

The cover features a high-resolution satellite image of the Earth, showing the African continent and surrounding regions. A white orbital line curves across the upper half of the image, with a small white circle representing a satellite or celestial body. The background transitions from a deep blue at the top to a dark green at the bottom.

SPACE DIRECTORY **2022**



LUXEMBOURG
SPACE EXPERTISE

space-agency.lu



SPACE
DIRECTORY
2022

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01

LUXEMBOURG,
A EUROPEAN HUB
FOR COMMERCIAL
SPACE

FOREWORD

In today's booming space sector, the next generation of space technologies is being designed and built by a steadily growing community of entrepreneurs, scientists, researchers and engineers.

Luxembourg is proving to be the European focal point for this 'new' space industry, and for good reason.

These space entrepreneurs need to be supported: they need access to research, finance and technical services. But if support is essential, cooperation is key. More than anything, today's space entrepreneurs need to be connected with one another, and with the world. Building bridges between businesses is the way towards new and rewarding projects that will lead to the next generation of space technologies.

This directory is designed to foster that process of discovery and connection. It showcases the capabilities of the space industry already established in Luxembourg and extends an open invitation to potential partners from around the world, inviting them to explore the rich potential for international research and business development which exists in the Grand Duchy.

In Luxembourg, the space industry is driven by a dynamic, multilingual and international work force. Many of the players presented here are known well beyond the borders of the Grand Duchy, their capabilities acknowledged by the international space community.

Since its first edition, this directory has charted the constant expansion and consolidation of the space industry in Luxembourg. We are happy to present the 2022 edition, which we strongly believe has a part to play in that story, helping to connect potential collaborators from around the globe in Luxembourg, the place for space development in Europe.

LUXEMBOURG : A GROWING SPACE ECO-SYSTEM

For more than three decades, Luxembourg has been at the forefront of commercial and co-operative initiatives that have shaped a vibrant space economy.

Today, the Grand Duchy is home to approximately 70 companies and research labs. The space sector's contribution to the nation's GDP is among the highest ratios in Europe.

Luxembourg's first foray into space came in 1985, with the creation of the Société Européenne des Satellites (SES), a landmark for satellite telecommunications and a global leader in this sector today. Further space-related services and businesses have developed alongside SES giving birth to an entire space industry in Luxembourg. A second, important factor in positioning the country in the space sector was Luxembourg's accession to the European Space Agency (ESA), on 30 June 2005.

From then on, the space industry in the Grand Duchy has continued to grow and diversify, with three identifiable segments:

- The space segment: manufacturing of satellite and instrument structures, system integration of micro-satellites, electric propulsion for satellites, robotic payloads, in-space manufacturing, composites, RF payloads, FPGA
- The ground segment: ground stations development, mechanical and electrical ground support equipment, communication networks, operations
- The service segment: teleport services, satellite-based media and telecommunications services, risk management services, data analytics, environmental applications and services, aeronautical information services, analytics platform

SPACE RESOURCES

The accelerating pace of technological progress and the emergence of privately-funded commercial start-ups in the space sector have encouraged Luxembourg to explore more deeply the long-term economic potential of space. Launched in February 2016 and led by the LSA, the SpaceResources.lu initiative positions Luxembourg as a pioneer in the exploration and utilization of space resources. With this initiative, Luxembourg has defined a framework to promote and support the sustainable exploration and utilization of resources from 'celestial bodies' such as the Moon and asteroids.

The Grand Duchy is the first European country, and the second worldwide, to offer a legal framework on the exploration and use of space resources.

In years to come, the focus on space resource exploration and utilization will generate attractive opportunities in areas including materials science, additive manufacturing, remote sensing, communications, robotics, data analytics and artificial intelligence.

In November 2020, the European Space Resources Innovation Centre (ESRIC) has been established in Luxembourg, powered by the Luxembourg Space Agency (LSA), the European Space Agency (ESA), and the Luxembourg Institute of Science and Technology (LIST) to create additional opportunities for European and international innovation. ESRIC aims to become the internationally recognised centre of expertise for scientific, technical, business and economic aspects related to the use of space resources for human and robotic exploration, as well as for a future in-space economy.

The SpaceResources.lu initiative also brings an ethical dimension to the project, seeking to ensure that space resources utilization serves a peaceful purpose. It aims to ensure

these resources are gathered and used in a sustainable manner, compatible with international law and for the benefit of humankind.

CONNECTING SPACE AND NON-SPACE

Another key element of Luxembourg's strategy is to broaden access to space-related data.

Huge data sets, gathered from space, represent an essential source of insight and opportunity for the space industry. Meanwhile, these same data sets are being used by non-space businesses searching for better ways to work on planet Earth. Data is the point of intersection for many high technology businesses.

The Luxembourg Space Agency Data Center was created in 2019 to support businesses in Luxembourg with reliable, fast and intuitive access to data streams from the European Copernicus Earth Observation programme.

The detailed optical and radar imaging data made available by this project can help us manage the environment, understand and mitigate the effects of climate change, and ensure civil security.

New products which make use of this data are of interest for businesses in many sectors including the environment, maritime, meteorology, agriculture, mobility, aviation and health, thus leading to a massive uptake of satellite-based products by end users.

FINANCING THE SPACE INDUSTRY

As well as human resources and innovation, space development requires serious financial input.

No business is going to get very far without funding. Luxembourg's unique cross-border expertise in international finance and the development of dedicated funding resources, have been crucial factors in the creation of a sustainable space industry.

The country is the global hub for fund distribution and 19 out of 20 of the largest Private Equity firms have a presence in Luxembourg. Moreover, private-equity firms with focus on space and space-related industries, such as NewSpace Capital, have a presence in the country as well.

Together with a group of private and public investors, the Luxembourg Government has invested a stake in Orbital Ventures, an investment fund focused on early stage companies engaged in space activities.

Anchored in Luxembourg, the venture capital investment fund will provide equity funding for early stage space companies with ground-breaking ideas and technologies.

At the European level, Luxembourg contributes to the European Space Agency programs, which support the development of technology and of products, services and infrastructure in areas such as Telecommunications and Earth Observation. These contributions open the door for players in Luxembourg to access the space market in Europe.

The national space program (LuxIMPULSE) implemented in partnership with ESA, also plays a key role in financing groundbreaking technological developments with strong market potential.

TALENT FOR SPACE

The Space industry needs a huge array of skills and talent. Several initiatives have been initiated in Luxembourg to foster the development of the necessary skills and expertise needed by the growing space ecosystem. Among these, a two-year Interdisciplinary Space Master program has been launched by the University of Luxembourg in fall 2019.

Set up in collaboration with the Luxembourg Space Agency, the Interdisciplinary Space Master provides solid knowledge in all aspects of the space value chain, along with space engineering expertise. Using a project-based learning approach, graduates obtain a fundamental understanding of the scientific and technical basis, as well as business requirements of successful space missions. Courses touch upon space systems engineering, space operations, space resource utilization, space data mining and intelligent systems, satellite communications, and robotics.

Young graduates from Luxembourg also have the opportunity to enter the ESA training program (LuxYGT). This program, set up by LSA and the ESA, is an opportunity to gain valuable experience in the development and operation of space missions and to qualify for the many opportunities within Europe's space industry.

THE FUTURE

The pace of innovation in space related technology continues to accelerate. To make tomorrow's technical possibilities a reality requires practical support today.

In Luxembourg, the space industry finds a nurturing and supportive environment with an established community of high tech businesses, researchers, and entrepreneurs along with access to the necessary services and facilities.



02

COMPANIES

**CEO/
HEAD OF DEPARTMENT**
Pierre De Gobert

CREATION DATE
2015

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 19
Space: 19

TURNOVER 2021
Total: € 4,1 M
Space: € 4,1 M

**R&D
INTERNAL INVESTMENTS**
€800 K

**QUALIFICATIONS,
APPROVALS**
ISO9001 under way

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CORE BUSINESS

adwäisEO is a Luxembourg company specialized in Earth Observation (EO) IT services.

The company is one of the major European actors in Space Ground Segment's IT sector. Thanks to cutting-edge expertise in Earth Observed data and ICT the company offers performing and cost-effective solutions such as multi-Petabytes archives, intuitive geoportals, and efficient processing solutions in cloud and/or HPC environment.

The company is a provider of data and information services for space agencies, companies, public institutions, and research centers.

adwäisEO is a member of the ACRI-ST group with other operational companies in France, the UK, Spain, and Canada.

PRODUCTS AND SERVICES

adwäisEO provides Data services for space agencies, companies, public and private institutions, NGOs and research bodies:

- Data collection, storage, dissemination and management, long-term archiving, to take care of your data respecting your privacy
- Data hubs, geo-portals, APIs and metadata generation and metadata standardizing to make the data easily accessible
- Cloud computing, HPC Cluster and efficient orchestrator for all your processing needs. Geo-Data mining and analytics, to extract valuable information from the data and produce knowledge

The company designs and develops HPC and/or cloud solutions in order to provide tailor made services and products.

TECHNICAL MEANS

The IT facilities of adwäisEO are hosted in TIER IV data centres in Luxembourg. The company uses the best of the available technology:

- Cloud-Storage and Cloud-computing (incl. 3616 cores in a Kubernetes private cloud)
- HPC cluster for brute power computational (more than 4800 cores)
- Scalar storage for massive data archiving (more than 40PB)
- LTO tape libraries for backup and preservation (more than 44PB)
- High speed internal network (400 Gbps) to feed processing node without delay and 30 Gbps Internet lines for no waste while data are transferred

The company offers:

- A team of ICT specialists, remote sensing experts, data engineers in the team corroborated by environmental scientists in the Group
- A library of EO data processors tuned to the analysis of long-term series of geo-physical/chemical/biological/ecological data of the global world.
- Partners in the European, American and Australian scientific communities and space agencies

MAIN CUSTOMERS

Space Agencies, European Commission, Public Institutions, Private Companies, Research organisations.

MAJOR SPACE PROJECTS

LSA Data Centre

Architect and Operator of the largest collection and distribution system of Europe for the LSA. More than 35 PB of S1 and S2 data, online and ready for the user.

ESA Advanced Long-Term Archive

Responsible for the operations of one of the Copernicus ALTA for S1, S2 and S3 RAW and auxiliary data.

Data Archival, Management and Processing Services

Main service provider for the DAMPS project. Secure and efficient archival solution, fast processing environment for ESA and third-party satellite data.

Sentinel Data [Re] processing

Operations management for the systematic production and the dissemination of Sentinel 3A Land products and the full reprocessing of Sentinel-2 data for the European Space Agency.

ESA Climate Change Initiative Sea Surface Salinity (CCI+SSS)

Responsible for the production of salinity data.

Optical Mission Performance Cluster

Infrastructure provider, cloud solution for the quality assessment of S2 and S3 optical data.

AM 4 AM



**CEO/
HEAD OF DEPARTMENT**
Maxime Delmée

CREATION DATE
2019

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 2-5

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CORE BUSINESS

AM 4 AM is an innovative start-up developing new metallic materials for additive manufacturing/3D printing.

Additive manufacturing is an emerging technology allowing parts with an ever-seen complexity to be produced. However, the amount of materials available for this technology is strongly limited. Indeed, the processing of conventional alloys by additive manufacturing leads most of the time to poor quality parts which are not reaching the industry specifications.

AM 4 AM patented an atmospheric cold plasma process to modify metallic powders and enhance their compatibility with 3D printing process. Thanks to this process, AM 4 AM will create a new generation of metallic powders by making available conventional alloys and in the same time developing new functional materials.

PRODUCTS AND SERVICES

HiPerAl

AM 4 AM firstly applies its plasma technology to solve the cracks and porosity formation in aluminium parts produced by additive manufacturing. This phenomenon is encountered in most high mechanical strength aluminium avoiding these materials to be used for structural and lightweight applications. AM 4 AM's solution is called HiPerAl and leads to the production of high mechanical strength parts processed by additive manufacturing. HiPerAl owns mechanical properties close to aluminium 7000 series processed by conventional techniques. This best in-class aluminium alloys is dedicated to lightweight application in domains such as automotive, aeronautic or space.

AM 4 AM also owns the capacity to develop new materials with tailor-made properties designed specifically for industrial applications.

MAIN CUSTOMERS

Industrial manufacturers mainly in automotive, aeronautics and space, 3D service providers, 3D equipment providers.

MAJOR SPACE PROJECTS

Development and production of satellite and thruster parts

CEO

Frane Miloš

CREATION DATE

2002

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 20

Space: 20

TURNOVER 2021

Total: €1,155,657.72

Space: €1,155,657.72

R&D

INTERNAL INVESTMENTS

€190,000

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CORE BUSINESS

Amphinicy Technologies (AT) is a valued provider of complex, tailor-made software solutions and all-round software support for the satellite industry. AT has been on the market for 20 years, with its Luxembourg office established in 2002. Amphinicy Luxembourg has high expertise in the fields of SatCom and Earth Observation. It provides enterprise solutions for big commercial and governmental projects.

Our primary field of expertise is in the ground segment solutions – Monitor and Control, Mission Operations, Simulations, Validation and Verification, Quantum encryption key management, EO data acquisition, Telemetry and protocol analysis.

PRODUCTS AND SERVICES

Products

- **Monica:** a modern monitoring and control built on the latest industry standards. It comes in two versions– as M&C solution for local ground stations (e.g. broadcasting teleport), or as ultra-scalable NMS solution for monitoring huge networks (e.g. VSAT networks, IoT, ...)
- **Blink:** an innovative software solution for ultra-fast EO telemetry acquisition and processing, using today's top-of-the-line commercial CPUs and GPUs and radically reducing costs, improving flexibility and maintenance
- **SatScout:** a handy, white-label mobile application, helps end users and professional installers in commissioning satellite VSAT terminals on site. It utilises augmented reality and mobile phone sensors

Services

Tailor-made software engineering and consulting services and all-round software support for the satellite and space industry.

TECHNICAL MEANS

AT employs top-notch, highly-qualified ICT and space engineers with expertise in the following ground segment domains:

SatCom solutions

- Monitor and control systems
- Ground segment simulations
- In-orbit testing systems
- Mission Operations
- Mobility – beam roaming and load balancing
- Embedded systems for ground segment
- Secure optical communication (Quantum encryption key mgm)
- Pooling and sharing mechanisms

Mobile solutions

- Antenna site survey and alignment (Augmented reality based)
- VoIP over satellite solutions
- Solar cells
- Professional UX visualization

Humanitarian projects

- SatLearning
- SatMedicine

Space Technologies / standards

- ECSS compatible
- CCSDS protocol and standards expertise
- SPELL language and standard

Extensive and valuable experience working on demanding ESA projects as well as on solutions for industry leaders in the fields of satellite operations, satellite services and satellite networks.

MAIN CUSTOMERS

- International space and humanitarian agencies (ESA, DLR, UNHCR)
- Leading satellite operators and global satellite service providers/ integrators (SES, O3b, Qinetiq, Airbus DS)
- Teleports and space mission operation centres (RSS) and
- Satellite equipment manufacturers (OHB, Newtec, iDirect)

MAJOR SPACE PROJECTS

Amphinicy Luxembourg provided software engineering services in the following flagship projects:

GOVSATCOM MOC

- Partnership with SES Networks
- Architecture and implementation of MOC
- Ground segment simulation

EDRS MOC

- System Orchestration
- Monitor and Control
- Simulation

AG1

SPELL procedures and translations

COPERNICUS

AIV for Sentinel communications modules

GHOST

Embedded system for spread spectrum modem

ST Engineering / iDirect Europe

Validation platform and services for VSAT networks

**CEO/
HEAD OF DEPARTMENT**
Cédric Spaas

CREATION DATE
2018

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 10-50

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CORE BUSINESS

Arspectra is specialized in the design and supply of Augmented Reality (AR) technology, with an initial focus on data visualization, teleassistance, and navigation in various applications. Arspectra's fully see-through AR data glasses and software project relevant data, instructions, and 3-dimensional images in the direct sight of the user. It allows to stay focused on the actual target and action while improving the performance of the professional user by the most natural and efficient integration of information and navigation data. This in-sight guidance naturally improves the precision, time-efficiency, cost, and outcomes of the various procedures.

By merging digital data and images into the real sight of its users, Augmented Reality is set to bring important changes in current visualization, training, and navigation solutions. Yet to truly benefit of the advantages brought by merging digital data seamlessly into the reality, the platforms must also perfectly fit to the performance and physical parameters demanded by the applications and users.

Arspectra designs modular Augmented Reality hardware and software platforms, delivering the most performant and adapted solutions to its partners and customers. From lightweight Augmented Reality glasses for visualization and communication, up to high-performance navigation platforms, Arspectra's partners can select from various available solutions, to fully customizable developments. Supporting software plugins enable them to flexibly integrate their own software and applications.

PRODUCTS AND SERVICES

Proprietary glasses are developed in close collaboration with end users and enable a very flexible integration of various sub-technologies. Arspectra offers adapted solutions leading to increased performances, lower costs, and better procedure outcomes to different applications and usage scenarios. Due to the technologic novelty, current procedure standards can be disrupted by unprecedented advantages and very competitive prices.

Arspectra's hardware developments:

- Design of medical AR glasses with adapted form factor and sensor technology
- Setup of intra-operative 3D tracking systems
- Design of mobile processing units for various AR-supported use cases

Arspectra's AR devices run a proprietary software platform that serves as base layer on which partners can develop their own AR software and algorithms. Next to the standard platform several functional plugins are available:

- Gesture tracking
- Voice control
- Cellular communication
- Up to military grade cybersecurity & encryption

Arspectra's team is highly experienced in the flexible co-development and integration of AR capabilities for visualization and navigation in existing or in-development technologies and operations.

MAIN CUSTOMERS

- Medical technology companies and distributors
- Medical specialists and institutions
- Industries with healthcare-related applications
- Research institutions
- Industries in need of AR-based remote assistance platforms
- Industries in need of AR-based visualization and navigation platforms

MAJOR SPACE PROJECTS

TeleAssist ESA project

Globally connected healthcare delivery for emergency and humanitarian needs.

**CEO/
HEAD OF DEPARTMENT**
Cédric Spaas

CREATION DATE
2020

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 1-10

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CORE BUSINESS

ArViCom SARL develops cellular and satellite-based communication technologies and services into mobile Augmented Reality (AR) platforms in order to enable global remote collaboration based on AR visuals and interaction.

Classic verbal and video-based communications are often difficult to interpret by the remote expert and can be obtrusive to the action of the mobile agent.

ArViCom enables remote visual validation, communication, expert overview, and senior interdisciplinary assistance through a secure, reliable communication, and access to expertise. It hereby offers improved procedure outcomes, a higher time efficiency, and reduced cost to unnecessary displacements of multiple agents and experts.

A first focus is placed on enabling a global reach to medical expertise for remote and mobile agents in humanitarian and remote medical use cases. Further applications to other industries are being developed through various partnerships. Each design transforms the end-user requirements and the technical and economic parameters into highly performant and adapted collaboration solutions with global access.

PRODUCTS AND SERVICES

The ArViCom devices are a combination of AR glasses, its mobile communication and processing units, and tailored software integrating global connectivity management.

As visual communication tool, it shares the same point-of-view observation as the mobile agent, but especially allows remote instructions and support to be delivered in the direct sight of the agent in action. It offers the user real-time visual interaction and support of remote experts, regardless of geographical location.

It offers a more natural interpretation of the discussion subject and case by the remote expert, and a hands-free visualization of the instructions by the user. It significantly improves the focus, comprehension, and success of active professionals.

These advantages are delivered on a high-performance technology with market-leading visualization, global and secure connectivity, designed to perfectly fit to the specific user actions and requirements.

MAIN CUSTOMERS

- Humanitarian and remote healthcare agencies
- Telemedicine companies and agencies
- Ambulance agencies and services
- Research institutions
- Industries in need of AR-based remote assistance and collaboration platforms
- Industries in need of outdoor AR-based visualization and navigation platforms

MAJOR SPACE PROJECTS

TeleAssist ESA project

Globally connected healthcare delivery for emergency and humanitarian needs.

ArViGuard ESA project

Space in response to the Covid-19 outbreak.

**CEO/
HEAD OF DEPARTMENT**
Marius Klimavičius

CREATION DATE
2019 Lithuania
2021 Luxembourg

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 8
Space: 8

TURNOVER 2021
Total: € 39,427
Space: € 39,427

**R&D
INTERNAL INVESTMENTS**
MDS digital twin tool
development €150k, Vision
Based Navigation (VBN)
system development €100k

**QUALIFICATIONS,
APPROVALS**

- Successfully completed
ESA contract no.
4000129951/20/NL/SC –
Mission Design Simulator
(MDS) for active debris
removal (ADR)
- Graduated from F4S #11
edition

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CORE BUSINESS

Blackswan Space provides autonomy solutions for satellite mission integrators and operators to eliminate risks and enable new capabilities.

Our software focused off-the-shelf products are designed to address the growing number of assets in orbit by enabling autonomous navigation and robotic manipulation coupled with fast mission prototyping using our digital twin technology. This reduces costs and increases revenues for the satellite integrators and operators through the newfound ability to design their missions faster and perform mission operations much more effectively by reducing the necessary human involvement.

PRODUCTS AND SERVICES

ACE – Autonomy-as-a-Service Platform

A software platform that enables spacecraft autonomy covering the entire lifecycle of your space missions. The platform includes all the tools and flight code necessary to build, launch and operate missions autonomously.

Mission Design Simulator (MDS)

Digital Twin for your space missions. A perfect sandbox tool for prototyping complex missions in real-time photorealistic environment with the ability to generate synthetic data for AI/ML applications cutting down your development time by as much as 50%.

Vision Based Navigation

The Vision Based Navigation (VBN) system is a dedicated software solution enabling small satellites to perform complex navigation manoeuvres including rendezvous and docking, visual inspection, in-orbit (on-orbit) servicing, refuelling, and many more.

Robohands

Off-the-shelf autonomous space robotics libraries that enable debris removal, in-orbit servicing, assembly and in space manufacturing missions.

MAIN CUSTOMERS

Satellite integrators and operators, Space Agencies, Academia, Research Centres.

MAJOR SPACE PROJECTS

- Mission Design Simulator (MDS) for Active Debris Removal (ADR). European Space Agency
- Digital twin for fast satellite mission prototyping (internal)
- Vision Based Navigation system (VBN) for autonomous satellite navigation in space (Eurostars project with University of Luxembourg (SnT))
- GNC technologies for robust autonomous asteroid exploration (with DLR and Argotec)



Rendezvous, Proximity Operations & Docking simulations on Mission Design Simulator



In-Orbit Servicing mission simulation on Mission Design Simulator



Blackswan Space products



Mission Design Simulator – Digital Twin platform for space missions



Vision Based Navigation system prototype



**CEO/
HEAD OF DEPARTMENT**
Jochen Harms

CREATION DATE
2018

ORGANISATION TYPE
Large Enterprise

NUMBER OF EMPLOYEES
Total: 5
Space: 5

TURNOVER 2021
Total: € 500 K
Space: € 300 K

**R&D
INTERNAL INVESTMENTS**
€100 K

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CORE BUSINESS

Life science technologies and services in space, on planets and Earth.

PRODUCTS AND SERVICES

- Revitalisation of deserted areas on Earth using Biological Soil Crusts (BSC)
- Bio Reactors
- Earth Observation
- Micro Gravity Experiments
- Life Science support to manned missions to other planets
- Terraforming

TECHNICAL MEANS

- Bioreactors for Earth and space applications
- Growth of bacteria and algae
- Qualification of material
- Earth Observation and GIS systems

MAIN CUSTOMERS

- Ministry of Foreign Affairs, Luxembourg (LUXDEV)
- ESA
- LSA
- EU
- Private industry

MAJOR SPACE PROJECTS

Green Earth

The program, led by Blue Horizon aims at developing, marketing and sale of products and services related to the fertilisation of soils in arid and semi-arid areas. Our biological soil crust (BSC) capable of strongly reducing water and wind erosion and creates the basis for first pioneer plants. It also forms a CO₂ sink. After a laboratory phase, the BSC is currently tested in our open field test sites in Africa.

At the same time, a site selection and monitoring system is developed using Earth Observation data. After the field test, the program will be rolled out in Africa.

OW INK

The project aims at developing printable material out of algae. First tests have been successful and the material is now qualified.

Micro Gravity experiments for health

Based on a feasibility study instruments are developed to monitor tumour and other cell cultures under Zero G conditions. A first instrument is developed supported by a number of well-known Luxembourgish and European partners from the health sector.



**CEO/
HEAD OF DEPARTMENT**
Alexander Finch

CREATION DATE
2016

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 10
Space: 10

TURNOVER 2021
Total: € 1.75 M
Space: € 1.75 M

**R&D
INTERNAL INVESTMENTS**
€ 400 k

CONTACT DETAILS
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E-mail: alexander.finch
@bradford-space.com

Website:
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CORE BUSINESS

Bradford Deep Space Industries develops technologies to export the NewSpace philosophy – and the increased value proposition it has already offered in LEO – to new applications in GEO, lunar and interplanetary space. This accelerates the cadence of scientific exploration and enables new business uses beyond LEO.

We offer **affordable, high-performance avionics for deep-space and Earth-orbiting smallsat missions**. The robust and performing nature of these makes them well suited for both deep-space and demanding LEO applications.

Furthermore, we produce the **Comet Water Thruster**. Comet is a launch-safe and cost-effective electrothermal propulsion system that offers the ideal balance of cost and performance. This high-performance propulsion system unit uses water as propellant, making the system easy to work with and easy to fuel. Its highly-flexible interface is easy to integrate into small satellites, regardless of size and form factor, and easy to operate on orbit.

PRODUCTS AND SERVICES

- An **avionics solution** – a modular system suitable for deep-space or high-performance smallsats in the 30-300kg (dry) mass range with a 5+ year lifetime, consisting of any combination of:
 - robust flight computer
 - high performance computational platform (with full-scale OS)
 - power control and distribution unit (that supports high-power loads such as electric propulsion, radar payload or drive motors)
 - high-power radio transponder with navigational ranging that works out to 1AU
 - a propulsion RTU
- The **Comet** – a water thruster for small LEO spacecraft
 - Non-toxic, safe for humans and launch vehicles
 - More thrust with less electrical power
 - Highly-flexible interface suitable for a wide range of spacecraft sizes
 - Zero failure in-orbit heritage



Power distribution sub-modules of the avionics stack product

TECHNICAL MEANS

Design, test, qualification and manufacture of electronic, RF and water propulsion systems.

MAIN CUSTOMERS

Commercial smallsat manufacturers, mostly US-based, including LeoStella, HawkEye360, UmbraLabs, Canadensys and Capella.

MAJOR SPACE PROJECTS

Design and developments of deep-space avionics.



Comet 1000 water-based propulsion system

**CEO/
HEAD OF DEPARTMENT**
Guillaume Schott

CREATION DATE
2020

ORGANISATION TYPE
Large Enterprise

NUMBER OF EMPLOYEES
Total:
• Luxembourg: 200
• Global: 77500
• Space: +1000

**QUALIFICATIONS,
APPROVALS**
ISO 9001, ISO 14001

CONTACT DETAILS
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CORE BUSINESS

Founded in 1976, CGI is among the largest independent IT and business consulting services firms in the world.

With 77,500 consultants and other professionals across the globe, CGI delivers an end-to-end portfolio of capabilities, from strategic IT and business consulting to systems integration, managed IT and business process services and intellectual property solutions.

CGI delivers secure, mission-critical space systems including data processing and exploitation, satellite communications, orbit determination, command and control, ground segment engineering, navigation and situational awareness.

CGI's desire remains more than ever to **help space players in Luxembourg** increase the value of their investments and, more specifically, to use space data to solve their business challenges and drive business opportunities.

PRODUCTS AND SERVICES

Our end-to-end services provide industry and technology expertise, solutions, frameworks and tooling to enable our clients to drive business agility, competitive advantage, transformation and cost efficiencies. At CGI, we believe that having a deep understanding of our clients' business is absolutely fundamental to us being able to deliver the best possible service.

We are supported by a large group, with 40 years of experience, composed by more than 1000 experts in the space industry. We are able to **capitalize on this global experience locally**

- We've helped ensure that navigation systems are secure, reliable and fit for purpose

- We provide network, service and business management systems to many of the world's communications satellite operators; commercial and military

MAIN CUSTOMERS

European institutions, financial sector, private & public sectors, space agencies, industries...

