magellium
artal group



Magellium Artal Group
IAC 2024

Data engineering for the Planet and Territories

Focus on Robotics



OU EXPERTISE IN ROBOTICS AND 3D SIMULATION

FROM SIMULATION TO ROBOTICS

For **over 15 years**, our robotics team has been developing **expertise in perception for planetary exploration robotics**. This led to contributions to such **well-known space missions** as the Rosalind Franklin Mission (formerly EXOMARS), Rosetta and MMX.

Today, we offer our skills to any **critical robotics application requiring complex or hostile environments** (robotics in orbit, ground navigation without GNSS, etc.). To do so, we use our **robotics simulation solutions** to develop a d**igital twin of your system**.

OUR SKILLS

PERCEPTION AND LOCALISATION

Our expertise in the field of heterogeneous data fusion for vision-based localisation has enabled us to develop high-performance relative and absolute localisation solutions for complex environments that are not dependent on GNSS signals.

2D AND 3D MAPPING

Our mastery of 3D data (LIDAR, Stereovision) enables us to offer a precise representation of a robot's environment, from the generation of 2.5D Digital Terrain Models (DTMs) to the complete representation of 3D environments.

3D PROCESSING AND DETECTION

We bring our skills in semantic analysis of the environment through terrain classification components for autonomous navigation, and object detection, recognition and tracking for more dynamic environments.

SIMULATION DIGITAL TWINS

We are developing a solution to simulate a complex robotic environment to assist the end-user in sizing and designing a robotic mission. This tool can also be deployed as a digital twin to monitor operations in progress.

WE HAVE THEIR TRUST SINCE 2005!



OVERVIEW OF OUR KEY PROJECTS IN ROBOTICS

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IN-SPACE ASSEMBLY AND MANUFACTURING (2023 – ONGOING)

Magellium Artal Group brings its expertise in **space simulation environments** for the validation of **autonomous on-orbit assembly** operations in the context of several projects (**ESA ISAAC, BPI DEMARLUS, HE EU-RISE**) in collaboration with **institutional bodies** (**ESA**), major **European space industry** players (**Airbus DS**), and new startups in the '**New Space' sector (The Exploration Company).**

CONTEXT

Autonomous assembly in space is a **significant challenge** for future missions, which will require **autonomy**, **flexibility,** and **interoperability** of the components involved. The next generations of satellites will be assembled directly in space, in one or more phases, necessitating **new technologies** capable of autonomously assembling the **largest structures** ever imagined. Beyond the growing needs for observation, these new in-orbit assembly approaches may also involve the deployment of **next-generation solar panels** or **reflectors**.

MISSION

We provide our partners with **space robotic simulation** capabilities to design and validate the capabilities of an autonomous robotic assembly plant.

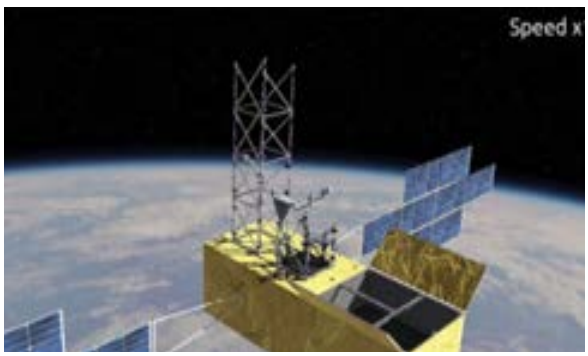
The main concepts developed are:

- **Mission simulation** and **component validation** (accessibility analysis, force simulations, etc.)
- **Mission control** application.
- **Digital twin:** integration of **real measurements** into the digital model, replay, and validation of operations before execution on board.

