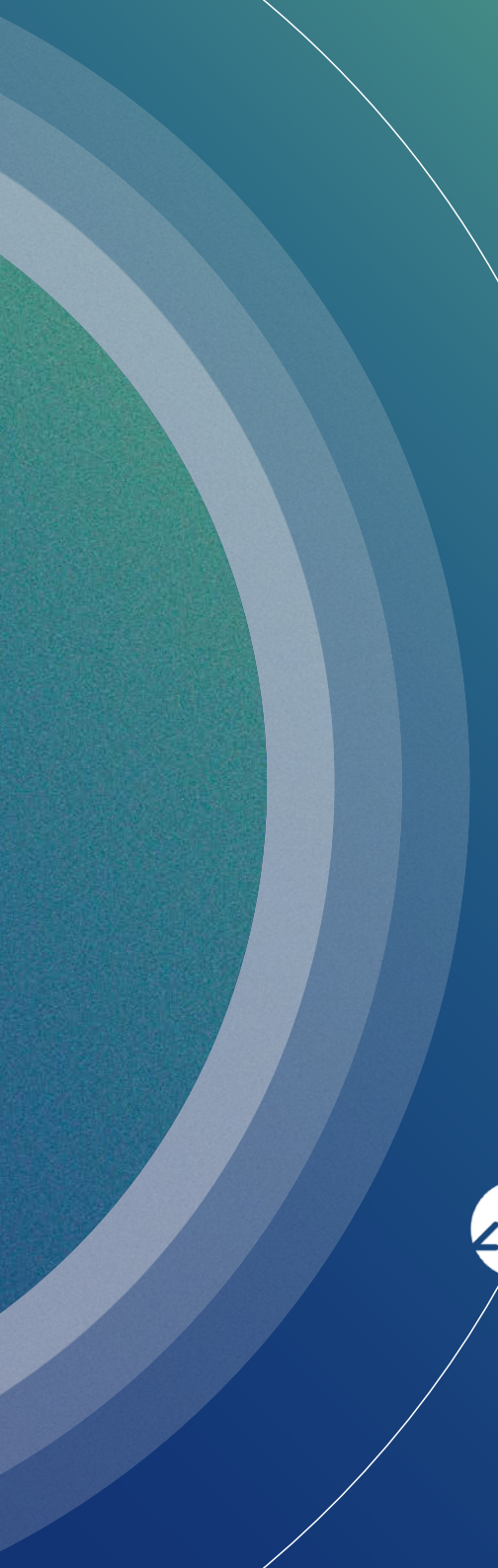




Space directory

2023



LUXEMBOURG
SPACE AGENCY

space-agency.lu

Space directory

2023

01

Luxembourg, a European Hub for Commercial Space

07

02

Companies

13

adwaisEO	14	HITEC Luxembourg	74
Air Liquide	16	Hydrosat	76
AM4AM	18	IBISA	78
Amphinicy Technologies	20	Imagination Factory	80
Arspectra	22	In Tech	82
ArviCOM	24	Integrasys	84
Blackswan Space	26	ispace Europe	86
Blue Horizon	28	itrust consulting	88
Bradford Space	30	Kleos	90
ClearSpace Today	32	LMO	92
CGI	34	Lunar Outpost	94
Contec Space	36	Luxsense Geodata	96
CREACTION INT.	38	LuxSpace	98
Cybercultus	40	LuxProvide	100
Databourg Systems	42	LuxTrust	102
Earthlab Luxembourg	44	Maana Electric	104
EBRC	46	Mission Space	106
EmTD Lab	48	Molecular Plasma Group	108
EmTronix	50	Northstar Earth and Space Europe	110
EURO-COMPOSITES	52	Odysseus	112
e-Xstream engineering	54	OffWorld	114
FACTiven	56	OQ Technology	116
Flawless Photonics	58	Orbitare	118
FourPoint Space	60	POST Luxembourg	120
FTA Communication Technologies	62	Rafinex	122
GlobEye Research	64	Redwire Space	124
GomSpace Luxembourg	66	RespectUS	126
GovSat	68	Rhea System Luxembourg	128
GRADEL	70	RSS-Hydro	130
HelixSpace	72	Saturne Technology	132

03

Public Research organisations 159

ESRIC	160
LIST ERIN	162
LIST ITIS	164
LIST MRT	166
Uni.lu Geodesy and Geospatial Engineering	168
Uni.lu Geophysics Laboratory	170
Uni.lu RUES	172
Uni.lu SnT	174

04

Useful Contacts 177



Posters
Table of Space capabilities
Space capabilities at a glance

SES	134	Telindus Luxembourg	148
Skyflox	136	Thales Alenia Space Luxembourg	150
Space Cargo Unlimited	138	WASDI	152
space4environment	140	WEO	154
SPARC Industries	142	Yuri	156
Spire Global	144		
SPIN	146		



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 2023 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 75 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.

Luxembourg: a sustainability focused strategy

Over the past year, Luxembourg has been redefining its national space strategy, which revolves around four sustainability pillars.

Resources for space - sustainable and responsible use of 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.

Economic sustainability

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 a 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.

In general, the economic sustainability of space activities is directly linked to the primary objective pursued in developing commercial space in Luxembourg: economic diversification.

It aims at the perpetuation of the competences developed until now and will therefore be a question of consolidating the national positioning on the preferred market segments but also of identifying new segments offering interesting commercial opportunities.

While economic sustainability is one of the pillars of our new national strategy, new challenges linked to a more intensive use of Earth orbits also arise, as recent years have witnessed technological developments facilitating the development of entrepreneurial initiatives.

In that context, Luxembourg's strategy for the development of the civil space sector has been reviewed. We aim to continue fostering the development of the space sector to make it a cornerstone of the national economy. At the same time Luxembourg wants to see space as a major contributor to the sustainability of activities on Earth and to favour a responsible approach to activities in Space.

Sustainability in space

The new dynamics witnessed in the space sector over the past couple of years, added to the intensive use of Earth orbits foreseen for the coming years, is leading to an increase in the risks of in-orbit operations and a proliferation of space debris.

Yet today, space is part of our everyday life. What is more, space infrastructures also provide commercial, security, environmental and societal benefits. It is therefore urgent and imperative to promote a responsible and sustainable use of space. Luxembourg's commitment will be materialized at both national and international levels, and through the development of national competencies in space traffic management and in-orbit services.

Sustainability on earth

Space can bring answers and a major contribution to societal and environmental issues we are facing today. Contributing to the sustainability of activities on Earth implies building bridges between the space sector and the terrestrial sector. LSA also aims at strengthening national competencies in fields of activity likely to serve other national economic sectors.

The development of competences will also target segments which can contribute to some of the sustainable development objectives, with a particular focus on those which are relevant to Luxembourg's commitments with regards to cooperation and humanitarian action.

One key element of this 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 self-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.

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 get a fundamental understanding of the scientific and technical basis and 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.

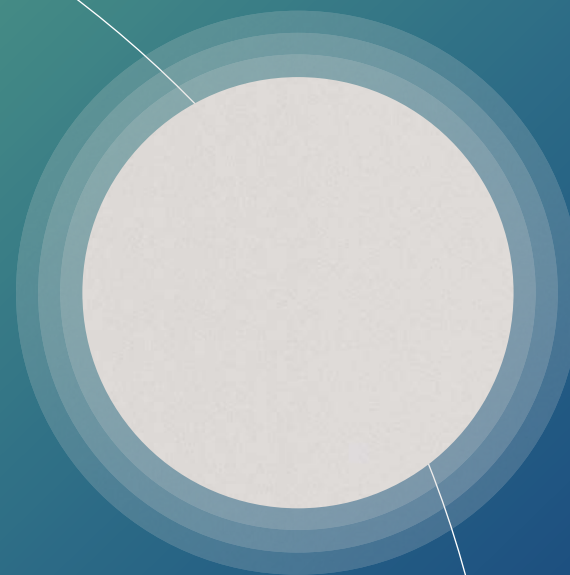
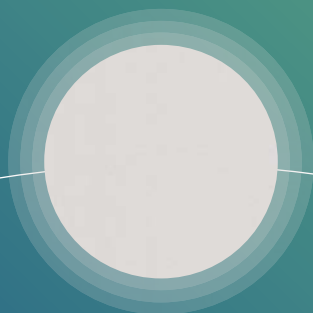
The future

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



adwäisEO

Core business

adwäisEO SA provides IT & Data Analytics services related to geospatial data in general and Satellite Earth Observations in particular. E.g. It provides components of Payload Data Ground Segments (PDGSs) of Satellite missions, and support the added-value downstream sectors of Earth Observation (EO), designing algorithms and implementing processes for Big Data Mining and Data Transformations along with high performing and cost-effective solutions such as multi-Petabytes archives, intuitive geoportals and efficient processing solutions in cloud and/or HPC environment.

Products & 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 develop native cloud and/or HPC solutions in order to provide tailor made services and products. To deliver, adwäisEO benefits from the support of its partners in the UK, France, Spain, and Canada, all members of the ecosystem are coordinated by the French company ACRI-ST

Technical means

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

- Cloud-computing: infrastructure and namespace -as-a-service (10 000 vCpus in a private cloud).
- Cloud-Storage 2 PB of in house S3 object storage with geographical replication Scalar storage for massive data archiving (more than 65 PB).
- LTO tape libraries for backup and preservation (more than 100PB).
- Fast NVME storage for computation (2 PB)
- 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.
- 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.

ESA Long-Term Archive

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

Data Archival, Management and Processing Services

Main service provider of 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.

Optical Mission Performance Cluster

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

Sentinel 2 Global Mosaic

Service provider for the Sentinel 2 Global Mosaic for the European Joint Research Center.



INFORMATIONS

CEO/Head of department

Pierre De Gobert

Creation date

2015

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 21

Space: 21

Turnover 2022

Total: 5.1M€

Space: 5.1M€

R&D internal investments

500K€

Qualifications, Approvals

ISO9001 under way

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Air Liquide Luxembourg SA

Core business

Air Liquide is a world leader in the production, purification and distribution of industrial and medical gases; supplying all types of industries, hospitals and patients with essential molecules such as O₂ or N₂. Air Liquide is actively involved in the energy transition with the development of proprietary technologies for the decarbonisation of various industries by capturing CO₂ at its emissions place or by reducing the emissions using hydrogen. Air Liquide is fully committed to the development of a low carbon H₂ society and can rely on its presence in more than 80 countries well connected with the local ecosystems. Although not its main activity in terms of revenue, Air Liquide has greatly contributed to the success of European launchers and Earth Observation Missions, with the development of advanced cryogenic technologies with exceptional high reliability. For the last 50 years, Air Liquide has developed and manufactured 802 cryogenic tanks that flew in space on Ariane rockets (over 260 launches), and 12 gas & cryogenic machines for 7 space missions (ISS, HERSCHEL, PLANCK, MICROSCOPE, EXOMARS, CSO, MTG).

Products & services

Industrial and medical gases
Gas production and purification plants
Advanced technologies for Hydrogen
Carbon Capture technologies
In-space cryocoolers, refuelling
and propellant supply

Major space projects

In Luxembourg : Development of in-space technologies related to energy storage (RFCS), cryogenic management systems and innovative gas purification technologies for air revitalization.



INFORMATIONS

CEO/Head of department

Vincent Dauchy, Air Liquide Industrial Merchant Benelux General Manager, including Air Liquide Luxembourg SA

Creation date

1931

Organisation type

Large Enterprise

Number of employees

Total: 10

Space: 2 employees dedicated to space technologies development in 2023, to grow in 2024 within Air Liquide Advanced Technologies Luxembourg (to be created)

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AM4AM

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 & 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



AM 4 AM
Advanced Materials
for
Additive Manufacturing



INFORMATIONS

CEO/Head of department

Maxime Delmée

Creation date

2019

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 2-5

CONTACT

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Amphinicy Technologies

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 +25 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, especially in ground segment virtualization and 5G compliance – SatCom modem virtualization, Monitor and Control, Mission Operations, Simulations, Validation and Verification, EO data acquisition, Telemetry and protocol analysis, CyberSecurity in Satcom.

Products & 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 station (e.g. broadcasting teleports), 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 reduces costs, improves flexibility and maintenance.

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 following ground segment domains:

SatCom solutions:

- Satcom ground segment virtualization (Virtualized SatCom modem, 5G compliance)
- Secure communication (Cybersecurity in SatCom)
- EO ground segment virtualization
- Monitor and control systems,
- Ground segment simulations,
- In-orbit testing systems,
- Mission Operations,
- Mobility – beam roaming and load balancing.

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 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, Qinetiq, Airbus DS)
- Teleports and space mission operation centres (RSS) and
- Satellite equipment manufacturers (OHB, iDirect).