MAJOR SPACE PROJECTS

In Luxembourg

- Support the development of custom gateways for GomSpace's Autonomous Operations Platform
- Implementation of a tool that controls satellites

Global references

- 200+ satellite missions supported by CGI software
- Designed and delivered the security solution for Europe's future space-enabled Air Traffic Control Network
- Largest independent supplier of security systems for Europe's Galileo satnav program
- Delivered the Galileo satellite constellation control facility that will control all of Galileo's 30 satellites
- Support the European Space Agency's (ESA's) climate change initiative
- European leader in military satellite communications ground segment systems
- Manage the maintenance and evolution of ESRIN's earth observation ground systems
- Designed, delivered and deployed the core infrastructure for Galileo Public Regulated System (PRS)

CONTEC Space SARL



CEO

Dr. Sunghye Lee,
CONTEC HQ in Rep.
of Korea

GENERAL DIRECTOR

Semi Park, CONTEC Space
SARL in Luxembourg

CREATION DATE

- Foundation of CONTEC
HQ in Rep. of Korea:
2015
- Foundation of CONTEC
Space SARL in
Luxembourg:
2019

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 2

CONTACT DETAILS

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(General Director of
CONTEC Space SARL)

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CORE BUSINESS

Established in January of 2015, CONTEC is a spin-off company from KARI (Korea Aerospace Research Institute) and is offering Space Ground Station Services and Satellite Image Processing & Application Services as well as a whole ground integration solution. At CONTEC, we strive for excellence and we think that it is only with talented people that this goal can be achieved. Currently, 33 engineers work in two different offices in Korea and Luxembourg as subsidiary, and half of them have a superior education degree, along with great experience in the space industry. With these services and powerful manpower, we are trying to provide a meaningful value for prospective customers in the New Space Age.

PRODUCTS AND SERVICES

At CONTEC, we are currently providing space ground station services through our own ground station and partners' ground stations all over the world. Our engineers also created CONTEC ONE, a platform where satellite communications become child's play.

In addition, we offer restrain satellite imagery analysis and application services based on raw satellite image data by applying deep learning algorithms in order to detect several specific objects depending on the needs of our customers. We especially focus on applications for urban change detection of Smart Cities and try to provide the best service possible for local governments and therefore participate to urban development.

TECHNICAL MEANS

Hardware

- Design and integration of ground station
- Small antenna manufacturing for ground station
- Whole MRO service for ground station

Software

- Monitoring and Control Software for ground station
- Multi-mission operation system for ground station
- Web-based platform and cloud technology for ground station service
- High-speed satellite image processing
- Calibration and validation (CAL/VAL) of satellite imagery
- Object detection on standard satellite image data

MAIN CUSTOMERS

As the number of satellite (especially small-sized satellites) launches has continuously increased, the space market is open to many new businesses and its scale is growing simultaneously. CONTEC is taking advantage of this opportunity and aims at those satellite operators and satellite launchers who need to connect with their satellites.

As for its satellite imagery application service, CONTEC is especially working with local governments but does not restrain to this category.

In conclusion, we can summarize our current and potential customers as below:

- KARI (Korea Aerospace Research Institute)
- Agency for defense department in the Republic of Korea
- Several government research institutes and commercial companies in the Republic of Korea
- Sejong local government (1st world smart city) in Republic of Korea

- KSAT in Norway
- RBC Signals in USA
- Perigee Aerospace and South Launch in Australia (for launch mission)
- Etc

MAJOR SPACE PROJECTS

CONTEC's own ground station is located in South Korea, more precisely in Jeju Island and benefits from an ideal environment (antenna picture). However, as is shown on the map below, our plan is to rapidly scale up our network by building new ground stations all around the world. Especially in:

- Northern Europe, UAE, North America and South America and so on
- CONTEC will build the 2nd ground station in Finland by the end of this year



Jeju ground station



Deployment plan

**CEO/
HEAD OF DEPARTMENT**
Jean-Paul Henry

CREATION DATE
1993

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total:
1 + 3 in-house consultants
Space: 1

TURNOVER 2021
Total: € 205,123
Space: € 96,025

**QUALIFICATIONS,
APPROVALS**
ESA BASS BROKER

CONTACT DETAILS
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CORE BUSINESS

CREACTION group is an engineering company dedicated to industrial innovation and particularly integrating space and other innovating technologies in non-space industrial sectors. The headquarter of the group have been based in the Grand Duchy of Luxembourg since 1993. CREACTION has developed its experience both in the Greater Region (B - F - L - D) and also in Europe-wide. The original approach of CREACTION is to consider in parallel four management sectors (marketing, technology, finance and IPR) during the new product / service development phases. Its activities as technology broker for the ESA/BASS programme focus on helping Luxembourgish companies identify and integrate space technologies which can add value to their business under the supervision of the Economic Ministry.

PRODUCTS AND SERVICES

- **SPACE CREATIVITY CENTRE:** a 3 days immersion-type workshop to pre-incubate an innovation project with sector-specific experts, customers, marketing, legal and financial experts.
- **ESA BASS:** Creacion is mandated to assist Luxembourg-based start-ups and SMEs, with identifying and integrating space applications which can satisfy their innovation needs or solve a technological problem. Creacion supports the customers in the feasibility study and demonstration project.
- **FOR COMPANIES:** a holistic suite of services for new product and company development from ideation and the sourcing of new technologies through to commercialization <https://creacion-int.eu/services/1>.

- **FOR RTD MANAGEMENT:** a comprehensive approach to evaluating RTD departments and research centers to help them detect and validate their most promising assets with a view to their commercialization.

Website: www.creaction-int.eu

TECHNICAL MEANS

- Space Creativity Centre, validation and optimization tools for new applicative markets
- Rapid prototyping competencies

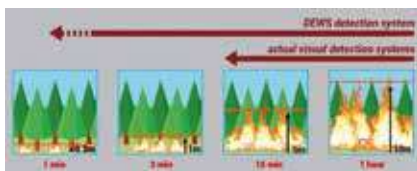
MAIN CUSTOMERS

- Private companies: Renault, Beccaert, John Zinck, Gradel, Orano, l'Oreal, Burgo Ardennes, Shell Luxembourg, Nimesis, Anywaves.../start up – scale up...
- ESA : ESEC – ESREC – ESRIN
- EU - INTERREG GR
- R&D centres

MAJOR SPACE PROJECTS

- ESA/TTPO since 2013
- As the ESA Technology Broker for Luxembourg
- An ESA-funded, highly secure crisis anticipation, supervision and management tool-platform, offering a complete toolbox of functionalities for chemical plants and SEVESO site managers ... EM-SAT ensures high and cyber security of chemical plants and their surrounding populations. The space technologies involve cyber security, satellite imagery and data quality control and four other crisis management tools
- **NUCLEAR:** improvement of new concepts of nuclear cask and security transport.
- **FIT4GROW:** project stock energy. Creativity session to identify, create and validate a new path of diversification in the utilities sector.
- **ERASMUS Utop**Textile: space technologies selected and tested through international workshops.

- **INTERREG/ PUSH GR: SHAPE YOUR PRODUCT DESIGN** <http://push-gr.eu/> Accelerator program to optimize and validate project/idea/service by integrating high value-added space technology. Organization of 2 workshops per year



**CEO/
HEAD OF DEPARTMENT**
Farid Meinköhn

CREATION DATE
1999

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 5
Space: 2

TURNOVER 2021
Total: €300 K
Space: €100 K

**R&D INTERNAL
INVESTMENTS**
€50 K

**QUALIFICATIONS,
APPROVALS**
City of Esch prize
for innovation 2006

CONTACT DETAILS
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CORE BUSINESS

Cybercultus focuses on providing the entertainment, cultural heritage and sustainable tourism sectors with innovative digital communication and content solutions by inventing the RAMO "Reactive and Adaptive Multimedia Objects" semantic layer that insulates content producers from the technical complexity of interactive communication and user immersive applications. The Cybercultus "eBusiness Solutions for the Art industry (eBSA)" aim at valorising entertainment, educational, cultural and tourism assets, as well as fostering human creativity through interactive, social and immersive technologies. Today, Cybercultus works with large industries and organisations in Europe and develops partnerships with public and private actors specialised in social / immersive applications (for TV programmes, cultural heritage, travel portals) and in GIS technologies (for spatial and temporal mapping of cultural, environmental and tourism geo localised multimedia assets).

PRODUCTS AND SERVICES

Culture

- eBSA expo suite (editor & run-time):
2D/3D organisation & display of cultural assets in virtual spaces
- eBSA museum suite (editor & run-time):
cultural assets and art collections management, valorisation and geolocalisation

Tourism

- eBSA travel suite (editor & run-time):
customised travel offers, virtual visits and planning, onsite support and on the move LBS application

Entertainment

- eBSA iTV suite (editor & run-time): immersive TV quiz show, immersive travel TV magazine, community TV content making
- eBSA iTV libraries: advanced interactivity enactment based on the RAMO model

TECHNICAL MEANS

RAMO (Reactive and Adaptive Multimedia Objects): based on the MPEG 7 open standard, development of platform independent software editors targeting “web, mobile and iTV” social & immersive applications. Open standards and technologies HbbTV, HTML5, MPEG 2, MPEG 7, XML, Java, PHP, Android, iOS 23

MAIN CUSTOMERS

- **Entertainment, culture and travel partners**
SES, ARD / RBB (Germany), ORF / TW1 (Austria), RTBF (Belgium), ORT (France), Musée Albert Kahn (France), Instituto Latin America de Museos (Costa Rica), Agence culturelle luxembourgeoise (Luxembourg), European centre for eco agro tourism (The Netherlands), Siel Canada (Luxembourg), SAN Parks (South Africa), Peneda-Geres National Park (Portugal), Sense Inverse (Belgium)
- **Industrial partners**
Thomson Multimedia (France), Philips (The Netherlands), GeoVille (Austria)
- **Public research partners**
LIST (Luxembourg Institute of Science and Technology), ESA, INRIA Lorraine (France)

MAJOR SPACE PROJECTS

Entertainment & cultural applications

- Real Time Immersive TV Show (RTI-TVS): enables TV viewers to participate from their homes, via avatar representations, to an aired TV quiz show

- Immersive Satellite TV (IMSATV): allows TV viewers, via an avatar representation and using the remote control, to discover the rich content associated with an aired tourism TV documentary or magazine
- Community TV Content Making (COTV): enables TV viewers to partner with TV channels, co-producing TV content using smart phones for HD video capture & upload onto the TV programme and using networked TV facilities for team editing, publishing and rating of the co-produced TV content

Tourism application

- Online tourism à la carte: Trip à la Carte is an online tourism platform enabling travellers to build “à la carte” from a map their own trip, selecting in each locality the activities, the lodging and the local transport of interest. It also provides them with LBS (Localisation Based Services) while on the move
- Sustainable, environmental and safe tourism in protected areas (SENSA): a range of facilities for trip planning in natural parks, for “on the move” itinerary processing with offline routing and geo-localised awareness information, for travellers’ safety with interactive/geo-localised satellite SOS messages and alert news from the park, and for optimal distribution of travellers in protected areas with real-time field observation reporting by visitors acting as preservation agents. The SENSA facilities make extensive use of advanced satellite communication, navigation and Earth observation capabilities
- Real-time interactions with parks authorities focus on nature preservation and travellers support using advanced satellite communication, navigation and earth observation

**CEO/
HEAD OF DEPARTMENT**
Ahmad Gharanjik

CREATION DATE
2017

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 3
Space: 3

CONTACT DETAILS
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CORE BUSINESS

Databourg Systems is a start-up company conceived from innovative technology developed at the University of Luxembourg for environmental monitoring using satellite networks. Databourg's mission is to provide the best rainfall intelligence to business and institutional users and to be recognized as "The Rain Company".

PRODUCTS AND SERVICES

Databourg delivers accurate, real-time, and localized rainfall data using innovative and affordable technology. For governments impacted by increasingly frequent floodings and landslides, Databourg offer rainfall intelligence for early warning and risk managements. Databourg is continuously expanding coverage of its rain monitoring system. It is currently operational in 4 courtiers: France, the Philippines, Indonesia, and New Zealand.

TECHNICAL MEANS

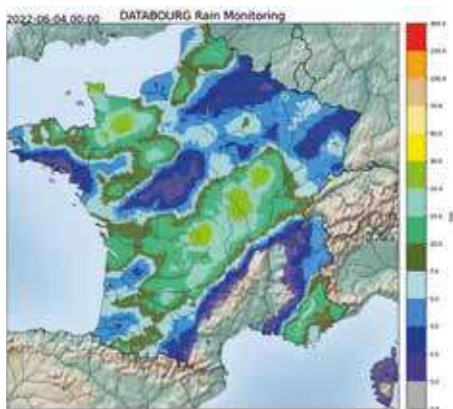
Patent pending and proprietary technologies

MAIN CUSTOMERS

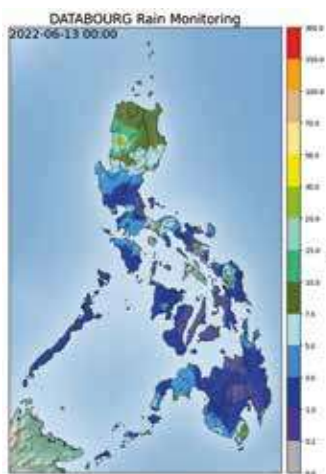
Governments, Utility companies, Weather service providers, Insurance Industry

MAJOR SPACE PROJECTS

- LuxIMPULSE



Daily accumulated Rainfall map in France captured by Databourg's Sensors



Daily accumulated Rainfall map in Philippines captured by Databourg's Sensors

**CEO/
HEAD OF DEPARTMENT**
Thomas Friederich

CREATION DATE
2015

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 9
Space: 9

TURNOVER 2020
Total: 568,000€
Space: 521,000€

**R&D
INTERNAL INVESTMENTS**
€ 95 K in 2019
€ 85 K in 2020

CONTACT DETAILS
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CORE BUSINESS

EarthLab Luxembourg was founded in 2015 to offer innovative services for professionals managing multiple hazards. It uses earth observation data with varied sources of information, such as aerial imagery, crowdsourced pictures, social media, trade and markets datasets, internal exposure databases, or ground sensors. We believe that platforms combining the latest technological developments, Artificial Intelligence, Big Data, and interoperability will standardize and bring a new definition of data-centric projects and a new community of users.

The Platform as a Service concept relies on our dedicated hybrid cluster allowing our customers to use our solutions to create new products, optimize their losses in case of extreme events, and adapt their strategies using predictive analytics. We offer a clear valorization of the data by creating multiple potential uses into one single central toolbox.

PRODUCTS AND SERVICES

We commercialize a highly flexible and data-centric platform that allows dealing with the landscape of global risks.

Our solutions are built on high-performance computing to support decision-makers in the event of risk manifestations, providing detailed, timely, and relevant information. A key advantage is that there is no ICT workload to set up, configure, and maintain with our platform. We provide a dynamic vulnerability scoring in terms of operations, the resilience of communities, supply chain, and environment. We use in-house simulations and A.I. models to anticipate the next landscape of significant risks. We enrich risk models by creating information thanks to automatic recognition into massive datasets to give context to risk assessment. We also

aggregate thousands of datasets from social and economic indicators in real-time, allowing us to predict the consequences of extreme situations (natural disaster, endemic accident, political event, pandemics, etc.).

TECHNICAL MEANS

EarthLab Luxembourg implements its products and services, relying on its private infrastructure. The implemented technologies follow the "Big Data" paradigms and fully subscribe to an elastic model ensuring future large-scale capacities.

Our approach relies on four different pillars: (1) strong data engineering and analytics, (2) data modeling and application of state-of-the-art A.I. algorithms, (3) optimization and automation with our Max-ICS platform and, finally, (4) an agile approach when building solution or project analytics.

MAIN CUSTOMERS

The current EarthLab Luxembourg's client base is insurance, financial services, industrial companies, and brokers about environmental risks and large industrial complexes concerning endemic hazards. We are processing highly innovating projects in collaboration with our four shareholders, coming from geo-information, telecommunications, and ICT: Telespazio France, e-GEOS, HITEC Luxembourg, and POST Luxembourg Group.

We are acting in the open-source and open data communities to share data science knowledge for communities.

MAJOR SPACE PROJECTS

Maritime Surveillance

It is crucial to analyze the surface activities & the comportment in dark-fish or preservation of protected maritime areas. E.O., GNSS, & A.I. are very important: it offers the possibility of systematically analyzing all the area images. Max-ICS platform helps create or improve the A.I. models & supports the automatically scaled deployment within a public cloud

Agriculture

During the COVID-19 crisis, agriculture came into the spotlight, helping to foster predictive solutions. Using different data sources & advanced analytics, EarthLab delivers various models and applications to support the domain

DroneAI

EarthLab has launched an innovative solution to push the use of space data and A.I. on disaster/humanitarian response: it combines E.O. open & commercial data to feed a data processing chain defined by the actors

**CEO/
HEAD OF DEPARTMENT**
Sébastien Genesca (as of
september 2022)

CREATION DATE
2000

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 200

**QUALIFICATIONS,
APPROVALS**
ISO 9001, ISO 20000,
ISO 27001, ISO 27018 (BP),
ISO 22301, ISO 14001,
ISO 50001, PCI DSS Level 1,
PFS of support (CSSF),
Gaia-X Day-One member,
Space Data Space
co-founding member
HDS (Hébergeur de
Données de Santé)
Data Centres 3x Tier IV
Design Documents, 2x Tier
IV Facility Constructed

CONTACT DETAILS

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CORE BUSINESS

Located in the heart of Europe, Luxembourg is a unique gateway to European and international markets, limiting risks in the financial sector and the management of sensitive information thanks to its secured regulatory frameworks. Luxembourg's ideal international environment offers competitive advantages that meet the clients' requirements for clear warranties in terms of risk management, service levels and quality. EBRC (European Business Reliance Centre) manages the whole supply chain and is thus able to offer a unique one-stop-shop to its clients, ranging from Data Centre Services to integrated Cloud Computing, Containers and ICT managed services. A wide range of services is accessible in a full or selective operational model to support advanced ICT operations in a 24/7 mode.

Through its presence in the financial market, EBRC has over the years developed a unique know-how in the design, implementation and operation of critical systems. These quality and security requirements are considered as best practices within EBRC and are required for clients managing sensitive information (Finance, Health & Life Sciences, International Institutions, Online Services, Security-Defence-Space and Operators of Essential Services, etc.).

PRODUCTS AND SERVICES

Trusted Advisory Services

- Guidance and advisory in the management of operational risks, information security, business continuity, IT services and IT outsourcing

Trusted Managed Services

- ICT agile services to boost your business
- End-to-end management of sensitive ICT infrastructures, from design and implementation to the daily operations

Trusted Cloud Europe

- Technology as a Service, enabling fast and secure business deployment

- Flexible infrastructure management through Infrastructure as a Service (IaaS) or Platform as a Service (PaaS) and Hybrid solutions
- KaaS (Containers using Kubernetes as a Service) to support DevOps environment

Trusted Security Europe

- ICT security services from advisory to risk management and operations

Trusted Resilience Services

- Overcome increasing risks and uncertainty
- Design, implementation and management of business continuity solutions coupled with the management of ICT security based on resilient infrastructures

Trusted Data Centre Services

- Advanced ICT environment to support your business
- Full Data Centre Services based on redundant Tier IV certified infrastructures for maximum security and availability

TECHNICAL MEANS

Trusted data store

- High performance store array for high density IOPS
- Large array for high data volume
- Long-term secured storage
- Highly secured data store mirrored within multitenant Tier IV certified Data Centre
- Specific expertise for regulated architecture: PCI DSS Level 1 (payment industry), National regulation (CSSF), ISO 27001 reference

Trusted data processing, Health Data (Hébergeur de Données de Santé, France)

- Efficient top Backup as a Service modality
- Dynamic processing resources for data manipulation
- Database services : MS SQL, Oracle, PostgreSQL, MySQL, Maria DB, NoSQL, Mango DB
- Strong partnership for big data development and high-performance computing resources on study

Trusted data access

- High internet connectivity for ground broadcast and Internet Exchange peer partner, large and various Telco PoP's, Tier 1 Telcos for intercontinental broadcast
- High data availability thanks to Multi-site access & Multi-site store

Trusted data privacy

- Advanced expertise of data privacy deployment
- Business impact assessment – Business Continuity
- Disaster recovery plan
- Privacy impact assessment
- Regulation compliance

MAIN CUSTOMERS

The main client synergies within the space sector and its players are created with POST Luxembourg, AdwaisEO, EarthLab Luxembourg to complete a space value chain integrating information capture, transfer, treatment and dissemination.

EBRC's Tier IV certified Data Centre is located next to the SES' Headquartered Q in Betzdorf. Its open and advanced facilities bring efficiency and flexibility to our continuous value chain making it possible to lead strong and deep-integrated projects. This Data Centre is ready to host space projects (including commercial, defence, restricted/secret, ESA projects).

MAJOR SPACE PROJECTS

- EBRC, as a member of the Consortium managed by AdwaisEO, is active within the Copernicus program
- In 2020, EBRC co-founded with RHEA Group, CS GROUP and 3DS Outscale a "Digital Alliance for Space" within GAIA-X
- In 2021, EBRC signed a Memorandum of Intent (MoI) with ESA, RHEA System Luxembourg, LuxSpace Sarl, Aurora Insight on the development and deployment of a European Spectrum Monitoring System.

EmTDLab - Space Division The Emerging Technologies Development Laboratory



**CEO/
HEAD OF DEPARTMENT**
Cedric R.G. Thiry

CREATION DATE
2018

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 5

CONTACT DETAILS
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Project Management Team

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CORE BUSINESS

EmTDLab develops advanced capabilities to extend human existence into deep space. The first priority is to develop materials that will significantly minimize the exposure of the human body and on-board electronics to space radiation. Our goal is to reduce the radiation risk for the crew to a level known as "As Low as Reasonably Achievable". Ideally, this would be where the risk for radiation exposure in space is comparable to that on Earth.

The structural configuration of the spacecraft is our company's starting point to improve radiation protection. EmTDLab builds prototypes to demonstrate the feasibility and commercial viability of radiation protection systems. The research will lead to applications for space, air and Earth-based systems that are sensitive to radiation.

PRODUCTS AND SERVICES

VLEO to deep space radiation environment simulation.

Radiation exposure modelling & shielding optimisation for existing materials.

Contract research / aerospace engineering services outsourcing for existing materials radiation shielding optimisation (structural materials only, not functional materials – semiconductors).

Contract Research / aerospace engineering services outsourcing for new materials discovery: Spacecraft Shielding Optimisation, On-board Electronics Shielding optimisation: IC's, MCU's, CPU's, GPU's, FPGA's, DRAM, AI Chips, and Power Systems.

Custom or mass-produced industrial scale radiation shields for space electronics components at chip level or board level.

Custom or mass-produced Industrial scale radiation optimised structural materials for space vehicle.

TECHNICAL MEANS

Radiation Optimised Materials

Possible Scope:

- Metal Alloys
- Polymers
- Ceramics
- Synthetic rubber
- Composites
- Foams

Physical & Chemical Properties Optimisation

- Radiation Shielding: High Energy Protons, High Energy Electrons, Galactic Cosmic Rays (Heavy Ions), Secondary neutrons; Optional: Gamma Rays and EMI shielding
- Thermal Management: Heat Dissipation / Heat Sink
- ATOX – Atomic Oxygen Corrosion

Mechanical Properties Optimisation

- Specific Strength
- Specific Modulus
- Fracture Toughness
- Fatigue Crack

MAIN CUSTOMERS

- Space agencies
- Private aerospace companies
- Large spacecraft integrators
- Space Electronics Segment
- Radiation-hardened electronics manufacturers
- Commercial-off-the-shelf electronics manufacturers

MAJOR SPACE PROJECTS

- Member of Singapore Space Technology Limited
- Private Public Partnerships with EU member state
- Industrial project are currently confidential

CEO

Cédric Lorant

CREATION DATE

2001

ORGANISATION TYPESmall and Medium-Sized
Enterprise**NUMBER OF EMPLOYEES**

Total: 28

Space: 26

TURNOVER 2021

Total: € 2,600K

Space: € 2,392K

R&D**INTERNAL INVESTMENTS**

2021: € 150K

QUALIFICATIONS,**APPROVALS**

ECSS-ST-Q-70-08C and

ECSS-ST-Q-70-38C

CONTACT DETAILS

Name: Cédric Lorant

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L-4991 Sanem,
Luxembourg**Office Address:**Building SISA,
5, rue Bommel,
L-4940 Hautcharage,
Luxembourg**Phone:** +352 26 58 17 50**E-mail:**

cedric.lorant@emtronix.lu

Website: www.emtronix.lu**CORE BUSINESS**

EmTroniX is designing and producing advanced electronics and embedded software for the New Space industry. Using state-of-the-art development tools, EmTroniX engineers are able to offer the most objective and cost-effective solutions to all customer's technological needs. The company offers the significant advantage of having in-house all the skills and experience required to handle different technical aspects of engineering development projects. We are also producing our own Space products as an On-board computer, a generic Software Defined Radio, LNB, LNA, Power Amplifier and even more to come.

PRODUCTS AND SERVICES**Services**

- Design, implementation and manufacturing of complex electronics, including software (embedded & FPGA) and mechanical aspects, primarily oriented for telecommunication purposes
- Radio Frequency transceivers, LNA, down-converters, up-converters up to Ka-Band and SSPA up to X-Band
- Advanced Digital Signal Processing, Software Defined Radio, real-time embedded software, automatic code generation, system modeling using rapid prototyping and optimized auto-coding
- Custom FPGA-based system, IP design and implementation (VHDL)
- Analog, digital, high-power driver and PSU electronic design
- High reliability, in-house automated SMT manufacturing
- Ultra-fast, In-house multilayer RF PCB/Filter prototyping up to Ka band

Products

- Multi-channels, high sensitivity ADS-B IP core
- Proximity-1 autonomous transceiver physical layer IP core
- Software Define Radio Payloads
- AIS receivers
- ADS-B receivers

TECHNICAL MEANS

Production

- Autotronic Automatic SMT Stencil Printer
- MYPro MY300LX Pick & Place machine
- IBL Vapor Phase Oven
- Memmert Drying Oven
- Dr Storage Dry Storage Cabinet
- LPKF U4 high precision Laser Milling Machine for PCB/Filter prototyping, Galvanic Through Hole plating and Hydraulic Press for up to 8 multilayers PCB

Characterising & Testing

- Vector Network Analyzers (Dual & Quad ports, up to 24GHz)
- Spectrum & Signal Analyzers (1.8GHz / 7GHz / 43 GHz)
- RF Arbitrary Signal Generators (3GHz / 20 GHz)
- High Speed RF DSO (4CH – 20 Gs/s 6 GHz)
- Low & Medium Speed DSO (4CH – 100 MHz/300 MHz/500 MHz/1 GHz/1.5 GHz)
- Noise source
- Multi Channels Electronics Loads
- Battery Simulator (5A, 20V)
- Thermal Chamber (-30°/+130°C)
- Climatic Chamber (-70°C/+180°C)

MAIN CUSTOMERS

Aerospace and aeronautics developers/integrators (ESA, OHB, SES, Thales Alenia Space, QinetiQ, OIP, Airbus, KLEOS, OO-Technology, SkyfloX, IPAG, GOMspace), Military (NSPA), Automotive component manufacturers (Delphi, Honeywell, Faurecia, IFP, Ferrari, Hannon, Audi) and research institutions.

MAJOR SPACE PROJECTS

- Proximity-1 Autonomous Transceiver (ESA): Software Defined Radio transceiver for Mars-Orbiter autonomous telecommunication HUB (automatic signal modulation, frequency and baud-rate detection)
- HERA's Juventas Radar(GomSpace): First Low Frequency Radar probe of an asteroid
- MACSAT IOD (OO-Tec): Complete payload transceiver and demonstration terminals
- Triton-X (OHB): High-Speed downlink and OBC for the satellite avionic DVBS2X FPGA-based downlink modulator, including RF and X-band SSPA. Avionic's On-Board Computer
- VesselSat 1 & 2 (OHB): Payload – Dual AIS receivers, telecommand receivers, OBC interface, GNSS receivers, 3D sun sensor
- 4M (OHB): Manfred Memorial Moon Mission: First commercial satellite orbiting the Moon
- Generic SDR (EmTroniX): Flexible, powerful and multi-platform Software Defined Radio payload for wide-range telecommunication purposes. Used in Juventas & MACSAT



PRESIDENT & CEO

Rolf Mathias Alter

DEPUTY CEO AND HEAD OF DEFENCE & SPACE TECHNOLOGY

Christoph Herrmann

CREATION DATE

1984

ORGANISATION TYPE

Large Enterprise

NUMBER OF EMPLOYEES

Total: 713

Space: 21

TURNOVER 2021

Total: € 100 M

Space: € 5.9 M

QUALIFICATIONS, APPROVALS

AIRBUS Group,

The BOEING Company,
EASA Part 145, EASA Part
21 G, EASA Part 21 J, IRIS,
DNV marine certification,
DIN 6701 Class A1,
EN 15085-2, ISO 14001,
ISO 9001 & SAE AS 9100,
NADCAP

CONTACT DETAILS

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Technology)

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Website:

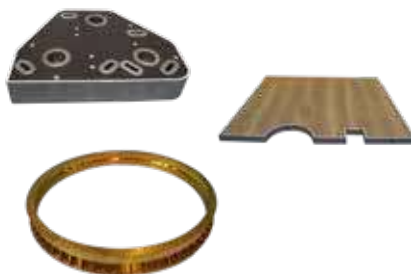
www.euro-composites.com

CORE BUSINESS

The EC-Group is a global player in the field of advanced and demanding composites products. We offer technical solutions based on advanced composites adapted to the needs of our customers: we are able to develop customized solutions to the required specification (build-to-spec), or we manufacture products according to the build-to-print approach. Just how it fits best for our customer and their needs.