PROJECTS

- **ISAAC** – Customer: ESA, Partners: ADS, SENER, Cranfield University (2022-2024)
- **DEMARLUS** – Customer: CNES, Partners: ADS, The Exploration Company (2023 – 2025)
- **EU-RISE** – Customer: European Commission, Partners: ADS, The Exploration Company, DFKI, Sener, Libre Space Foundation, OikoPlus (2023 – 2025)





ON-ORBIT SERVICING – DIANE (2024 – 2028)

The DIANE project will provide a **response to the proliferation of satellites and space debris in low-Earth orbit**. Magellium Artal Group, in partnership with Thales Alenia Space, has been selected as part of the France 2030 plan for this project.

CONTEXT

The DIANE project (for Démonstration d'Inspection et Amarrage Novatrice Embarquée) represents a major step towards a **more eco-responsible and sustainable space**. **Proximity operations, capture and inspection are key** functions to unlock satellite servicing (maintainable, refueling ...) or active debris removal (ADR).

The project will exploit the EROSS (European Robotic Orbital Support Services - currently being funded by the European Union) demonstration satellites, which will be in orbit, to **demonstrate rendezvous, proximity inspection and docking operations with a non-collaborative satellite** in low earth orbit.

MISSION

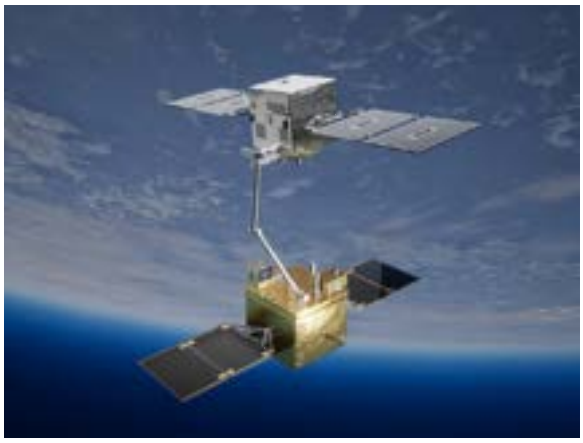
Our team is **responsible for image processing for vision-based localisation and proximity inspection**. We develop **solutions for autonomous in-orbit assembly**, including vision-based localisation and image processing pipelines for automatic inspection. Key capabilities include:

- **Model-based pose estimation** for rendezvous and visual servoing for capture;
- **Automatic impact detection**;
- **Local 3D reconstruction** for detailed structural analysis.

Additionally, we provide mission simulation tools, a digital twin, and a mission control application to validate operations before execution in space.

PROJECT DIANE

- Customer: CNES
- Partners: TAS-F, DLR, Telespazio France



© EROSS-IOD, TAS-F

VISION BASED LOCALISATION (2005–ONGOING)

CONTEXT

Since 2017, Magellium Artal Group is involved in numerous ESA and European Commission projects through H2020 PERASPERA program and Horizon Europe on Space Robotics for Autonomous rover exploration (H2020 Infuse, H2020 ADE, H2020 Corob-X, ESA ALPER, CNES ALMER) but also to its application on terrestrial context (MOBILEX challenge).

