



Intelligent on-board flight software

Our experience of flight software, ground segment, and operations, over many diverse missions, ideally places CGI to contribute to the definition of key mission objectives and capabilities.

We help you develop successful flight software. Our comprehensive flight-heritage software baseline leads to efficient development for new missions.

CGI routinely supports the launch, LEOP, commissioning and maintenance of satellites running our software. We are adept at delivering software updates post-launch, enhancing the mission effectively and safely. ESA XMM-Newton: A customer-requested update was patched into the software in-flight, allowing the use of the redundant reaction wheel for “4-wheel drive”.

Looking to the future CGI actively pursues innovations in the space arena and is leading the way with several revolutionary technologies that will shape the future of spacecraft flight software.

Key benefits

- From our extensive experience on projects, from mission inception to end-of-life, we provide consultancy to help you find the best solution and make the most of your mission.
- CGI offers solutions across the entire space software domain with cutting edge technology development, space segment, ground systems, simulators and operations. This end-to-end capability allows CGI to successfully and reliably achieve your mission’s needs.

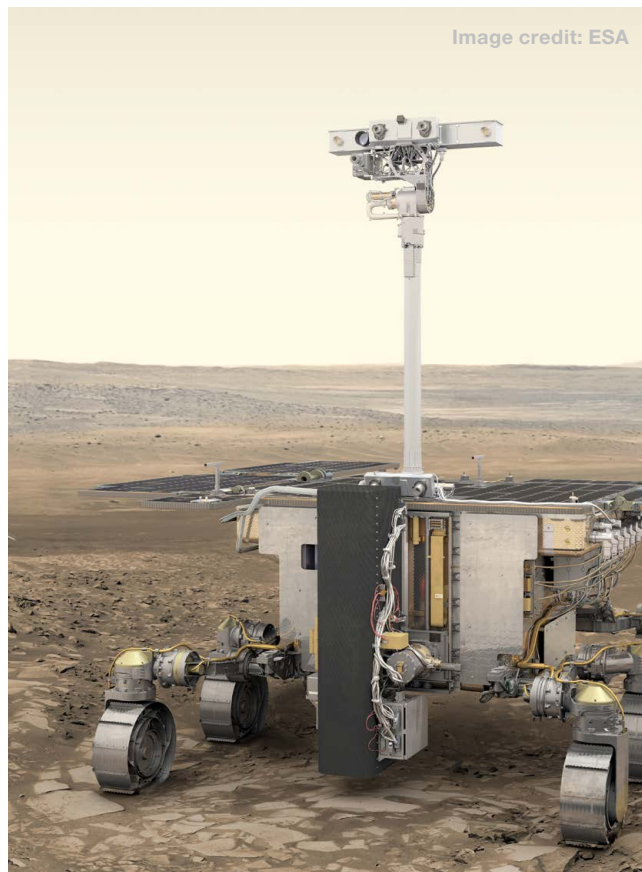
NASA GRACE Follow-On:
Our flight software achieved significant reuse, making for a smooth and successful development project.



Intelligent applications and automation

CGI has long been active in automation and artificial intelligence (AI) research. We conduct key R&D activities with a mission focus: for example, delivering state-of-the-art AI and Machine Learning based detection systems for Martian geology. We have introduced and applied advanced concepts on flight missions, such as the Visual Localisation module for ESA's ExoMars Rover.

The techniques and expertise gained here can be deployed to benefit everyday space missions. For example, we can deliver detectors for specific EO features and exploit the results autonomously on-board, prioritising the downlink of the most interesting images or filter out images with no value.



FPGA deployment

FPGAs promise to deliver the combined benefits of speeding up the execution of advanced algorithms and alleviating the load on the main processor. CGI is championing the inclusion of increasingly advanced autonomy in real space missions. To support this, we are undertaking work to port existing qualified flight software to FPGA.

Through consultancy or implementation, CGI will assist you in deploying software if your mission requires the processing power of an FPGA.

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Electronic data sheets

Electronic Data Sheets (EDS) offers an industry-wide data exchange format for device interface information, which can be imported into and exported from a database and other data modelling tools. It is a CCSDS standard, pursued by both ESA and NASA. CGI has a long involvement with EDS: we have technically led most EDS R&D projects and are the experts within the CCSDS and SOIS EDS working groups. We are actively pursuing ways to best exploit EDS in the delivery of efficient, effective and reliable flight software.

Time and space partitioning

Increasingly complex space avionics leads to larger, more complex spacecraft with increased power and mass requirements. With higher-performing processors becoming available for space applications, one solution is to merge several processing units into the main computer. This reduces the complexity, mass, and cost of the spacecraft.

TSP technology enables this while ensuring the imported applications cannot affect the central control software. Each application executes in its partition, which is a virtual execution environment with no access to neighbouring partitions except where deliberately configured.

CGI has been involved in the research and development of TSP within ESA, and we can therefore reliably implement TSP for your mission.

About CGI

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world. We are insights-driven and outcomes-based to help accelerate returns on your investments. Across 21 industry sectors in 400 locations worldwide, our 76,000 professionals provide comprehensive, scalable and sustainable IT and business consulting services that are informed globally and delivered locally.

We are an IT Systems Integrator working to advise, build and operate bespoke, technically complex, mission-critical information systems. Bringing innovation to our clients using proven and emerging technologies, agile delivery processes and our expertise across space, defence, intelligence, aerospace and maritime, all underpinned by our end-to-end cyber capability.

For more information about CGI, visit cgi.com/uk/space, or email us at enquiry.UK@cgi.com