Major space projects

Amphinicy Luxembourg provided software engineering services in following flagship projects:

ViSAGE

- A feasibility study for Satcom virtual ground segment
- The first PoC of fully software implemented SatCom modem
- 5G compliant service layer (e.g. orchestration)

P2PFSO

- CyberSecurity provisions for a point to point optical link terminals
- Military grade security implementations

GOVSATCOM MOC

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

COPERNICUS

AIV for Sentinel communications modules

GHOST

Embedded system for spread spectrum modem

ST Engineering / iDirect Europe

Validation platform and services for VSAT networks



**AMPHINICY
TECHNOLOGIES**



INFORMATIONS

CEO/Head of department

Frane MILOŠ

Creation date

2002

Organisation type

SME

Number of employees

Total: 25
Space: 25

Turnover 2022

Total: 1 660 574,73
Space: 1 660 574,73

R&D internal investments

450 000,00

CONTACT

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Arspectra SARL

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 & 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.



AR SPECTRA

INFORMATIONS

CEO/Head of department

Cédric Spaas

Creation date

2018

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 10-50

CONTACT

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ArViCom Sarl

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 & 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.

ARVICOM



INFORMATIONS

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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Blackswan Space

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 & 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

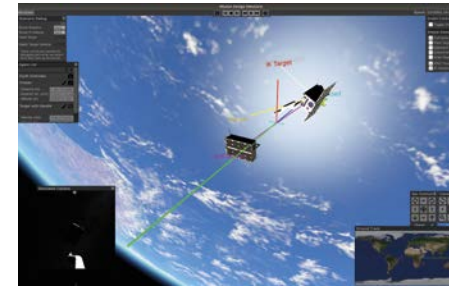
Off-the-shelf autonomous space robotics libraries that enable debris removal, in-orbit servicing, assembly and in space manufacturing missions.

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))
- ESA GRALS Digital Twin Development



Rendezvous, Proximity Operations & Docking simulations on Mission Design Simulator



In-Orbit Servicing mission simulation on Mission Design Simulator



Vision Based Navigation system prototype



INFORMATIONS

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 2022

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

CONTACT

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Blue Horizon Sarl

Core business

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

Product & services

Revitalisation of deserted areas on Earth using Biological Soil Crusts (BSC)
Bio Reactors
Earth Observation
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) is capable to strongly reduce water and wind erosion and creates the basis for first pioneer plants. It also forms a CO² sink. After a laboratory phase, the BSC has been tested in our open field test sites in Burkina Faso. At the same time, a site selection and monitoring system is developed using Earth Observation data. After the field test, the next step is the implementation of a large-scale field test (1 ha and 1 km²) in Morocco, which will be carried out between 2023 and 2025.

OW INK

The project aims at developing printable material out of algae. First tests have been successful, and the material is now qualified. A second project will now further qualify different materials and allow the production of various tools using 3D printing technologies.

BIORAT 2

Development of a nitrification process using algae and bacteria to convert urine into useful products in space.



INFORMATIONS

CEO/Head of department

Jochen Harms

Creation date

2018

Organisation type

Large Enterprise

Number of employees

Total: 7
Space: 5

Turnover 2022

Total: 700 K
Space: 400 K€

R&D internal investments

100 K€

CONTACT

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Bradford Space

Core business

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

We offer affordable and high-performance avionics whose robust and performing nature makes them well-suited for both deep space and demanding near Earth orbit applications.

We produce the Comet propulsion system which is a launch-safe and cost-effective electrothermal propulsion system offering the ideal balance of cost and performance. Comet uses water as propellant which allows it to be handled and fuelled at the factory with ease. Its highly flexible interface is easy to integrate into small satellites and to operate on orbit.

Products & services

An avionics solution

a modular system suitable for deep-space or high-performance small satellites 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
- propulsion electrical control unit aimed at monopropellant thruster solutions

The Comet

a water-based propulsion system 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
- Space heritage since 2018

Technical means

Design, test, qualification and integration of electronics, RF and non-toxic propulsion systems.

Main customers

Commercial and institutional small satellite manufacturers from all over the world.

Major space projects

Design and developments of deep-space avionics & propulsion systems.



Example Configuration of the Bradford Avionics Suite



Comet 1000 Water-based Propulsion System



INFORMATIONS

CEO/Head of department

Gary Paul

Creation date

2015

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 20

Space: 20

Turnover 2022

Total: 4.5M€

Space: 4.5M€

R&D internal investments

1.35M€

Qualifications, Approvals

Organisme agréé pour l'environnement naturel

CONTACT

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ClearSpace Today SA

Core business

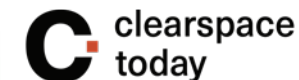
ClearSpace is a newspace company which is addressing the problem of space sustainability for a practical perspective developing high-tech solution to remove space debris and service, repair, upgrade and refuel satellites

Products & services

ClearSpace builds products and services to provide the in-orbit capabilities critical to the successful future of sustainable space operations. ClearSpace sees the safe removal of space debris (Active Debris Removal, or ADR) as a foundational capability, from which other services can be developed. Services such as orbital transport (last-mile deployment, relocation), mission extension (attitude control, station-keeping, refuelling), and repair and construction (inspection, component replacement, manufacture) will leverage technologies developed in support of ADR.

Major space projects

ClearSpace is currently working on an ambitious program ENCORE with ESA (European Space Agency) with a strong support from Luxembourg Space Agency (LSA) and commercial satellite operator to develop technologies and solutions to extend life of an operational satellite in space that has run out of fuel.



INFORMATIONS

CEO/Head of department

Sergey Gugkaev (General Manager)

Creation date

10.03.2023

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 3
Space: 3

CONTACT

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Website

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Artistic impression of a ClearSpace servicer approaching a GEO satellite © ClearSpace



CGI

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 & 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 GornSpace'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)



INFORMATIONS

CEO/Head of department

Guillaume Schott

Creation date

2020

Organisation type

Large Enterprise

Number of employees

Luxembourg: 200

Global: 77500

Space: +1000

Qualifications, Approvals

ISO 9001, ISO 14001

CONTACT

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CONTEC Space Sarl

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. With professionals from a space background in ground stations and satellite operation, CONTEC aims to go public on the KOSDAQ market in October of 2023. In addition, CONTEC has expanded with two more subsidiaries, CONTEC Earth Service and CONTEC Space Optics, both preparing for seed funding in the latter half of 2023.

Products & 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 satellite imagery analysis and application services based on raw satellite image data by applying deep learning algorithms for object detection depending on the needs of our customers. We especially focus on applications for urban change detection of Smart Cities and provide the best service possible for local governments and urban development. CONTEC's subsidiaries, CONTEC Earth Service provides satellite imagery and value-added satellite image application and CONTEC Space Optics provides technologies in high-resolution imaging for space missions.

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 continued to increase, the space market is open to many new businesses and its scale is growing simultaneously. CONTEC is taking advantage of this opportunity and aim to provide services to satellite operators and satellite launchers who need to connect with their satellites. These customers are comprised of government agencies, research institutions, universities, and the private sector in the Americas, Europe, and Asia. As for its satellite imagery application service, CONTEC is especially working with local governments but does not restraint to this category.

Major space project

CONTEC established its first ground station located on Jeju Island, South Korea and has expanded globally with a total of 12 ground stations across 10 different countries. In addition, CONTEC plans to launch the first CONTEC satellite, Oreum-Sat, in early 2024. <CONTEC Ground Station Map >



Jeju ground station



Deployment plan



INFORMATIONS

CEO/Head of department

CEO: Dr. Sunghee Lee, CONTEC HQ in Rep. of Korea
General Director: Ms. Semi Park, CONTEC Space Sarl in Luxembourg
CEO: White JH Paek, CONTEC Earth Service in Rep. of Korea
CEO: Dr. Youngwan Choi, CONTEC Space Optics in Rep. of Korea

Creation date

Foundation of CONTEC HQ in Rep. of Korea: Jan 5th, 2015
Foundation of CONTEC Space Sarl in Luxembourg: December, 2019
Foundation of subsidiary, CONTEC Earth Service in Rep. of Korea: November, 2021
Foundation of subsidiary, CONTEC Space Optics in Rep. of Korea: April, 2023

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 2

Turnover 2022

Total: 12 Millions

CONTACT

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CREACTION INT. SARL

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 & 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:** Creaction 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. Creaction 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://creaction-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

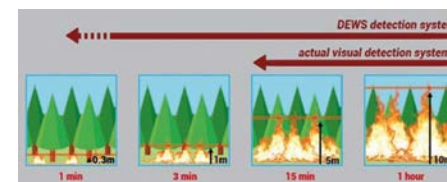
Main customers

- Private companies: Renault, Beckaert, 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 UtopTextile: space technologies selected and tested through international workshops.
- NTERREG/ 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



CREACTION INTERNATIONAL

INFORMATIONS

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

Qualifications, Approvals

ESA BASS BROKER

Turnover 2021

Total: € 205,123

Space: € 96,025

CONTACT

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Cybercultus

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 & 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



INFORMATIONS

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

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Databourg Systems S.A R.L-S

Core business

Databourg Systems is an environmental data analytics startup that emerged from innovative technology originating at the University of Luxembourg. We specialize in repurposing existing telecommunications infrastructures, particularly communication satellite networks, for environmental monitoring. Databourg's mission is to deliver top-tier rainfall intelligence to both businesses and institutional users, aiming to be recognized as "The Rain Company".

Products & services

Databourg's RainVision product offers precise, real-time, and geographically specific rainfall information through a cost-effective approach. By merging data from its extensive proprietary rainfall sensors with other data sources, it offers a comprehensive view of rainfall patterns. This invaluable rainfall intelligence assists governments and businesses with early warnings and decision support tools.

Databourg is dedicated to extending the reach of its rainfall monitoring system. Presently, it operates in Southeast Asia and is poised for expansion into South America, further solidifying its commitment to delivering vital environmental insights on a global scale.

Technical means

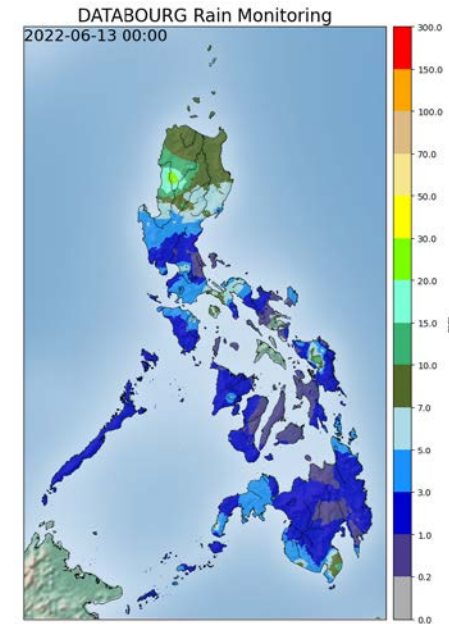
Patented and proprietary technologies.

Main customers

National Weather Agencies, Insurance Industry, Utility companies, Weather service providers

Major space projects

LuxIMPULSE



INFORMATIONS

CEO/Head of department

Ahmad Gharanjik

Creation date

2017

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 4

Space: 3

CONTACT

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EarthLab Luxembourg SA

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 & 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



INFORMATIONS

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

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EBRC

Core business

Located in the heart of Europe, Luxembourg is a unique gateway to European and international markets, limiting the risks in the financial sector and in the management of sensitive information thanks to its secured regulatory frameworks. Luxembourg's international environment is ideal to offer competitive advantages meeting 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 compulsory for clients managing sensitive information (Finance, Health & Life Sciences, International Institutions, Online Services, Security-Defence-Space and Operators of Essential Services, etc.).

Product & 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

→ 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 SES Headquarters 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.



INFORMATIONS

CEO/Head of department

Sébastien Genesca

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, Data Centres 3x Tier IV Design Documents, 2x Tier IV Facility Constructed

CONTACT

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EmTDLab – Space Division S.A.

Core business

Space radiation is still the most limiting factor for satellite and spacecraft. Current radiation shielding solutions are either inefficient from an economic and technical point of view or completely absent from the newest ships for deep space travel. EmTDLab is the sole company that tackles the radiation shielding challenge at a fundamental level. The technology uses nature-inspired algorithms where the radiation-fittest materials are selected for reproduction and mutation in order to produce offspring's of the next generation. The fittest candidates are then scaled-up to their microstructure to predict their mechanical properties & manufacturing condition. The combination of radiation & mechanical properties optimisation is a novel and inventive technology that will revolutionize the way materials are designed in the New Space era.

Products & services

Mass-producible multi-layer shielding for System-on-Module electronics components dedicated to in-space computing.