PRODUCTS AND SERVICES

- Product development including structural and thermal analysis
- Advanced composite parts production
- High precision 5-axis CNC machining in a clean and climate controlled environment
- Formed composite parts
- Design and manufacturing of tools and moulds
- Completion of drop-in parts (inserts, reinforcements, extruded profiles, primed, grinded, coated/painted)
- Autoclave processing
- Resin infusion and resin transfer moulding processes for interior and structural parts
- Final assembly of complete units
- Kevlar®, Nomex®, Glassfibre, Carbon Fibre and Aluminium (5052, 5056, 3003) Honeycomb cores (with or without perforation)
- Sandwich panels (flat and curved structures)



TECHNICAL MEANS

- RI – resin infusion
- Autoclave
- FSW – friction stir welding
- Coating
- CAD/CAM software
- 5-axis CNC milling centres in climate controlled environment
- Sandwich panel production
- Honeycomb core production
- Quality control and measurement tools
- Laboratory for mechanical tests
- X-ray chamber
- Cleanrooms ISO 7 & ISO 8
- Ultrasonic inspection

MAIN CUSTOMERS

Airbus Defence & Space, ESA, QinetiQ Space, Boeing, Thales Alenia Space, MDA Corporation, Deutsches Zentrum für Luft- und Raumfahrt (DLR), SENER, IAI

MAJOR SPACE PROJECTS

Ongoing Projects

- ALTIUS Mission: Design & Engineering, Aluminium structural panels, CFRP solar array substrates, Bracketry, S/C environmental testing, S/C transport container
- SMILE MISSION: Payload Module Structure
- Skyflox: Radome design & manufacturing, final assembly
- 3D Honeycomb for Curved Structure Manufacturing
- ATHENA Mission: Low temperature radiator panel with embedded heat pipe
- Lagrange Mission: Components for the Heliospheric Imager (HI)
- Development of RF-transparent Glass Fibre Sandwich Panels for Space applications
- SAR satellite structure manufacturing, incl. painting and heat-pipes
- Large Telecommunication satellite manufacturing

Heritage

ESA PROJECTS

- PROBA-3: Aluminum structural panels, CFRP solar array substrates, Solar Array substrates
- PROBA-3: Optical benches
- EUCLID: Aluminum External Panels manufacturing
- PROBA Next (P200): Aluminum structural panels, CFRP solar array substrates, Solar Array substrates
- Small Geo: CFRP and Aluminum Structural Panels, Transport boxes and Heat Pipe Test Panel for the Platform
- PROBA-V: Aluminum structural panels, CFRP solar array substrates, Solar Array substrates
- BepiColombo: High Temperature Aluminum Core (Flight Hardware)
- Perforated Honeycomb core: Qualification of perforated honeycomb types for Space application
- Quartz-Glass honeycomb core and sandwich panels: RF transparent glass fibre sandwich panels

Studies

- Light-weight, torsion-free structural panel with excellent surface properties
- Development of CFRP radiator panels with integrated fluid tubes
- Manufacturing of Honeycomb panel with embedded heat pipes for telecommunication satellites
- Study for structural CFRP thermal conditions

Projects

- Abrisas: Support panel for solar arrays
- BIRD: Solar Array support panels
- Herschel & Planck: Sub-Platform Test Dummy and Solar Panel Test Dummies
- Astrosat100: Structural Panel, Aluminum face sheets
- TET: Solar array panels, Payload panel
- DLR: DESIS CFRP box for ISS
- BOEING: parts for CST 100

e-Xstream engineering, part of Hexagon Manufacturing Intelligence Division



**CEO/
HEAD OF DEPARTMENT**
Dr. Roger A. Assaker

CREATION DATE
2013

ORGANISATION TYPE
Large Enterprise

NUMBER OF EMPLOYEES
Total: 70
Space: 15

TURNOVER 2020
Total: €16 M
Space: €4 M

CONTACT DETAILS
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CORE BUSINESS

e-Xstream engineering, part of Hexagon's Manufacturing Intelligence division offers the industry the most complete and integrated solution portfolio to leverage the full potential of ICME*. Our solutions are built on an integrated stack of state-of-the-art software, hardware and engineering expertise to model materials, manufacturing process and final part performance and their connectivity in the virtual world, the physical world and between the virtual and real worlds. ICME offers engineers across industries the ability to use the optimal combination of materials and manufacturing processes to innovate and maximize performance while reducing cost and lead time. ICME enables new design paradigms by modeling the strong coupling between materials, manufacturing and product performance.

PRODUCTS AND SERVICES

We provide software solutions dedicated to material modeling and materials data lifecycle management as well as consulting services around those topics.

* *ICME: Integrated Computational
Materials Engineering*

TECHNICAL MEANS

Our solutions enable virtual material development & testing, material lifecycle management, to enhance predictivity & reliability for part's development, Materials Intelligence and last but not least sustainability by reducing the carbon footprint & material waste.

MAJOR SPACE PROJECTS

Recent major space projects are CompoSelector (Multi-scale Composite Material Selection Platform with a Seamless Integration of Materials Models and Multidisciplinary Design Framework), PSIDESC (Predictive Simulation of Defects in Structural Composites), and EXTREME (Dynamic Loading – Pushing the Boundaries of Aerospace Composite Material Structures)



**CEO/
HEAD OF DEPARTMENT**
CK Singla

CREATION DATE
2020

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 14

TURNOVER 2021
Total: € 2 M
Space: € 2 M

**R&D
INTERNAL INVESTMENTS**
€ 2 M

CONTACT DETAILS

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CORE BUSINESS

Manufacturing of optical fibers and components in microgravity. Flawless Photonics produces the industry-leading SpaceFiber™, which is an optical fiber from a fluoride glass called ZBLAN, produced in microgravity conditions in Low Earth Orbit (LEO). From this fiber, improved and novel applications are produced for the photonics industry such as lasers, amplifiers, sensors, as well as superior optical fiber for the telecommunications industry.

PRODUCTS AND SERVICES

Flawless Photonics offers superior optical fibers of various geometries and performance capabilities, as well as components, products, and system-solutions such as lasers, amplifiers, LiDAR, and sensors based on the SpaceFiber technology.

TECHNICAL MEANS

Flawless Photonics controls 3 patents issued by the US Government on the equipment and process of manufacturing optical fiber in microgravity. Further, FP has conducted extensive research and development in the field of ZBLAN glass, MWIR optical theory and systems, AI and robotic automation, and other areas critical to the success of producing large volumes of commercial grade SpaceFiber for use across applications and across industries.

MAIN CUSTOMERS

Currently Flawless Photonics has one main customer in the form of the US Government, with approximately 100 potential customers at various stages of discussion to procure and utilize SpaceFiber once sufficient quantities and performance have been achieved.

MAJOR SPACE PROJECTS

Flawless Photonics is in the business of manufacturing commercial-grade SpaceFiber at scale. To this end, our primary space project is to achieve this mission. Various facets of FP's business from R&D, to manufacturing, and supply chain are touched by the unique requirements and demands of transportation to LEO, being successful in the special conditions of microgravity, and safely returning our products to Earth for sale and fulfilment with our customers.

**CEO/
HEAD OF DEPARTMENT**
Christophe Perini

CREATION DATE
1999

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 20 in Luxembourg,
10 consultants (Poland, UK,
Israel, India; Kenya, Brazil)
Space: 20 in Luxembourg,
10 consultants (Poland, UK,
Israel, India; Kenya, Brazil)

TURNOVER 2021
Total: €16 M
SPACE: €16 M

R&D
INTERNAL INVESTMENTS
€1 M

**QUALIFICATIONS,
APPROVALS**
CE, RoHS, SAT>IP

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CORE BUSINESS

Inverto is a leading supplier of broadcast reception equipment, remote monitoring and video streaming solutions serving major DTH operators across the world.

Leveraging on its strong R&D and software capabilities it has secured a leading position in a host of new breakthrough technologies including Ka/Ku Co-locate LNBs, dCSS, SAT>IP, cloud IoT, multiscreen video transcoding and mABR streaming.

Inverto has over 30 years of experience in the industry and is supplying millions of LNB, dishes, dCSS multiswitches and accessories every year to leading brands and tier-1 DTH operators. Inverto's broader expertise in digital video broadcast covering antenna, feed and microwave PCB design as well as mobile and real-time software in confined embedded environments allow for a truly holistic view on product design, sustaining innovation and guaranteeing world class quality.

PRODUCTS AND SERVICES

- **LNBs:** A supplier of choice for leading DTH operators across the world; the broadest product range in the industry covering Universal, band stacking or Unicable (dCSS) solutions for C band, Ku and Ka bands for single or multiple satellite reception (monoblock LNBs)
- **Satellite Dish Antennas:** A comprehensive range of satellite dish antenna and mounting accessories designed and engineered to meet the strictest performance and durability standards
- **Satellite and DTT distribution solutions** for residential and commercial installation over fiber or coax networks: Most optimized and

field proven designs of Unicable (dCSS) cascadable switches and Unifiber product line – the smallest footprint optical transmit headend and a wide range of optical receivers

- Video transcoding and secure streaming solutions for IPTV / OTT services and mABR streaming gateways for 4G/LTE/5G-Satellite integration applications
- Flat panel Electronically Steering Antennas for mobile broadband services over Ka and Ku satellite links addressing communication on-the-go applications covering consumer broadband, maritime and other commercial enterprise services
- SatPal™ and SatWatch – Satellite installation and IoT remote monitoring solutions
- SAT>IP Server/Client devices: The first SES-certified SAT>IP Server in the world
- Accessories, Coax and Fiber cables; RF and optical splitters, combiners, power inserters, optical amplifiers for satellite TV distribution

TECHNICAL MEANS

- RF measurement and test equipment
 - signal generators, spectrum analyzers, oscilloscopes, noise figure meters, logic analyzers, DVB-S2 modulators
- Satellite signal measurements
- High speed PCB design and simulation tools
- Mechanical and product design tools
- Software development (embedded firmware, Linux, Windows, iOS, Android, cloud and web applications)
- Systems engineering expertise
- Optical system design for satellite TV RF distribution over fiber or coax networks
- UI/UX and product industrial design tools

MAIN CUSTOMERS

- DTH operators worldwide eg TataPlay, Multichoice, Serbia Broadband (total TV), Airtel, Claro, Digiturk and Canal+ Luxembourg
- Distribution and OEM partners worldwide

MAJOR SPACE PROJECTS

ESA projects:

- MLNB
- SVC+VCM
- HTS-DBS
- 5G Emerge / European Broadcasting Union (EBU)

**CEO/
HEAD OF DEPARTMENT**
Dr. S. Pepino

CREATION DATE
2020

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 1-10
Space: 1-10

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CORE BUSINESS

GlobeEye®. Make Informed Decisions, Before
Anybody Knows.

GlobeEye® operates at the intersection
of New Space, Fintech and Climate Tech.
It brings earth observation data to finance
and the sustainable economy.

It specialises in the analysis of satellite
and other remote sensing data to derive
information for businesses and financial
institutions, and aims at fostering sustainable
growth. It leverages the technological frontier
in satellite data, artificial intelligence,
and big data to derive timely, accurate,
actionable insights.

PRODUCTS AND SERVICES

GlobeEye develops ready-to-use indicators
for the financial services industry and other
businesses.

MAJOR SPACE PROJECTS

Macroeconomic and air pollutions indicators
based on satellite data.



COUNTRY MANAGER

Eduardo Cruz

CREATION DATE

2017

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 34

Space: 34

TURNOVER 2021

Total: € 4,2 M

SPACE: € 4,2 M

CONTACT DETAILS

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CORE BUSINESS

GomSpace Luxembourg is engaged with two lines of business:

We are developing and offering Operations as a Service (OaaS) to owners of nanosatellites providing a scalable low-cost and fully automated solution that ensures high return on investment.

Further, we are developing Deep Space projects acting as the prime for ESA. The two missions M-ARGO and Hera/Juventas will explore nearby asteroids and provide a wealth of new information facilitating future resource utilisation.

PRODUCTS AND SERVICES

Our main products is the Hands-Off Operations Platform (HOOP) being the basis of our OaaS offering. Its features are:

- Our Hands Off Operations Platform (HOOP) is the only product designed from the ground up ready for constellations
- Cost effective for single satellite in-orbit demonstrations to full-blown constellations providing commercial services
- HOOP manages the entire ground segment, from antennas to end-users, allowing to optimise your assets at multiple levels
- Our continuous development and integration approach blends development and operations, ensuring our platform is fit for purpose - and adjust to your changing business priorities
- Our business model allows shifting CAPEX cost to OPEX; bringing down investment for enabling new space-based services
- Build for a cybersecure world. HOOP has a holistic approach to security that covers both space and ground segments all the way to your customers

TECHNICAL MEANS

GomSpace Luxembourg has highly qualified space talent covering Ground Segment, Systems Integration and Quality. GomSpace Luxembourg has technical knowledge and processes to provide support to a growing number of satellites in space, and is currently designing and developing some of the most advanced nanosatellite missions in the world ranging from Earth Observation to Asteroid Rendezvous. There is also a systems integration lab for subsystems checkout, integration, and testing.

MAIN CUSTOMERS

The European Space Agency is currently the largest customer of GomSpace Luxembourg, to which GomSpace Luxembourg is providing Operations as a Service to missions such as CubeMap, GOMX-5, Artic Weather Satellite; as well as Deep Space mission such as Juventas and M-ARGO.

But there is also a growing number of commercial customers, namely for the operational services, to which GomSpace Luxembourg provided operational support in the Academia, Defence, Institutional and Commercial market such as Startical, Kleos, UnseenLabs, Colombian Air Force, JP Morgan, Sky and Space Global, University of Saarland and University of Manchester.

MAJOR SPACE PROJECTS

Our HOOP project is a continuous development project where incremental updates are being released to the production environment adding new features and capabilities.

The M-Argo project is developing a 12U nanosatellite explorer expected to piggyback launch in 2025-2026 and independently navigate to an asteroid target and perform scientific investigations hereof. The project is pushing the state-of-the-art on almost any aspects of small satellite, including miniaturisation, autonomy, and resiliency.

The HERA/Juventas is a 6U cubesat that will be part of the HERA mission and will attempt landing on the Dimorphos (Didymoon) asteroid system in 2024 in order to exploit its secondary payloads a gravimeter and an IMU. The 6U carries a low-frequency radar payload that will probe into the interior of the asteroid. The mission will be managed through communications that goes through the HERA mother craft.

**CEO/
HEAD OF DEPARTMENT**
Patrick Biewer

CREATION DATE
2015

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 17

TURNOVER 2021
Total: € 25.9 M

**R&D
INTERNAL INVESTMENTS**
€ 116 K

**QUALIFICATIONS,
APPROVALS**
ISO 9001, ISO 27001,
NATO FSC, EU FSC,
LUX FSC

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CORE BUSINESS

GovSat is a satellite operator and service provider. It is a public-private joint venture between the Luxembourg government and SES, the world-leading satellite operator. Its mission is to provide secure, reliable and accessible satellite communication services for governments – addressing the demand for connectivity resulting from defence and civilian security applications. Dedicated entirely to governmental and institutional users, the GovSat-1 satellite features high-powered fully-steerable spot beams and an X-band Global beam. It is equipped with anti-jamming features, encrypted telemetry and control, and uses assured frequencies. This enables an array of applications such as connectivity for theatres of operation, interconnection of institutional or defence sites, border control, ISR, as well as various types of communications for air, land and maritime missions.

PRODUCTS AND SERVICES

GovSat's portfolio of services covers key fields of expertise: capacity and coverage, anchor and teleport services, secure hosting solution and end-to-end solution offerings.

On the capacity side, GovSat-1 is a secure satellite capability featuring high-powered fully-steerable spot beams in X and Mil Ka-Band, and a Global X-Band beam. It is equipped with anti-jamming features, encrypted telemetry and control (TT&C), and is offered on a non-preemptible basis. Due to its orbital position at 21.5° East, GovSat-1's coverage reaches from 50°W to 90°E and 70°N to 70°S. GovSat offers capacity for short and long-term lease from MHz, transponders through to beams with full steering rights in X and Mil Ka-Band.

The architecture of GovSat-1 allows flexibility on how to anchor the traffic. Customers can use their own anchor facilities or the GovSat's high resilience anchoring service, as prime or back-up. It is also possible to offer access to other partners' teleports within the footprint.

TECHNICAL MEANS

GovSat-1 is positioned at the 21.5 East Orbital position with coverage areas spreading over Europe, Middle East, Africa and South West Asia with maritime coverage for the Atlantic, Baltic, Mediterranean and Indian Oceans.

The satellite has a so-called "global X-band beam" and fully steerable X- and mil Ka-band spot beams that will provide communication capabilities within the mission area as well as back to the associated headquarters. This means that the satellite coverage area can be fully adapted to the requirements of the user.

GovSat-1 features high-powered fully-steerable spot beams, an X-band Global beam and a total of sixty-eight transponder equivalent units. It is equipped with anti-jamming features, encrypted telemetry and control, and uses assured frequencies.

MAIN CUSTOMERS

GovSat is a new satellite communications capability dedicated to governmental and institutional users. It addresses the demands for connectivity resulting from defence and civilian security applications.

MAJOR SPACE PROJECTS

GovSat-1 was launched in January 2018 and is operational since March 2018.
Lifetime: >15 years

**CEO/
HEAD OF DEPARTMENT**
Claude Maack

CREATION DATE
1965

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 68
Space: 31

TURNOVER 2021
Total: € 10.5 M
Space: € 4.8 M

**R&D
INTERNAL INVESTMENTS**
€1.4 M

**QUALIFICATIONS,
APPROVALS**
Certified ISO 9001,
14001 and 45001
EN 9100 in preparation

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Website: www.gradel.lu /
www.gradellw.eu

CORE BUSINESS

Since more than 50 years of background in developing special purpose equipment in automated electro- mechanical engineering, automation, and dynamic axis control, GRADEL is established in the space market as specialist for complex systems.

GRADEL is specialised in developing, building, and testing of Mechanical Ground Support Equipment (MGSE), for which it is able to deliver a complete range of equipment to Manutention, Assembly and Test S/Cs, subsystems of payloads or instrumentation. These Complex Systems are built to painstaking specifications using specialized materials like mechanical precision paired with cleanliness requirements as well as magnetic and thermal compatibility.

A new business field has been established since 2018 by developing and manufacturing sustainable lightweight structures for flight hardware with an own developed Gradel Robotic Additive Manufacturing process (GRAM). This process is an endless fiber winding process for manufacturing complex 3D structures with weight savings up to 70% at equal stiffness or/and strength. GRAM enables hybrid construction by integrating functions by design. GRAM allows the use of different fibers materials (carbon, flax, basalt, glass, rayon etc..). A wide range of products and applications have already been realized for versatile market segments. GRAM has been qualified for Space applications with ESA in 2022.

PRODUCTS AND SERVICES

MGSE

Transport Containers for Satellites, Multipurpose Trolleys for satellites, fully automated with AGV- systems, Hoisting Devices for horizontal and vertical lifting of satellites, Integration Stands, automatized Oq supports for manufacturing, equipment for Antenna Test Facilities.

LIGHTWEIGHT STRUCTURES:

GRADEL Lightweight structures and parts which are predestined to optimize all possible lightweight 3D structural components in the space sector. GRADEL analyses from multi-axial static and / or dynamic load cases are all covered using the GRADEL engineering digital process chain. GRADEL designs & manufactures from simple parts to relatively complex integrated 3D lightweight parts i.e., assembly reduction time and fasteners. GRADEL lightweight technology enables structures sizes of few centimetres up to some meters which may also include additional functions and features in the structures & parts, where weight savings up to 70% have been demonstrated.

TECHNICAL MEANS

Engineering office with 16 engineers in multiple disciplines Software: SOLIDWORKS, FEMAP, NASTRAN, MATHLAB, SIMULINK.

Assembly and test workshop of 800 m² x 10 m height, crane capability: 2 times 10 t
Production facility for composite structures: 600 m² with clean room, 5x GRAM and 10m rail Curing oven of 1 and 12 m³.

MAIN CUSTOMERS

Airbus Defence &Space, Ariane Group, ESA, OHB Systems, Thales Alenia Space.

MAJOR SPACE PROJECTS

Gradel has or is participating with its space products for different customers in the following programs:

- Transport Container for ONESAT AIRBUS
- Compact Antenna Test Range OHB
- SMART Multipurpose Trolley TAS
- Portable Antenna Measurement ESA
- Communication
- Alphabus, EDRS, Electra, Eurostar Neo, Neosat, SGEO, SES17, Heinrich Hertz, Space Inspire, OneSat.

Science

Euclid, ExoMars, JUICE, Solar Orbiter, Proba III, PLATO, Athena

Earth Observation

MTG, Copernicus

Others Moonmission M4

In orbit manufacturing



MANAGING PARTNER & CEO

Yves Elsen

SENIOR PARTNER & COO

Philippe Osch

CHIEF SYSTEMS ENGINEER

Yves Leiner

MANAGER ENGINEERING

Tom Mathes

CREATION DATE

1986

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 54

Space: 16

QUALIFICATIONS, APPROVALS

ISO 9001

AQAP 2110

Made in Luxembourg

SGS USTC

SuperDrecksKëscht fir

Betribber (in accordance
with ISO 14024)

Charte de la diversité

Lëtzebuerg

CONTACT DETAILS

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Tom Mathes

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CORE BUSINESS

HITEC Luxembourg S.A is a 100%-owned Luxembourg company and offers high-technology solutions covering different business areas: satellite ground segment, equipment for testing and measuring of physical properties, traffic management and mission critical. HITEC Luxembourg serves private and public sectors at a national and international level.

The company offers, among others, satellite ground segment technology as well as innovative satellite-based products and ICT services to support public safety services in case of crises or disasters. Its range of Limited Motion (LM) and Full Motion (FM) high-end antenna systems, operating in various frequency bands and supporting institutional and commercial satellites, is complemented by antenna components such as antenna control units (HACU®) and servo control units (HSCU™). The company's services include project management, design, engineering, integration, installation, commissioning and maintenance of full antenna systems and antenna components.

PRODUCTS AND SERVICES

- Limited and full motion ground station antennas, ranging from 3 to 14 meters in diameter and covering frequencies from L- to Q/V-band (HTS gateways, TT&C, IOT/LEOP, EO/data downlink) in particular 6m and 9m limited motion antennas in X-, Ka- and Q/V-band and 4m to 13m full motion antennas in L- to Ka-band, including options such as HVAC and de-icing
- Elevation over azimuth and equatorial mount positioners (e.g. for antenna arrays and optical telescopes respectively)
- Antenna components: HACU® Antenna Control Units (program, step- and monopulse track) and HASK Antenna Servo Kits
- Nomadic Satellite Communication Systems: NoSaCo® Rapid and NoSaCo® Rack

- Mission Critical Information Management solutions for defence, emergency and humanitarian markets

Services:

- Project management and coordination
- Ground station system integration and turn-key supplies
- Ground station antenna refurbishment, retrofit and relocation
- Ground station antenna maintenance and ILS-ISS
- Quality assurance and RAMS analysis
- Customer specific design, simulation and manufacturing
- Commissioning and training

TECHNICAL MEANS

HITEC Luxembourg's facilities are easily accessible on the outskirts of Luxembourg City. The premises comprise engineering offices, equipped with state-of-the-art design and analysis SW and HW. The facilities also comprise a laboratory, used for testing, commissioning, and training purposes. In addition, a small workshop and assembly area allow for rapid prototyping and troubleshooting. From its central location in Europe, HITEC Luxembourg is well connected to a proven network of suppliers, with whom all products are delivered to guaranteed quality standards.

MAIN CUSTOMERS

European Commission (DG Enterprise and Industry, DG Research and Innovation), European Space Agency (ESA), German Aerospace Center (DLR), Luxembourg Government, Caribbean Disaster Emergency Management Agency (CDEMA), Administration of the Republic of Slovenia for Civil Protection and Disaster Relief (URSZR), Civil Protection of the Friuli Venezia Giulia Region (PCRAFG), SES Group, SES TechCom, LuxGovSat,

Inmarsat, Lockheed Martin, POST Group, AIRBUS Defence & Space, Telespazio, CGDIS (Corps Grand-Ducal Incendie & Secours), Thales Alenia Space, OHB, Luxembourg army

MAJOR SPACE PROJECTS

Satellite Ground Station Antennas

- Defence projects: limited- and full-motion antennas (6.8m, 9.0m) in Ka-, X-, and S-Band
- DLR:
 - Full-motion antenna in Ka-band (13m) for IOT
 - Wide-band full-motion antenna (5m) for GNSS monitoring
- ESA projects:
 - Q/V-band large aperture HTS gateway development
 - Antenna Control Units (program, step- and monopulse track) development
 - GSTP design study for a 3-axis full-motion antenna in S-/K-band (14m) for Earth observation
 - SSA NEO: feasibility study and prototyping of telescope design for near Earth objects
- EDRS: Limited-motion antennas in Ka-band (6.8m) for TT&C, feeder uplink and data downlink
- Earth observation: 3-axis full-motion antennas in S/X-dual-band (6.8m)
- Galileo IOV: full-motion antennas in S-band (13m) for TT&C

Satellite-based ICT solutions

- emergency.lu: deployment of worldwide available Rapid response solution for humanitarian aid and disaster relief, integrating, among other solutions NoSaCo® and DISP®
- ALPDIRIS: Assist search and rescue teams in the Alps by providing satellite-based connectivity and software (DISP)
- Service to provide a rapid mapping solution based on Earth observation

**CEO/
HEAD OF DEPARTMENT**
Royce Dalby

CREATION DATE
2018

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 13
Space: 13

TURNOVER 2021
Total: € 2,048,989
Space: € 2,048,989

R&D
INTERNAL INVESTMENTS
€ 500,000

**QUALIFICATIONS,
APPROVALS**
ESA Contract
Partnerships with
Universities
Collaborations with
Commercial Customers

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CORE BUSINESS

Hydrosat is a data analytics company based in Luxembourg that applies proprietary algorithms to satellite thermal imagery, combines it with data fusion capabilities and delivers insights into plant health and related applications for commercial and government customers around the world.

PRODUCTS AND SERVICES

Our team in Luxembourg is focused on developing two commercial products, both with significant commercial potential and offering substantial environmental benefits. The first focuses on early and accurate yield forecasts of all major crops across the globe. Agribusiness companies, financial traders, governments and other customers will have unparalleled insights into what they can expect out of local and global production of everything from grains to sugar cane to cotton, allowing businesses to operate more efficiently. Our second product tells farmers exactly when and how much to water their crops. Hydrosat's own field studies, backed up by NASA research, have demonstrated that this will increase farm production by 20% while also substantially decreasing water usage – a win for the farmer and a benefit for the planet.

TECHNICAL MEANS

Hydrosat applies data analytics and data fusion techniques to thermal infrared and multi-spectral satellite imagery and turns it into actionable insights. Hydrosat's multidisciplinary team has expertise in the areas of big data analytics and distributed computing, remote sensing, image processing, image segmentation and classification, time-series forecasting and machine learning. Hydrosat has particularly developed expertise in the areas of vegetation health, stress monitoring and crop yield forecasting.

