures and designs
- Realization of FDIR analyses

## Standards

- ECSS
  - ECSS-M-ST-10C
  - ECSS-M-ST-40C
  - ECSS-M-ST-80C
  - ECSS-E-ST-10C
  - ECSS-E-ST-40C
  - ECSS-E-ST-70-41A/C
  - ECSS-Q-ST-80C
- NTSS
  - NASA-STW-8719.13
  - NASA-GB-8719.13
  - NASA-HDBK-2203
- CCSDS
- DIN EN 9100:2016
- V-Modell XT
- MISRA

## Tool Experience (synopsis)

- DOORS, REQTIFY, RequisitePro, MKS, Polarion
- Rational Rhapsody, Rational Rose, Enterprise Architect
- Various compilers and debuggers for C, C++, C#, ADA, Java, Assembler, as well as various scripting languages
- Oracle, MySQL, PostgreSQL, SQLite
- Matlab / Simulink, Octave
- ClearCase, PVCS, MKS, SVN, GIT, CVS
- ClearQuest, Bugzilla, Trac, Jira, OpenProject, Redmine
- Cantata++, VectorCast
- PC Lint, QA-C
- Check-out systems (e.g. CGS, OpenCenter, SCOS-2000), UDMS
- MOIS, Elisa, UCL
- Real-time operating systems (VxWorks, RT-Linux, Rtems, PikeOS)

## Missions (synopsis)

- GALILEO
- CRYOSAT
- DEOS
- COLUMBUS (ISS)
- GRACE Follow-On
- MetOp
- Sentinel (1, 2 & 6)
- EarthCARE
- LISA Pathfinder
- ADM Aeolus
- Swarm