Custom-produced radiation optimised structural materials for space vehicle.

VLEO to deep space radiation environment simulation

Radiation exposure modelling & shielding optimisation for existing materials

Contract research aerospace engineering services for existing materials radiation shielding optimisation

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.

Technical means

Radiation Optimised Materials Possible

Scope:

- Metal alloys
- Crystalline polymers
- Technical ceramics

Physical & Chemical Properties Optimisation

- Radiation Shielding: Heavy Ions, High Energy Protons, High Energy Electrons, Secondary neutrons; secondary electrons; EMI shielding

Mechanical Properties Optimisation

- Young Modulus
- Instant Fracture
- Fatigue Crack, fatigue crack propagation

Main customers

- Private aerospace companies
- Spacecraft integrators
- Space agencies
- Radiation-hardened electronics manufacturers
- Commercial-off-the-shelf (COTS) electronics manufacturers

Major space projects

Smart Radiation Shielding for EEE Components
European Space Agency (ESA) supplier
Member of Singapore Space Technology Limited

EmTDLab

INFORMATIONS

CEO/Head of department

Cedric R.G. Thiry

Creation date

2018

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 7

CONTACT

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EmTroniX

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 On-Board Computer, Software Defined Radio, LNB, LNA, Power Amplifier and even more to come.

Products & 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 modelling 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, OQ-Technology, SkyfloX, IPAG, GOMspace), Military (NSPA), Automotive component manufacturers (Delphi, Honneywell, 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 (OQ-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.



INFORMATIONS

CEO/Head of department

Cédric Lorant, CEO

Creation date

2001

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 32

Space: 29

Turnover 2022

Total: 2800k€

Space: 2700k€

R&D internal investments

265k€

Qualifications, Approvals

ECSS-ST-Q-70-08C
and ECSS-ST-Q-70-38C

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EURO-COMPOSITES S.A.

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 & services

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

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, Aluminum structural panels, CFRP solar array substrates, Bracketry, S/C environmental testing, S/C transport container
SMILE MISSION : Payload Module Structure
ATHENA Mission : Low temperature radiator panel with embedded heat pipe (Design, Manufacturing & Tests)
Development of RF-transparent Glass Fiber Sandwich Panels for Space applications
Moon Rover Structural parts manufacturing
ARIEL: Propulsion Module Structure
SAR Satellite Structure for LEO
Several commercial missions similar to PROBA design
Macro-perforated non-metallic core development for launchers
COMET-Interceptor: Dust shield

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)
Skyflux: Radome design & manufacturing, final assembly

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
- Perforated Honeycomb core: Qualification of perforated honeycomb types for Space application
- Quartz-Glass honeycomb core and sandwich panels: RF transparent glass fibre sandwich panels
- 3D Honeycomb for Curved Structure Manufacturing

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
- Commercial Geostationary Telecommunication Satellite Bus Module Structure Manufacturing and Assembly
- SAR satellite structure manufacturing, incl. painting and heat-pipes
- Antenna Backing Structures with Diameter of 2,5m



INFORMATIONS

President & CEO

Mr. Rolf Mathias Alter

Deputy CEO and Head of Defence & Space Technology

Mr. Christoph Herrmann

Creation date

1984

Organisation type

Large Enterprise

Number of employees

Total: 713
Space: 21

Turnover 2022

Total: € 100 MIO
Space: € 5.9 MIO

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

Name

Dipl. - Ing. Christoph Herrmann, MBA (Deputy CEO, CSO Defence & Space Technology)

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e-Xstream engineering, part of Hexagon Manufacturing Intelligence Division

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 & services

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

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)

* ICME: Integrated Computational Materials Engineering



INFORMATIONS

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

R&D internal investments

25000

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FACTiven

Core business

FACTiven is a cybersecurity company providing data security solutions for space, government and defence organizations.

FACTiven specializes in safeguarding and enhancing the reliability of space system data. Our mission is to ensure that vital information from space, such as observation data, space traffic insights and analytics remains trustworthy and secure. We achieve this through innovative solutions that trace the journey of data, protecting it from manipulation and tampering, even in distributed and Zero-Trust environments. By fortifying the integrity of space data, we empower organizations to make informed decisions and drive progress in fields like CSR, climate change adaptation, disaster relief, security and defence.

Products & services

FACTiven provides:

- state-of-the-art digital solutions for space data traceability and protection which seamlessly integrates into the space data value chain, from satellites to end-users.
- Consultancy and engineering services

With FACTiven, clients access not just software but a partner in navigating the evolving landscape of space data trustworthiness.

Technical means

FACTiven employs highly-qualified ICT and space engineers with expertise in the following domains:

- Space and ground segments development & operations
- Cybersecurity and cryptography
- Data stewardship

Main customers

- Space data value chain actors
- Government & institutions
- Space and defence agencies

Major space projects

Enhancement of remote sensing data for use in regulated industries.



INFORMATIONS

CEO/Head of department

Frederic TOURRET

Creation date

2022

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 1-10

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Flawless Photonics, S.a.r.l

Core business

Manufacturing of optical glasses, fibers and components in microgravity. Flawless Photonics produces the industry-leading Flawless Fiber, 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 cables for the telecommunications industry.

Products & 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.

Technical means

Flawless Photonics conducts extensive research and development in the field of ZBLAN glass, Mid Wave InfraRed, AI and robotic automation, and other areas critical to the success of producing large volumes of commercial grade Flawless Fiber for use across applications and across industries.

Main customers

Currently Flawless Photonics has one main customer, with approximately 50 potential customers at various stages of discussion to procure and utilize Flawless Fiber once sufficient quantities and performance have been achieved.

Major space projects

Flawless Photonics is in the business of manufacturing commercial-grade Flawless Fiber at scale. To this end, our primary space projects are to achieve this mission. Various facets of Flawless Photonics' business from R&D, to manufacturing, and supply chain are influenced 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.


FLAWLESS PHOTONICS

INFORMATIONS

CEO/Head of department

Robert Loughan

Creation date

10/04/20

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 14

Space: Optical Systems, and Component Manufacturing; In-Space production systems

Turnover 2022

Total: 2M€

Space: 2M€

R&D internal investments

2M€

CONTACT

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Four Point Space S.A R.L.

Core business

As a member of structure that holds Four Point, Remote Sensing Business Solutions, Haul Vision, Remote Sensing Environmental Solutions and Four Point Space, company leverages cutting-edge AI and SpaceTech to revolutionize transportation and environmental monitoring. Our two prime offerings, TerraEye and Autonomous Transportation Platform (ATP), redefine logistics and terrain mapping, with applications in mining, space exploration, and beyond. Our robust products boost safety, efficiency, and cost-effectiveness, shaping the future of industries and space exploration.

Products & services

Many industries struggle with inefficient logistics, hazardous working conditions, and environmental impact. We address these issues with TerraEye and ATP. TerraEye provides real-time, comprehensive geospatial data for precise environmental monitoring, while ATP optimizes material transport via autonomous haulage, enhancing safety and efficiency additionally expanding TerraEye capability with extra sensor data collected from in situ operations.

Technical means

TerraEye, our advanced geospatial intelligence platform, uses multi-source geospatial data, AI, and satellite imagery for real-time, precise ground condition information. It creates digital twins of environments, with reporting and notification features for efficient monitoring. This real-time data and analytics combo is industry novel. Our Autonomous Transportation Platform (ATP) boosts our unique value with autonomous haulage, improving safety, efficiency, and cost-effectiveness in material transport. The real magic happens when these two technologies synergize. They not only tackle immediate industry challenges but also show promise in space exploration, an underserved area. Our dual-tech, future-focused approach sets us apart.

Main customers

Industries like mining, transportation, and space exploration are constantly seeking innovative technologies to enhance efficiency, safety, and sustainability. Issues such as environmental monitoring, land cover segmentation, and autonomous transportation present constant challenges, and the demand for robust solutions is high. Customers are acutely aware of these problems and are keen on implementing cutting-edge technology that can alleviate them effectively.

Major space projects

TerraEYE :

application designed to analyse the productivity of a mine, its impact on the environment, plan new extraction, and track machine telematics.

ATP :

Autonomous Transport Platform to be used in Lunar environment, granted in Start-up Support Programme in ESRIC; part of ecosystem in 'Site Preparation for Landing/ Launch Pad and Blast Shield Construction' developed by Astroport Space Technologies, Inc. in STTR project funded by NASA.

Regolith Sorting Station :

concept study during 'Site Preparation for Landing/ Launch Pad and Blast Shield Construction' project developed by Astroport Space Technologies Inc. Under patent registration and further development



INFORMATIONS

CEO/Head of department

Marek Wilgucki CEO of Remote Sensing Business Structure (Holding Structure)
Filip Janasz,
Manager Four Point Space (Lux)
Oskar Fryckowski,
Manager Four Point Space (Lux)

Creation date

Four Point
11.2018
Remote Sensing Business Solutions
05.2022
Four Point Space Sarl
03.2023

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: **1**
Space: **1**

Qualifications, Approvals

Microsoft Azure AI Specialization

CONTACT

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FTA Communication Technologies SARL

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 & 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) cascable 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)



INFORMATIONS

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

CONTACT

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GlobeEye®

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 & 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.



INFORMATIONS

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



CONTACT

Name

GlobeEye S.A.R.L.

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GomSpace Luxembourg SARL

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 & 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.



INFORMATIONS

CEO/Head of department

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

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GovSat

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 & 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



INFORMATIONS

CEO/Head of department

Patrick Biewer

Creation date

2015

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 20

Turnover 2021

Total: 23,4 M

R&D internal investments

N/A

Qualifications, Approvals

ISO 9001, ISO 27001, NATO FSC, EU FSC, LUX FSC

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Gradel sàrl

Core business

With over 50 years of experience in automated electro-mechanical engineering, GRADEL specializes in developing complex systems for the space market. GRADEL offer a complete range of Mechanical Ground Support Equipment (MGSE) for handling, assembling, and testing spacecraft components. These systems are built to precise specifications using specialized materials to ensure cleanliness, magnetic compatibility, and thermal compatibility. GRADEL has also ventured into sustainable lightweight structures and developed the Gradel Robotic Additive Manufacturing process (GRAM) in 2018. GRAM is an endless filament wet winding process enabling the manufacturing of complex 3D structures. Weight savings up to 70% have been proved without compromising stiffness, strength or frequency requirements.

Products & 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 O/g supports for manufacturing, equipment for Antenna Test Facilities.

LIGHTWEIGHT STRUCTURES:

GRADEL offers R&D, Engineering, Robotic & Multi-Material lightweight manufacturing expertise according to customer request using GRAM. Considering all load cases to fit at best into the given available customer design space, using AI powered software algorithms for manufacturing parts from few cm up to several meters.

Technical means

2 Engineering office with more than 60 engineers in total in multiple disciplines
Software: SOLIDWORKS, FEMAP, NASTRAN, MATLAB, SIMULINK.

2 Assembly and test workshops

→ 800 m² x 10 m height, crane capability: 2 times 10 t

→ Production facility for composite lightweight structures: 650 m² with grey room ; 5x robot equipped with GRAM applicator on a 10m long x-axis ; 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



THINK LIGHTER



INFORMATIONS

CEO/Head of department

Claude Maack, CEO

Creation date

1965

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 68

Space: 31

Turnover 2022

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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Helix Space

Core business

Helix Space has two divisions:

1. Services:

We serve the NewSpace industry in the fields of Space Resources, Ground Segment virtualization/cloudification, downstream applications, and big data, with Soft Funding, Product/Market Fit, and Cybersecurity Services.

We also serve the Life Sciences value chain providing scientific review and grant evaluation services.

2. R&D:

We want to use existing and future research infrastructure on Earth's orbit to develop and commercialize biomolecules, biomaterials, and nutritional supplements for preventive and therapeutic management of human and veterinary diseases on Earth.

Products & services

Soft Funding:

Helix Space helps you obtain national (e.g., Luxembourg Space Agency, Belgian Space Office), or intergovernmental (e.g., European Space Agency, European Union Space Agency) grants to develop your product or service. We provide the following services:

- Analyse and identify public grants or tenders that fit your requirements.
- Create or guide you in the preparation of the Business Plan, Cost Sheets and Financial Model material required by the public procurement agency.
- Review and determine if there are any gaps in the technical, legal and management material prepared by your team.
- Assist you during the negotiation phase with the public procurement agency.

Product/Market Fit

Helix Space works with you to make sure your product or service is Feasible, Desirable and Viable. We help and/or guide you through the following tasks:

- Value proposition design
- Market analysis and assessment
- Competitive analysis
- Business model
- Go to market strategy
- Product development roadmap
- Implementation roadmap
- Financial model, sensitivity analysis and scenarios.
- Commercial risk analysis
- Business/Technical partner mapping & networking

We can do this as part of your existing product development budget, or as part of a publicly funded project.

