upon the initiative of

partners

associated partners

organised by

media partners

AZO – Space of Innovation
Anwendungszentrum GmbH Oberpfaffenhofen
Friedrichshafener Str. 1
82205 Gilching, Germany

Silvia Corti, Lara Schaflinger
Email: team@copernicus-masters.com
Website: www.copernicus-masters.com

if not indicated otherwise, images are kindly provided by ESA

follow us on

copernicus masters

The leading innovation platform for commercial Earth observation applications is awarding prizes to innovative solutions for business and society.

www.copernicus-masters.com

THE WINNERS 2016
RESULTS

upon the initiative of

partners

associated partners

organised by

AZO Space of Innovation

ESA'S INTRO

This year has been very exciting and particularly successful for the most ambitious Earth observation programme to date – Copernicus. In February 2016 Sentinel-3A was launched, the European global land and ocean monitoring mission. The space craft has successfully completed its In-Orbit-Commissioning Review and we are extremely pleased with its excellent performance. ESA's radar observatory mission Sentinel-1B followed in April, soon afterwards commissioned and handed over for mission operations. Together with its identical twin, Sentinel-1A, which is actively scanning Earth for already two years, the two satellites take coverage and data delivery for the Copernicus services to the next level. Today, more than 45,000 users have registered to access Sentinel data via the public data hub, thanks to the free and open Sentinel data policy. These developments in Europe's Earth observation ecosystem are not only important assets for fostering the User Uptake and raising awareness of Copernicus and its manifold application fields. They also serve as gear wheels to increase the development of "Space 4.0". The latest technological developments and space always influence each other. In this regard, it is essential to refine our space capabilities, the commercialisation of space technologies and support the foundation of space companies, in order to drive the European competitiveness with a concerted effort. This is why I like to think of Europe as "United Space in Europe".

The Copernicus Masters is an excellent example for boosting this process in a truly pan-European way. Within the last five years, this leading innovation competition for Earth observation applications has been showcasing and promoting the most pioneering solutions with the overall purpose of benefitting Europe's economy and society. It is wonderful to see how the forward-thinking entrepreneurs turn their ideas into thriving businesses. Thereby, the Copernicus Masters provides fertile ground, with an ever increasing basis of profound knowledge and expertise.

To further push these positive developments and foster the User Uptake, the creation of the brand new Copernicus Accelerator programme, funded by the European Commission, displayed another key step towards the overall objective of increasing the Copernicus visibility and awareness all across Europe. For the first time ever, the best 40 winners and finalists of the Copernicus Masters are provided with a customised business development scheme. The competition functions as a reliable catalyst of cutting-edge applications based on Earth observation data and technology. The tremendous potential Earth observation incorporates is reflected in added-value products and solutions which meet global challenges and benefit the environment and humankind simultaneously.
My gratitude and congratulations go out to all participants and winners of the Copernicus Masters 2016 edition. Special thanks also go out to the competition organisers at ESA and Anwendungszentrum GmbH Oberpfaffenhofen (AZO), who have again underlined the enormous potential and power of groundbreaking ideas based on Earth observation.

Johann-Dietrich Wörner
Director General
European Space Agency (ESA)

"The Copernicus Masters is an excellent example for boosting this process in a truly panEuropean way. Within the last five years, this leading innovation competition for Earth observation applications has been showcasing and promoting the most pioneering solutions with the overall purpose of benefitting Europe's economy and society."

ORGANISER'S INTRO

Over the last five years, the Copernicus Masters has evolved into the leading international platform for future-oriented commercial Earth observation applications. We have initiated this unique innovation competition on behalf of the European Space Agency (ESA), in the context of the Copernicus User Uptake. It has developed into the moving force of promoting cutting-edge solutions and thereby raises the awareness of Europe's Earth observation capabilities and its vibrant community. At the same time, today's most nagging issues are tackled with revolutionary business ideas on state-of-the-art technological topics, such as deep learning, the IoT, big data analytics, smart mobility and Industry 4.0 – just to name a few. Since 2011, more than 900 progressive people submitted pioneering ideas and close to 50 have been honoured with prestigious awards in various categories.

Taking into account these positive advancements, the creation of the brand new Copernicus Accelerator programme, funded by the European Commission, providing customised business development support for 40 Copernicus Masters finalists, has allowed for a significant additional boost for the User Uptake and the overall consciousness-raising for Europe's most ambitious Earth observation programme. Furthermore, ESA's very first hardcover book on Earth observation applications "Copernicus in Action", in partnership with AZO, features 70 successful business cases which prove the economic potential of groundbreaking entrepreneurial ideas based on spaceborne data.

As the organiser of the Copernicus Masters, AZO – Space of Innovation, represents a hotbed of innovation supporting Europe's major space programmes Copernicus and Galileo. The Copernicus Masters and our numerous other initiatives have the common objective of developing new businesses, increasing employment and exploring new application fields in the field of space-based entrepreneurship. In regards to the goal of creating new jobs, the innovation competitions as well as the ESA Business Incubation Centres – and in particular the ESA BIC Bavaria – are a very important asset within the AZO value chain, covering the wide range from an initial visionary idea to a marketable product or solution. Over the years more than 50 Earth observation companies have been nurtured within the European ESA BIC network.