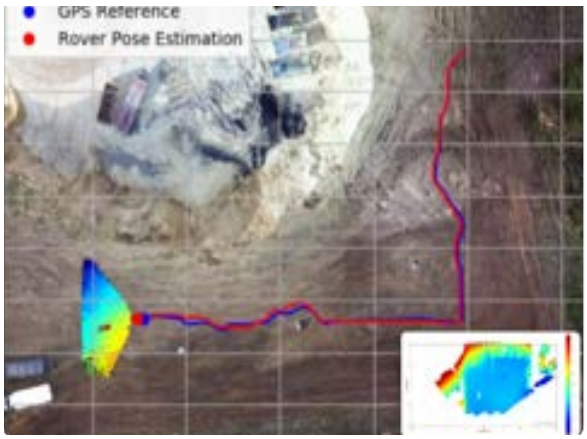
MISSION

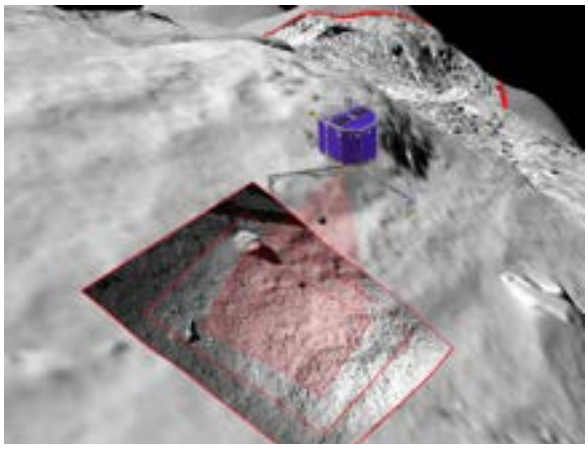
We provide **vision based localisation and mapping functions** for planetary exploration applications:

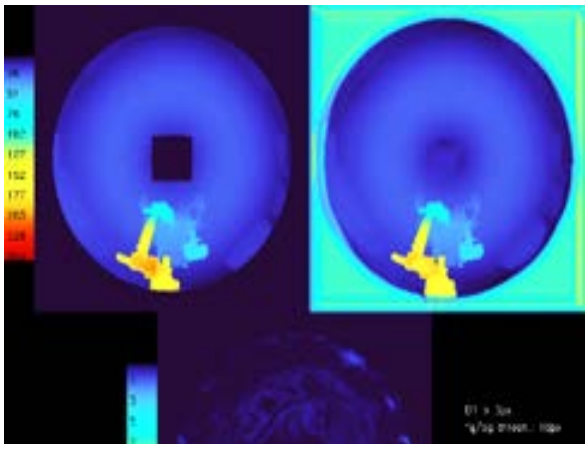
- Stereo reconstruction and Digital Terrain modelling;
- Visual Motion Estimation, Visual SLAM, Pose fusion approaches, absolute localisation;
- Marker based and model based pose estimation.

PROJECT

- **ALPER –** Customer: ESA (2022-2023)
- **ALMER –** Customer: CNES (2024-2025)
- **MOBILEX Challenge –** Customer: CNES, ANR, AID, AIT / Partner: CEA (2023-2026)







ABOUT MAGELLIUM ARTAL GROUP

For **over 26 years**, we have been offering high-added value solutions and mastering every imagery and IT technologies, from the image date to complex software systems.

Image processing, mapping, robotics, artifical intelligence, geo-intelligence, software development - we are an engineering company which operates in the most basic as wel as in the most specific areas, depending on our customers' needs and interest.

Magellium Artal Group is your reliable partner to turn scientific innovations into operational reality.

OUR EXPERTISES

DIGITAL GEOGRAPHY

Digital technology based on knowledge of the territory, with a very broad spectrum of thematic expertise: network management, planning, forestry, environment, mobility, housing, defence and security.

EARTH OBSERVATION AND SPACE SURVEILLANCE TRACKING

As experts in space imagery and geophysical and biophysical applications, we develop algorithms and satellite image processing chains and are specialised in value-added products and services. We work on numerous institutional projects involving the monitoring of our planet and the fight against climate change.

AUTOMATION AND IMAGES

For over 10 years, Magellium Artal Group has been helping its customers to develop new technologies and rapidly transform scientific innovations into operational solutions in many fields : robotics, data captation, 3D simulation, video and image processing and artificial intelligence.

SOFTWARE AND SYSTEMS ENGINEERING

For more than 20 years, we have been developing services and software solutions to meet our customers' needs, enabling them to supervise and operate flying machines in the space and aeronautics sectors. We are also specialised in building Web applications using the new paradigms of Cloud Native development.



LET'S UNITE OUR SKILLS AND VALUES TO PROMOTE A MORE INCLUSIVE AND SUSTAINABLE WORLD!