Cybersecurity

Helix Space assesses or audits your cybersecurity stand based on internal or external requirements. We provide the following cybersecurity services so you can achieve your business goals:

- Risk Assessment using standard frameworks (e.g., National Institute of Standards Technology (NIST) Special Publication (SP) 800-30, or ESA European Cooperation for Space Standardization (ECSS) M-ST-80C).
- State-of-the-Art Analysis (e.g., satellite-based Quantum Key Distribution (QKD), Post-Quantum Cryptography (PQC)).
- Improve your cybersecurity stand via audits based on internal or external requirements (e.g., National Institute of Standards Technology (NIST) Internal Report (IR) 8401).

Life Sciences:

Helix Space provides scientific review and grant evaluation services to researchers, private and public research institutions, and private companies.

Technical means

Cybersecurity:

- Open-source tools for Open-Source Intelligence (OSINT), such as Shodan, theHarvester, and FOCA, and Vulnerability Analysis, such as OpenVAS.
- Commercial tools for Vulnerability Analysis such as Nessus.

Life Sciences:

Within the field of human metabolism and its role in health and disease, our expertise includes computational modelling for OMICS analysis using a variety of tools:

- MatLab and R, Python, with COBRA toolbox, Bioconductor for the analysis of diverse OMICS data types (e.g., genomic, transcriptomic, proteomics, metabolomics).
- Good Clinical Practice

Main customers

Publicly disclosed:

Amphincity
European Space Resources Innovation Center (ESRIC)
European Science Foundation
Luxinnovation
Startup Division
Verhaert Masters in Innovation
Under confidential agreement:
Cybersecurity service providers
Satellite Operators
SpaceTech start-ups & SMEs
Consulting firms
Investment firms

Major space projects

CASSINI Business Accelerator
CASSINI Hackathons & Mentoring
D2D satellite communications
ESRIC Start-up Support Programme
Fit4Start – Space
Fit4Start – High Performance Computing & Data Analytics
Galileo
Quantum Key Distribution
Space Hubs Network
ViSAGE Feasibility Study



INFORMATIONS

CEO/Head of department

Manuel Cuba

Creation date

1-May-2021

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 2

Space: 2

Turnover 2022

Total: n.a.

Space: n.a.

R&D internal investments

n.a.

Qualifications, Approvals

Private Research Institution accredited by the Ministry of Economy of Luxembourg.

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HITEC Luxembourg

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 & 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, , Administration of the Republic of Slovenia for Civil Protection and Disaster Relief (URSZR), , SES Group, SES TechCom, LuxGovSat, Inmarsat, Lockheed Martin, POST

Group, AIRBUS Defence & Space, Telespazio, Thales Alenia Space, OHB System AG, OHB Italy, C-Core, 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



INFORMATIONS

CEO/Head of department

Yves Elsen – Chairman of the Board
Philippe Osch – Chief Executive Officer
Yves Leiner – Chief Systems Engineer
Tom Mathes – Manager Engineering

Creation date

1986

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 54
Space: 16

Qualifications, Approvals

ISO 9001
ISO 14001
ISO 45001
AQAP 2110
Made in Luxembourg
SGS USTC
SuperDrecksKëscht fir Betriber (in accordance with ISO 14024)
Charte de la diversité Lëtzebuerg
Signataire du Pacte national
Entreprises et droits de l'Homme

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Hydrosat Sàrl

Core business

Hydrosat is a climate tech company based in Luxembourg that uses thermal imagery from space to create proprietary data analytics. Our products increase food security, conserve water, improve public safety, and strengthen Earth's environment.

Products & services

Our primary product is IrriWatch, an irrigation management tool that allows farmers to conserve water and increase crop yields by more than 50%. In our first year of sales, we already have customers in 36 countries and on five continents, as we provide insights to growers for a fraction of the cost of ground-based systems.

Technical means

Hydrosat applies data analytics and data fusion techniques to thermal infrared and multi-spectral satellite imagery and turns it into actionable insights. Our scientists measure leaf temperature, solar radiation, and photosynthesis to provide reliable recommendations to farmers, regardless of crop type. The multidisciplinary team has expertise in the areas of big data analytics and distributed computing, remote sensing, image processing, image segmentation and classification, machine learning, and agronomy.

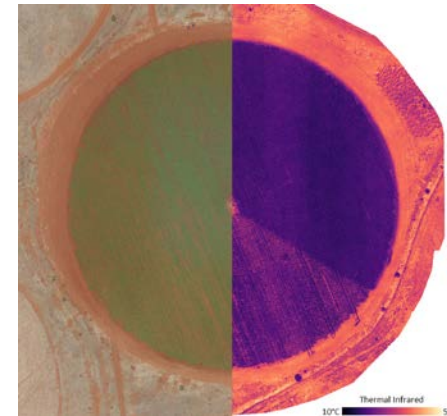
Main customers

- 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 16 satellites 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.



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



INFORMATIONS

CEO/Head of department

Royce Dalby

Creation date

2018

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 13

Space: 13

Turnover 2022

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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IBISA SA

Core business

IBISA is a pioneering insurtech startup, providing innovative climate-risk insurance solutions. Drawing on satellite data and cutting-edge technology, we aim to shield communities and businesses that are most vulnerable to climate change. Our comprehensive services encompass the design, distribution, and management of accessible, cost-efficient, and bespoke insurance products for a wide range of climate-exposed sectors. We maintain strategic partnerships with both local organizations and global reinsurers, bridging gaps and fostering trust in the insurance domain. Ultimately, IBISA's mission has global reach: to protect those most vulnerable to climate risks, fostering resilience, and mitigating the socio-economic impacts of climate change.

Products & services

At IBISA, we offer satellite-powered parametric insurance against climate risks, primarily to climate-exposed communities and businesses. Using our proprietary risk models, we design insurance products based on weather data analysis, providing protection against factors such as excess rainfall, drought, heat stress, and more. We also offer our clients an intuitive policy management platform that monitors insured events, sending alerts and facilitating swift claim responses. With our inclusive and adaptive model, we can cater to diverse geographical locations and climate vulnerabilities. Beyond insurance services, we consult, guiding our clients in designing insurance products and pricing them. Harnessing the power of Earth observation satellites, we're committed to making climate risk insurance affordable, accessible, and effective for those most in need.

Main customers

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

Major space projects

ESA Business Applications



INFORMATIONS

CEO/Head of department

Maria Mateo Iborra

Creation date

04/2019

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 9

Space: 2

CONTACT

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Imagination Factory

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 & 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
- Seaboats S.r.l.
- Sas Centralelease

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



INFORMATIONS

CEO/Head of department

Federico Masier

Creation date

2016

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 6

Space: 4

Turnover 2022

Total: 53.400,00 €

Space: 248.000,00 €

R&D internal investments

150.000,00 €

CONTACT

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InTech SA

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 & 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



INFORMATIONS

CEO/Head of department

Fabrice Croiseaux

Creation date

1995

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 148

Space: 8

Turnover 2022

Total: 13,8 M€

Space: 100 k€

R&D internal investments

900 k€

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INTEGRASYS

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 & services

Integrasys 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.



INFORMATIONS

CEO/Head of department

Alvaro Sanchez, CEO

Creation date

1990 (Spain)

2022 (Luxembourg)

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: **44**
(4 in Luxembourg, initial recruitment)

Space: **34**

Turnover 2022

Total: **5 M€**

Space: **5 M€**

R&D internal investments

1.5M€

Qualifications, 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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ispace EUROPE S.A.

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.

In 2022, ispace became the first fully private company to successfully launch a lander to the Moon.

Products & 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.

Technical means

Our small, robotic lunar landers and lunar rovers are designed to provide low-cost, high-frequency transportation of customer payloads to the Moon (instruments, supplies, etc):

- Series 1: 30kg design payload capacity to the surface
- Series 2: 500kg design payload capacity to the surface (2mT in orbit)

Our rover, developed by ispace EUROPE S.A., will capture its surroundings with the help of multiple cameras and will offer payload capacity for applications requiring mobility on the lunar surface.

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



Lunar Earthrise during solar eclipse, captured by HAKUTO-R M1 lander-mounted camera

ispace

INFORMATIONS

CEO/Head of department

Julien-Alexandre Lamamy

Creation date

2017

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 29

CONTACT

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itrust consulting s.à r.l.

Core business

itrust consulting s.à r.l., a 16-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 & 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, LuxQCI, Lux4QCI and EAGLE-1.

Within the framework of IPCEI-CIS¹, the call for projects of the Luxembourg Ministry of the Economy, and as part of the CLAUSEN² consortium to create an open cybersecurity data economy, itrust consulting, together with itrust Abstractions Lab, contribute with their joint CyFORT³ project by designing and developing several tools, such as IDPS-ESCAPE⁴ (open-source cloud-oriented SIEM and IDS, powered by state-of-the-art machine learning), SATRAP-DL⁵ (threat-intelligence-related activities) and C5-DEC⁶ (involving Common Criteria, cryptography and security analysis of cyber-physical system).

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

² Cloud & 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



INFORMATIONS

CEO/Head of department

Dr Carlo Harpes

Creation date

2007

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 15

Space: 2

Turnover 2022

Total: 1526K€

Space: 56K€

R&D internal investments

14K€

Qualifications, Approvals

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

CONTACT

Name

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Kleos Space SA

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 & services

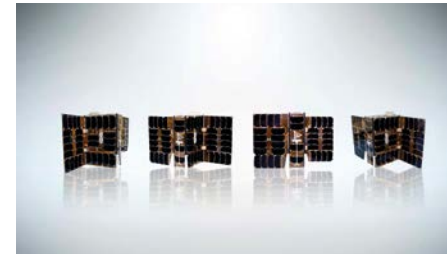
Kleos' RF geolocation data products are available –via Guardian LOCATE, a Kleos processed data set to deliver geolocated RF activity. Kleos data products can be pre-ordered by registered users on a monthly or annual basis and will be delivered to customers after data collection by the Kleos' mission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



INFORMATIONS

CEO/Head of department

Andy Bowyer

Creation date

2017

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 30
Space: 30

CONTACT

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Andy Bowyer

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LMO

Core business

LMO is a Luxembourg Space company developing subsystems to enable satellite to operate safely and sustainably in Space. By using sensors and artificial intelligence, LMO enables satellites to observe and understand the space environment around them with no human in the loop, opening new opportunities for Space Traffic Management and In-Orbit Servicing, Manufacturing & Repair.

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 & services

- In-Orbit Servicing Payloads for Rendezvous & Proximity Operations
- Space Domain Awareness Payload for Protect & Defend
- Computer Vision for Space Applications
- Embedded Software for Space Electronics

Main customers

LMO main customers are civil and defence companies providing Space Surveillance, In-Orbit servicing and Manufacturing Services 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

EDF SPRING

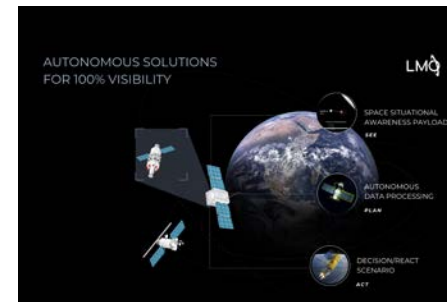
Space Based Bodyguard Satellite Definition

MECO/DOD AUREA

Autonomous Recognitions of Foreign Assets

AUDACITY Mission

Autonomous Detection & Characterisation of Objects During Deployment



INFORMATIONS

CEO/Head of department

Michel Poucet

Creation date

2020

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 12

Space: 12

Turnover 2022

Total: 12

Space: 12

CONTACT

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Lunar Outpost EU

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 & services

Lunar Outpost EU offers thermal control and thermal energy storage subsystems for satellites, planetary vehicles, payloads and other hardware operating in extreme conditions. These products are offered in custom, as well as COTS packages to support rapid development. This includes an active thermal switch that controls the transfer of heat between locations in a system, leading to enhanced survivability and ConOp flexibility.

Lunar Outpost EU offers Thermal Engineering and Testing services for customers throughout their system's lifecycle, including TVAC chambers at Lunar Outpost's LU facility available for 3rd party testing.

Finally, Lunar Outpost EU also offers the Canary, an IoT environmental monitoring device. This low cost, modular, constant monitoring solution was originally built by Lunar Outpost in the US and now also sold in LU.

Main customers

Lunar Outpost customers include governmental space agencies, as well as international space companies, focusing on orbital and lunar operations.