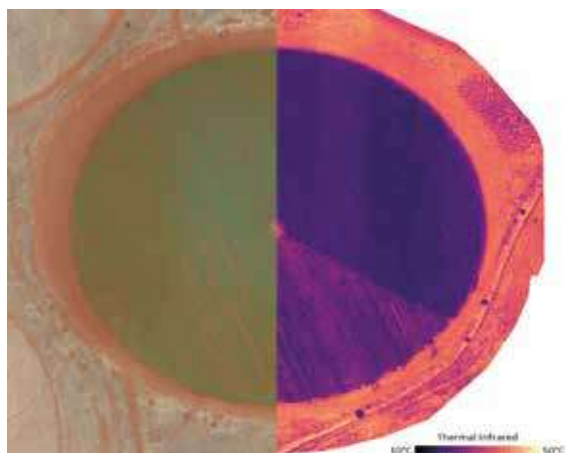
MAIN CUSTOMERS

- Food processors, packagers and distributors
- Commodity Traders
- Insurance Companies
- Government Agencies
- Corporate and Independent Farmers
- Humanitarian Organizations

MAJOR SPACE PROJECTS

Thermal Infrared Remote Sensing Constellation

Although there are many space imagery constellations in orbit and planned for launch, thermal imagery is missing. Consequently, Hydrosat is developing a constellation of sixteen spacecrafts that will provide a complete heat map of Earth twice per day. The data from these satellites will enhance our products and give us unparalleled access to high-resolution thermal imagery to meet the needs of a wide range of commercial and government customers.



© Hydrosat Sàrl
Hydrosat provides data beyond what is visible to most satellites:
Infrared & Temperature.

CO-FOUNDER

Maria Mateo Iborra

CREATION DATE

2019

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 6

Space: 2

CONTACT DETAILS

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CORE BUSINESS

IBISA is a tech-based Global Climate Insurance Platform. IBISA builds, distributes, and operates climate insurance solutions for agriculture and dairy in a cost-efficient, scalable and innovative way. Configurable Weather Parametric insurance with affordable premiums, fully digitalized, transparent, and rapid payouts that is changing the way cooperatives, agriculture financial providers, inputs providers and food and beverage companies recover from the impact of extreme weather events and support smallholder farmers to stay in business and flourish.

IBISA's solution overcomes the challenges of high administration and claim assessment costs hindering the large-scale uptake of agricultural insurance.

IBISA has a global presence with operations in India, Philippines, Senegal and Guatemala and is working with different segments in the Agri value chain.

PRODUCTS AND SERVICES

IBISA's platform is composed by 3 main building blocks: underwriting engine, policy management system and automated and remote loss calculation.

We use remote sensing, blockchain and actuarial technologies to design products that are cost-efficient, transparent, simple and adapted to the needs of our customers.

IBISA builds and operates innovative products, fast, adapted to the need of the clients and package them to fit into their business. From protection embedded in contract farming structures, to weather derivatives to forecast insurance.

Products cover customer's segment needs, from:

- Understanding of Climate risk exposure
- Insurance Product design
- Support to insurers
- Climate insurance Insurance (drought, excess rain, temperature, cyclone, excess windspeed, etc.)

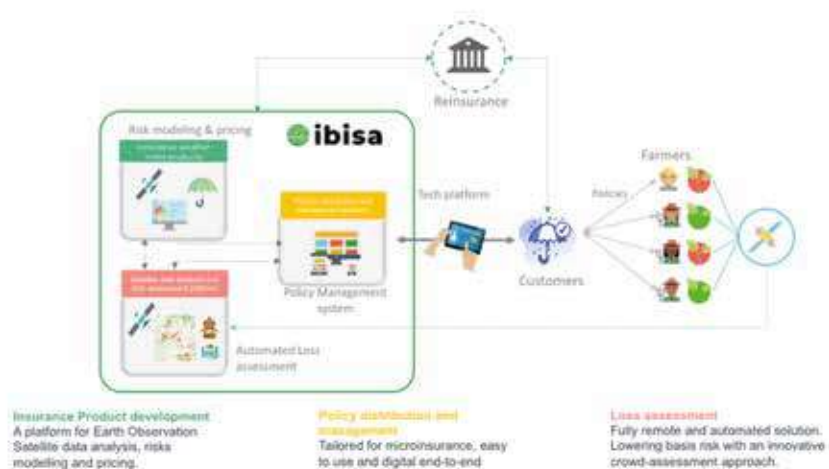
MAIN CUSTOMERS

Insurance actors, Finance Institutions, Agriculture Input Providers, G&I and Global Food and Beverage Companies.



MAJOR SPACE PROJECTS

ESA Business Applications .



CEO

Rafał Modrzewski

CREATION DATE

2014

ORGANISATION TYPESmall and Medium-Sized
Enterprise**NUMBER OF EMPLOYEES**

Total: 450

CONTACT DETAILS**E-mail:** info@iceye.fi**Website:** www.iceye.com**CORE BUSINESS**

ICEYE delivers unmatched persistent monitoring capabilities for any location on earth. Owning the world's largest synthetic-aperture radar constellation, the company enables objective, data-driven decisions for its customers in sectors such as insurance, natural catastrophe response and recovery, security, maritime monitoring and finance. ICEYE is enabling access to entirely new levels of data for the persistent monitoring of large and small areas across the globe – every few hours, day and night, in any weather. In December 2021, ICEYE opened a new office and a Machine Learning Center of Excellence in Luxembourg, in conjunction with the Luxembourg Future Fund. The office is playing a key role in the future development of ICEYE's machine learning and artificial intelligence capabilities.

PRODUCTS AND SERVICES

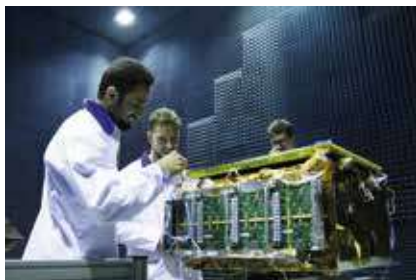
From tracking fast-moving objects like vessels in the sea to monitoring and addressing national security issues to monitoring natural disasters such as floods, ICEYE's persistent monitoring unlocks previously unseen changes to the environment and human activity. ICEYE's SAR satellites are purpose-built to be smaller, more affordable, and more flexible than legacy systems, giving governments and organizations the opportunity to get quicker access to SAR data or even own their own fleets of satellites. ICEYE is the only organization in the world today able to deliver this ground-breaking and proven capability for SAR satellites.

ICEYE's Flood Insights solution is the world's first global and always-on data utility developed for the unique needs of insurers and Emergency Management organizations. ICEYE's Flood Insights enables clients to

accurately and quickly size damage, streamline the claims process, build new products like parametric offerings and move into untapped markets.

MAJOR SPACE PROJECTS

ICEYE has successfully launched over 20 satellite missions and operates the world's largest constellation of synthetic aperture radar satellites. In October 2021, ICEYE becomes the first European New Space company to take part in the European Space Agency (ESA)'s Copernicus programme, the largest satellite Earth observation programme in the world. In June 2021, ICEYE's imagery was also included into ESA's Third Party Mission (TPM) data portfolio, which allows sponsored SAR data access to researchers and Earth Observation (EO) application developers.



© ICEYE

**CEO/
HEAD OF DEPARTMENT**
Federico Masier

CREATION DATE
2016

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 6
Space: 4

TURNOVER 2021
Total: € 498,000
Space: € 449,000

**R&D
INTERNAL INVESTMENTS**
€ 200,000

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CORE BUSINESS

We are a Multimedia Service Company having, in the broadest sense, any interest whatsoever in electronic media and the development of communication technology. Our aim is to be predominantly active in the communications area and to invest, directly or indirectly, in other companies that are actively involved in the dynamic industry of communication and multimedia applications.

We conduct research & developmental activities into potential expansion and development opportunities in the field of communication technology applied to multimedia applications and in auxiliary services.

We are headquartered in Luxembourg and operate worldwide through dedicated regional teams or qualified Business Partner.

PRODUCTS AND SERVICES

U Learning, a new generation software/hardware platform that enables an enhanced, participative learning experience combining together physical and digital presence.

U Learning enables active participation versus a passive presence taking remote learning to a new degree and enabling a rich learning experience for all those students that, for logistic reasons, have no direct access to the physical facilities.

The main components of the product are:

- touch interfaces, interactive walls, tables and tablets devices;
- blended context and adaptability;
- content creation and distribution.

Among these fields of application, here are some examples:

- school, primary and secondary
- university
- corporate training

3WayComm, an innovative triple-band VSAT maritime terminal for dual-use applications. The most innovative feature of the proposed satellite antenna is the ability to operate on X-band, Ku-band and Ka-band with automatic switching and no manual intervention, thus allowing unlimited operation and coverage areas in every possible operational scenario. While X-band is used mainly for encrypted military and civil operations, Ka and Ku bands are mainly used to enable broadband services aimed to ensure the on-board personnel's welfare. People on-board access the open Internet for information and entertainment purpose, to communicate with their families through e-mail, social networks and voice/video over IP.

TECHNICAL MEANS

- Strong technical background in telecommunications: satellite communication X/C/Ku/Ka-bands, Wi-Fi and global 4G
- Operating through first class worldwide cloud infrastructures
- Specialized in the design and deployment of complex projects
- Specific competence in high level software design and implementation (Oracle, Java, XML, Web Services)

MAIN CUSTOMERS

- European Space Agency (ESA)
- Sat@Sea Information Technology Network Services
- Azimut Benetti
- Fesano Trading

MAJOR SPACE PROJECTS

U learning is an interactive learning framework which allows students to engage in ubiquitous, flexible, immersive, non linear learning. It enables the collaboration between remote students and classrooms using a dedicated satellite layer which takes care of seamless content synchronization and live experience management.

3WayComm project consists of the design, development and prototype manufacturing of a innovative triple-band VSAT maritime terminal for dual-use applications under the ESA ARTES Competitiveness & Growth Programme.

The most innovative feature of the proposed satellite antenna is the ability to operate on X-band, Ku-band and Ka-band with automatic switching and no manual intervention, thus allowing unlimited operation and coverage areas in every possible operational scenario.



**CEO/
 HEAD OF DEPARTMENT**
 Fabrice Croiseaux

CREATION DATE
 1995

ORGANISATION TYPE
 Small and Medium-Sized
 Enterprise

NUMBER OF EMPLOYEES
 Total: 140
 Space: 8

TURNOVER 2021
 Total: € 14.5 M
 Space: € 8 M

**R&D
 INTERNAL INVESTMENTS**
 € 700 K

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CORE BUSINESS

InTech is a POST Luxembourg Group subsidiary specialized in IT Consulting and Digital Application Development. InTech designs and implements software solutions combining specific developments and integration of generic components with skills of project management, functional and technical architectural consulting, technical expertise and development.

InTech supports its customers and partners in their digital transformation by providing innovative and pragmatic services and effective solutions for their strategic project. Historically meeting the needs of Luxembourg's financial sectors and administrations, it aims to diversify especially in the space segment, mainly with its Innovation pole and expertise in Blockchain and Artificial Intelligence. InTech also co-organizes two major Space hackathons in Luxembourg: Space Hack and Act In Space.

PRODUCTS AND SERVICES

InTech provides IT services from IT Consulting to Development of digital specific tailored solutions including mobile and web applications. InTech believes that innovation and identification of the most suitable technologies for a given problem are the keys to successful projects. We co-create and design solutions and carry out complex projects with the help of development experts, UX specialists, technical architects and project managers.

TECHNOLOGIES

Open Source Development Tools, Blockchain, Artificial Intelligence, Machine Learning, IoT, Big Data, VR/AR

MAJOR SPACE PROJECTS

- Blockchain for Secure Nano-Satellite Constellations with Distributed Authority
- SkyTrust: Trust digital assets using space data
- Lux5GCloud: Cloud hierarchical database platform



CEO

Alvaro Sanchez

CREATION DATE

1990 (Spain)
2022 (Luxembourg)

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 42 (3 in Luxembourg,
initial recruitment)
Space: 32

TURNOVER 2021

Total: € 5 M
Space: € 5 M

R&D

INTERNAL INVESTMENTS
€1.5 M

QUALIFICATION

APPROVALS

CMM Evaluation Report
which is equivalent to ISO
9001, and certifies
INTEGRASYS as Level 2
CMM Certified to work with
European Space Agency.

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CORE BUSINESS

INTEGRASYS, was established in 1990, 31 years ago. The company was founded by a team of Hewlett Packard engineers, who spin-off to develop automated signal monitoring for the government. Since then, we have developed technologies for streamlining communications, especially in satellite network environments and remote areas to bridge the digital divide.

INTEGRASYS is a software development and engineering company specialized in satellite network design, deployment, maintenance, and interference mitigation tools for monitoring critical satellite infrastructure in the commercial and defence fields.

Our innovative products are sold worldwide to main SatCom network manufacturers, operators and services providers

PRODUCTS AND SERVICES

Integrasy product portfolio is totally adapted to the current needs of Satellite and Network Operators, covering all stages, from design, deployment, and maintenance of ground segment:

- Antijamming Capabilities (Interference Canceller for Defence, Attack or Protect) – Ground and onboard capabilities
- Link Budget (Satellite Network Design) and Multiorbit
- Automate and Fast Installation terminals
- Zero Touch Installation Terminals (plug and play deployment for automated antennas)
- Capacity Management and Monitoring (sharing a pool of spectrum for different users)
- Geolocate Interferences

- Automated Network Maintenance (perform automated checks to effectively manage a global network from a centralized location with redundancy and security)
- Securitization of Firmware (for preventing and mitigating Hacking in terminals)

TECHNICAL MEANS

RF signal processing components

for Automated Radio Spectrum Monitoring, based on modular designs where basic components are re-used across different systems, extended and integrated in order to create specialized tools to be used in the lab and/or in the field. Examples: ultra-fast wideband signal acquisition, automated signal detection, vector-based characterization or signal geolocation, antenna arrays and carrier processing techniques.

Satellite communications lab: based on fully-fledged manufacturers Satellite Hub (iDirect, Newtec, Comtech, SpaceBridge...) and user terminals.

Embedded computing lab based on a large and diversified set of embedded computing boards and FPGAs with associated tooling for professional embedded software development.

Satellite LEO TT&C laboratory based on LEO RF simulators and the CCSDS TT&C software modem.

MAIN CUSTOMERS

- Service Providers: KTSat/Speedcast/Marlink /OPTUS/Datacomm/Axesat/
- Hub manufacturers: ST Engineering iDirect / Hughes/ Comtech/ SpaceBridge/UHP
- Integrators: Waldo/Aicox/Lumina/nelco/ Airbus /L3Harris
- Satellite Operators: Intelsat/JSAT/APSAT/ MEASAT/SES/Telespazio/Arsat
- Antenna Manufacturers: Kymeta/GATR/
- Telcos: Telefonica/entel/Vodafone/ / AT&T/ Orange
- Government: EU Commission, Italy MoD, Singapore MoD, US DoD

MAJOR SPACE PROJECTS

ESA CLEANRF. Signal processing solution placed in the reception chain of a satellite RF link that allows the detection, separation and cancellation of RFI sources.

SEC RESISTO: Protection of Critical Telecommunication infrastructure – Integrasys works at RF level protection. Interference detection, protection of firmware of network devices based on blockchain solution.

H2020 GSA AIOSAT: Tracking and Mission critical communications for firefighters (Galileo, Inertial Sensors, In-situ infrastructure and SatCom). Integrasys provide hybrid self-deployable terrestrial and satellite communication network.

ESA KA-METROCAL to design, manufacture and test a high precision (+/- 0.5 dB uncertainty) metrology and calibration system for Ka Band able to perform fast, accurate and inexpensive Rx Carrier Power measurements for satellite services in Ka-Band.

**CEO/
HEAD OF DEPARTMENT**
Julien-Alexandre Lamamy

CREATION DATE
2017

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 26

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CORE BUSINESS

ispace is a private lunar exploration company and a leading innovator in space robotics and data analytics.

ispace has a global presence with headquarters in Japan and offices in Luxembourg and in the US. The company is developing among the first lunar landers (spacecraft for delivery to the lunar surface) and lunar rovers (robots for surface mobility). These key technological solutions coupled with ispace's in-house capabilities and competences in data analytics and space resources are what sets ispace apart as one-stop shop for lunar transportation & exploration and expanding business opportunities on the Moon.

Our vision is to create a new ecosystem in outer space and expand the human living sphere beyond Earth.

PRODUCTS AND SERVICES

- **Payload Delivery:** We deliver payloads (cargo) to the Moon using our small and lightweight lunar landers and rovers
- **Data Analytics:** Using our lunar rovers, we will collect critical information about the lunar environment and its resources, and process them into valuable data products for space and non-space customers
- **Partnerships:** We offer opportunities for companies to join the lunar adventure through partnerships based on joint technology development, space business entry and corporate branding
- **Resource Exploration Services:** We provide services and expertise in fields such as mission planning, space resources and reserves evaluation, autonomous navigation systems and space resources prospection and exploration

MAIN CUSTOMERS

- Space agencies, research institutes, private space companies
- Non-space commercial companies willing to expand their business in outer space or to use space-based technologies for terrestrial applications

MAJOR SPACE PROJECTS

ispace Europe activities in Luxembourg include:

- Development of commercial lunar rovers
- Development of lunar data analytics solutions
- Development of methods to prospect, explore, extract and process lunar resources



**CEO/
HEAD OF DEPARTMENT**
Dr. Carlo Harpes

CREATION DATE
2007

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 18
Space: 12

TURNOVER 2021
Total: € 1.490 K
Space: € 230 K

**R&D INTERNAL
INVESTMENTS 2021**
€ 60 K

**QUALIFICATIONS,
APPROVALS**
The Information Security
Management System
(ISMS) at itrust consulting
is certified according
to ISO/IEC 27001.

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CORE BUSINESS

itrust consulting s.à r.l., a 15-year-old, recognized actor in Luxembourg's and Europe's Information Security field, certified according to ISO/IEC 27001, consults its customers coming from public, financial, and private sector to protect their information against divulgation, manipulation and unavailability. The company acquires know-how in engineering and sciences, enabling it to find the economically appropriate solution for specific security requirements. It applies and develops research projects, norms, security controls and information processing techniques, covering topics such as information security management systems, risk management, business continuity management, incident management, digital signature, cryptology, network security, internet security, critical infrastructure protection, space ICT, computer forensics, etc.

PRODUCTS AND SERVICES

Consulting services, sourcing and innovation studies

Management and guidance of security projects. Critical Infrastructure protection. Technology integration and assistance (PKI, VoIP, virtualisation, etc.). Risk analysis (TRICK Service™). Forensic and malware analysis. Personal data protection, Data Privacy Impact Assessment (DPIA) following GDPR. Assistance to CISO and DPO. Managerial monitoring of security issues. Incident response team.

Hacking

CERT services (e.g., SIEM, penetration testing and vulnerability assessment of hardware (network, server mobile devices, smart cards, firmware), software, web applications, and access security).

Organizational audit

ISO 2700x, ISO 20000, ISO 27799, IEC 62443, Business referential (PSF, PSDC), Legal referential (EU directives, grand-ducal regulations, CSSF), Protection of personal data (CNPd).

Technical audit

Code review (OWASP, SANS, etc.), Equipment configuration review, Critical Infrastructure, SCADA, Wireless infrastructure, Data Protection, PCI-DSS, ISO 15408 (Common Criteria), CSSF Compliance, EuroPriSe, CNPD compliance.

Elaboration of security tools & services

TRICK Service™ (risk assessment); TRICK Cockpit (real-time risk monitoring); ESA ECSS compatible requirements engineering and software validation tool, LASP: provide assurance to location services that locations indicated are trustworthy.

Training services

Introduction and practical advice to comply with GDPR – Data Privacy; GDPR foundation certification – principles, legal framework and compliance; Data Protection Officer (DPO) – certified; ISO/IEC 270xx workshop; Risk Manager certified for DPIA (guided by ISO/IEC 27005); Lead Implementer ISO/IEC 27001 – certified; ISMS Lead Auditor ISO/IEC 27001 – certified; PSDC – eArchiving training session; Security awareness 4 your employees; etc.

TECHNICAL MEANS

TRICK Tester (penetration testing platform); Galileo receiver; GPS repeater; Requirements engineering and software validation tool designed to include support for ESA ECSS: based on open standards and architectures, it provides advanced traceability features and enables dynamic linking of artefacts produced in heterogeneous environments (e.g. diagrams, source code, test cases); Expertise in design and development of simulation tools for modelling classical/quantum systems and communication channel properties, e.g. in ground and space setups for quantum key distribution.

MAIN CUSTOMERS

EU institutions, national public administrations, private service providers, critical infrastructure providers, e.g. energy distributors, ESA, etc.

MAJOR SPACE PROJECTS

itrust consulting has a strong track record in managing nationally funded projects such as CELTIC Bugyo Beyond on Security Assurance, ITEA2 Diamonds on Security testing, SGL-Cockpit on risk monitoring of critical infrastructures, and CELTIC CRITISEC. Moreover, itrust has experience in multiple EU projects, e.g., iGOing, LiveLine, CockpitCI, ATENA, TReSPASS, bloTope (H2020), and ESA projects, e.g., LASP, QUARTZ and LuxQCI.

Within the framework of IPECI-CIS¹, the call for projects of the Luxembourg Ministry of the Economy, and within the CLAUSEN² project to create an open cybersecurity data economy, itrust consulting will contribute with its CyFORT³-CLAUSEN project, and design and develop several tools, such as IDPS-ESCAPE⁴ (open-source IDS, using recent machine learning-based approaches), SATRAP-DL⁵ (threat-intelligence-related activities) and C5-DEC⁶ (synergies from previous work in ESA projects (LuxQCI and QUARTZ) related to testing and validation.

¹ Important Project of Common European Interest – Cloud Infrastructures and Services

² CCloud & dAta security reSource cENtre

³ Cloud Cybersecurity Fortress of Open Resources and Tools for Resilience

⁴ Intrusion Detection and Prevention Systems for Evading Supply Chain Attacks and Post-compromise Effects

⁵ Semi-Automated Threat Reconnaissance and Analysis Powered by Description Logics

⁶ Common Criteria for Cybersecurity, Crypto, Clouds – Design Evaluation and Certification

**CEO/
HEAD OF DEPARTMENT**
Andy Bowyer

CREATION DATE
2017

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 30
Space: 30

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CORE BUSINESS

Kleos is a space-enabled radio frequency Reconnaissance data-as-a-service company with operations in Luxembourg, the US and UK. Kleos uses Space technology to locate radio transmissions in key areas of interest around the globe, efficiently uncovering and exposing activity on land and sea. Using clusters of satellites, RF data is collected, transmitted to the ground, processed using proprietary technology, and delivered to customers worldwide. Customers, including analytics and intelligence entities, license data on a subscription basis (Data-as-a-Service, DaaS), or by buying dedicated satellite capacity (Mission-as-a-Service, MaaS). The provided data is applicable to government and commercial use cases, aiding better and faster decision making. Kleos currently has a constellation of 12 satellites with the launch of its fourth cluster planned before the end of 2022.

PRODUCTS AND SERVICES

Kleos' RF geolocation data products are available -via Guardian LOCATE, a Kleos processed data set to deliver geolocated RF activity. Kleos data products can be pre-ordered by registered users on a monthly or annual basis and will be delivered to customers after data collection by the Kleos' mission satellites and having been processed through the Kleos' algorithms on the ground.

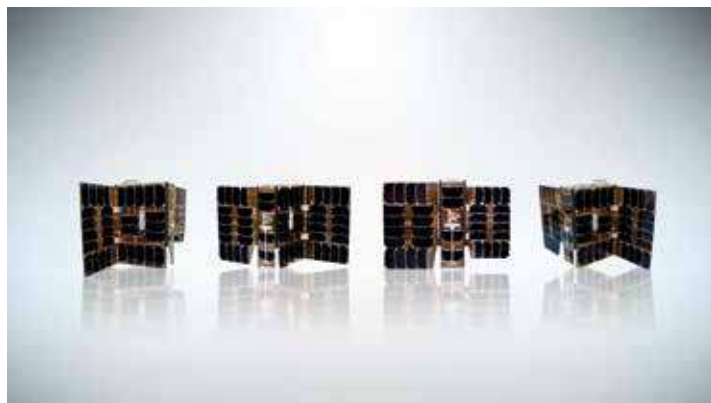
TECHNICAL MEANS

The multi-satellites Mission system are made of 4x nano-satellites and form the foundation of a constellation that uncovers hidden and illegal activity on land and sea, enhancing the intelligence capability of government and commercial entities when AIS (Automatic Identification System) is defeated, imagery unclear and targets out of patrol range.

Kleos is uniquely positioned with a 4-satellites per cluster approach, flown in formation, targeting accurate RF geolocation data. Each new cluster increases coverage and revisit rates as well as data collection capabilities.

MAJOR SPACE PROJECTS

- Scouting Mission (KSM1)
- Vigilance Mission (KSF1)
- Patrol Mission (KSF2)
- Observer Mission (KSF3)
- Futrism - Kleos' patented In-Space Manufacturing technology development



**CEO/
HEAD OF DEPARTMENT**
Michel Poucet

CREATION DATE
2020

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 11
Space: 11

CONTACT DETAILS
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CORE BUSINESS

LMO develops autonomous Space Situational Awareness (SSA) payloads and software based on artificial intelligence. Using machine learning technology LMO is providing the necessary tools for satellites to look around them in space and make autonomous decisions based on this information, via edge processing, without the need for ground segment intervention.

LMO's payloads and processing software can be used for:

- Space Domain Awareness
- Space Surveillance and Tracking
- In-Orbit Servicing & Debris Removal
- In-Space Manufacturing

PRODUCTS AND SERVICES

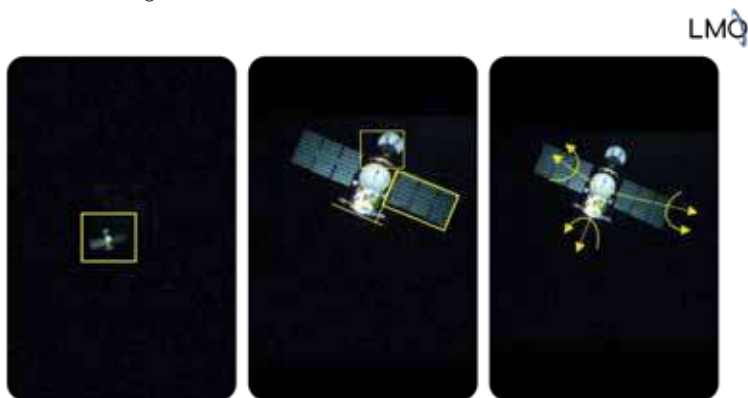
- Computer Vision for Space Applications
- Embedded Software for Space Electronics
- Space Situational Awareness SW & Payloads for Space Resident Object Identification & Characterisation
- Space Situational Awareness SW & Payloads for Rendezvous & Proximity Operations

MAIN CUSTOMERS

LMO main customers are civil and defence companies providing Space Surveillance, In-Orbit servicing and Manufacturing Service to the space community.

MAJOR SPACE PROJECTS*

- DIOSSA – ESA / LuxImpulse Development of an In-Orbit SSA Payload for In-Orbit Servicing
- Space Surveillance and Tracking using Artificial Intelligence



Lunar Outpost EU



CEO

Julian Cyrus

CREATION DATE

2022

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: <10

Space: <10

CONTACT DETAILS

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CORE BUSINESS

In order to enable long term operations in space and therefore increase the value gained from each mission, it is critical to maximize mission longevity. On the Moon, this means being able to survive the daunting temperature changes between lunar day and night. Lunar Outpost EU creates thermal technologies to enable enhanced survivability on the Moon, cis-lunar space, and extreme conditions on Earth.

PRODUCTS AND SERVICES

Lunar Outpost EU offers thermal control system components and subsystems for satellites, planetary vehicles, payloads and other hardware operating in extreme conditions. These products will be offered as COTS components to support the rapid development cycles seen in the Cubesat and New Space arenas, as well as in customized packages if necessary. This offering includes an active thermal switch that allows for the transfer of heat between different areas in a system in a controlled manner, leading to enhanced survivability and more flexible ConOps.

MAJOR SPACE PROJECTS

LuxIMPULSE contract with LSA and ESA for the development of specialized technologies, contributing to the commercial thermal component and system offerings. This includes hardware for the MAPP lunar rover missions, in partnership with Lunar Outpost Inc in the US.

**CEO/
HEAD OF DEPARTMENT**
Dr. Gilles Rock

CREATION DATE
2015

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 4
Space: 4

CONTACT DETAILS
Name: Dr. Gilles Rock
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Website: www.luxsense.lu

CORE BUSINESS

Luxsense geodata is a young SME whose objective is to use innovative techniques from earth observation in research projects and to render services for the acquisition of reliable geodata. Further, the development of high level products for environmental studies, precision agriculture and engineering projects is one of the major goals of the company.