OUR CSR POLICY

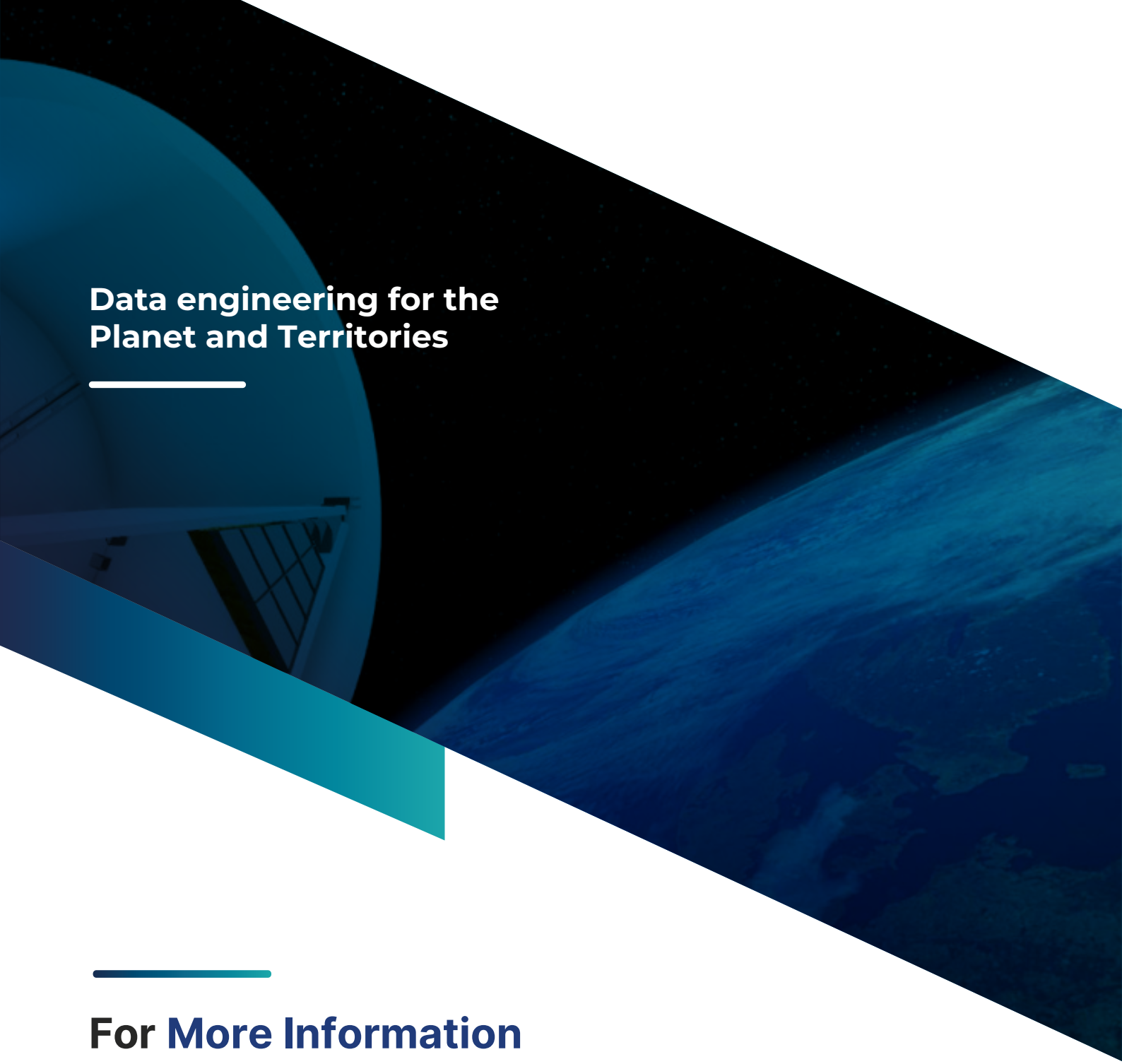
89/100 Equality index women/men

Bronze medal ecovadis in 2023

GreenIT has provided **eco-design training** for our teams

14 different nationalities in the company in 2023

79kg of CO2 saved in 2023 according to Easytri



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For More Information

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