Major space projects

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

Active Thermal Switch caption: The Active Thermal Switch controls the flow of thermal energy from one point to another, allowing systems to better control their temperature in an active, rather than passive manner. It is available as a COTS component and is designed and manufactured in Luxembourg.

Thermal Vacuum Testing Facility caption: Lunar Outpost EU offers Thermal Engineering and Testing Services, including testing in its two TVAC chambers. The Lunar Outpost TVAC is designed to perform thermal balance and cycling tests for spacecraft subsystems and components, reaching levels of $<5 \times 10^{-6}$ mbar.



INFORMATIONS

CEO/Head of department

Julian Cyrus - President

Creation date

2022

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 10
Space: 10

CONTACT

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Luxsense Geodata s.à r.l.

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 & 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
- Instant-As-Built : Handheld device for high accuracy and high resolution data acquisition

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.

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

LuxVita2

Monitoring Luxembourg forest vitality using Sentinel2 time series



INFORMATIONS

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

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LuxSpace

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 & 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 50 -250 kg class for applications in the field of Earth Observation (EO), telecommunications, science, and technology demonstration
- OnBoard computers and Integrated Avionics Units for Space systems requiring high performance on-board processing
- Telemetry, Telecommand & Ranging (TT&R) subsystems for geostationary (GEO) and Low Earth Orbit (LEO) satellites
- 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, University of the German army 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

Major space projects

Smallsats (microsatellites)

- Triton-X Seranis mission with the University of the German Army: about 15 different experiments on board a Triton-X Heavy satellite
- Triton-X Genesis mission with ESA: In-orbit demonstration of several Space technologies on board a Triton-X demo small satellite
- Triton-X development project with ESA: 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:

Space applications & services

- LUXEOSYS project with the Luxembourg Ministry of Defence: service provision for the ground operations of the Luxembourg national earth observation satellite LUXEOSYS
- 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)



INFORMATIONS

Managing Directors

Edgar Milic

Creation date

2004

Organisation type

Large Enterprise
(OHb Group Subsidiary)

Number of employees

Total: 70
Space: 70

Turnover 2022

Total: 9498561€
Space: 9498561€

Qualifications, Approvals

ISO 9001:2015



CONTACT

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LuxProvide

Core business

LuxProvide offers a unique platform that combines data science and supercomputing resources to help organizations increase the Return on Investment (ROI) of their most challenging innovation projects. What we deliver is insights for better decision-making through super-fast, ultra-powerful, secure by design, energy-efficient and environment-friendly technologies.

Products & services

LuxProvide offers a unique platform that combines data science and supercomputing resources delivering insights for better decision-making.

Our team of data scientists, AI engineers, Machine Learning architects, privacy and cybersecurity experts focuses on the needs of our customers including research and business players, both large and small, in Luxembourg and the Greater Region. We believe that the key to effective innovation is a design thinking and co-creation approach involving our customers throughout the entire development process. By adding data-driven insights to their decisioning processes, LuxProvide's customers endow themselves with a powerful and differentiating way of creating tangible value.

LuxProvide is a 100% publicly owned company located in Luxembourg, a leading digital center in the heart of Europe. MeluXina, the cloud-enabled world-class supercomputer operated by LuxProvide, is a key element of Luxembourg's data-driven innovation strategy.

Technical means

Luxembourg's national supercomputer Meluxina was built to serve a large variety of complex, data-driven computational workloads. Its design is forward-looking, responding to the convergence of simulation, modeling, data analytics and artificial intelligence, and enabling simulation-driven by predictive analytics. As the most powerful of the Petascale systems in the EuroHPC network and one of the fastest supercomputers in Europe, it provides a robust platform for science and industry.

MeluXina is based on the EVIDEN BullSequana XH2000 platform with a computing capacity of 18 PetaFlops per second, and counts on 20 PetaBytes of DDN storage. MeluXina is fully scalable due to its open and modular architecture, and delivers high sustained performance through its GPU AI accelerators.

Main customers

Private enterprises

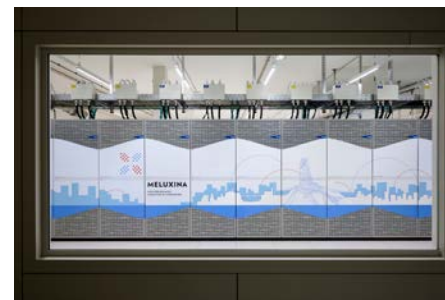
SES, RHEA, Spire, adwäisEO, RSS-Hydro, Hydrosat, WEO, iSpace, Space Shift, Whiffle, LuxSpace

Public research partners

LIST (Luxembourg Institute of Science and Technology), University of Luxembourg/ Interdisciplinary Center for Security, Reliability and Trust (SnT), Nanyang Technological University, National University of Singapore

Major space projects

LuxProvide offers tailor-made high-performance computing (HPC), high-performance data analytics (HPDA) and artificial intelligence (AI) projects with the easiest onboarding and highest quality assistance, in a confidential, trusted and cyber-secure environment.



INFORMATIONS

CEO/Head of department

Filipe PAIS (CCSO)

Creation date

2019

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 18

Space: 6

Qualifications, Approvals

ISO 27001

CONTACT

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LuxTrust S.A.

Core business

LuxTrust is a Qualified Trust Services Provider and a Certification Authority. Since our inception in 2005, we have been a pioneer in 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), France (Paris), and Monaco, our teams help you secure your digital future.

Products & 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

- Ground segment – Operators authentication
- Ground segment – Operations traceability
- 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

LUXTRUST

INFORMATIONS

CEO/Head of department

Fabrice Aresu

Creation date

2005

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 110

Qualifications, Approvals

Qualified Trust Services Provider on the EU Trusted List

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Maana Electric SA

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 & 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:

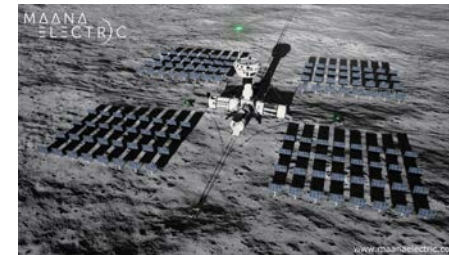
- 400 m² dedicated to offices.
- 200 m² dedicated to metallurgical testing.
- 70 m² dedicated to sand and regolith processing.
- 91 m² ISO-8 clean room and 34 m² ISO-7 clean room for photovoltaic processes.
- 800 m² of machining area and workshop.
- 700 m² of prototype assembly area.

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 focusses 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).



INFORMATIONS

CEO

Joost van Oorschot

Creation date

27/04/2018

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 35+

CONTACT

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Mission Space

Core business

World experience next challenge from space weather impacting economy in Space and on the Earth worth 3.4 trillion USD. Sustainable space impossible without robust way to predict and mitigate Solar phenomena. Currently humanity employ legacy technology which doesn't tackle nowadays challenges. Mission Space developing a satellite-based space weather system to help space & earth companies, academia & government agency to quantify and mitigate space weather-related risks and data deficit.

Product & 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.

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

Mission Space also sells own detectors for the satellite operators, which can be used for increasing accuracy of the data & monitoring of radiation awareness.

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. We produce own detectors: Universal Semiconductor Spectrometer, Cherenkov detector, own scientific models of solar plasma impact on ionosphere and own SAAS.

Major space projects

Space Weather Detecting Payloads

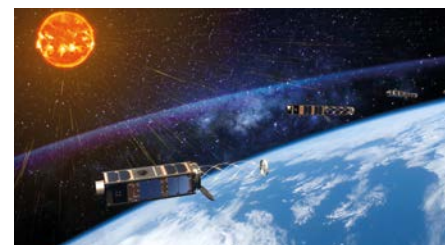
AURORA-1 IOD mission to be launched in 2024 will mark the world's first commercial mission to monitor the full spectrum of space weather parameters on LEO. Mission Space will be measuring highly energetic particles of protons and electrons that will enhance their dynamical model of the near-Earth radiation 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.

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



MISSION SPACE

INFORMATIONS

CEO/Head of department

Alex Pospikhov

Creation date

2021

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 10

Space: 4

R&D internal investments

350K EUR

Qualifications, Approvals

Luxembourg Fit4Start
Seraphim Space Camp
Space Founders Acceleration program
Amazon AWS Space Acceleration program
Singapore SSTL acceleration program
Creative Destruction Lab Canada



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Molecular Plasma Group SA

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 & 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)



INFORMATIONS

CEO/Head of department

Stijn Vansant, CEO

Creation date

25/02/2016

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 20

Space: 0

Turnover 2022

Total: 2.4 Million €

Space: 35 k€

R&D internal investments

1,8 million €

CONTACT

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NorthStar Earth & Space

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 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 & services

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

The NorthStar Europe team in Luxembourg works on the Si2 platform to offer automated and scalable tools that deliver actionable Space Traffic Management insights. Our conjunction assessment and alerting system predicts close encounters between resident space objects (RSOs) tracked in the NorthStar RSO Catalogue and issues a warning when risk exceeds an acceptable threshold. More broadly, our mapping and risk assessment

services help clients identify less congested and less risky regions of space where it may be safer to plan an orbit. In each case, solutions are built on the unique space-based observations and data processing pipelines that are at the core of NorthStar.

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.

Main customers

NorthStar Earth & Space has a wide range of clients worldwide. For Space Information & Intelligence (Si2), these include:

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

Major space projects

In Luxembourg, 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 has embarked on the LuxImpulse project, administered by the Luxembourg Space Agency (LSA) in partnership with the European Space Agency (ESA), to drive the development of cutting-edge tools and applications for space traffic mapping, close approach warning systems, and global space hazard risk assessment. These advancements are crucial for fleet management, future mission planning, and insurance considerations. NorthStar objective with LuxImpulse, is to rapidly advance these developments to meet the growing demand for improved observation, up-to-date knowledge, and precise navigation tools in an increasingly crowded space environment.



INFORMATIONS

CEO/Head of department

Stewart Bain
Founder & CEO

Creation date

2012 (Canada)
2021 (Luxembourg)

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Luxembourg: 10
Worldwide: 66

R&D internal investments

€3M/year

CONTACT

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Odysseus Space

Core business

We envision a future where all data generated by human assets in space can be transmitted swiftly and securely to the Earth. By providing lightspeed connectivity between space-based assets and the Earth, we aim to ensure seamless communication and the efficient transfer of information.

As satellites continue to generate an ever-expanding volume of data, surpassing their current data transfer capabilities, Odysseus Space steps in to solve the data download bottleneck. We proudly present Cyclops, our comprehensive laser communication solution, encompassing cutting-edge space terminals and data services. With Cyclops, satellite operators can effortlessly download their space data to Earth at remarkable data rates, free from radio frequency licensing concerns, and with utmost security.

Products & services

Cyclops represents an unparalleled Terminal-as-a-Service laser communication solution, structured on a subscription basis, empowering satellite operators with swift and secure space-to-ground data retrieval.

At Odysseus Space, we provide the Cyclops-DTE satellite terminal, designed for seamless integration into your satellite system, along with access to our global network of ground receivers, Cyclops-GT, forming an expansive Optical Ground Stations Network. These stations, equipped with Cyclops-GT, are fully compatible with Cyclops-DTE and other designated space terminals.

With Cyclops, satellite operators can effortlessly transmit their valuable space data from the Cyclops-DTE terminal in orbit to the Cyclops-GT receiver on Earth, ensuring rapid, high-capacity data transfer. This ground-breaking solution is particularly ideal for microsatellite constellations in Low Earth Orbit seeking efficient and rapid space-to-ground data communication.

Major space projects

Odysseus Space's flagship project, Cyclops, is set to reimagine space communication by 2025. Collaborating closely with satellite operators and integrators, we are gearing up to provide Cyclops, our end-to-end laser communication solution. In a strategic partnership with a leading Ground Stations Network operator, we are enhancing their infrastructure with laser communication capabilities.

While our focus is on developing a laser communication solution for Low Earth Orbit (LEO) to ground, we envision extending our reach to enable intersatellite links in LEO and beyond in the near future.

Stay tuned for ground-breaking advancements in space communication with Odysseus Space and Cyclops, and join us on this exciting journey toward faster, more efficient, and secure space communication.



ODYSSEUS

INFORMATIONS

CEO/Head of department

Jordan Vannitsen

Creation date

2019

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: >15
Space: >15

CONTACT

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OffWorld Europe

Core business

OffWorld works in the field of extreme environment industrial robotics and has a vision to establish an end-to-end collaborative robotic system comprising thousands of multi-species robots working together to achieve objectives across mining, processing, fabrication, assembly, manufacturing and construction – essential elements for developing space infrastructure.