The use of UAVs (Unmanned Aerial Vehicles or drones) allows for a rapid intervention and the acquisition of extremely high resolution geodata. These characteristics of UAVs – combined with a multitude of different sensors – make these systems very powerful in the case of natural disasters or precision agriculture, where satellite data lacks the spatial or temporal resolution.

PRODUCTS AND SERVICES

Geodata acquisition

- UAV operation for data acquisition
- Data processing for LiDAR-, RGB-, thermal and multi- and hyperspectral data

Product development

- Development of customized data products
- Precision agriculture / viticulture: disease and weed detection, biomass and photosynthesis
- Forestry: Remote sensing based inventories, health status and biomass development
- Construction site monitoring : volume estimation, 3D reconstruction, BIM and pipe detection

TECHNICAL MEANS

- **Heavy lift UAVs**

In many research projects, multiple camera systems need to be flown simultaneously and combined with sensors for side parameters..

- **LiDAR**

A LiDAR scanner enables to collect 300pts/m² and allows to collect high precision digital elevation models, even below vegetation.

- **Multi- and hyperspectral sensors and high-resolution RGB-cameras**

The acquisition of the complete electromagnetic spectrum is required for the analysis of vegetation. The available sensor systems cover the spectral domain from 350 – 950nm.

- **Thermal camera**

A thermal camera captures long wave thermal infrared from 8-14µm and provides information about land surface temperature and emissivity.

- **Field spectrometer**

The field spectrometer captures light in the spectral range from 350nm to 950nm. This data is used for research in vegetation studies and for cal/val of UAV data.

MAIN CUSTOMERS

Luxembourg municipalities

Governmental administrations

- Administration de la nature et des forêts
- Administration des ponts et chaussées
- Administration de la gestion de l'eau

Research institutions

- LIST
- IBLA
- University of Trier

MAJOR SPACE PROJECTS

- SESAME – Secure and Safe Multi-Robot Systems
- MonESCA – Disease detection in grape vines
- COMTECT – Smart XG in remote farming, forestry and rural areas

MANAGING DIRECTORS

Edgar Milic, Oliver Salisch

CREATION DATE

2004

ORGANISATION TYPELarge Enterprise
(OHb Group Subsidiary)**NUMBER OF EMPLOYEES****Total:** 50**Space:** 50**TURNOVER 2021****Total:** € 9,872,280**Space:** € 9,872,280**R&D INTERNAL
INVESTMENTS 2021**

€ 9,872,280

**QUALIFICATIONS,
APPROVALS**

ISO 9001:2015

CONTACT DETAILS**Name:** Edgar Milic,
Oliver Salisch**Address:**9, rue Pierre Werner,
L-6832 Betzdorf,
Luxembourg**Phone:**

+352 267 890 4000

E-mail: info@luxspace.lu**Website:** www.luxspace.lu**CORE BUSINESS**

LuxSpace is an integrated provider of small satellites and space applications & services. The company can look back on seven successfully launched space systems, including the Triton-2/ESAIL satellite launched in September 2020, and has over 15 years of experience in data applications with a particular focus on the maritime sector and Earth observation. LuxSpace optimally combines expert development processes with innovative techniques to provide its customers with competitive, rapidly deliverable and reliable solutions.

PRODUCTS AND SERVICES

LuxSpace develops and delivers complete smallsat space systems and subsystems with own design, specification, procurement, manufacturing, integration and/or testing.

This includes:

- Triton-X platforms product line for microsatellites in the 35 -200 kg class for applications in the field of Earth Observation (EO), telecommunications, science, and technology demonstration
- Telemetry, Telecommand & Ranging (TT&R) subsystems for geostationary (GEO) and Low Earth Orbit (LEO) satellites
- Avionics and payload electronics for smallsats (microsatellites)
- Space-related software (Embedded / Application / Simulator)
- Mission and feasibility studies for Space systems

Additionally, LuxSpace provides space applications & services in the AIS/Maritime and Earth Observation domain and it is expanding into further data areas.

TECHNICAL MEANS

LuxSpace has equipped itself across the years with new state-of-the-art systems to efficiently deliver smallsat based solutions.

Among them, LuxSpace owns and operates:

- an Electronic Laboratory covering digital, analogue and Radio Frequency developments and testing
- a Thermal vacuum chamber (TVAC) and a Thermal test chamber
- a Cleanroom for satellite integration
- dedicated Satellite simulation & design software laboratories
- dedicated Satellite data applications servers

MAIN CUSTOMERS

European Space Agency and other European Institutions (e.g. EMSA, DG MARE, DG ENTERPRISE, EUROSTAT, European Defense Agency), players inside European and global space sector like OHB, Orbcomm Inc., Thales Alenia Space, players inside maritime sector

Space applications & services:

- AIS data services and AIS added value service development for the maritime industry (e.g. fishery enforcement and safety and security)
- GIS and EO services:
 - LUCAS: Field survey data management and quality control
 - Copernicus Global Land Service: quality control for high resolution hot spot monitoring activities
- Space-based maritime reconnaissance & surveillance – vessel detection using NAVRAD radar

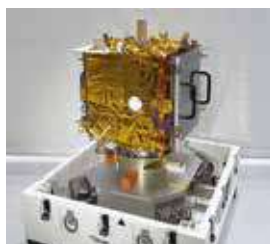
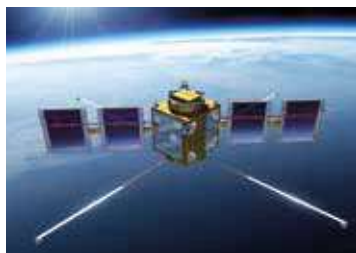
(GEO) Telecommunication satellites:

- Core team member for OHB's developed Small GEOstationary (SGEO) Satellite Platform: LuxSpace being responsible for the TT&R subsystem and the satellite simulator
- Two launched SGEO Projects: Hispasat AG1 (2017) and European Data Relay System EDRS (2019)

MAJOR SPACE PROJECTS

Smallsats (microsatellites):

- Triton-X: Scalable and powerful microsatellite platform
- Triton-2/ESAIL: Prime contractor under ESA's ARTES SAT-AIS program (launched in 2020)
- Triton-1/4M: Manfred Memorial Moon Mission (launched in 2014)
- Triton-1/Vesselsat 1 & 2: First satellites "Made in Luxembourg" (launched in 2011/12)
- Pathfinder 1a: Company funded first AIS satellite (launched in 2007)
- Two TT&R subsystems for SGEO:



**CEO/
HEAD OF DEPARTMENT**
Fabrice Aresu

CREATION DATE
2005

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 80 → 90

**QUALIFICATIONS,
APPROVALS**
Qualified Trust Services
Provider on the EU Trusted
List

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CORE BUSINESS

LuxTrust is a Qualified Trust Services Provider and a Certification Authority. Since our inception in 2005, we have been a pioneer of trusted services. We develop innovative and multi-applicative solutions to secure applications, online transactions, digital identities and electronic signatures for space and defence companies, public institutions, businesses, and private individuals.

We guarantee the security of digital space assets, making your applications more robust and reliable for the present and post-quantum world. Thanks to our digital solutions, you can authenticate data, identify your users, secure open architectures, simplify processes and increase business efficiency. Conveniently located in Luxembourg, Belgium (Brussels) and France (Paris), our teams will help you secure your digital future.

PRODUCTS AND SERVICES

LuxTrust provides global trust services, APIs and solutions that:

- **ensure data authenticity and integrity.**
From satellite images, to code, AI analytics or even C4ISR information, we make your applications more secure, reliable and trustworthy.
- **digitise your paper processes.**
COSI, our trust services hub, enables you to address your specific business needs whilst being easily integrated in your legacy IT infrastructure.
- **better prepare your systems for the post-quantum world.**
- **enrich your cyber forensics capabilities.**
Our solutions secure and track each step of the processing chain, building evidence support in case of investigation.
- **securely identify your users.**
Using electronic certificates, our strong authentication service allows you to identify your users and thus prevent any unauthorised access to your online services.

MAIN CUSTOMERS

LuxTrust supports international customers from highly regulated sectors such as space and defence, banking, insurance, financial services, public institutions, and health.

MAJOR SPACE PROJECTS

- Quantum Key Distribution
- Authentication and data encryption for EM-SAT, a comprehensive Secure Operation Centre for emergency situations in chemical plants
- Authentication and protection of earth observation satellite data
- Digitalisation of paper processes

CEO

Joost van Oorschot

CREATION DATE

2018

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 38

CONTACT DETAILS

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CORE BUSINESS

The core business of Maana Electric is the development of dual use applications integrating In-Situ Resource Utilization (ISRU) concepts and sustainability/power systems technologies, with the aim to the utility company of the solar system. We use our proprietary ISRU technologies – originally thought for the space industry – to revolutionize the way in which solar panels are produced, on Earth and in space. MaanaBoxes are automated and transportable production facilities using only locally available materials and solar electricity to produce fully functioning solar panels from sand on Earth, and regolith on the Moon or Mars. Within the MaanaBox family, the TerraBox is specifically designed for large-scale utility solar farms in desert land areas, and the LunaBox designed for the Moon to enable the development of a lunar economy.

PRODUCTS AND SERVICES

The ISRU technologies developed at Maana Electric enable the manufacturing of products from the raw materials potentially available in the low value feedstock such as desert sand (such as silicon, aluminum, iron, precious metals) and regolith (silicon, aluminum, iron, titanium). The MaanaBoxes allow to produce:

- Solar cells (for terrestrial and space applications)
- Solar panels (for terrestrial and space applications)
- Glass panes and components

In addition, Maana Electric is constantly exploring other domains of applicability of the ISRU technologies developed for MaanaBox programme. The implementation of Maana's ISRU concepts can help:

- On Earth, in cost reduction or limiting footprint and environmental impact of traditional industrial processes such as mining, metallurgy, semiconductors, etc.
- On the Moon, in facilitating the exploitation of resources to support lunar colonization

TECHNICAL MEANS

Maana Electric focused from the very beginning on a rapid prototyping approach with the development of inhouse capabilities oriented to independent manufacturing, testing and analysis/characterization. This allowed Maana Electric to fast progress and develop a wide range and multisectoral expertise. Our >2000 m² facilities currently host:

- 100 m² dedicated to metallurgical testing
- 70 m² dedicated to sand and regolith processing
- 91 m² ISO-8 clean room and 34 m² ISO-7 clean room for photovoltaic processes
- 900 m² of machining area and prototype AIT workshop

In addition Maana Electric is equipped with a many testing devices for fundamental material science and semiconductor physics and tools for analysis and materials characterization (XRF, Raman spectroscopy, FTIR, metallography, profilometer, sun simulator and several other developed inhouse).

MAJOR SPACE PROJECTS

Maana Electric's vision focuses on the building green and sustainable power infrastructures for those who have less immediate access to resources (i.e. remote areas) with limited footprint and environmental impact. This reflects also in the idea of building power infrastructure on the Moon. This is accomplished through in-space validation/ demonstration of the ISRU technologies by dedicated space and lunar payloads currently under development at Maana Electric.

In addition, we are expanding our portfolio with several power and ISRU technology demonstrators designed to support the development of lunar power infrastructure and support off-Earth exploration and manufacturing (LEO, Moon and other planets).



Mission Space

MISSION SPACE

CEO AND CO-FOUNDER
Ksenia Moskalenko

CREATION DATE
2021

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 12
Space: 10

R&D
INTERNAL INVESTMENTS
€ 250,000

QUALIFICATIONS, APPROVALS
NATO Innovation Challenge
Finalist

CONTACT DETAILS
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E-mail: a@mission.space
Website:
www.mission.space

CORE BUSINESS

With the upcoming solar maximum, Mission Space is focused on providing highly accurate space weather radiation intelligence using a combination of outside data sources and its own detectors in low Earth orbit. Mission Space's proprietary constellation of LEO-based detectors and dedicated analytics form the in-situ data collecting infrastructure, capable of providing unique space weather services on-demand.

Mission Space API-driven space weather cloud services enable both space and ground-based businesses to measure the potential impacts and risks of solar and geomagnetic storms. Based in Luxembourg, the company builds an integrated risk assessment platform, designed to serve as a decision support tool to detect, predict and warn about solar storms and space radiation risks.

PRODUCTS AND SERVICES

Mission Space provides on-demand space weather analytics and data services tailored to predicting and forecasting radiation risks on specific assets in space and on the ground. The first own payload AURORA-1 will be launched in 2023, marking the first commercial mission to monitor the full spectrum of space weather radiation from LEO.

With the subscription to our platform, Mission Space provides access to a user-oriented decision support tool to safely manage the risks of space weather, reduce uncertainties and boost resilience needed for a sustainable future in space:

- Near real-time monitoring and forecasting of space weather conditions and events
- Accurate short-term warnings of coronal mass ejection arrivals

- Interactive space weather data displays via APIs
- Tailored risk assessment tools and alerts to determine proper mitigation actions

TECHNICAL MEANS

Mission Space is building a satellite-based space weather intelligence system using a combination of its own in-situ measurements, publicly available data, and proprietary model algorithms with the underlying dynamical model of near-earth radiation environment as the basis for forecasting and nowcasting. With the payload instrumental set consisting of several independent devices launched on polar LEO orbits, Mission Space turns outdated and costly raw data processes into real-time, actionable insights. Mission Space offers a user-oriented high-accuracy short-term forecast, localized products for different orbits, and custom infrastructure-specific hazard warning gathering own data on fluxes of charged particles in the inner magnetosphere, which will be used to monitor critical space weather parameters.

MAIN CUSTOMERS

- Satellite operators and manufacturers
- Space Agencies
- Insurance
- Space Traffic Management platforms
- Government structures
- Research and Institutional organizations
- Defense and Military
- Space tourism and space exploration missions
- Aviation Industry
- GNSS operators

MAJOR SPACE PROJECTS

Space Weather Detecting Payloads

AURORA-1 IOD mission to be launched in 2023 will mark the world's first commercial mission to monitor the full spectrum of space weather parameters on LEO. Mission Space will be measuring highly energetic particles of protons and electrons that will enhance their dynamical model of the near-Earth radiation environment and enable the release of space-based radiation forecasting and risk assessment purposes.

Space Weather Cloud Services

Mission Space's space weather cloud services enable space and ground-based businesses to measure the potential impacts and evaluate the risks of space storms on their specific assets. Mission Space also helps to close the gaps between space weather research and actionable applications for consumers and users, which would enable actionable insights and support timely decision-making.



CEO

Stijn Vansant

CREATION DATE

2016

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 20

TURNOVER 2021

Total: € 5,6 M

Space: € 25 K

R&D

INTERNAL INVESTMENTS

€1,8 M

CONTACT DETAILS

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CORE BUSINESS

We develop customized solutions using our

- MolecularGRIP™ technology for improved adhesion between difficult-to-bond materials with custom-designed primer layers
- Leaf™ technology for nano-structured, water-repellent and non-stick coatings
- Virucidal & bactericidal coatings
- UV filter coatings

Our Molecular Plasma Technology enables single-step grafting of a wide range of one or more functional precursor molecules (organic, inorganic, nanoparticles, biomolecules, ...) onto any surface using a scalable, dry, ambient, atmospheric process. The solutions we develop are easily scalable and we ensure a robust industrial implementation.

PRODUCTS AND SERVICES

Development and implementation of solutions for:

- Priming for improved bonding of inert materials (e.g. PTFE, Titanium, CFRP's, Polyolefins) in multi-material structures
- improvement of adhesion between any fibre and a polymer matrix
- non-stick, water-repellent and anti-corrosion solutions
- REACH-compliant, wet chemical primer replacement
- R&D equipment for RTO's, Universities and companies
- Pilot lines
- Small scale production
- Custom-designed industrial systems
- After-sales service and remote diagnostics

TECHNICAL MEANS

- Lab facilities for application development with Plasmaspot™ and Plasmaline™ equipment
- PlasmaFIBER equipment for functionalisation of fibers and tows
- PlasmaPOWDER equipment for particle engineering
- Small production runs & scale-up support
- Characterisation (cooperation with LIST)
- 3D printing for rapid prototyping
- Engineering of customised solutions

MAIN CUSTOMERS

ArianeGroup, Samsonite, Freudenberg, Valeo Research Institutes and Universities such as LIST, KU Leuven (B), Centexbel (B), University of La Rioja, VTT (Fi), PICC (CH), FILK (D)

FOUNDER & CEO

Stewart Bain

CREATION DATE

2012 (Canada)

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 45

R&D

INTERNAL INVESTMENTS

US\$ 12 M / yr

CONTACT DETAILS

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www.northstar-data.com

CORE BUSINESS

NorthStar's goal is to vastly improve sustainability by creating a unique set of information services, Space Information & Intelligence (Si2) and Earth Information & Intelligence (Ei2), that will empower humanity to preserve our critical Space and Earth environments.

From space, NorthStar will accurately track and predict the positions of Space objects and Earth ecosystems through a secure and dedicated system of systems comprising sensors, algorithms, and high-speed information processing. NorthStar's high fidelity, contextualized information services are designed to keep the Earth and Space environments safe, sustainable, and secure for future generations. NorthStar services empower decision-makers and organizations to predict outcomes and take timely actions to protect valuable assets and make informed decisions with confidence. NorthStar is proud to have its European HQ in Luxembourg and is planning to realize an important operational facility to develop and launch leading edge commercial products.

PRODUCTS AND SERVICES

NorthStar delivers a suite of high-speed, comprehensive information services through a sophisticated and adaptable platform.

NorthStar provides a unique space-based service to resolve the critical challenges facing satellite and spacecraft operators by delivering more frequent and precise observations than any other SSA system. NorthStar offers precise and timely Space Object Tracking, Navigation Assistance, Space Domain Awareness, Manoeuvre Detection, Proximity Warnings, and high-powered Simulation tools to optimize any system and help clients to navigate confidently in the rapidly expanding space economy.

NorthStar is developing to launch the first and only space-driven turnkey platform using a combination of Hyperspectral & IR Imaging, to provide real-time monitoring, intelligence, and actionable insight into Earth's ecosystems crucial for environmental protection and sustainable resource stewardship. NorthStar is focusing its Immediate attention on creating solutions through partnerships that will benefit agriculture, forestry, energy transportation, and sensitive coastal regions.

TECHNICAL MEANS

NorthStar's space-based monitoring system continuously surveys the near-Earth Space environment from LEO to beyond GEO, producing precise observations that drive NorthStar's Space Information & Intelligence (Si2) platform. With a stream of space-based sensor data coupled with proprietary algorithms and AI, NorthStar delivers high-precision and predictive Space Object Tracking to address immediate and future Space Situational Awareness and Space Traffic Management challenges.

NorthStar collects hyperspectral and infrared sensor data pertaining to the chemistry of the Earth multiple times daily, leverages proprietary data analytics, and delivers in near-real time, precise information that serves numerous sectors and industries that have a significant impact on Climate Change and our environment.

MAIN CUSTOMERS

NorthStar Earth & Space has a wide range of clients worldwide, including:

Space Information & Intelligence:

- Commercial Satellite operators
- Governments and Agencies
- Regulatory organizations
- Insurance companies
- International, Humanitarian & Research Organizations

Earth Information & Intelligence:

- Agriculture, Livestock & Fishing Companies
- Mining & Energy Companies
- Governments, Agencies & Institutions
- Regulatory & Insurance Industry
- International, Humanitarian & Research Organizations

MAJOR SPACE PROJECTS

NorthStar is partnering with SES to enhance Space Situational Awareness and ensure sustainable use of space for the future. They will be working together to develop, launch and evolve NorthStar's SSA products, tailored to benefit SES' satellite operations and fleet management and to promote best practices in all near-earth orbits for SES and its partners. The collaboration is targeted towards more responsible and sustainable operations in space from all stakeholders, with Space Sustainability as a central pillar in SES' ESG strategy.

NorthStar is partnering with Spire Global, to help NorthStar build a constellation of satellites focused on Space Situational Awareness and debris monitoring. The collaboration will leverage Spire's existing infrastructure and expertise to help NorthStar accelerate and scale its capability to monitor space from space, and provides on-board processing, tasking, flexibility and agility to maintain pace with the exponential increase in space activity.



**CEO/
HEAD OF DEPARTMENT**
Jordan Vannitsen

CREATION DATE
2016 (Taiwan)
2019 (Luxembourg)

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: ~10
Space: ~10

CONTACT DETAILS
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Phone: +352 545 580 201

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info@odysseus.space

Website:
www.odysseus.space

CORE BUSINESS

We believe in a future in which goods and information are exchanged alongside human sustainable presence at Solar system scale. Our goal is to facilitate those flows. We see three features to reach this goal: **SOLVE · CONNECT · EXPLORE**.

To **SOLVE** our customers' challenges by supporting them at different phases of their satellite missions.

To **CONNECT** our customers' satellites in needs for high-data rates, secured and license-free communications with CYCLOPS, our end-to-end laser communication solution.

To **EXPLORE** the Solar system effectively, finding and transporting resources will be required. In addition to the expertise and other products developed by the company, ASTRAEUS, our autonomous deep space navigation solution, is a key-enabling technology to make such missions possible.

PRODUCTS AND SERVICES

ASTRAEUS - Autonomous Navigation

ASTRAEUS is a solution supporting autonomous guidance navigation & control capabilities to spacecraft anywhere in the Solar System. ASTRAEUS can possibly reduce mission cost and allow new kinds of mission profiles. Station keeping, interplanetary cruise, proximity operations & rendezvous to celestial bodies or spacecraft are potential applications.

CYCLOPS - Laser Communication

CYCLOPS satellite & ground laser terminals offer a Direct-to-Earth communication end-to-end solution. This is especially suitable for microsatellite constellations in Low Earth Orbit requiring to rapidly transfer a large amount of data from Space to ground.

Services

Market study, Mission Analysis & Design, System Engineering & Project Management consultancy, Launch Campaign support, Mission Operations, Earth Observation data.

MAIN CUSTOMERS

ASTRAEUS answers the needs of companies planning missions to the Moon and beyond wishing to reduce the cost of their mission. Companies in need for in-orbit services (e.g. refuelling, de-orbiting) could use an adapted version of ASTRAEUS too.

CYCLOPS answers the needs of Earth Observation microsatellite constellations in Low Earth orbit.

ODYSSEUS has been satisfying returning customers (mainly Space Agencies, National Laboratories and Universities in Asia and Europe) with its line of services for more than 5 years.

MAJOR SPACE PROJECTS

ASTRAEUS (autonomous navigation solution for space applications) and CYCLOPS (end-to-end laser communication solution for LEO applications) are the core products currently being developed by the company.

In parallel with its R&D activities, the company keeps providing small satellite related services to its customers to make their missions successful. With its international team of experts coming from Space Agencies, Industry and Research Laboratories, our team has already been involved in more than 15 small satellite missions in Asia and Europe.



**CEO/
HEAD OF DEPARTMENT**
Jim Keravala

CREATION DATE
2016

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 85
Space: 15

**R&D INTERNAL
INVESTMENTS 2021**
\$750,000

CONTACT DETAILS
Name: Jim Keravala

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CORE BUSINESS

OffWorld has undertaken Research and Development in the field of extreme environment industrial robotics, initially applied to the mining and mineral processing sector. Applications are expanding into the construction and infrastructure markets. The objective is to establish an end-to-end collaborative robotic system comprising thousands of multi-species robots working together to achieve defined strategic objectives across mining, processing, fabrication, assembly, manufacturing and construction – essential elements for developing space infrastructure.

Space operations require that these robotic systems undertake complex tasks autonomously or with minimal human intervention. OffWorld has developed a task agnostic machine learning framework to automate industrial processes. This approach enables operations in the space environment.



PRODUCTS AND SERVICES

OffWorld is currently at the expansion stage for its initial terrestrial mining robots. We are already developing our program to encompass modularity, massive scale production engineering, serviceability, forward and backwards compatibility and robustness. The first species pilot programs have completed successfully exceeding all KPIs and species expansion for production engineering is commencing. The approach we are taking is that of mining as a service and currently in mine trials for our autonomous mining robots and direct energy beaming robots. The OffWorld platform is extending to space and lunar modules to begin development in our Luxembourg facilities with multiple space projects now underway.



TECHNICAL MEANS

OffWorld will refine its machine learning mining robots to make them lighter, increasingly modular, and lunar-surface-environment tolerant. This is necessary to reduce transportation cost to the Moon and be employed in mining ice bearing regolith located in permanently shadowed regions around the lunar poles. Each step in this ISRU process is envisioned as a stand-alone function within an autonomous robotic platform of multiple robotic units operating collaboratively together. Our autonomous robotic platforms are currently in development for Earth mining under internal funds with demonstration units already undergoing testing and development. Our ISRU Technology subsystem is a subset of OffWorld's overall concept for mining Moon and Mars regolith for volatiles and minerals.

MAIN CUSTOMERS

Due to the dual use approach taken by OffWorld, customers will be both space and terrestrial.

- In-space transportation companies
- Space Agencies
- Terrestrial mining, construction and manufacturing companies

MAJOR SPACE PROJECTS

Development, demonstration and deployment of lunar focused robust, scalable in-situ resource utilization robots.

**CEO/
HEAD OF DEPARTMENT**
Omar Qaïse

CREATION DATE
2016

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 10
Space: 5

**R&D INTERNAL
INVESTMENTS**
€ 180,000

**QUALIFICATIONS,
APPROVALS**
ETSI Member (Since March
2020), 3GPP Member
(Since March 2020)

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CORE BUSINESS

OQ TECHNOLOGY is a global 5G "Internet-of-Things" network operator providing the largest remote IoT data access and analytics platform and cutting costs of data transmission through satellites by a large factor by utilizing non-terrestrial networks (satellites, balloons, drones).

We serve the oil and gas, maritime, Industry 4.0 and transport segments particularly for the management and tracking of assets in remote areas. Whether this is digital oilfield applications, offshore monitoring, SCADA applications, asset tracking, fleet management, smart metering or predictive maintenance, we provide you with an innovative low-cost connectivity solution.

We also help mobile operators extend their cellular IoT coverage to remote and rural areas where their cellular tower coverage cannot reach.

Our wireless technology is compatible with cellular IoT, particularly Narrowband IoT. The modules are cellular compatible plug & play, easy to install, have long battery life and connect you directly to our or your data cloud.

Security is important for us, and all our modules and data interfaces are highly secure and encrypted. We have our own network and we can customise our service according to your needs to guarantee the reception of data in your own country only.

PRODUCTS AND SERVICES

Connectivity Service: We offer highly secure managed 5G IoT connectivity service with large data plans and low cost compared to traditional solutions.

5G Sat M2M Modules: Hybrid cellular terrestrial and satellite NB-IoT modules that can roam and switch between the mobile and satellite network anywhere in the world.

5G IoT Sat Terminals: It is a universal NB-IoT data aggregator that is designed to provide

a gateway for IoT and M2M data and connects to any satellite, regardless of the platform used. Typical applications include SCADA, maritime, and remote industrial connectivity. It implements edge-computing, high security standard, and low power communication. IT can connect to any VSAT or other satellite terminal.

Data Analytics: Our secure data analytics platform gives you access to a wide range of meta data that together with highly targeted analytics algorithms offer you the necessary information needed for your critical business decision-making processes and for optimising your operations.

DSP House: Strong experience and skills in cellular transceiver and software stack development for mobile and satellite operators, NB-IoT over satellite IP own development product and patented under OQ.

Consultancy: we support customers' hi-tech and telecommunication projects at all stages, from the definition of requirements, initial studies, engineering processes, procurement and management tasks as well as operations through to the end of the project with archiving and lessons learnt. During the project establishment phases, we have the experience to support the requirements capture, the analysis, the identification of key drivers, the operations concept definition, the cost estimation and the specification of statements of work, and the writing of commercial bids and proposals. OQ TECHNOLOGY can also provide monitoring of industrial contracts for clients.

MAJOR SPACE PROJECTS

MACSAT Feasibility Study: OQ TECHNOLOGY successfully performed a detailed study and the system design of a global satellite system dedicated for Machine2Machine communication. The technology developed surpasses existing wireless technologies in meeting the extensive demands of IoT & M2M communication requirements. The study also included a detailed analysis of the M2M and IoT

markets and target business models that allows such a technology to be rapidly implemented as a product and service.

Smart Automatic Model Based Architecture: The project aims to create a set of agile software tools implementing in their core Artificial Intelligence techniques and cognitive algorithms that support engineers in integral product design or complex processes by creating a modular framework. The software main objective is to be used to produce engineering test plans and routines in the automotive and aerospace industry, with minimal human intervention. It can be also used to manage the IoT networks. Using this tool customers can save up to 70% of the time and cost needed to develop conventional network optimisation techniques. The AI training algorithm was successful in matching a human engineer work up to 93% in a specific scenario.