Products & services

OffWorld is currently at the expansion stage for its initial terrestrial swarm robotic mining product line. 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 include Surveyor Bot, Excavation Bot and a Directed Energy Bot.

The OffWorld platform is extending to space with the development of the Lunar Processing Module in Luxembourg. The LPM is designed to extract water volatiles from icy lunar regolith, generating consumable products such as potable water, radiation shielding water, rocket propellant, or dry regolith to produce lunar concrete.

Technical means

OffWorld will produce lunar autonomous mobile robots capable of extracting and processing water and water-based volatiles in permanently shadowed regions around the lunar poles at an industrial scale. This is a new class of robotic systems that changes the paradigm of current Moon and Mars rover technologies. 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.

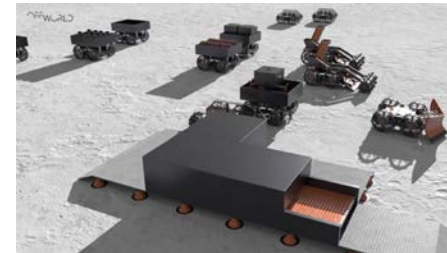
Main customers

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

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

Major space projects

Participation in multiple NASA projects including SBIR and Break The Ice Challenge. LuxImpulse contract to establish OffWorld Europe and the lunar In Situ Resources Utilization (ISRU) capability with the development of the Lunar Processing Module. Development, demonstration and deployment of lunar focused robust, scalable Autonomous Mobile Robots.



OFFWORLD

INFORMATIONS

CEO/Head of department

CEO: Jim Keravala
Managing Director: Kyle Acierno

Creation date

2015

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 100
Space: 20

CONTACT

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OQ TECHNOLOGY

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. We serve the oil and gas, maritime, Industry 4.0 and transport, logistics and Agriculture segments. 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 areas where their terrestrial coverage cannot reach. Our 3GPP standardized technology is compatible with cellular 4G/5G 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. All our modules and data interfaces are highly secure and encrypted. We operate our own network and we can customise our service according to your needs to guarantee the reception of data in your own country.

Products & services

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

OQ ONE Modules: Hybrid cellular terrestrial and satellite NB-IoT modules that can roam and switch between the mobile and satellite network anywhere in the world.

OQ ONE User 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.

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.

Technical means

OQ TECHNOLOGY hosts a team of multi-talented engineers with cross-functional domain experience ranging from space systems, telecom R&D, Software development for space and telecom, Space electronics hardware design and development and Digital Signal Processing. OQ TECHNOLOGY also has built an end-end state of the art 5G satellite IoT lab comprising of a functional flatsat, ground segment and a 5G payload and prototype user terminals and the necessary measurement and instrumentation EGSE to aid development and testing.

Main customers

Our main customers include Saudi ARAMCO, the biggest Oil & Gas company in the world. We deliver our satellite based 4G/5G IoT services to ARAMCO for oil and gas for the management and tracking of assets in remote areas for digital oilfield applications, offshore monitoring, SCADA applications, asset tracking, fleet management, smart metering or predictive maintenance etc.

We also have ongoing engagements with customers partners such as Marlink & Wyld Networks from the maritime, Industry 4.0 and transport segment.

Major space projects

MACSAT Feasibility Study: OQ TECHNOLOGY successfully performed a detailed Business, Market & technical 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.

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.

MACSAT In-Orbit Demonstration Mission: OQ TECHNOLOGY is the prime contractor of the MACSAT IOD mission (Launch 2023), 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 Technology's first Technology Demonstrator Mission 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: 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.

5G-IoT-Chip: As a follow up of the MACSAT Mission, OQ Technology, as the prime contractor, is developing the necessary Software IPs for 4G/5G NTN base station for the higher layers of the communication stack and user modules.

OQ Technology has successfully added 5 satellites as part of its growing constellation for its 4G/5G services and has 5 more satellites by 2023.



INFORMATIONS

CEO/Head of department

Omar Qaïse

Creation date

2016

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 25

Space: 5

R&D internal investments

7000000€

Qualifications, Approvals

ETSI Member (Since March 2020),
3GPP Member (Since March 2020),
IMC Member (Since 2023), GSMA
Member (Since 2023)

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Orbitare

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 & 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.



Orbitare

INFORMATIONS

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 2022

Total: 500000€
Space: 500000€

R&D internal investments

250000€

CONTACT

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POST Luxembourg

Core business

POST Luxembourg is Luxembourg's leading telecommunications and information services company. It offers a large range of ICT services for business customers: high-speed secure connectivity solutions as well as cybersecurity, voice and data management services for individuals and professional customers.

POST Luxembourg is also the country's largest provider of postal services and offers financial services.

Products & 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 bespoke ground station, hosting, satellite broadband and communications services to major corporate and public customers.

POST Groups also participates in space research projects, e.g. quantum key distribution, digital asset authenticity validation or 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.



INFORMATIONS

CEO/Head of department

Claude Strasser

Creation date

1842

Organisation type

Large Enterprise

Number of employees

Total: 4 689

Turnover 2022

Total: 892 M€

CONTACT

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Rafinex

Core business

Rafinex is a company focused on the development of next-gen computational design and optimization algorithms for safety-critical engineering applications, ranging from structural over fluid-structure and beyond in sectors such as space, aerospace, and defence. A particular focus is on the use of stochastic methods to account for real-life variability in digital design & optimization, making the digital design considerably more realistic and applicable in in-service conditions. Finally, Rafinex has in-house know-how on latest algorithmic mathematics and numerical HPC expertise.

Products & services

Rafinex distributes its world-class algorithms for robust safety-critical design optimizations through its SaaS platform entitled Möbius. With the latter, customers can achieve weight saving and performance improvements of real-life designs at scale. Additionally, Rafinex provides application engineering support as well as custom mathematical algorithms developments for high-value challenging problem statements.

Technical means

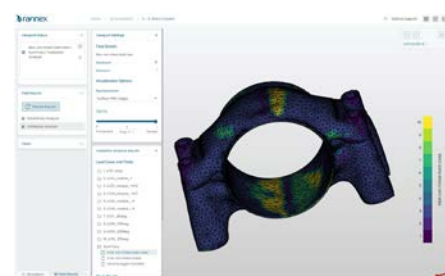
Rafinex' groundbreaking innovation is our AI-assisted topology optimization for safe, lightweight designs. This technology actively manages uncertainty and risks of real-life variability to create uniquely robust designs that remain safe even in off-design load conditions. Rafinex offers a suite of next-generation algorithms to solve your product design and manufacturing challenges. We ensure structurally optimized designs for various manufacturing strategies like casting, moulding, AM as well as fibre directions in composites. Using Rafinex' technology end-users can systematically optimize reliable product designs fit for reality and thereby achieving profitable sustainability at scale.

Main customers

European OEMs & Tier 1s in the areas of aerospace, automotive, racing, aerospace, tooling & consumer products.

Major space projects

Rafinex is a member of the European Defence Agency's Land and Air CapTech communities with activities in land and aerial vehicle design optimization. Similarly, activities in space & satellite component optimization. In the UK, Rafinex is the primary algorithm developed for the 40m GBP ASCEND consortium, lead by GKN Aerospace and McLaren Automotive, for the development of high-rate composite manufacturing and its associated supply-chain.



INFORMATIONS

CEO/Head of department

André A.R. Wilmes

Creation date

14/02/2023

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 8 FTE

Space: Space, Aerospace, Automotive, Industrial Tooling

R&D internal investments

>3m EUR

Qualifications, Approvals

Hannover Messe 2019 – Best Young Tech Enterprise
Luxembourg Young Innovative Enterprise 2020
Accredited as Research Institute in Private Industry for computational mathematics & algorithms

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Redwire Space Europe

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 & 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.

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

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 as 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.



Caption: STAARK© robotic arm



INFORMATIONS

CEO/Head of department

Jaroslav Jaworski

Creation date

2018

Organisation type

Large Enterprise

Number of employees

Total: 24
Space: 24

CONTACT

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RespectUs

Core business

Export Control Compliance Daily. RespectUs offers a SaaS (Software-as-a-Service) platform 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 is providing:

- 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
- Knowledge base of export control legislations all over the world

Products & services

The RespectUs services and platform are 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.



INFORMATIONS

CEO/Head of department

Patrick Goergen

Creation date

16.08.2019

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 8
Space: 7

Turnover 2022

Total: 166.092 EUR
Space: 85.000 EUR

Qualifications, Approvals

Graduate Fit4Start, 9th ed.,
Space vertical (2020)
Platform Software validated
by ESA in August 2023

CONTACT

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RHEA System Luxembourg S.A.

Core business

RHEA Group is a professional engineering company providing tailored engineering solutions, system development and security services for mainly space, government and defence organisations. 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 800 people working at client's premises or RHEA offices throughout Europe and North America.

RHEA System Luxembourg focuses on three main strategies:

- Cybersecurity testbed and thrive for EU cyber validation/certification of end-to-end systems, in cooperation with CCC and SecurityMadeinLu, ESA and EU
- International Operational Usecases in Quantum Key Distribution (INT-UQKD), in partnership with ESA
- End-to-end Satellite & Systems operations and services

Products & 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.

- In partnership with key Luxembourg players and the European Space Agency (ESA), we develop a next-generation cybersecurity operational and international solution based on the distribution of quantum encryption keys, complementing current national space segment quantum communication infrastructure programmes.
- 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 CDP4-COMET enables multidisciplinary teams to work together efficiently on complex systems by analyzing requirements, carrying out calculations and validating models in real time.
- Our ASTRAL component-based ground segment offering, allows a high degree of flexibility for customer to integrate their own third-party components and interface with other systems. Our Manufacturing and Operations Information System (MOIS) tool suite has been used by spacecraft manufacturers and operators on over 100 satellite missions 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 Cyber-Range Services, which are used across industry for cybersecurity testing, planning and training. Our Cyber Testbed in Luxembourg allows for testing hardware in the loop.

- INT-UQKD is a new cross-border network for QKD operational usecases

Main customers

Customers & Partners: Luxembourg Space Agency, Luxembourg Ministries, POST, LuxTrust, 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)
- International Use cases for Operational QKD Applications and Services (INT-UQKD)
- Rapid and Resilient Crisis Response System Study
- Numerous satellite and cybersecurity operations for commercial operators



INFORMATIONS

CEO/Head of department

Pascal Rogiest (CEO) ; Arne Matthyssen (VP Benelux)

Creation date

2020

(RHEA Group created in 1992)

Organisation type

Large Enterprise

Number of employees

Total: 772
Space: 464

Turnover 2022

Total: € 99.8M
Space: € 94.7M

R&D internal investments

€ 1955K

Qualifications, Approvals

2020: 3rd fastest growing company in Trends Gazelle Walloon Brabant
ISO 9001:2015
ISO 27001:2013

CONTACT

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RSS-Hydro Sarl

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 & services

Remote sensing and computer simulations of water risks at local to global scales; Flood & Fire 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

Almost 20 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 & fire disaster response assistance using EO products and services;
Participation and mentoring in NASA/Europe Frontiers Development Lab (FDL);
Acquisition of high-resolution drone data and provision of services to a variety of sectors.



RSS-Hydro

INFORMATIONS

CEO/Head of department

Dr. Guy Schumann

Creation date

2017

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 6
Space: 4

Turnover 2022

Total: <500k € (Space 60%)

Qualifications, Approvals

Government-accredited private research institute

CONTACT

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SATURNE TECHNOLOGY

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 & 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.



INFORMATIONS

CEO/Head of department

Walter Grzymalas

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

CONTACT

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SES

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 369 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 & 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 Space & Defence 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

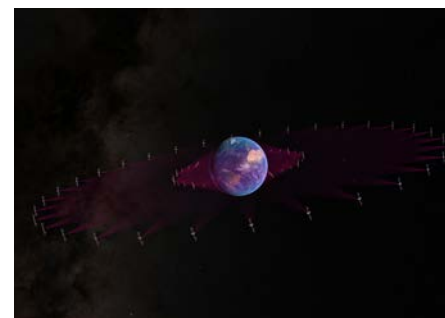
SES is trusted by public and private broadcasters, content owners, telcos, MNOs, enterprises, governments and institutions across the world.

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 second-generation MEO system O3b mPOWER brings exponentially more capabilities. The highly flexible satellite system will comprise 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.



SES[▲]

INFORMATIONS

CEO/Head of department

Ruy Pinto

Creation date

1985

Organisation type

Large Enterprise

Number of employees

Total: >2000

Turnover 2022

Total: ~EUR 1.9
BILLION

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SkyfloX Sàrl

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 & 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.



INFORMATIONS

CEO/Head of department

Emmanuel Rammos

Creation date

2018

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 4
Space: 4

CONTACT

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Space Cargo Unlimited

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 & 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.



SPACE CARGO UNLIMITED

INFORMATIONS

CEO/Head of department

Nicolas Gaume

Creation date

2014

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 15

Space: 5

Turnover 2021

Total: €1 M

Space: €1 M

R&D internal investments

€5 M

CONTACT

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space4environment

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 (European Green Deal, Greenhouse Gas reporting) 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 land cover / use changes, the condition of ecosystems and their services or the state of environment in general.

Products & 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 - 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)
- Convention on Biological Diversity (CBD)
- Horizon Europe

Luxembourg organisations

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

Major space projects

Copernicus:

EU Grassland Watch: Development of an online information system for assessing land cover changes in protected areas between 1994 and today
Quality control of High Resolution Layers and Local Component products
Quality assurance of Global Hot Spot Mapping products for Africa
Quality control of the LUCAS 2021 in-situ survey
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. CLC+)

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, 2018 and 2021
Development of ecosystem extent, ecosystem condition and ecosystem service accounts for Luxembourg
GPS-based monitoring of water buffalo grazing behaviour as part of environmental management of protected areas in Luxembourg
Mapping of CLC Luxembourg: 2006, 2012 and 2018



INFORMATIONS

CEO/Head of department

Stefan Kleeschulte

Creation date

2007

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 9

Turnover 2022

Total: 1100000
Space: 200000

R&D internal investments

25000

Qualifications, Approvals

Organisme agréé pour l'environnement naturel

CONTACT

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SPARC Industries SARL

Core business

SPARC Industries has two core business areas. Number one is de-risking EP development at all TRL levels, related research activities, EP product commercialization, and satellite design iteration. 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 slot availability and reliability, and diagnostics.

reducing the risk associated with long term personnel availability.

reducing effort / success relation of R&D proposal preparation and the research funding acquisition in general – also for public research entities.

increasing the clients' competitiveness by enabling EP developers to enrich their products' plume data to strengthen their product offers to their clients.

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.

We also develop technologies to protect high value space assets from undesired identification. This we achieve with a combination of sophisticated software as well as dedicated EP technology.

Products & 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 (SYSTEMA, OpenPlumeEP, SPIS). Additional design templates and functionalities can be provided upon request.

Services:

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

Main customers

Developers of electric satellite thrusters across the value chain and size.

Satellite manufacturers who use EP technology on their satellites.

Universities with interest in EP related research and education.



INFORMATIONS

CEO/Head of department

Dejan Petkow

Creation date

24.11.2017

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 8

Space: 7

Qualifications, Approvals

RDI Certificate

CONTACT

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Spire Global

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 & 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



INFORMATIONS

CEO/Head of department

Peter Platzter

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

R&D internal investments

25000

Qualifications, Approvals

Organisme agréé pour l'environnement naturel

CONTACT

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Space Products and Innovation

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 & 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.



INFORMATIONS

CEO/Head of department

Ran Qedar

Creation date

2021

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 3

Space: 3

Turnover 2022

Total: 62,000

Space: 62,000

CONTACT

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PROXIMUS LUXEMBOURG S.A.

Core business

Proximus Luxembourg: a leading actor in convergent ICT and Telecom services for companies

Our team provides ICT and telecom solutions to all companies and public administrations. Our areas of expertise include fixed and mobile telecommunications, ICT infrastructures, cloud and cybersecurity and Fintech Solutions and Managed services. Our approach is customer-centric and a single contact manages their needs thanks to the mastery of an integrated end-to-end solution.

Proximus has become a reference player in the supply of a complete services solution (Fixed and Mobile Telecommunications, ICT Infrastructures, Multi-Cloud, Fintech solutions, Cybersecurity and Managed Services).

Products & services

In a world where changes are accelerating, companies must constantly adapt in order to thrive.

Our business is ICT and our strength is to be able to provide our customers with ICT in a service mode, from basic infrastructure to software support, with a daily cover.

Fixed, mobile and connectivity: Proximus offers you a full range of telecommunications services for companies.

Cloud: Benefit from a flexible IT environment that can enhance your performance and reduce costs.

Cybersecurity: A comprehensive approach to assist you in the implementation of your digital transformation through a full range of cybersecurity services and solutions.

ICT solutions: A mixture of innovative technologies combined with an expertise of 40 years on the Luxembourg market

Managed services: A full range of outsourcing operations, through a combined cloud and management services offer.

Digital Trust Solutions: Solutions for the Financial Sector, including fund administration, wealth management, depositary, asset management, insurance and private banking.

Technical means

Proximus Luxembourg Infrastructures

The networks: A national coverage with a 99, 99 % available and reliable network, more than 2 000 km of optical fibre and more than 400 "Points of Presence", positioning Telindus as the 2nd largest BtoB provider in Luxembourg.

The Datacentres: 4 LuxConnect datacenters, 3 in Bettembourg and 1 in Bissen; of Tier II to Tier IV levels, equipped with the best technologies available on the market.

International capacity

→ **BICS:** Best international wholesale solutions to mobile voice and data service providers worldwide.

→ **Vodafone:** Partnership with the British operator allows an international opening to customers in Luxembourg.

→ **Telindus Netherlands:** One of the ICT leaders for companies and public organisations.

→ **IT & Economic Partners:** Partnerships with the world's largest IT players that allow us to offer increasingly innovative solutions.

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

Major space projects

Proximus Luxembourg S.A. was, and is still, actively participating in the efforts of ESA to improve and ensure the overall security of their missions and infrastructures. In this context, they have successfully completed projects like GASF (Generic Application Security Framework), GASF Evolution and PenBox and are currently working on projects like AACT (Advanced Automated Cybersecurity Testing) and SSE4Space (Secure Systems Engineering for Space). The GASF study and its continuation GASF Evolution focused on the augmentation of ECSS (European Cooperation on Space Standardization) standards, which are also widely used within the European space sector, to include information security aspects in ESA software development projects. Additionally, a tool (the GASF tool) was developed to guide project teams through the process of defining and iterating security requirements, translate them into suitable security controls and trace decision making process and its consideration within the development. The GASF framework, as well as the tool, have been successfully used in the context of ESA's Mission data systems Information Security Management System (ISMS) to reduce risks related to software security and is being mandated for usage by the Secure Operations Procedures (SECOPS). PenBox and its continuation AACT, aim to automate the complex, time and resource consuming task of penetration testing without the need for expert penetration testers. They define an automated and repeatable security penetration testing concept for space mission ground segment systems by identifying suitable tools, tactics, techniques and procedures suited to security testing of mission ground segment systems, protocols and interfaces.



INFORMATIONS

CEO/Head of department

Gérard Hoffmann

Creation date

1978

Organisation type

Large Enterprise

Number of employees

Total: 773

Turnover 2022

Total: 328.2M€

Qualifications, Approvals

ESA Qualified Partner under GFC8 – Ground System Software related activities
Cybersecurity

CONTACT

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Thales Alenia Space Luxembourg

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 Center dedicated to space activities.

Products & 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



INFORMATIONS

CEO/Head of department

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: 11/06/2020

Organisation type

Large Enterprise

Number of employees

Total: 8500
Thales Alenia Space: 8500
Thales Alenia Space in Lux: 17

Space:

Thales Alenia Space: 8500
Thales Alenia Space in Lux: 17

Turnover 2022

Total: 2.2 Billion Euros
Space: 2.2 Billion Euros

CONTACT

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WASDI sàrl

Core business

WASDI is a cloud platform that makes it easy for experts in Earth Observation to develop algorithms and turn them into applications in the cloud. Additionally, the platform allows them to publish their applications in a marketplace to reach end users.

With a unified interface, seamless access to data, and online tools, WASDI allows professionals to concentrate on work that matters rather than grappling with IT-related difficulties.

On top of this enabling horizontal technology, the WASDI team develops vertical applications. In collaboration with world-class partners, the WASDI team developed several vertical applications used in international initiatives in different areas (e.g., natural hazards, environmental monitoring, and urban areas). These applications enabled new services such as parametric insurance.

Products & services

WASDI offers access to a growing number of observations (public and commercial VHR imagery), derived products (e.g., European ECOSTRESS hub, Copernicus services, VIIRS, IMERG), simulated products (ERA5), and more (bathymetry and DEM). WASDI automatically handles multiple data providers, offering reliability and speed. WASDI supports several programming languages (Python, L3 Harris IDL, Javascript, C#, Java, Octave) and technologies (e.g., ENVI and ESA SNAP) to let the users define their processing blocks, which can in turn be triggered programmatically. Compliant with multiple standards, WASDI is fully interoperable.

Vertical applications built with WASDI include the monitoring and mapping of floods, water bodies, urban areas, fires & burned areas, impact assessment, oil spills, and air quality. Large time series analysis is supported.

Technical means

WASDI offers:

- A scalable multi-cloud federated platform for Earth Observation connected to a growing body of data providers
- 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 and the 20-year experience in complex software projects development of FadeOut Software
- The capability of leading and joining tenders

Main customers

- ESA
- World Bank
- SEADRIF
- Joint Research Center (JRC)
- CIMA Foundation
- Luxembourg Institute of Science and Technology (LIST)
- ENEL
- Telespazio

Indirect:

- Asian Development Bank (ADB)
- Luxembourg National Research Fund (FNR)
- United Nations Environment Programme (UNEP)

Major space projects

ESA - European Ecstress Hub:

Bringing ECOSTRESS data acquired over Europe and Africa into the cloud

ESA - Telespazio, RSS Hydro - WaSCIA:

Delivering Water Stress and Climate Indices through a web interface for drought and water stress management in Africa

EU - PROMPT

Preparedness for Operational Monitoring and Prediction of Contaminant Transport in the sea

ESA, eDRIFT - Expand Demand

Disaster Risk Financing and Transfer against floods

World Bank, SEADRIF

Daily EO flood maps over Laos and Myanmar for National Sovereign Risk against flood

Asian Development Bank

EO Services to support water and food security planning & investments in Indonesia

JRC, EC - GHSL Landcover Service POC

Assessing Copernicus Data and DIAS to generate GHSL on demand

UNEP, CIMA Foundation - EIS Iraq & Haiti:

Development of Environmental Information Systems (EIS)



INFORMATIONS

CEO/Head of department

Paolo Campanella / Lucien Hoffmann

Creation date

23 December 2020

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 5
Space: 100%

Turnover 2022

Total: 798 185 €
Space: 100%

R&D internal investments

154000 €

CONTACT

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WEO SAS

Core business

WEO SAS, founded and registered in Luxembourg in 2020, was formed with an aim to improve global environmental sustainability, to enable a more sustainable society. WEO employs deep learning and satellite data to enhance urban sustainability and resilience, offering environmental analytics to cities and facilitating the deployment of green infrastructure. By transforming satellite imagery insights from their native, lower-resolution state to high-resolution, we leverage openly accessible satellite data, enabling our clients to receive vital, scalable information regularly and affordably. For instance, WEO monitors green roofs, land surface temperature, surface sealing, and vegetation management to address urban heat, flood, and wildfire risks while promoting biodiversity.

Products & services

Our main products are maps and services related to vegetation and risk 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
- Vegetation Risk to Assets
- Wildfire risk 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)
- Sanem
- Esch
- Brussels Environment
- Luxembourg Ministry of Environment
- Shroeder&Associates
- Dudelange

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.
TreeMonitor – ESA, VDD, VDL and CFL
UrbanGreen – Antwerp, Ghent and Schroeder&Associates



INFORMATIONS

CEO/Head of department

Imeshi Weerasinghe CEO
(Charlotte Wirion CTO)

Creation date

2020

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 7
Space: 7

Turnover 2022

Total: € 329.069,70
Space: € 329.069,70

CONTACT

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yuri LUX GmbH S.A R.L

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 & 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.