MACSAT In-Orbit Demonstration Mission: OQ TECHNOLOGY is the prime contractor of the MACSAT IOD mission, where it is designing, implementing, and building the first satellite to be launched to demonstrate the company's innovative 5G IoT technology implemented in both the payload and user terminals.

TIGER-1 Mission: OQ Successfully tested NB-IoT over two LEO Cubesats, the mission was a technology proof of the feasibility of cellular IoT over LEO satellites and successfully tested the transceiver algorithms developed by OQ.

ANCORSAT: As a part of ESA ARTES 4.0 Programme OQ TECHNOLOGY is the prime contractor for this Activity which aims at technical design & development of an end-to-end test bed to demonstrate and verify Satellite IoT use cases for Agile 5G Network Configurations.

**CEO/
HEAD OF DEPARTMENT**
Luis Muñoz

CREATION DATE
2017 (Switzerland)
2020 (Luxembourg)

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 8
Space: 8

TURNOVER 2021
Total: € 500,000
Space: € 500,000

**R&D
INTERNAL INVESTMENTS**
€ 250,000

CONTACT DETAILS

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CORE BUSINESS

The core business of Orbitare is addressing the needs of people from space. We work in identifying projects of large social impact which can only be made possible with the use of space assets and make them happen by working on the three business pillars of market, funding, and development.

Spaceloop is the first of such projects, aiming at changing the market of personal satellite communications by providing universal access to IP messaging connectivity to keep people always safe and connected to those who matter to them.

PRODUCTS AND SERVICES

- IP messaging services over the Spaceloop satellite network
- Integration of third-party applications over the Spaceloop network
- Network as a Product – turn-key satellite networks designed to meet the needs of specific customers
- Skylink test services: In-space demonstration of software payloads and communication links in S-Band over our SDR payload
- Transfer of space experience – we are happy to share our long time experience in space with the vibrant community of new space

TECHNICAL MEANS

- Skylink test facility: our SDR payload in space operating in S-Band with the corresponding ground equipment and frequency licenses.
- Software tools to design and analyse advanced communication systems
- Standard RF laboratory equipment up to 6GHz
- Flight representative Software Defined Radios
- Diverse transceiver and FPGA evaluation boards
- Antennas

MAIN CUSTOMERS

The main customers of Spaceloop will be adventure travellers, professional and recreational mariners, NGO personnel and journalists working in the field, the communities in the Earth Polar regions and any other location across the World. Governments and large organizations are potential customers of Spaceloop Networks as a Product.

MAJOR SPACE PROJECTS

The Spaceloop IP messaging personal satellite communication system is the main project of Orbitare. It reached TRL6 under a LuxIMPULSE contract with an In-Orbit demonstration Mission which continues in operation. Development continues under ESA ARTES C&G Programme with TRL9 planned for Q4 2023. Orbitare's core activity is in the user, mission and system level engineering, the development of the end-to-end communication stack, the payload and the user terminal hardware. Non-core activities are performed in cooperation with our international partners.



POST Luxembourg



**CEO/
HEAD OF DEPARTMENT**
Claude Strasser

CREATION DATE
1842

ORGANISATION TYPE
Large Enterprise

NUMBER OF EMPLOYEES
Total: 4 725

TURNOVER 2021
Total: € 899 M

CONTACT DETAILS
Name: POST Luxembourg

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commercial.telecom
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Website: www.post.lu

CORE BUSINESS

POST Luxembourg is Luxembourg's leading telecommunications and information services company. It was founded in 1842 as a public service and has been a wholly state-owned company since 1992. It is the country's largest provider of postal and telecom services and also offers financial and philatelic services.

As of 2021, POST Luxembourg Group is the largest employer in the country. It is also an innovative company that adopts an open-minded approach and embraces diversity, with its staff from more than 50 nationalities.

POST Luxembourg offers a large range of ICT services for residential customers (fixed and mobile telephony, Internet access, television), as well as standard and tailor-made services designed for business customers.

PRODUCTS AND SERVICES

POST Luxembourg Group offers a broad portfolio of ICT services and tailor-made solutions to business customers. The offering comes in six layers completing one another:

- Datacentre: Tier III & tier IV datacentres; on-premise, public & hybrid & private cloud solutions
- Infrastructure: Virtualization, compute, storage, network, connectivity (fixed, mobile, satellite), backup
- Service: Monitoring, automation, deployment, management
- Application: E-Mail, document management, collaboration, sync & share
- End-User: Workplace, printing, applications, mobile device management, support
- Security: Internet and network protection, device protection, data protection (including GDPR compliance), vulnerability and threat management including a Security Operations Centre

MAIN CUSTOMERS

POST Luxembourg serves all customer segments from residential customers to large corporate and public customers.

POST Luxembourg Group has the privilege of counting amongst its customers almost all major corporates from the financial, insurance, health, industry, commerce, space and transport sectors, as well as the national public sector and the institutions of the European Union.

MAJOR SPACE PROJECTS

POST Luxembourg provides ground station, hosting, satellite broadband and communications services to major corporate and public customers.

In a research project funded by ESA, POST Group aims to build trust in digital assets by securing their authenticity through a novel approach combining terrestrial and satellite communication, electronic signature and blockchain. Another research project aims at providing novel solutions for secure quantum key exchange over satellite.

POST Luxembourg also participates in the Lux5GCloud research project (funded by SMC) investigating the potential of combining 5G, satellites and IoT for Smart Agriculture.

Furthermore, POST Luxembourg supports the space ecosystem development through the Luxembourgish space fund 'Orbital Ventures', which focuses on early stage companies engaged in space activities.

PROXIMUS LUXEMBOURG SA



**CEO/
HEAD OF DEPARTMENT**
Gérard Hoffmann

CREATION DATE
1978

ORGANISATION TYPE
Large Enterprise

NUMBER OF EMPLOYEES
Total: 750

TURNOVER 2020
Total: € 302,2 M

**QUALIFICATIONS,
APPROVALS**
ESA Qualified Partner
under
GFC8 – Ground System
Software related activities

CONTACT DETAILS
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CORE BUSINESS

Proximus Luxembourg

Proximus Luxembourg SA unites the Tango, Telindus and Codit brands under one umbrella and employs 750 people.

Tango offers fixed and mobile telephony, Internet and television services to residential customers and small businesses with less than 10 employees, while Telindus provides ICT and fixed and mobile telecommunication services to medium-sized and large companies as well as public administrations. Codit capitalizes on the competencies developed by its experts in domains such as data integration, API Management, Artificial Intelligence, Machine Learning and IoT, but also on a privileged partnership with Microsoft

Proximus Luxembourg is a subsidiary of the Proximus group, the main provider of telephony, internet, television and ICT services in Belgium.

PRODUCTS AND SERVICES

FIXED, MOBILE & CONNECTIVITY

Today, Telindus offers you a full range of telecommunications services for companies. Innovative and competitive products coupled with long experience in the BtoB market so as to meet your voice and connectivity needs.

CLOUD

Switch to the cloud with Telindus' solutions. You benefit from a flexible IT environment that can enhance your performance and reduce costs. Simplified procedures and IT management give you time to refocus on your core business and gain agility.

CYBERSECURITY

Securing your most valuable information gives you the serenity you need for the development of your business. Telindus is part of a comprehensive approach to assist you in the implementation of your digital

transformation strategy and security policy of the most critical information systems, through a full range of cybersecurity services and solutions.

ICT SOLUTIONS

Telindus' ICT solutions are much more than a combination of computing and telecommunication components. Expertise gained from our ability to create end-to-end architectures, from the desktop to the datacentre infrastructures. Reliable, scalable and agile, our solutions are backed by a framework contract that includes customisable full service level agreements (SLAs). We also work in partnership with leading IT solutions providers so as to offer you the best in technology.

MANAGED SERVICES

Today, companies rely on a wide variety of complex information systems to operate their business. With 40 years of experience and expertise, Telindus offers you a full range of outsourcing operations, through a combined cloud and management services offer.

DIGITAL TRUST SOLUTIONS

The Telindus Digital Finance Solutions team develops Digital Solutions for the Financial Sector, including fund administration, wealth management, depository, asset management, insurance and private banking. Telindus' financial solutions increase productivity and quality while ensuring compliance with regulatory frameworks and improving the customer experience. Business and operating models are unique and our financial solutions are tailored to your needs.

MAIN CUSTOMERS

Our Customer-centric structure is organised:

Depending on their profession:

- Finance: banking, insurance and financial services companies

- Industries and services (iron and steel, distribution, transport, press,...)
- Government and health: European Institutions, national and international public administrations, hospitals,...

According to their size:

- Startups
- SMEs
- Key Accounts

As close as can be to their concerns and needs, their requirements are therefore at the heart of our priorities.

MAIN CUSTOMERS

- TC Authentication and Data System Security to qualify the security of applications
Mission Control System Security Study to assess the security of SCOS-2000 Data System Security Risk Analysis on ESOC's Operations Data Study on Cryptographic Design to evaluate cryptographic configurations for TM/ TC protocols
Standards, specifications and processes for space software and hardware development Analysis of GMES security requirements fulfilment
- Generic Secure Ground Architecture to generically authenticate and encrypt communications between ground stations and spacecraft
- Generic Application Security Framework to introduce application security aspects into software development lifecycles
- PenBox, implementation of a prototype to automate penetration testing.
- SSE4Space, framework to guide and enforce security throughout a systems lifecycle.



GENERAL MANAGER FOR EUROPE

Jaroslav Jaworski

CREATION DATE

2018

ORGANISATION TYPE

Large Enterprise

NUMBER OF EMPLOYEES

Total: 24

Space: 24

CONTACT DETAILS

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CORE BUSINESS

The core business of Redwire Space Europe is the development & sale of robotic arms for space applications. Additionally, Redwire Space Europe also participates in collaborative R&D projects related to robotic arm applications in space and extreme terrestrial environments. By lowering barriers to sophisticated in-space robotics, Redwire Space Europe is helping introduce the next generation of space industrialization.

PRODUCTS AND SERVICES

Space-rated robotic arms offered by Redwire Space Europe are the company's main product.

The robotic arms are designed to carry out a range of functions which are widely applicable across space-based robotic missions. Satellite servicing, refuelling operations, station-keeping, manipulation of payloads, in-orbit assembly, planetary exploration, and in-situ resource utilisation (ISRU) can all be beneficially augmented with the use of Redwire Space Europe robotic arms.

In addition to providing robotic arms, Redwire Space Europe provides correlated services which include engineers to support integration of the arm to the spacecraft or rover, and a robotic arm software model for dynamic simulation. Redwire Space Europe also offers a prototype robotic arm for mock in-space operations which customers may use at the company's facilities in Luxembourg.

TECHNICAL MEANS

Redwire Space Europe's robotic arm has several key features.

- 1) Standardized, open-source interfaces
 - simple integration of arm-to-system and open-source arm-to-end-effector connection interface
- 2) Easily-programmable software - enables seamless programming of robotic arm
- 3) Modularity and scalability - arm specifications can be customized based on customer requirements due to a simple, modular system
- 4) Tool changer and end-effectors - robotic arm features several tooling options and a changer which can use different end-effectors while in-operation
- 5) Affordable - robotic arm is mass-produced and commercially available



STAARK® robotic arm

MAIN CUSTOMERS

The main customers of Redwire Space Europe are companies and entities that need affordable robotic arms for industrial space applications and missions. These applications include orbital activities, such as satellite servicing and in-space assembly, as well those for surface activities, such as planetary exploration and ISRU. In addition to industrial space companies, Redwire Space Europe also works with R&D consortiums which are interested in refining robotic technologies for far-future missions (10+ years).

MAJOR SPACE PROJECTS

At this time Redwire Space Europe's efforts are dedicated to the development of the robotic arm product.

**CEO/
HEAD OF DEPARTMENT**
Patrick Goergen

CREATION DATE
2019

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 8
Space: 7

TURNOVER 2021
Total: € 44,226
Space: € 9,790

**QUALIFICATIONS,
APPROVALS**
Graduate Fit4Start, 9th ed.,
Space vertical (2020)

CONTACT DETAILS

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CORE BUSINESS

RespectUs will offers a SaaS (Software-as-a-Service) product to exporters of sensitive goods, their suppliers and banks.

All exporters of sensitive items (in Space vertical and other industries) face the challenge to determine the need to apply for and be granted a Governmental license when exporting, importing, transiting, brokering or transferring controlled goods, software and technology. It is their responsibility to obtain the license before proceeding, and if they do not comply with this requirement, they may face heavy administrative and/or criminal sanctions, and civil liability. To answer the question if a license is required, they need to process different checks and screenings: customer, end-use, product and transaction. Currently done mostly manually (or with Excel sheets), RespectUs provide them with a cloud-based platform allowing them to process and duly document and keep records of the checks and screenings.

RespectUs platform will offer:

- Efficient product classification with regard to control lists, and exchange of classification sheets between suppliers and integrators
- Efficient customer and end-use due diligence
- Documentation of an internal compliance program
- Protection against legal fines and/or business suspension
- Productivity gains (time, resources, money)
- Proper determination of license requirement
- Demonstration of overall compliance with export control regulations

PRODUCTS AND SERVICES

The RespectUs services and platform will be composed of different modules, each of them being able to be subscribed to individually:

- **License Determination.** This module uses questions & answers and algorithms to ensure that a company gets to a concrete stage where a relevant answer is found, for a particular transaction, product, customer and end-use, and considering the applicable legislation, to the question if a license is required.
It takes into account information about the range of license types (including individual, global and general licenses) and controlled activities (including export, brokering, transfer and transit), and about the license application procedures relating to the applicable multilateral and national dual-use trade controls.
- **Product Classification.** Item classification is about determining whether the items are listed. This is done by comparing the technical characteristics of an item against the EU and national military, torture and dual-use control lists. This module helps to understand whether dual-use items, whether a physical product, software or technology, require a license for export.
- **Customer Screening.** This module allows to know the customers and their end-use of the company's products. It stores customer profiles, due diligence reports, database screenings and end-use statements provided by the customer.
- **Sanctions & Embargoes.** This module processes checks on embargoed, sanctioned or sensitive destinations and entities, and ensure that none of the involved parties (intermediaries, purchaser, consignee or end-user) or products or transactions are subject to restrictive measures (sanctions) by consulting the up-to-date sanctions lists.

- **End-Use Checks.** In this module, platform users document their assessment of diversion risk indicators and of signs about suspicious enquiries or orders. This feature allows to deal with catch-all controls for non-listed dual-use items.
- **Risk Assessment.** The risk assessment allows to determine a company specific dual-use and military trade risk profile. It will help the company to become aware of what parts of its business need to be covered by an internal compliance program and target this program to the company's specific circumstances.
- **Knowledge Base.** This module provides platform users with a complete and detailed overview of the legal framework of export control compliance, with precise legal references and (legally justified) answers to precise questions. It allows keyword search and extend glossaries.

Accessory professional services include: Training, Compliance Audits, License Management, Internal Compliance Programs (ICP), Transaction Structuring, Violations Management.

TECHNICAL MEANS

RespectUs is offering consulting services and a SaaS (software-as-a-service) product, that means a cloud-based computing software on a subscription basis and online access only.

MAIN CUSTOMERS

SMEs and large enterprises from Space sector. Exporting companies and suppliers from other industries.

MAJOR SPACE PROJECTS

Export Control compliance for Space companies, and their suppliers.

RHEA System Luxembourg SA



**CEO/
HEAD OF DEPARTMENT**
Pascal Rogiest

CREATION DATE
2020 (RHEA Group
created in 1992)

ORGANISATION TYPE
Large Enterprise

NUMBER OF EMPLOYEES
Total: 750
Space: 403

TURNOVER 2021
Total: € 86.8 M
Space: € 73.8 M

**R&D
INTERNAL INVESTMENTS**
€ 238 K

**QUALIFICATIONS,
APPROVALS**
2020: 3rd fastest growing
company in Trends Gazelle
Wallonia Brabant

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Christine Leurquin

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CORE BUSINESS

RHEA Group is a professional engineering company providing tailored engineering solutions, system development and security services for mainly space, government and defence organizations. We have built a reputation as a trusted partner developing solutions that lead to sustainable added value for our customers.

For 30 years our staff have been working in the space, security and system engineering sectors, contributing to the development of solutions to the most complex systems and missions. We focus on end-to-end services in space and cybersecurity and deliver the highest quality in secure design development, testing, roll-out, training, operations, and maintenance for business-critical systems.

Headquartered in Belgium, RHEA Group employs over 650 people working at client's premises or RHEA offices throughout Europe and North America.

RHEA System Luxembourg focuses on three main strategies:

- Cybersecurity strategy (CCC, SecurityMadeInLu) and thrive for EU cyber validation/certification
- LUXQCI strategy to be valued cross-borders
- LUX-5G strategy

PRODUCTS AND SERVICES

- We provide full lifecycle engineering solutions, including design, integration and operation, for complex programmes.
- We supply operations and ground system engineering services for missions including Earth observation, communications, scientific, navigation and space exploration helping both New Space and established organizations set up their operations

infrastructure or introduce new ground segment technologies. Our GENI easily extracts and processes information from EO data using the latest advances in machine learning and data analytics.

- We develop complete cyber-resilient programmes, build SOC's and services to protect clients against cyberattacks, and deliver cyber-range capabilities to test and train teams.
- Our concurrent design methodology significantly reduces both the cost and overall risk early in a project's lifecycle.
- Cybersecurity managed services and Satellite end-to-end services are the focus of RHEA System Luxembourg, in the sectors identified as priority for the LSA strategy

TECHNICAL MEANS

- Our Concurrent Design product COMET enables multidisciplinary teams to work together efficiently on complex systems by analyzing requirements, carrying out calculations and validating models in real time.
- Our Manufacturing and Operations Information System (MOIS) is a suite of tools used by spacecraft manufacturers and operators to optimize the processes of spacecraft validation, mission operations and preparation.
- Cyber Integration, Test and Evaluation Framework (CITEF) provides an interactive emulation of an organization's local network, system, tools and applications. Its highly accurate representation of both information and operational technology assets powers RHEA's Next Generation Cyber-Range Services, which are used across industry for cybersecurity testing, planning and training.

MAIN CUSTOMERS

Customers & Partners: Luxembourg Space Agency, Luxembourg Ministries, POST, LuxTrust, InTech, HITEC, the European Space Agency, SnT Uni.lu, the European Union Agency for the Space Programme (EUSPA), the European Commission, national space and defence agencies, other national institutes and commercial clients.

MAJOR SPACE PROJECTS

- SCCOE: the establishment of the Security Cyber Centre of Excellence, located in the European Space Security and Education Centre (ESEC), in Redu, Belgium
- Traleo 2: cyber testbeds for satellite to ground communications
- LUXEOSys: the lifetime day-to-day maintenance and operations of the Luxembourg DoD Earth Observation System (LUXEOSys)
- Numerous satellite and cybersecurity operations for commercial operators



CEO

Dr. Guy Schumann

CREATION DATE

2017

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 6

Space: 4

TURNOVER 2021

Total: € 356 K

QUALIFICATIONS, APPROVALS

Government-accredited
private research institute

CONTACT DETAILS

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E-mail: info@rss-hydro.lu

Website: www.rss-hydro.lu

CORE BUSINESS

R&D in remote sensing applications and computer simulations of water risks. RSS-Hydro employs traditional methods and advanced machine learning models to extract actionable information from geospatial datasets and to simulate water risks at impact level scales. Our innovative remote sensing technology services, including drones and satellites as well as computer models are developed in-house to respond to the needs of our customer.

PRODUCTS AND SERVICES

- Remote sensing and computer simulations of water risks at local to global scales
- Flood disaster response assistance with Earth Observation (EO) products and services
- Flood event re-analysis using EO data and computer models
- Expert consulting services in remote sensing and modelling of water risks and environmental applications
- Drone services and products for the natural and the built environments

TECHNICAL MEANS

- More than 15 years of expertise in academia and R&D in the field of remote sensing and computer simulations of water risks
- Our team members have many years of expertise in hydrology, geospatial data analytics, and machine learning applications
- Experience in IoT, in particular using open geospatial web services
- Expertise in drone technologies and services

MAIN CUSTOMERS

Applied research funding sources:

- Government departments
- Space agencies
- Private sector companies
- Public institutions (including universities)
- NGOs and international organisations
- European Commission

R&D services provision to:

- Government departments and other public sector entities
- City Councils
- Development aid organisations
- Humanitarian response organisations
- Private sector, including the (re)insurance sector

MAJOR SPACE PROJECTS

- ESA Incubed project “FloodSENS”: Smart Mapping of Floods – <https://incubed.phi.esa.int/portfolio/floodsens/>
- Active R&D projects focus mainly on flood disaster response assistance using EO products and services
- Participation and mentoring in NASA/Europe Frontier Development Lab (FDL)
- Acquisition of high-resolution drone data and provision of services to a variety of sectors

**CEO/
HEAD OF DEPARTMENT**
Walter Grzymlas

CREATION DATE
2001

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 13
Space: 2

**R&D
INTERNAL INVESTMENTS**
€2,4 M

**QUALIFICATIONS,
APPROVALS**
Certificat ISO 9001: 2015
FR13/018059
Certificat ISO 9100: 2016
FR12/01276

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CORE BUSINESS

SATURNE TECHNOLOGY serves its clients and partners through experience and skills. The main objective is to meet the expectations and needs of customers, while respecting the three most essential points for effective partnership: quality, price, deadline.

The permanent challenge for all our customers is to quickly introduce new products on a changing market. Project managers, developers and designers use our services to validate a concept or the functionality of their parts or a prototype, detect possible design problems, present team marketing and convince their clients. They need to test different solutions, compare and confront them, validate industrial processes and optimise their knowledge to reduce manufacturing costs and, finally, confirm the launch of production in small, medium and large series.

PRODUCTS AND SERVICES

Additive manufacturing

Our selective laser process is the ideal solution for realising your functional parts. There is no loss of time between conception and getting your metal parts as parts are not obtained by removing but by adding material and additive manufacturing. We can make complex shapes and produce what was until recently inaccessible for the state of the art:

- Geometric forms without limit
- Conduits and internal canals, in any forms and geometries
- More efficient cooling systems
- Optimised lightening
- Moving mechanical parts (e.g. ball joints, etc.)

Laser welding

SATURNE TECHNOLOGY's laser welding machines allow the realisation of welding, point by point, as well as cords with high quality and perfect precision:

- with or without contribution of material
- speed and precision
- absence of mechanical constraints
- complex forms

Laser drilling

We can make small circular hole diameters, without moving the beam. Materials which can be drilled include steel, plastic, copper, ceramics, etc.

Laser cladding

With our reloading laser technology, we can deposit different types of alloys or materials on mechanical parts to increase their durability, hardness and profitability. Our deposits are realised with a "coaxial" head, allowing fine and/or important deposits, having a connection with the basic material, completed and without constraint.

Laser cutting

Our cut laser applies to different types of materials with complex contours which require a specific treatment, fast and without resistance. This method presents a number of advantages, the main one being the manufacturing without deformation in parts up to 3 mm in thickness. Our laser machines allow obtaining a precision lower than 1/100 mm on very diverse materials.

Precision engineering

To enable us to finalize the manufacture of parts in additive manufacturing or other parts made internally we have invested in a set of precision mechanics such as milling, EDM cutting, EDM drilling and grinding.

TECHNICAL MEANS

- AM Machines: 1 XSLM 500 HL, 2 X PROX 300
- Machining: Machining 3 & 5 Axis, Manual Milling, CNC Lathe Turning, Manual Lathe Turning
- Non Destructive Testing: CT Scanning, Radiographic Scanning, Blue Light Scanning, Laser Scanning, CMM

- Post Build Processes: Wire EDM, Blasting (wet/dry), Support Removal, Chemical etch (FOD removal), ULTRASONIC / Other, Powder removal, Behringer Band Saw / Giant Tumbler
- Vacuum Heat Treat
- Mechanical Testing: Ambient Temperature Fatigue Testing, High Temperature Fatigue Testing, LCF, HCF, Crack Propagation Growth, Fracture Toughness, Ambient and High Temperature Tensile Testing, Impact Testing, Tensile Testing
- Hardness Testing: Rockwell Testing, Superficial Testing, Micro hardness Testing, Vickers Testing
- Chemistry Lab Services: ICP-OES, Interstitial Element N,O,H,C,S, Sub-ppm Elemental Analysis, Flow Test, Tap Density Test, True Density Test, Morphology Evaluation, Failure Analysis, Metallographic Evaluation, Preparation, Grain Size, Microstructure, Macro Etch/Micro Etch, Porosity/Density Evaluation, Particle Size Distribution, SEM w/EDS

MAIN CUSTOMERS

Civil and military aeronautics, space, industry, armament, medical, automotive, nuclear, food-processing industry, art and jewellery, research and development.

MAJOR SPACE PROJECTS

Development and additive metal fabrication as well as laser welding of waveguides and satellite support. Development and additive metal manufacturing of engine components for rocket propulsion.

CEO

Steve Collar

CREATION DATE

1985

ORGANISATION TYPE

Large Enterprise

NUMBER OF EMPLOYEES

Total: >2000

TURNOVER 2021

Total: € 1.8 BILLION

CONTACT DETAILS

Name: SES

Address:Chateau de Betzdorf,
L-6815 Betzdorf,
Luxembourg**Phone:** +352 710 725 1**E-mail:**www.ses.com/contact-us**Website:** www.ses.com/**CORE BUSINESS**

As the leader in global content connectivity solutions, SES operates the world's only multi-orbit constellation of satellites with the unique combination of global coverage and high performance, including the commercially-proven, low-latency Medium Earth Orbit (MEO) O3b system. SES delivers high-quality connectivity solutions anywhere on land, at sea or in the air, and is a trusted partner to the world's leading telecommunications companies, mobile network operators, governments, connectivity and cloud service providers, broadcasters, video platform operators and content owners. SES's video network carries almost 8,200 channels and has an unparalleled reach of over 366 million households, delivering managed media services for both linear and non-linear content. The company is listed on Paris and Luxembourg stock exchanges (Ticker: SESG).

PRODUCTS AND SERVICES

SES leverages a vast and intelligent multi-orbit network that spans satellite and ground infrastructure to provide video and data solutions and services.

The Networks business of SES provides market-tailored solutions for telco, cloud, maritime, aero, energy, and government customers. SES offers secure high-performance connectivity to governments via its Defence, Security & Institutions team and a range of affiliates including Luxembourg-based ones - GovSat (public-private venture with the Luxembourg Government) and SES's fully-owned affiliate SES Techcom.

Through the Video business, SES delivers high-quality video anywhere, anytime, and on any screen, via a comprehensive suite of distribution solutions using satellite, terrestrial, and IP networks.

Learn more about SES's services:
<https://www.ses.com/>

TECHNICAL MEANS

Satellite operation and services leveraging a multi-orbit fleet of GEO and MEO satellites, as well as extensive ground infrastructure.

MAIN CUSTOMERS

SES is trusted by public and private broadcasters, content owners, telcos, MNOs, enterprises, governments and institutions across the world.

MAJOR SPACE PROJECTS

SES's O3b MEO non-geostationary (NGSO) system has been operational since 2013, delivering low-latency fibre-equivalent data connectivity services to customers in 50 countries.

SES's next-generation MEO system O3b mPOWER will bring exponentially more capabilities. The highly flexible satellite system comprises an initial constellation of eleven low-latency, high-throughput MEO satellites, each with thousands of fully-shapeable and steerable beams. It will provide multiple terabits of throughput globally to drive digital transformation and cloud adoption virtually anywhere on the planet.

Among other SES's next-generation capabilities is the high-throughput GEO satellite SES-17, dedicated to services for the aeronautical, maritime, fixed and mobile broadband markets.

CEO

Emmanuel Rammos

CREATION DATE

2018

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 6

Space: 6

CONTACT DETAILS

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CORE BUSINESS

SkyfloX develops the ESA patented concept of ORCA: **O**ptical and **R**F Constellations on **A**ircraft. ORCA proposes to use civil passenger aircraft to provide services such as those offered by satellites. ORCA lends itself specifically well to Earth observation applications that require high resolution data, in combination with high revisit

PRODUCTS AND SERVICES

Earth observation is the initial application of ORCA, where ORCA can provide multiple daily, metric GSD Multitemporal Orthos, medium-high GSD Thermal Orthos, and high GSD Digital Surface Models (HiResDSM). The multitude of flights furthermore allow the production of True Orthos, along with fused products related to RGB, Thermal, and DSM data.