Yuri Platform - ScienceTaxi

- Hosts up to 38 experiment units (ScienceShells)
- Designed for orbital platforms (Dream Chaser, Dragon, ...) but also fits suborbital or parabolic flights
- Independent from ISS
- Temperature range +4°C to +40°C
- Fully automated, no crew interaction needed
- Seamless power transmission for experiments
- Centrifuge with Earth, Moon, and Mars gravity
- Real-time Housekeeping-Data monitoring and commanding
- Modular Design: Different Experiment Platforms possible

Yuri micro-lab - ScienceShells

- In-flight adaption of experiment timeline
- Sensors to measure in-flight experiment data (O2, pH, pressure)
- Microscope imaging with resolution <5µm
- Fluorescence imaging
- Active fluidic exchange for cells or bacteria
- Passive O2 exchange
- Complex fluidic systems (lab on a chip)

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)
- HepaWell (ISS)
- Biomission (ISS)
- Überflieger (ISS)



YURI

INFORMATIONS

CEO/Head of department

Managing Director: Adrian Wilkins
CCO Managing Director: Mark Kugel

Creation date

June 2020

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 10
Space: 10

Turnover 2022

Total: 1,5 M€
Space: 1,5 M€

R&D internal investments

0,5 M€

CONTACT

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03

Public research organisations

ESRIC

European Space Resources Innovation Centre

Core business

Based in Luxembourg, the European Space Resources Innovation Centre (ESRIC) is the world's first innovation centre entirely dedicated to space resources. Launched in 2020, ESRIC is an initiative of the Luxembourg Space Agency (LSA) and the Luxembourg Institute of Science and Technology (LIST) in strategic partnership with the European Space Agency (ESA). ESRIC's activities are based on three main pillars: research and innovation, support for economic activities, community and knowledge management. ESRIC connects leading academic, industrial, and entrepreneurial talents in the field, as well as contributes to economic growth by supporting commercial initiatives and start-ups. The ESRIC Start-up Support Programme brings a business incubation component and enables technology transfer between space and non-space players.

Products & services

ESRIC is a unique place where technologies, businesses and people meet to drive the future of space resources utilization in support of space exploration and the creation of an in-space economy. It supports the space resources sector by undertaking industry-relevant R&D, by training the next generation of space resources innovators and by developing pathways to implementation. Additionally, ESRIC supports commercial initiatives in space resources. The Start-up Support Programme is the first worldwide incubation programme, entirely dedicated to space resources utilization. ESRIC connects people and businesses, ambitions, and challenges, as well as facilitates knowledge sharing, by creating an open and collaborative environment in which

the space resources community can enjoy the free exchange of ideas as they grow together.

Technical means

ESRIC's laboratories and testing facilities are located at Luxembourg Institute of Science and Technology's (LIST) premises in Belvaux, Luxembourg. Ambitious, mission-driven research and applications, best-in-class talent and state-of-the-art facilities unique in Europe are key to success. In line with the research goal to process regolith and produce oxygen on the Moon, the ESRIC laboratories have dedicated ISRU capabilities to support the centre's activities and provide access to analytical and experimental infrastructure:

- Dry chemistry and analytical suite: access to handling and preparation tools for regolith simulants and mineral powder, as well as analytical capabilities for the characterisation of input and output materials
- End-to-end demonstrators and assembly suite, demonstrators hosted at ESRIC in strategic partnership with ESA.

Main customers

ESRIC partners with public and private international players to create a hub of excellence for space resources in Europe, working closely with:

- Research and technology organisations
- Universities
- Commercial space companies
- Non-space commercial companies keen to expand their business in space resources.
- Space agencies
- International organisations
- Industry players

Major space projects

- Lunar regolith processing for the production of water, oxygen and metals (in partnership with ESA)
- Extraction of oxygen and metals from lunar minerals, aiming to produce alloys for additive manufacturing (partnership with Airbus)
- Purification of water and oxygen for lunar resource production (partnership with Air Liquide)
- ESRIC Start-up Support Programme, offering business and technical support, incubation, and access to non-dilutive funding.
- ESA-ESRIC Space Resources Challenge, an innovation-driven initiative
- Space Resources Week, an annual event covering scientific, technical, business and legal topics. In 2024 the event is taking place between 25 – 27 March at the European Convention Center in Luxembourg.



INFORMATIONS

CEO/Head of department

Dr. Kathryn Hadler, Director

Creation date

November 2020

Organisation type

Public Research Organisation

Number of employees

Total: 21
Space: 21

CONTACT

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Environmental Research and Innovation (ERIN) department

Luxembourg Institute of Science and Technology (LIST)

Core business

The Environmental Research and Innovation department is capitalizing on a blend of remote sensing data obtained from space- and air-borne platforms for producing information on the status of natural resources for public and private stakeholders. It relies on competences in remote sensing and environmental sciences to improve the capacity to monitor variations of Earth's biotic and abiotic resources at unprecedented temporal and spatial resolution. Moreover, it aims to integrate remote sensing data with in situ measured data, land surface models and leverages on satellite communication and IoT LPWAN technology in order to provide evidence-based decision support in near real time in a variety of thematic domains (i.e. disaster risk reduction, precision agriculture, viticulture and forestry, preservation and management of natural resources, maritime surveillance).

Products & 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
- Building areas from SAR and optical data
- Land surface changes from SAR and optical data
- Geospatial software technologies and platforms for web based data integration
- Training in multi source EO data acquisition and processing

Software enabling the effective 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, IoT sensors
- 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, , VITO, TELOPS-Canada, KU Leuven, TU Vienna, University of Bristol, adwaisEO, SES, EarthLab, Cybercultus, , Hydrosat, World Bank, Asian Development Bank, , CIMA Research Foundation, Earth Observation Data Centre, Wageningen University, Agroptimize, WASDI, RSS-Hydro, Fadeout Software, Service des médias et des communications, Luxsense Geodata, POST, Frontier Connect, Thales Alenia Space, PWC, Ministry of Foreign Affairs, Directorate of Defence INDRA, CESBIO, Friendship Luxembourg, Red Cross, Terradue, Spuerkeess, Geoville, DLR

Major space projects

GFMS – Global flood monitoring service
OVERSEAS – Multi-source EO-based maritime traffic monitoring
COMNECT – Addressing the need of rural communities in terms of connectivity solutions
EURANUS – LST and ET products for Europe and Africa
HERITAGE – Crop yield forecasts based on EO, machine learning and crop modelling
CHAMELEON – Detection of changes using heterogeneous EO data powered by AI
CITYWATCH – Mapping urban settlements using EO data
HIDRATE – Integrating EO data and land surface models for transpiration and evaporation mapping
EDRIFT – EO-based solutions to support disaster risk financing
GRASS – Gravimetry and radar data assimilation into a hydrological models for improving drought prediction
DestinE – Digital twin supporting the management of natural disasters
LUXSCAT – Field experiments supporting the development of geostationary C-Band SAR systems

LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



INFORMATIONS

CEO/Head of department

Prof. Dr Lucien Hoffmann

Creation date

2015

Organisation type

Public Research Organisation

Number of employees

Total: 200
Space: 25

CONTACT

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LIST ITIS Department

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 & services

The ITIS department is active on the following RDI topics:

Responsible Data Science & Analytics:

- Trustworthy AI
- Visualization & Interaction
- Human Modeling

Reliable Distributed Systems:

- Optimization of Intelligent Systems
- Edge and Mobile Computing for IoT
- Trusted Data Systems

Software Engineering RDI:

- First Low-code/No-code platform for smart software

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

Innovation lines:

- 5G and 6G Networking
- Digital Twin Technologies
- Digital Upskilling
- Explainable AI

Main customers

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

Major space projects

→ 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

→ LEONE (JOINT FNR & MECO)

Low-Latency Command and Control via LEO Satellites

LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



INFORMATIONS

CEO/Head of department

Francesco Ferrero

Creation date

2015

Organisation type

Small and Medium-Sized Enterprise

Number of employees

Total: 100

Space: 9

Turnover 2022

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)



CONTACT

Name

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

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 & 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

LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



INFORMATIONS

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

Name

Dr. Damien Lenoble

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Uni.Lu Geodesy and Geospatial Engineering

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 & 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)



INFORMATIONS

CEO/Head of department

Prof. Felix Norman Teferle

Creation date

2017

Organisation type

Public Research Organisation University

Number of employees

Total: 8
Space: 5

CONTACT

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UNI.LU Geophysics & Remote Sensing (GRS) LABORATORY

Core business

Geophysics & Remote Sensing is a research group devoted to the study of environmental changes and their impact on Earth's systems, encompassing both human and natural factors. Our interdisciplinary team is actively engaged in the development of advanced technologies for detecting, monitoring, and mitigating the risks posed by natural disasters, as well as identifying and evaluating space resources for future exploration and utilization. GRS harnesses expertise in geophysics, remote sensing, planetary science, and engineering, enabling us to contribute significantly to the sustainable development of our planet and beyond. Our overarching mission is to advance the realm of environmental science and champion sustainable practices, thereby forging a brighter future for our world. Through the synergy of cutting-edge technology and our field expertise, GRS occupies a unique position in comprehending environmental changes and addressing the pressing challenges of our era.

Products & services

Our gravity instrumentation plays a pivotal role in metrology, enabling us to measure gravity acceleration with unmatched precision, achieving accuracy levels as fine as 1-2 microgal (1 microgal = 10^{-8} m/s²). Furthermore, our expertise extends to harnessing Global Navigation Satellite Systems (GNSS) for the high-precision monitoring of both stationary and mobile objects on a global scale. We provide a diverse range of GNSS processing strategies tailored to meet specific client requirements, ensuring precision and accuracy at the millimeter to centimeter level in positioning

and modeling. Moreover, our capabilities extend to utilizing GNSS signals of opportunity for a wide array of environmental data retrieval. This includes measurements of sea levels, ice sheets in polar regions, inundation maps, and global soil moisture levels.

Technical means

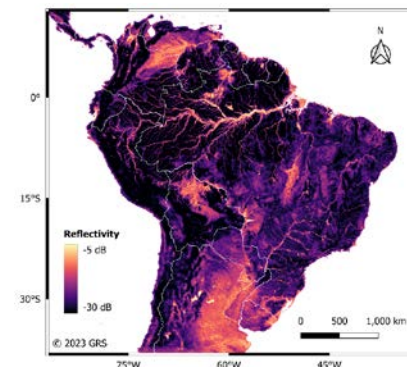
Our technical arsenal comprises a variety of cutting-edge instruments meticulously designed to precisely measure and monitor gravity-related phenomena. At the core of our capabilities lies the Absolute Gravimeter, a portable device renowned for its exceptional accuracy, capable of measuring gravity acceleration with a precision as fine as 1-2 microgal. In addition to the Absolute Gravimeter, we employ Relative Gravimeters, including the portable Scintrex Relative gravimeter, which delivers remarkable precision, typically achieving measurements within approximately 3 microgal and a sensitivity to height changes as small as 20 mm. For specialized monitoring of short-period changes in gravity, we rely on the Superconducting Gravimeter, a non-portable relative instrument. Furthermore, our toolkit boasts an extensive range of state-of-the-art geodetic grade GNSS and GNSS-R equipment. These instruments empower us to observe all current GNSS signals, furnishing us with a comprehensive and adaptable suite of tools suited for an extensive array of ground-based and spaceborne applications.

Main customers

NASA, ESA, LSA, Spire Global, ILNAS

Major space projects

Our portfolio of major space projects encompasses a wide spectrum of cutting-edge research initiatives. Drawing upon satellite gravity measurements, GNSS observations, and altimetry, we engage in extensive research endeavors at the GRS. Within our group, we have been at the forefront of pioneering ground-based GNSS-R techniques. These innovations enable us to detect crucial changes in soil moisture, snow depth, and sea-level, yielding valuable insights for scientific applications. Furthermore, GRS has played a pivotal role in the development of advanced algorithms tailored for spaceborne GNSS-R, with a specific focus on soil moisture assessments and inundation extent mapping. Additionally, we harness the capabilities of grazing angle GNSS-R for in-depth studies related to sea-ice and ice sheets. In parallel, we are actively engaged in precise orbit determination of swarms of CubeSats for gravity applications, further expanding our research horizons.



INFORMATIONS

CEO/Head of department

Prof. Olivier Francis

Creation date

2005

Organisation type

Public Research Organisation

Number of employees

Total: 7
Space: 6

CONTACT

Name

Prof. Olivier Francis & Dr. Sajad Tabibi/
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UNI.LU RUES

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 & 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.



INFORMATIONS

CEO/Head of department

Prof. Stephan Leyer

Creation date

2003

Organisation type

University

Number of employees

Total: 120
Space: 10

CONTACT

Name

Prof. Stephan Leyer

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SNT

Interdisciplinary Centre for Security, Reliability and Trust

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 address organisational, human and legal issues. Through SnT's Partnership Programme, researchers currently work in collaboration with over 70 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 five spin-offs, and creating a dynamic interdisciplinary research environment with some 480 people.

Products & 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 6 space labs: Concurrent Design Facility, CubeSatLab, LunaLab, Zero-G Lab, 6G-SpaceLab, and the CommLab. 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 200 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 70 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



INFORMATIONS

CEO/Head of department

Prof. Björn Ottersten

Creation date

2009

Organisation type

Public Research Organisation

Number of employees

Total: 480
Space: 120

CONTACT

Name

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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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The background of the image features a series of concentric circles in various shades of green and blue, creating a dynamic, circular pattern. The circles are centered on the right side of the frame, with the largest circle being a dark blue and the outermost rings being lighter shades of green and blue.

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