TECHNICAL MEANS

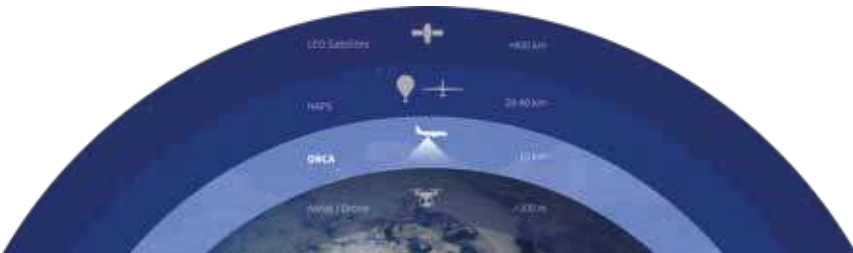
Payload design, aviation certification management, proprietary software for coverage simulations and statistics, ground segment development

MAIN CUSTOMERS

Currently confidential, though SkyfloX is actively working with the largest EO analytics companies in the world for its upcoming pilot project.

MAJOR SPACE PROJECTS

SkyfloX cooperates with a team of international aerospace partners and users, including major airlines, to equip and fly the first ORCA Earth Observation payload on a Boeing 737-800 in 2022. It aims to raise its series A to equip a first constellation of 40 aircraft by the end of 2024.



**CEO/
HEAD OF DEPARTMENT**
Nicolas Gaume

CREATION DATE
2014

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 15
Space: 5

TURNOVER 2022
Total: €1 M
Space: €1 M

**R&D INTERNAL
INVESTMENTS 2021**
€5 M

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Website:
www.space-cu.com

CORE BUSINESS

Space Cargo Unlimited aims to seize the high, although still untapped, potential of in-space manufacturing. We believe the space environment offers unique conditions to design & manufacture a variety of high value products for back on Earth, extremely difficult or impossible to manufacture as such on Earth.

Manufacturing assets at scale in LEO requires payloads and payload infrastructures of the next generation. SCU dedicates its assets towards enabling the factory of the future with newly developed specific key technologies, a new generation of payloads, payload infrastructures as well as a new generation of space vehicle fleet, called REV1, fine-tuned for go-to-market programs such as SCU's iconic initial program WISE, on the future of agriculture and viticulture.

PRODUCTS AND SERVICES

Space Cargo Unlimited offers turn-key pressurised round-trip missions from launch platforms around the world for all users believing in the assets of in-space testing and manufacturing. With a portfolio ranging from its own one-of-a-kind fully automated, pressurised returning space factory to suborbital missions on new space vehicles, as well as established platforms such as ISS, Space Cargo Unlimited offers a comprehensive range of modern science applications as well as manufacturing opportunities in space. SCU business partners profit from a unique space operation profile and payload service system at the highest commercial market standard.

TECHNICAL MEANS

Building on the expertise of major space players and institutional pilot programs, SCU pioneers towards the industrialization of LEO. For this, SCU invested recent years into key technologies and industrial enablers which guarantee commercial production of assets at scale. New digital high data communication and AI payload services like the SpaceLink and SpaceOS, the Space-Boot-Camp based on its published "Guided Evolution" method, the world first returning in-space thruster test-bed, ultra-high-power and temperature payload bus systems are just few technologies mastered to see REV1 as the revolution in LEO.

Beyond REV1, SCU has strategic partnerships with vehicles operators and leveraging the high-level expertise of the European industry, Space Cargo Unlimited develops comprehensive expertise in complex microgravity project management and funding. Space Cargo Unlimited has partner teams in France, Germany, Italy, and the USA, with a network covering nearly all major actors in space infrastructures worldwide.

MAIN CUSTOMERS

SCU customers vary from institutional organisations, commercial enterprises interested in specific performance enhancements in bioproducts & materials, to high-tech applications and key technologies to be tested and validated in space.

MAJOR SPACE PROJECTS

In November 2019, the SCU launched red wine to the International Space Station for a year-long mission. The goal was to better understand the development of taste and composition of wine while ageing in the extreme conditions offered by space.

In December 2019, SCU exposed vine calluses (undifferentiated plant material which allow to recover full plants) to several minutes of weightlessness aboard a Blue Origin New Shepard spacecraft before returning to Earth. SCU was interested in commissioning a new scientific protocol, called "Self-Guided Evolution" allowing to provoke a high evolutionary rate of organisms in a space environment.

In March 2020, SCU transported 320 vine plants (CANES) to the International Space Station for a duration of 10 months. The goal of this mission is to trigger adaptational processes in the plants when threatened by the complex stress of the harsh space environment. CANES lead to new variants of vine plants which showed enhanced resistance against attacks by fungi and mildew in lab conditions. Other plants showed changes in their morphology and anatomy. SCU and its partners (ISVV, FAU and Mercier) started in field testing this year and targets to sell their new varieties beginning 2024.

These missions are part of the program WISE (Vitus Vinum in Spatium Experientia). Space Cargo Unlimited mission WISE program is developing new models and technology to tackle the future of agriculture and food by leveraging the effect of microgravity on complex biological systems. Mission WISE is the first comprehensive, privately led applied research program in space, aimed at reinventing the future of agriculture.

The identification of significant economic shortcomings in current existing platforms inspired SCU in the creation of the space factory platform of the future called REV1. Latest missions targeted the in-space validation of REV1 specific key technologies.

CEO

Stefan Kleeschulte

CREATION DATE

2007

ORGANISATION TYPESmall and Medium-Sized
Enterprise**NUMBER OF EMPLOYEES**

Total: 6

Space: 6

TURNOVER 2021

Total: €1,000,000

Space: €200,000

**R&D INTERNAL
INVESTMENTS 2021**

€20,000

**QUALIFICATIONS,
APPROVALS**Organisme agréé pour
l'environnement naturel**CONTACT DETAILS**

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space4environment.com

Website: www.

space4environment.com

CORE BUSINESS

space4environment is an independently owned SME focusing on adding the environmental dimension to Earth Observation in the land domain, respectively "using space data to provide space for the environment", as expressed in the company's motto.

At space4environment we are building our GIS and Earth Observation activities on three pillars of expertise:

- Sound knowledge of the data (at national and European level)
- Expertise in data handling, processing, smart visualization and scientific analysis
- Policy related thematic assessments

space4environment is applying this expertise on the one hand for the provision of quality control and quality assurance of Copernicus products, as well as in support of environmental reporting obligations and dataflows, and on the other hand to assess issues like environmental sustainability, the condition of ecosystems and their services or the state of environment in general.

PRODUCTS AND SERVICES**GIS and EO data processing**

Satellite data processing & analysis - Land use / land cover mapping, change mapping
 - Database design, management & interactive query tools - Data analytics and visualization
 - Spatial modelling and software development
 - Digital cartography - Web mapping tools

Environmental assessments

Mapping and assessment of ecosystems and their services - Green Infrastructure - Land systems and land resource efficiency - Urban sustainability - Disaster risk mapping
 - LULUCF reporting and data analysis

Geodata provision and distribution

Official distributor of Eurogeographics data

Management and consultancy

Requirements analysis - Geographic information consultancy - Project definition and supervision

MAIN CUSTOMERS

International organisations

- European Commission (DG Environment, Eurostat, JRC, ESPON)
- European Environment Agency (EEA)
- European Space Agency (ESA - ESRIN)
- Airbus DS Geo
- Convention on Biological Diversity (CBD)

Luxembourg organisations

- Ministère de l'Énergie et de l'Aménagement du territoire
- Département de l'aménagement du territoire
- Ministère de l'Environnement, du Climat et du Développement durable
- Département de l'Environnement
- Administration de l'environnement
- Administration de la nature et des forêts
- STATEC - Institut National de la Statistique et des Etudes Economiques

MAJOR SPACE PROJECTS

Copernicus

- Quality control of High Resolution Layers and Local Component products
- Quality assurance of Global Hot Spot Mapping products for Africa
- Quality assurance of the image data for the provision of a Very High Resolution (VHR) satellite image coverage of Europe (6 Mio sqkm)
- Development of a new European land monitoring concept (i.e. 2nd generation CLC or CLC+)
- COP4N2K - Copernicus for Natura2000: Development of an online information system for assessing land cover changes in protected areas between 1994 and 2018

Land cover mapping

- Land Cover and Land Use mapping of Luxembourg for 2015, 2018 and 2021
- Development of a methodology to calculate LULUCF related land use changes for the reference years 1989, 1999, 2007, 2012, 2015 and 2018
- Development of ecosystem extent, ecosystem condition and ecosystem service accounts for Luxembourg
- EO4CBI - EO data in support of the City Biodiversity Index
- Mapping of small linear landscape features (hedges, tree rows)
- Mapping of CLC Luxembourg: 2006, 2012 and 2018

CEO

Dejan Petkow

CREATION DATE

2017

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 10

Space: 9

QUALIFICATIONS, APPROVALS

RDI Certificate

CONTACT DETAILS

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CORE BUSINESS

SPARC Industries has two core business areas. Number one is accelerating our customers' satellite Electric propulsion technology and product development to be at market as early as possible – at lower cost and risk. We achieve this by:

- reducing the number of experimental test campaigns common in our customers' business
- reducing the learning curve of the technology by providing details that no experimental test generates
- reducing the overall time for test preparation, conduction, and interpretation
- reducing the overall cost for material, operation, and personnel
- reducing the risk associated with the material supply chain including material availability in terms of time, quality, amount, and price
- reducing the risk associated with test facility availability in terms of price, test window size
- reducing the risk associated with long term personnel availability

This is implemented with the support of our self-developed ESA-supervised plasma simulation software VSTRAP which fulfils space industry requirements as well as ESA requirements. The confidence in the simulation results is enhanced by respective reporting allowing a much easier interpretation of the results.. This not only enhances associated research proposal success chances but adds significantly to the client's competitiveness if VSTRAP generated results backed by written credibility proof is added to the client's offer made to the satellite manufacturers.

VSTRAP has been invented not only for accelerated EP thruster optimization but more generally for any low density plasma technology exploration, specification,

and IP generation. This is where our second core business comes in via IP exploitation by licensing the designs to customers who have strong interest in being first. The company is open to joint product development and commercialization.

PRODUCTS AND SERVICES

Products

Our ESA-rated plasma simulation software VSTRAP is designed for industrial use.

The product requirements are derived from intense discussions with EU and US space industry members (propulsion developers and satellite manufacturers mainly), plasma simulation experts, and ESA. It not only

has general gas and plasma simulation capabilities, but also pre-configured propulsion designs, e.g., for Hall Effect Thrusters and Gridded Ion Optics. This allows being productive already on day one. The product delivers data in formats that are readable by satellite manufacturers' tools for satellite contamination and charging. Additional design templates and functionalities can be provided upon request. Book a free live demo via our website!

An own thruster technology currently under development has the unique stealth capabilities: Invisible to optical observers, and invisible to the satellite – the latter enhancing the satellite's lifetime.

Services

Engineering support with a broad spectrum of elements, e.g., consultancy, simulation services, participation in consortia-based projects (ESA, Horizon Europe, etc.).

MAIN CUSTOMERS

Developers of electric satellite thrusters both start-ups as well as established companies. We also support satellite manufacturers to better predict the impact of certain satellite propulsion technologies on their satellites, incubators hosting start-ups from the aforementioned domains), Universities with or without EP labs, independent plasma propulsion labs, and public research labs.

**CEO/
HEAD OF DEPARTMENT**
Ran Qedar

CREATION DATE
2021

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 2
Space: 2

TURNOVER 2021
Total: € 62,000
Space: € 62,000

CONTACT DETAILS
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spinintech.com
Website:
www.spinintech.com

CORE BUSINESS

Space Products and Innovation (SPiN) is tackling long and costly manufacturing processes.

We accelerate the technology cycle by enabling faster integration through our adapter to replenish depleted satellite systems rapidly, therefore providing a cheaper and faster solution to improve access to space.

Our product, the Multipurpose Adapter Generic Interface Connector (MA61C), is a universal adapter to transform incompatible off-the-shelf components into plug-and-play for satellite manufacturers. It connects to most off-the-shelf components thanks to the ability to support 9 different interfaces, delivering cost reductions of 50% on design, 30% on production, and removing a year from satellite integration time.

PRODUCTS AND SERVICES

The MA61C adapter offers a single connector that matches 80% of suppliers by having 9 interface standards: Spacewire, UART, RS232, RS422, RS485, SPI, CANBUS, I2C and GPIO. It has a powerful processor (GR712RC) and components with space heritage.

MA61C is a solution to facilitate and reduce costs of satellite integration. It is used in space, as a Command and Data-Handling (CDH) device, which can also host the onboard software for small satellite missions. Thanks to our adapter, SPiN also offers an all-inclusive modular CubeSat design and integration service, using COTS to reduce the price and time-to-orbit.

MAJOR SPACE PROJECTS

The company launched its first satellite, SPiN-1, on May 25, 2022. The 1U cubesat was fully designed and integrated by SPiN.

SPiN-1 in-orbit demonstration mission is a project that was born to demonstrate in-orbit reconfiguration and the benefits of modular satellite assembly with off-the-shelf components through MA61C, SPiN's universal adapter.



**CEO/
HEAD OF DEPARTMENT**
Peter Platzer

CREATION DATE
2012 (San Francisco,
California, USA)
2018 (Luxembourg)

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
(Spire Global including Lux)
Space: 300-500

TURNOVER 2021
(Spire Global including Lux)
Total: € 43.4 M
Space: € 43.4 M

CONTACT DETAILS
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CORE BUSINESS

Spire Global, Inc. (NYSE: SPIR) is a leading global provider of space-based data, analytics, and space services, offering access to unique datasets and powerful insights about Earth from Space so that organizations can make decisions with confidence, accuracy, and speed. Spire uses one of the world's largest multi-purpose satellite constellations to source hard-to-acquire data and enriches it for the maritime, aviation, and weather industries. Spire's growing Luxembourg footprint includes key operations across its business units, including Spire Aviation, Weather, Earth Intelligence, Space Services, and Maritime. To learn more, visit spire.com.

PRODUCTS AND SERVICES

Spire collects, analyzes, and enriches information gathered from our custom constellation of satellites, using it to create a priceless repository of insights not available anywhere else.

- **Spire Aviation** – provides historical flight data, ADS-B tracking, and up-to-date data on the weather that impacts aviation operations, all delivered through developer-friendly APIs.
- **Spire Weather** – offers a proprietary weather forecast model powered by our radio occultation data and custom predictive models, producing highly accurate, global high-resolution forecasts with over 50+ discrete variables.
- **Spire Maritime** – is revolutionizing how global AIS data for maritime intelligence is collected, analyzed, and delivered, providing Intelligent maritime tracking and monitoring solutions, unique coverage of high traffic zones, and maritime weather forecasts.

- **Spire Earth Intelligence** - we collect rich and unique data sets about our planet's surface and its atmospheric layers fuelling key research and development programs, inspiring new services and applications, and driving public environmental programs across the globe.
- **Spire Space Services** - using our space technology, state-of-the-art in-house manufacturing process, seamlessly integrated space and ground infrastructure, and automated operations, we enable other innovators, commercial organizations, and governments to deploy their own applications and sensors into space.

TECHNICAL MEANS

Spire has more than 350 years of space flight heritage, having launched 150+ Low Earth Multi-Use Receivers (LEMUR) across more than 30 launch campaigns, 3 so far in 2022, on 10 different launch providers.

We operate the world's largest RF sensing fleet and are the largest producer of radio occultation and space weather data.

Our multi-payload satellites are equipped with a variety of sensors incl. Automatic Identification System (AIS), Automatic Dependent Surveillance-Broadcast (ADS-B), Global Navigation Satellite System (GNSS), Radio Occultation (RO), and Reflectometry®.

We operate a global network of 30+ ground stations globally, with 70+ antennas in over 16 countries.

Our data provide a global view with coverage in remote regions like oceans and poles; with an up-to 15 minutes refresh rate

We are continuously launching improved sensors and upgrading them in-orbit

We turn ideas into the live feed from space in as little as 6-12 months.

MAIN CUSTOMERS

Spire's customers range from small logistics analytics companies to large enterprises and government agencies (both civil and defence). Our panel of experts and strategic partnerships across verticals are well-positioned to tackle some of the most pressing problems of the 21st century.

MAJOR SPACE PROJECTS

We are rapidly scaling our team in Luxembourg in order to carry out a wide portfolio of scientific and engineering projects, including:

- The development of edge computing capacities, leveraging state-of-the-art machine learning techniques for on-board and near-real-time data processing.
- Leveraging unique dataset collected through Spire Constellation for the provision of value-added products on the Earth's Surface. Notably around soil moisture and sea ice coverage.
- Development of dedicated payload and algorithms for RF spectrum Monitoring and Signal Intelligence applications
- Leveraging external datasets and data fusion techniques to improve the value of the data collected by Spire's satellites

**THALES ALENIA
SPACE CEO**

Hervé Derrey

**CEO OF THALES ALENIA
SPACE IN LUXEMBOURG**

Etienne Barritault

CREATION DATE

Thales Alenia Space: 2007

**Thales Alenia Space in
Luxembourg:** 2020

ORGANISATION TYPE

Large Enterprise

NUMBER OF EMPLOYEES

Total: Thales Alenia

Space: 7700 employees /

Thales Alenia Space in

Luxembourg: 3 employees.

Initial recruitments

on-going

TURNOVER 2020

Total: € 1,850 Bn

CONTACT DETAILS

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CORE BUSINESS

Drawing on over 40 years of experience and a unique combination of skills, expertise and cultures, Thales Alenia Space delivers solutions for telecommunications, navigation, Earth observation, environmental management, exploration, science and orbital infrastructures. Thales Alenia Space sees space as a new horizon, helping to build a better, more sustainable life on Earth.

#SPACEFORLIFE

Thales Alenia Space in Luxembourg is a brand new Digital Competence Centre dedicated to space activities.

PRODUCTS AND SERVICES

Thales Alenia Space in Luxembourg develops state-of-the-art digital solutions for all space domains.

We leverage big data, artificial intelligence and cybersecurity technologies to address complex end-to-end systems' challenges, while fostering UI/UX excellence.

Our expertise covers innovative design and implementation approaches with customers, minimum viable products development, design and development of key digital building-blocks of space systems, roll-out and operations of solutions, experimentation of new technologies and concepts.

Our current projects encompass: Digital Twins, Secured Digital Platforms for Earth Observation, Data Valorisation engines...

TECHNICAL MEANS

A joint venture between Thales (67%) and Leonardo (33%), Thales Alenia Space is a global space actor operating 18 sites in 11 countries. Thales Alenia Space in Luxembourg is built and organized after the model, working environment, and proven practices of Thales Digital Factory. Our development environment is cloud native and Software as a Service oriented.

MAIN CUSTOMERS

Thales Alenia Space in Luxembourg serves customers and partners in Luxembourg, Europe and world-wide with the support of the Business Lines of Thales and Thales Alenia Space. Our solutions address all space market segments, including telecommunications, observation, exploration and navigation.

Governments, institutions and private industry alike count on Thales Alenia Space to design satellite-based systems that provide anytime, anywhere connections and positioning, monitor our planet, enhance management of its resources, and explore our Solar System and beyond.

MAJOR SPACE PROJECTS

Some of Thales Alenia Space flagship programs: Iridium NEXT, Space Inspire, Copernicus Sentinels, Meteosat, Wekeo, COSMO-SkyMed, EGNOS & Galileo, International Space Station pressurized modules, Planck, ExoMars 2022, ALMA (Chile), Stratobus.



THALES ALENIA

SPACE CEO

Paolo Campanella /
Lucien Hoffmann

CREATION DATE

2020

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: : 4

TURNOVER 2021

Total: € 277,661

R&D INTERNAL

INVESTMENTS 2021

€ 154,000

CONTACT DETAILS

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CORE BUSINESS

WASDI is a cloud platform for Earth Observation (EO) that helps both remote sensing experts and end users work with satellite imagery.

EO experts can turn their algorithms into operational services in the cloud: no need for them to deal with the technicalities of setting up a virtual server or the creation of a docker container. Instead they can enjoy the "develop at home, deploy to the cloud" paradigm: they can work with the technology, language and tools they prefer, and just a drag & drop their code on the website of WASDI to deploy it to the cloud. Then, if they want, they can offer their newly created cloud service in a marketplace.

In this marketplace, end users can find the EO-based services they look for to satisfy their business needs.

PRODUCTS AND SERVICES

WASDI data catalogue grows by the day, and includes observations (Sentinels, Landsat, Proba-V, Envisat), derived products (Copernicus Atmosphere, Copernicus Marine, VIIRS, IMERG, World Cover), simulated products (ERA5), and others (e.g., bathymetry and DEM). WASDI connects to multiple data providers and handles them automatically, meaning reliability, and fast searches and import.

WASDI supports python (pip and conda), ENVI IDL, C#, Java, Javascript, and Octave. Moreover, R is in the roadmap.

WASDI allows the upload and batch execution of SNAP workflows. Processing and preprocessing can be triggered programmatically.

Applications for end users include mapping of floods (rural and urban areas), permanent

waters, active fires, burned areas, urban areas; radiometric indices, air quality data downscaling, historical flood analysis.

TECHNICAL MEANS

WASDI offers:

1. a scalable multi-cloud federated platform for Earth Observation, connected to a growing body of data providers
2. the ability to develop new Earth Observation-based applications and cloud services, thanks to the internationally acclaimed research capabilities of the Luxembourg Institute of Science and Technology, the 20-years experience in complex software projects development of FadeOut Software and the know-how of RSS-hydro
2. the capability of leading and joining tenders

MAIN CUSTOMERS

1. World Bank
2. SEADRIF
3. Joint Research Center (JRC)
4. ESA
5. CIMA Foundation
6. Luxembourg Institute of Science and Technology (LIST)
7. Advanced Microturbines
8. (indirectly) Asian Development Bank

MAJOR SPACE PROJECTS

1. **ESA, eDRIFT** – Expand Demand – Disaster Risk Financing and Transfer against floods.
2. **JRC, EC** – Next Generation Mapping of Human Settlements from Copernicus Sentinel-2 data: leveraging cloud
3. computing, machine learning and earth observation data.
4. **World Bank, SEADRIF** (South-East Asia Disaster Risk Insurance Facility) – daily EO-Based flood Maps over LAOS and Myanmar for National Sovereign Risk against flood, operated by the SEADRIF company, incorporated by World Bank in Singapore.
5. **Asian Development Bank** – Support to Water and Food Security Planning and Investments in Indonesia Through Earth Observations Services
6. **JRC, EC** – GHSL Landcover Service Proof-of-Concept – assessing Copernicus Data and DIAS to generate GHSL on demand
7. **CIMA Foundation and UNEP** – EIS Iraq – development of an Environmental Information System (EIS)

**CEO/
HEAD OF DEPARTMENT**
Imeshi Weerasinghe CEO
(Charlotte Wirion CTO)

CREATION DATE
2020

ORGANISATION TYPE
Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES
Total: 5
Space: 5

TURNOVER 2021
Total: € 168,967.50
Space: : € 168,967.50

CONTACT DETAILS

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CORE BUSINESS

WEO SAS, founded and registered in Luxembourg in 2020, was formed with an aim to improve global water management and vegetation management, to enable a more sustainable society. WEO develops deep learning algorithms and products which use broad Earth Observation (EO) image information from a range of satellites and other sources to intelligently process into usable, accessible and accurate products. The company is currently developing commercial products for water management, and urban tree management. It has specific expertise in Lidar, SAR, Optical and thermal data processing, as well as harmonisation and fusion of various datasets.

PRODUCTS AND SERVICES

Our main products are maps and services related to water resource management and tree management for sustainable cities and agriculture using open access data from space (sentinel missions mainly). A list of our products and services include:

- Tree management (Tree extent, tree height, tree location, tree growth and tree health)
- Mapping of potential for green roofs in urban areas
- Mapping of potential to convert permeable surfaces (i.e. parking spaces) to impermeable areas for water infiltration
- Land surface temperature mapping (urban heat of different surfaces)
- Flood risk mapping
- Soil moisture mapping

TECHNICAL MEANS

Both cofounders, Charlotte Wirion, CTO and Imeshi Weerasinghe, CEO have PhD topics focused around water resource management in the urban or agricultural fields using remote sensing (space) data. Charlotte Wirion is also Guest Professor in Urban Hydrology and Remote Sensing at the Vrije Universiteit Brussels.

MAIN CUSTOMERS

- Ville de Luxembourg
- Luxembourg Water Agency (AGE)
- European Space Agency (ESA)

MAJOR SPACE PROJECTS

Smart Urban Tree Feasibility Project with ESA, LSA and Ville de Luxembourg LuxImpulse – Sustainable Water Resource Management (SWARM) with ESA, LSA and Luxembourg Water Agency.

**MANAGING DIRECTOR
YURI LUX**

Oliver Dresch

CEO

MANAGING DIRECTOR

Maria Birlem

COO

MANAGING DIRECTOR

Christian Bruderrek

CCO

MANAGING DIRECTOR

Mark Kugel

CSO

Daniela Bezdán

CREATION DATE

2019

ORGANISATION TYPE

Small and Medium-Sized
Enterprise

NUMBER OF EMPLOYEES

Total: 31

Space: 31

TURNOVER 2021

Total: € 3 M

Space: € 3 M

R&D

INTERNAL INVESTMENTS

€ 0.5 M

CONTACT DETAILS

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CORE BUSINESS

Our main purpose is to do Space Biotech for a Better Life. As we are following our vision for a bright future for human health on earth and beyond. By engineering End-to-End solutions to provide biotech products formed in space. Our own hardware enables state-of-the-art microgravity research also in a post ISS world.

Furthermore, we are offering a one-stop-shop for any service in microgravity, we not only enable research in microgravity but also make it accessible to any industry.

We enable efficient life science research in microgravity - on space stations, rockets and parabolic flights.

We offer an end-to-end service to take life science experiments, e.g. cell culturing or protein crystallization to microgravity - mostly to the ISS, but also on suborbital rockets or parabolic flights.

Our modular and reusable hardware system makes it possible to offer ISS experiments in less than 6 months and less than €100.000 instead of taking several years of preparation and costing 1 million euros.

PRODUCTS AND SERVICES

We develop fully automated micro-labs with the size of a wallet and launch them in behalf of scientists around the world to the International Space Station (ISS), on orbital and suborbital spacecraft, on parabolic flights, and on drop towers. Additionally, we have the so-called ScienceTaxi under development, a space incubator which is going to have its maiden flight in 2024 and can host up to 36 experiments.

TECHNICAL MEANS

- ISS Mission Execution
- Mechanical Design (CAD)
- Structural Analysis (FEM)
- Technical and Safety Documentation
- Systems Engineering
- Fracture Control
- Project Management

MAIN CUSTOMERS

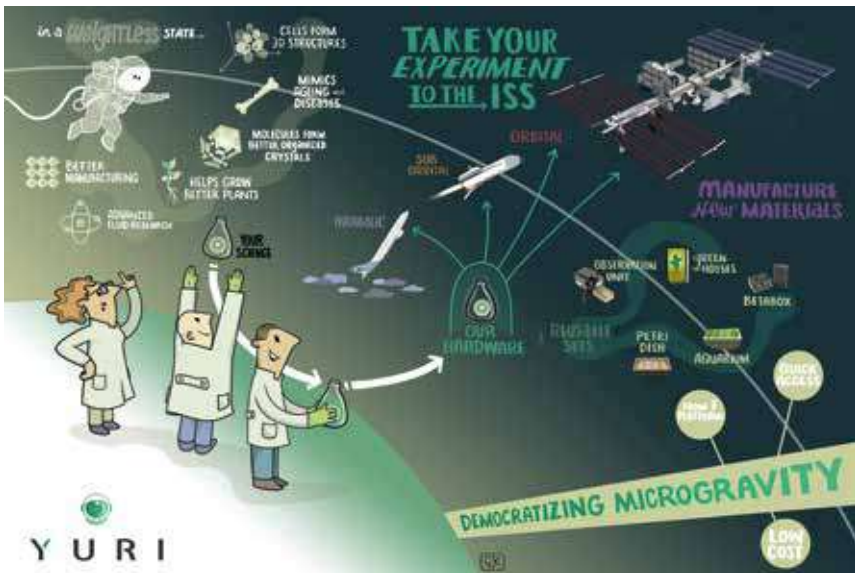
Customers we have already acquired and some of whom we have already "taken into space":

- NASA
- ESA
- University of California Los Angeles (UCLA)
- University of Florida
- University of New York (NYU)

- Israel Institute of Technology
- GlaxoSmithKline
- University of Zurich (UZH)
- University of Technology Sydney (UTS)
- University of Jena
- ZF Friedrichshafen
- German Aerospace Center (DLR)
- Luxembourg Space Agency
- Charité Berlin
- Goethe University Frankfurt

MAJOR SPACE PROJECTS

- ScienceTaxi
- Cellbox-3 (ISS)
- JIA (ISS)
- Hamster (ISS)
- Biomission (ISS)
- Überflieger (ISS)





03

PUBLIC
RESEARCH
ORGANISATIONS

EUROPEAN SPACE RESOURCES INNOVATION CENTRE (ESRIC)



DIRECTOR

Dr. Kathryn Hadler

CREATION DATE

2020

ORGANISATION TYPE

Public Research
Organisation

NUMBER OF EMPLOYEES

Total: 21

Space: 21

CONTACT DETAILS

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CORE BUSINESS

ESRIC is the first research, business and innovation centre exclusively focused on the use of space resources in support of human and robotic space exploration and the creation of an in-space economy. ESRIC is a joint initiative of the Luxembourg Space Agency (LSA), the Luxembourg Institute of Science and Technology (LIST) and the European Space Agency (ESA).

ESRIC's activities are based on four main pillars: space resources research and development, support for economic activities, knowledge management and community management. ESRIC connects leading academic, industrial and entrepreneurial talents in this field. It contributes to economic growth by supporting commercial initiatives and start-ups, offering a business incubation component and enabling technology transfer between space and non-space industries.

PRODUCTS AND SERVICES

Research and development

ESRIC is developing research activities all along the value chain of space resources utilization. It focuses on the following four thematic areas of research:

- ISRU value chain (end-to-end space resources systems)
- Prospecting and Mining (characterise, excavate, beneficiate and handle resources)
- Processing and Supplying (produce, store and deliver feedstock and consumables)
- Construction and Manufacturing (fabricate equipment and infrastructure using space resources)

The initial focus is on enabling sustainable space activities using gases and metals derived from lunar regolith.

Business

ESRIC seeks to develop partnerships with established companies and start-ups. The ESRIC start-up support programme supports early-stage start-ups in the space resources sector to refine their business plan, attract their first customers and secure their first investment.

Knowledge management

ESRIC monitors the progress in space resources science, technology and markets. Additionally, it provides a source of up-to-date information on developments related to space resources utilization.

Community management

ESRIC helps to connect the space resources community by creating an open and collaborative environment to encourage dialogue and exchange of ideas.

TECHNICAL MEANS

ESRIC hosts key research infrastructure, enabling ground-based R&D along the value chain including the prospecting, extraction, processing, storage, delivery and utilization of space resources. This infrastructure is accessible to European industry and academia, as well as international partners. ESRIC's laboratories and testing facilities are located at LIST's premises in Belvaux, Luxembourg, with dedicated office space for staff, contractors and external users associated to the projects.

In line with the research goal to process regolith and produce oxygen on the Moon, the research facilities provide the following capabilities:

- Dry Chemistry and Analytical suite: access to standard tools for the handling of granular material and powders, as well as analytical capabilities for the characterisation of input and output materials (i.e. regolith simulants).
- Wet Chemistry suite: facilities to handle liquid substances used during the processing of materials.
- End to end oxygen demonstrators and assembly suite: hydrogen reduction and molten salt reactors, as well as workbenches for components assembly and modifications

Additional equipment will be added to the laboratories of ESRIC depending on the evolution of European research needs in this domain, including a Dirty Thermal Vacuum Chamber and terrestrial pilot plant.

MAIN CUSTOMERS

ESRIC partners with public and private international players in order to create a hub of excellence for space resources in Europe.

- Research and technology organizations
- Universities
- Commercial space companies
- Non-space commercial companies keen to expand their business into space resources
- Space agencies
- International organizations

MAJOR SPACE PROJECTS

Lunar regolith processing for the production of consumables such as water, oxygen and metals (in partnership with ESA).

ESRIC start-up support program, offering business and technical support, incubation and access to non-dilutive funding.

ESA-ESRIC space resources challenge, supporting innovative technical methods for prospecting resources on the Moon.

Space resources knowledge management and sharing platform

Space Resources Week, an annual event covering general, scientific, technical, business, legal and economic topics



Environmental Research and Innovation (ERIN) department Luxembourg Institute of Science and Technology (LIST)

LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



HEAD OF DEPARTMENT

Prof. Dr. Lucien Hoffmann

CREATION DATE

2015

ORGANISATION TYPE

Public Research
Organisation

NUMBER OF EMPLOYEES

Total: 200

Space: 25

CONTACT DETAILS

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CORE BUSINESS

The Environmental Research and Innovation (ERIN) department is active in the use, processing, and interpretation of remote sensing data from multiple sensors installed on space- and airborne platforms of Earth Observation (EO) data for environmental management, precision agriculture and viticulture, maritime surveillance and risk management applications. The focus is geared towards a better use of EO data in operational management tools and to integrate remote sensing data together with global navigation satellite systems for near real-time eco-hydrological, hydraulic, and crop growth modelling. Eventually, it also aims to integrate remotely sensed information with in-situ data, process-based models, and leverage on satellite communication and IoT Low Power Wide Area Network technology to provide evidence-based decision support tools.

PRODUCTS AND SERVICES

Algorithms to enable the automated production of environmental variables:

- Evaporation and transpiration from thermal remote sensing data (STIC)
- Leaf area index, canopy chlorophyll, nitrogen content, plant disease detection from multi- and hyperspectral field, drone, and satellite data
- Time series analysis toolbox as web interface with automated processing
- Water bodies and floodwater variations from SAR data
- Flood hazard from multi-temporal remote sensing data
- Urban flood mapping from InSAR data
- Vessel detection and coastal delineation from SAR data

- Geospatial software technologies and platforms for web based data integration
- Training

Integration of remote sensing data with in-situ data and process-based environmental models.

Software enabling IoT-based collection of environmental data.

TECHNICAL MEANS

- In-situ sensors: field spectrometers ASD Field Spec-3 and Spectral Evolution RS-3500 and sensors for crop state parameters Li-COR 2200 and Minolta SPAD
- Ground-based and airborne hyperspectral thermal sensor
- UAV platforms equipped with thermal (Teax ThermalCapture Fusion Zoom), hyperspectral VNIR/SWIR (Headwall Nano and Headwall M384 and LIDAR sensors
- IoT-satellite integrated testbeds

MAIN CUSTOMERS

ESA, LSA, CNES, Ministry of Environment, Ministry of Agriculture, Luxspace, HITEC Luxembourg, Terrasphere, Aerovision BV, VITO, TELOPS-Canada, KU Leuven, TU Vienna, University of Bristol, adwaisEO, SES, EarthLab, Cybercultus, Blue Horizon, Hydrosat, World Bank, ISARDSAT, CIMA Research Foundation, Earth Observation Data Centre, Wageningen University, Gomspace, Agroptimize, WASDI, RSS-Hydro, Fadeout Software, Service des médias et des communications, Luxsense, Geodata, POST.

MAJOR SPACE PROJECTS

LANDCOVER CCI

Global land cover map development for climate modelling applications

SENSECO

Optical synergies for spatiotemporal sensing of Scalable ecophysiological traits

CASCADE

Combining earth observation with a large-scale model cascade for assessing flood hazard at high spatial resolution

ESHAPE

Satellite Earth Observation-derived water bodies & floodwater record over Europe

GFMS

Global flood monitoring service

ECOSTRESS

Developing the EUROPEAN ECOSTRESS HUB

SMARTIES

Real time smart irrigation management for multiple stakeholders' levels

Lux5GCloud

Luxembourg 5G Smart Country Data Cloud

OVERSEAS

Multi-source Earth Observation-based maritime traffic monitoring

**CEO/
HEAD OF DEPARTMENT**
Francesco Ferrero

CREATION DATE
2015

ORGANISATION TYPE
Public Research
Organisation

NUMBER OF EMPLOYEES
Total: 100
Space: 9

TURNOVER 2021
Total: € 3,752,000 €
Space: € 383,819.38 €

**QUALIFICATIONS,
APPROVALS**
ECSS-E-40 (European
Cooperation for Space
Standardisation –
Software Engineering
Guidelines for the Telecom
Applications Projects)

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CORE BUSINESS

The "IT for Innovative Services" (ITIS) department of LIST has as objective to support the digital transformation of private and public organisations by enabling digital technology innovation with a significant impact that help them to:

- manage their operations more efficiently,
- take better decisions
- comply with a rapidly evolving regulatory environment

To fulfil this aim, ITIS develops methodologies, architectures, models, algorithms, software tools, and integrated IT-based systems to achieve a more efficient, optimised, robust, scalable, secure, trustworthy and user-friendly utilisation of data and information technologies both for fully automated systems and for systems with humans in the loop.

The activities of the Department are supported by an AI, data analytics and visualisation Technology Infrastructure.

PRODUCTS AND SERVICES

The ITIS department is focusing on the 6 following "innovation lines" which are coordinating a number of core technology building blocks and associated services to build functional prototypes meeting the exacting requirements of a specific market:

- 6G
- Automated Process-Based Systems
- Digital Twin Technologies
- Digital Upskilling for Industry 5.0 and Services
- Explainable AI Regulatory Sandbox
- Interactive Technologies for Critical Incidents

MAIN CUSTOMERS

ESA, SES, HITEC Luxembourg, LuxSpace, Cybercultus, Ministry of Foreign and European Affairs (Directorate of Defence)

MAJOR SPACE PROJECTS

Previous projects led by CRP Henri Tudor (now part of the LIST)

SAT'N'SURF (ESA) – Internet content sharing via satellite

Content delivery according to a community / interest group the user belongs to, with respect of user privacy

IMSATV (ESA) – Interactive TV via satellite

Satellite-based user interactivity with TV programs

TASMANIA (ESA) – Secured and Monitored content delivery by satellite

Satellite-based remote administration and monitoring of high value content delivery

COTV (ESA) – Interactive TV via satellite

TV users' mobile communities compete in the production of TV programs, mixing professional and user-generated audio-visual content, vote and broadcast the winner program via satellite

WellCom (EUREKA-ITEA) – Location (satellite position) Based Services

Luxembourg @Home & mobile demonstrator on "Interactive Personalised Advertisement and Location-based (GPS) Shopping Assistant"

Project TRANSCOMAS (ERDF Interreg)

Creating a cross-border Network of AeroSpace Measure and Control facilities, to allow interested Space actors to benchmark their products and services and thus to improve fulfilment of highly requesting requirements of the Aerospace sector

DG-Trac (ESA) – Dangerous Goods Tracking & Tracing

Feasibility study on a tracking and tracing system for dangerous goods transport in the medical sector

SENSA (ESA) (participating) – Sustainable, Environmental and Safe Tourism in Protected Areas

Safety services and real-time touristic information for travelers in protected parks in South Africa. SENSA uses satellite trackers with other networks and dedicated mobile applications to help the tourists connect in all situations with the parks authorities.

SENSAWILD.COM

- MILAN (FNR Bridges) – Machine Learning for AstroNomy
- KM4SR – Knowledge Management for Space Resources
- ECOSTRESS (ESA) – ECOSystem Spaceborne Thermal Radiometer Experiment on Space Station (to investigate vegetation water stress through the measurement of plant temperatures)
- CRISTAL (DoD) Earth observation combined with Social Media Mining for crisis management
- PUBLIMAPE (FNR CORE) Public information mapped to environmental events

Luxembourg Institute of Science and Technology (LIST) Materials Research & Technology (MRT) department

LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



CEO/ HEAD OF DEPARTMENT

Dr. Damien Lenoble

CREATION DATE

2015

ORGANISATION TYPE

Public Research
Organisation

NUMBER OF EMPLOYEES

Total: 200
Space: 10

QUALIFICATIONS, APPROVALS

Space qualification:
Super-black technology

CONTACT DETAILS

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CORE BUSINESS

The Materials Research and Technology department (MRT) is a department of the Luxembourg Institute of Science and Technology (LIST). MRT pools its skills and technologies to improve materials technologies for the industry, including the space sector.

Our research and technology activities rely on the following fields of expertise:

- Nanomaterials and nanotechnology
- Composite materials
- Manufacturing technologies
- Scientific instrumentation

PRODUCTS AND SERVICES

Specific to the space sector, MRT activities target five priority technologies:

- **Advanced manufacturing for space applications**, aiming at manufacturing new (multi-)functional, lightweight or durable composite materials, by a combined approach of instrumented and robotized processes, adequate numerical modelling and testing.
- **Thin Film technologies**. Based on a large panel of industry-scalable deposition technologies, MRT develops thin film technologies for a wide range of surface functionalities.
- **Technologies for energy**, targeting more powerful, lightweight and safer energy storage, generators and innovative energy harvestors.
- **Autonomous Sensors**. MRT develops miniaturized temperature, mechanical & chemical sensors based on innovative sensing technologies and printing technologies.

- **Scientific Instrumentation for space,** focusing on miniaturized instruments and sensors platforms, for space exploration, autonomous in-space manufacturing and in-habitat monitoring.

TECHNICAL MEANS

Up-scalable processing technologies

- (bio-based) Raw materials refining and modification
- Synthesis of nano-structures, nano-particles and organic chemistry
- Powder engineering
- Thin-film processing, engineering and devices
- Polymer Processing
- Composite manufacturing

Advanced characterisation & Functional measurements

- Molecular analysis
- Elemental and isotopic analyses
- Structure, morphology and topography
- Non-destructive Inspection
- Mechanical testing
- Accelerated ageing
- Thermal analysis
- Characterization of optical & electrical properties

Numerical simulation

- Commercial codes (finite element, molecular dynamics, crystal plasticity)
- In-house codes (finite element, composite, boundary element method, e-Xtended finite element, XEFG)

MAIN CUSTOMERS

Airbus DS, Axon' Cable, CNES, CSL, ESA, Euro-Composites, Gradel, I-space, KLEOS, Luxspace, Molecular Plasma Group SA, NASA, SouthWest Research Institute, Thales Alenia Space.

MAJOR SPACE PROJECTS

- Super-black coating technology for complex opto-mechanical systems
- Miniaturized mass spectrometers for space exploration
- Miniaturised chemical sensors for the monitoring of molecular contamination on payload surfaces.
- Anti-static ETFE based nanocomposite
- Improved thermal conductivity of epoxy resin
- Carbon-based solutions for super-capacitors, Li-ion batteries and fuel cells
- Software tool enabling numerical analyses of composite space structures
- Fully integrated stress-temperature sensors for structural health monitoring
- Antibacterials-antifungal coatings for in-orbit habitat
- In-space pultrusion manufacturing

**CEO/
HEAD OF DEPARTMENT**
Prof. Björn Ottersten

CREATION DATE
2009

ORGANISATION TYPE
Public Research
Organisation

NUMBER OF EMPLOYEES
Total: 450
Space: 80

**R&D INTERNAL
INVESTMENTS**
€7.7 M

CONTACT DETAILS
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CORE BUSINESS

The Interdisciplinary Centre for Security, Reliability and Trust (SnT) at the University of Luxembourg conducts internationally competitive research and PhD education in information and communication technology (ICT) with an emphasis on creating socio-economic impact.

Space-related research features prominently among its strategic priorities, with current projects including work in satellite communications, space resources and space vehicles – in the centre's unique space laboratories, SnT researchers develop new space technologies with partner companies.

SnT scientists conduct both long-term research and engage in demand-driven projects; an interdisciplinary approach allows them to tackle problems not only from a technical perspective, but also to address organisational, human and legal issues. Through SnT's Partnership Programme, researchers currently work in collaboration with over 60 private and public organisations, addressing the key challenges facing industry and the public sector in ICT.

The Centre has undergone a rapid development since its launch in 2009; recruiting top scientists, launching over 100 EU and ESA projects, protecting and licensing IP, launching six spin-offs, and creating a dynamic interdisciplinary research environment with some 450 people.

PRODUCTS AND SERVICES

Our expertise in satellite communications, autonomous systems, orbital and planetary robotics, small satellites, space systems design and mission-critical software makes us the ideal centre of excellence to support Luxembourg's commitment to space exploration and in-situ resource utilisation (ISRU).

We collaborate with public and private partners through an established model: **our Partnership Programme**. Companies of all sizes, entities and agencies work with us to achieve their innovation and optimisation goals. In return, our researchers receive access to relevant challenges, real-world data, and systems to test their research results. Every project is different, but usually the outcome is a prototype working in the partner's real environment. Companies work alongside specialised staff ready to hire at the end of the project, if needed. Our partners also receive access to the latest research methodologies and state-of-the-art equipment. SnT supports projects with co-financing, as well as support for third-party research grant applications.

TECHNICAL MEANS

We have 7 space labs: Concurrent Design Facility, CubesatLab, Lunalab, Zero-G Lab, SatcomLab, CommLab and 5G-SpaceLab. Our technical expertise covers a wide range of capabilities:

- Ground station development
- Mechanical and electrical ground support equipment
- Communication networks
- Operations
- Manufacturing of satellites
- Electric propulsion for satellites
- Robotic payloads
- In-space manufacturing
- Composites
- Satellite-based media
- Telecommunication services
- Risk Management services
- Data Analytics
- Environmental applications and services

MAIN CUSTOMERS

Around 70% of SnT's income stems from competitive research funding and over 100 MEUR external funding has been secured since SnT's creation. Through the SnT Partnership Programme, large numbers of partners have proved willing to invest in joint research activities, ultimately improving their competitiveness through new and improved services and systems. The programme currently counts over 60 partners.

MAJOR SPACE PROJECTS

- SES Partnership - Research Program in Satellite Systems
- VHTS: User Terminal Wideband Modem for Very High Throughput Satellites, ESA.
- LiveSatPreDem: Live Satellite Precoding Demonstration, ESA
- FlexPreDem: Demonstrator of Precoding Techniques for Flexible Broadband Systems, ESA
- SIERRA: Spectral efficient Receivers and Resource Allocation for Cognitive Satellite Communications, FNR-ANR
- PROSAT: on-board PROcessing techniques for high throughput SATellites, FNR
- MOSIS: Model-Based Simulation of Integrated Software Systems
- INSTRUCT: Integrated Satellite-Terrestrial Systems for Ubiquitous Beyond 5G Communications

**CEO/
HEAD OF DEPARTMENT**
Prof. Felix Norman Teferle

CREATION DATE
2017

ORGANISATION TYPE
Public Research
Organisation
University

NUMBER OF EMPLOYEES
Total: 8
Space: 5

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CORE BUSINESS

The Team Geodesy and Geospatial Engineering specializes in geodetic high-precision measurements and Earth Observations (EO) within various multi-scale geophysical, environmental and engineering applications. We also investigate improvements in the involved measurement techniques, e.g. GNSS, SAR remote sensing, photogrammetry and LiDAR, and their data analyses (machine learning/deep learning). Our applications include GNSS-derived crustal deformations for studies of sea-level rise, glacial isostatic adjustment and plate tectonics, GNSS-derived atmospheric parameters for applications in meteorology and climatology, multi-platform digital photogrammetry and LiDAR for the computation of high resolution digital terrain/elevation models for flood hazard modelling and city modelling, high-precision multi-sensor geodetic monitoring for infrastructure applications, multi-sensor 3D reality capture for Building Information Models (BIM) and digital twins.

PRODUCTS AND SERVICES

We are GNSS specialists and can provide a variety of related products (station coordinates, atmospheric parameters and satellite orbit and clock products as well as Earth Rotation Parameters). In the past we have provided coordinate solutions for reference GNSS networks on national to global scales. Our background in remote sensing and geospatial engineering allows also for classic topographic survey products, the generation of digital terrain and elevation models, building information models (BIM), city models, as well as deformation maps of geophysical features/infrastructure and subsidence/uplift maps of cities and regions. We are an International GNSS Service (IGS)

Tide Gauge Benchmark Monitoring (TIGA) working group analysis and combination centre. We provide near real-time hourly GNSS tropospheric products to EUMETNET eGVAP for assimilation into numerical weather prediction models.

TECHNICAL MEANS

We operate permanent GNSS stations at Findel Airport and Campus Kirchberg (G.D. Luxembourg), Walvis Bay and Lüderitz (Republic of Namibia) and the South Atlantic Ocean islands of South Georgia (South Georgia and the South Sandwich Islands), St. Helena and Tristan da Cunha (Ascension, St. Helena and Tristan Da Cunha).

We maintain a variety of scientific GNSS software (Gamt/Globk, Bernese GNSS Software, PRIDE, Napeos, RTKLib), as well as various geospatial software suits (e.g. Leica GeoOffice, Trimble Business Centre, Hexagon Geospatial Suite, PCI Geomatica, ESRI ArcGIS, nFrames SURE, PointCap Pro 3D), which we run on our in-house workstations or on the UL High Performance Computing Facility (ULHPC). For projects also available are our GNSS RTK kits, reference GNSS kits, terrestrial laser scanners, a drone and state-of-the-art surveying equipment.

MAIN CUSTOMERS

Administration du cadastre et de la topographie (ACT), Administration de la navigation aérienne (ANA) – MétéoLux, RSS-Hydro S.a.r.l., National Oceanography Centre (NOC), British Antarctic Survey (BAS), GeoForschungsZentrum Potsdam (GFZ), International Oceanographic Commission (IOC), Hartebeesthoek Radio Astronomy Observatory (HartRAO), Astronomical Institute University of Bern (AIUB), University College London (UCL), Luxembourg Institute of Science and Technology (LIST), Maxar/DigitalGlobe, PCI Geomatics, Hexagon Geospatial.

MAJOR SPACE PROJECTS

Almost all of our data is space based. However, we have also participated in the NASA Frontiers Development Lab (FDL) in 2017, 2018 and 2019:

- Lunar Resources (Water & Volatiles)
- Space Weather Challenge 02, Improve ionospheric models using GNSS/GPS data
- Disaster Prevention, Progress and Response, final topic: Flood detection in orbit (onboard a cubesat)

**CEO/
HEAD OF DEPARTMENT**
Prof. Olivier Francis

CREATION DATE
2005

ORGANISATION TYPE
Public Research
Organisation

NUMBER OF EMPLOYEES
Total: 10
Space: 9

TURNOVER 2020
Total: € 150 K
Space: € 100 K

**R&D INTERNAL
INVESTMENTS**
€ 50 K

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CORE BUSINESS

The Geophysics Laboratory focuses on climate, sea level variability and geodynamics. The primary goals include satellite geodesy of new remote sensing applications, obtaining reliable geodetic measurements of environmental change and assessing the influence of human and natural factors in those changes. To do so, the group has developed a patented differential free-fall gradiometer as part of our activities in scientific metrology, advanced high-accuracy Global Navigation Satellite Systems (GNSS) techniques, provided interpretation of time variable gravity from space and improved the modelling of environmental effects on geodetic observations.

PRODUCTS AND SERVICES

The gravity instrumentation can be used for metrology. We have the ability to measure the acceleration of gravity to 1-2 microgal (1 microgal = 10^{-8} m/sec²). Global Navigation Satellite Systems can be used to monitor positions of stationary and moving objects with high accuracy on a global scale. We have the ability to apply different GNSS processing strategies for absolute and relative positioning, and modelling depending on client requirements to achieve millimeter to centimeter level precision and accuracy. In addition, GL uses GNSS signals of opportunity to retrieve environmental variables such as sea level in polar regions.

TECHNICAL MEANS

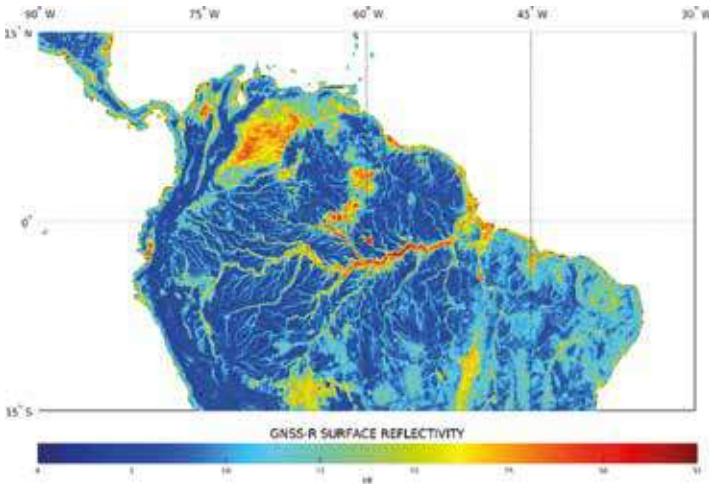
- Absolute Gravimeter: the portable instrument has the ability to measure the acceleration of gravity to 1-2 microgal (1 microgal = 10^{-8} m/sec²)
- Relative Gravimeters: the portable Scintrex Relative gravimeter has a precision of about 3 microgal (it is sensitive to height changes of 20 mm)
- Superconducting Gravimeter: non-portable relative instrument that primarily records changes in gravity due to solid Earth and ocean tides and atmospheric pressure; it is valuable in monitoring short- period changes in gravity
- GNSS Equipment: The GL have a range of state-of-the-art geodetic grade GNSS receivers which have the ability to observe all current GNSS signals

MAIN CUSTOMERS

NASA, ESA, LSA, Spire Global, ILNAS.

MAJOR SPACE PROJECTS

We use satellite imagery data but also satellite gravity, GNSS observations, and altimetry for our research. The Geophysics Laboratory developed ground-based GNSS reflectometry to detect changes in soil moisture, snow depth, and sea-level for scientific applications. GL have developed algorithms for spaceborne GNSS-R for soil moisture. GL uses grazing angle GNSS-R (GG-R) for sea-ice studies.



**CEO/
HEAD OF DEPARTMENT**
Prof. Stephan Leyer

CREATION DATE
2003

ORGANISATION TYPE
University

NUMBER OF EMPLOYEES
Total: 120
Space: 10

CONTACT DETAILS
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CORE BUSINESS

Within the University of Luxembourg, a leading institution of advanced research and higher education, the Research Unit in Engineering Science (RUES) – covering civil, mechanical and electrical engineering, as well as geophysics – recognises the socio-economic needs and challenges of both society and industry. To address these, the research unit has committed itself to becoming the Greater Region's education and research leader as well as a global player in its core research areas. A special focus will be placed on energy, environment and sustainable growth, contributing to, among other things, the European Strategic Technology Plan and the European Union's emphasis on creating an Innovation Union in Europe. The aim is to provide an innovation-driven research environment and to seamlessly integrate research and education to form future leaders and critical thinkers. Our research activities can be organised in three main areas:

- **Construction and Design:** research into civil and mechanical engineering structures, fatigue behaviour, dynamic testing methods and development processes
- **Energy and Environment:** research into energy efficiency of buildings, energy consumption and renewable energies
- **Automation and Mechatronics:** research into mechatronic systems, dynamics of electromechanical systems

The majority of projects have an applied as well as a fundamental character and are executed in close collaboration with industry. The focus can be on the technology, or on the process of its development, simulation and validation.

All research activities are integrated into a network of national, regional and international public and private research institutions.

PRODUCTS AND SERVICES

- Satellite control
- Space robotics
- Improvement of development processes
- Dynamics of mechanical structures
- Energy consumption
- Communication

MAIN CUSTOMERS

EURO-COMPOSITES, HITEC Luxembourg, DKE Aerospace, Goodyear, ISS, Husky, IEE, Delphi

MAJOR SPACE PROJECTS

- **Galileo:** DMGA (Dynamic Modeling of Ground Antennas) The goal of the DMGA project is to obtain a very accurate and optimised static and dynamic model of large satellite ground antennas including the closed loop full motion control by integrating modern computation tools like CAD, FEM analysis, Multi-body systems and regulation simulation software. The simulation models are validated by measurements on the real antenna on site
- **Satellite Control:** research is carried out in the area of modelling and advanced control of satellites, especially attitude and orbit control systems, with a special focus on micro satellites
- **Space Robotics:** modelling, simulation and control of robotic manipulators for spacecraft and satellites. Applications are in the area of space debris removal and on orbit servicing

Further research is carried out in the area of systems engineering and the improvement of development processes for micro satellites.



04

USEFUL
CONTACTS

ABOUT THE LUXEMBOURG SPACE AGENCY

The objective of the Luxembourg Space Agency is to develop the space sector in Luxembourg by fostering new and existing companies, developing human resources, facilitating access to funding and supporting academic research.

The agency implements the national space economic development strategy, manages national space research and development programs, and leads the *SpaceResources.lu* initiative. Furthermore, the LSA represents Luxembourg within the European Space Agency and space-related programs of the European Union and the United Nations.

LUXEMBOURG SPACE AGENCY – ECONOMIC DEVELOPMENT TEAM

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