Special thanks go out to our dedicated partners who hosted the topic-specific challenges of this year's Copernicus Masters edition: the European Space Agency (ESA), the German Aerospace Center (DLR), T-Systems International GmbH, Satellite Applications Catapult Ltd., the German Federal Ministry of Transport and Digital Infrastructure (BMVI) and Stevenson Astrosat Ltd. In addition, the University Challenge specifically addressed students and research assistants around the world.

I want to express my appreciation for the pioneering application ideas of all the participants and future-highflying entrepreneurs. Furthermore, I want to congratulate all the winners of the Copernicus Masters 2016 and wish them the best of success. Earth observation, its data and application fields are of tremendous value to the European society and economy. Therefore, they call for forward-thinking innovators to constantly strive for the most pathbreaking business cases. We are very much looking forward to the next Copernicus Masters competition, scheduled to take place from April to July 2017.

Thorsten Rudolph
Managing Director
Anwendungszentrum GmbH Oberpfaffenhofen

COPERNICUS ACCELERATOR

FUNDED BY

This year's Copernicus Masters has presented a new and unprecedented feature: the Copernicus Accelerator programme, which provides the best 40 entrants of the competition with a tailored business coaching service delivered by high-level professionals from the realms of Earth observation, ICT, mobile industry and more. Funded by the European Commission, this new initiative aims to support outstanding entrepreneurs in turning their promising ideas into reality, successfully entering the market and achieving measurable progress toward their established objectives. Through the Copernicus Accelerator, 40 Copernicus Masters finalists with EU residency will receive support from expert mentors and work with them on advancing their innovations over a period of several months.

Finalists in the Copernicus Masters will benefit from a unique coaching service tailored to their needs and preferences. But that's not all: the Copernicus Accelerator is also a gateway into the prestigious international Earth observation and global navigation satellite systems (GNSS) community, where participants can reach out to potential customers, investors and partners and raise awareness among space stakeholders around the world.

In addition to getting access to pioneering ideas and providing a remunerated coaching service to the brilliant minds behind them, mentors will also have the chance to interact with industry stakeholders, renowned institutions and forward-thinking peers. Mentors have been selected from a pool of expert applicants based on their ability to leave their mark and shape the future of space-related innovations.

A EUROPEAN COMMISSION INITIATIVE

"With Copernicus, the European Union owns the most ambitious Earth observation programme in the world. With four satellites already in orbit and six services (Land, Marine, Atmosphere, Climate Change, Emergency, and Security), Copernicus helps us address diverse societal challenges. Entrepreneurs and startups are a fundamental link between Copernicus and the end users. We need businesses to develop tailor-made applications for specific users; reach out to new users, communities and sectors; and sell products in international markets. This is why we have launched this year the first Copernicus Accelerator. It will provide coaching to the top 40 applicants of the Copernicus Masters. It is the first stone of our Copernicus startup programme, which will accompany startups from the generation of an idea to its full commercialisation. Let me congratulate the participants to the Copernicus Accelerator. Their dedication and creativity is a fantastic asset for Copernicus and Europe!"

Philippe Brunet
Director for Space Policy, Copernicus and Defence, DG for Internal Market, Industry, Entrepreneurship and SMEs
European Commission (EC)

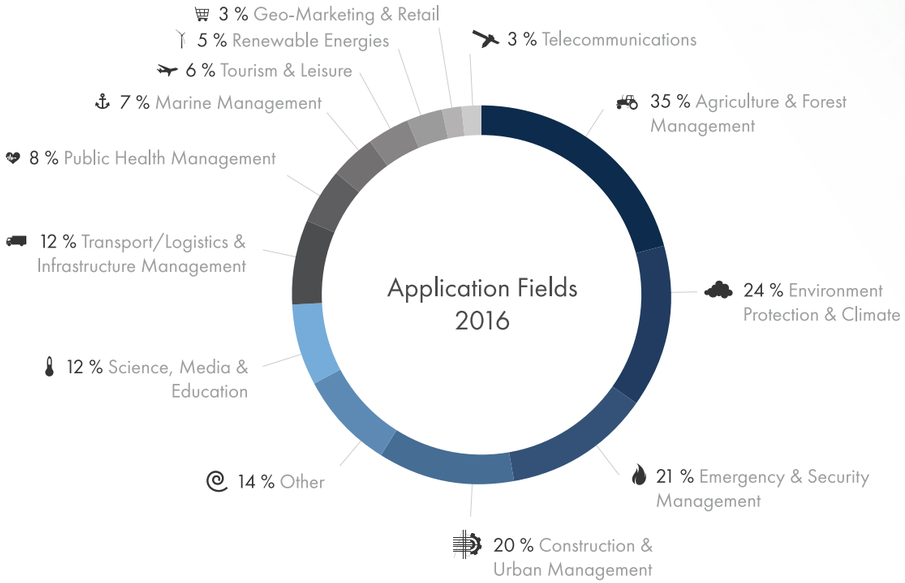
The Copernicus Accelerator wants to become synonymous with supporting innovative startups all over Europe that contribute to society and business through their ground-breaking solutions.

Sentinel-2A being encapsulated within the half-shell of the Vega rocket fairing, on 6 June 2015 at Europe's Spaceport in Kourou, French Guiana. © ESA, M. Pedoussaut, 2015

The data generated are not only open to users worldwide, but also provided free of charge. This enables Copernicus to contribute to the development of a wide variety of innovative applications and services tailored to specific public or commercial needs.

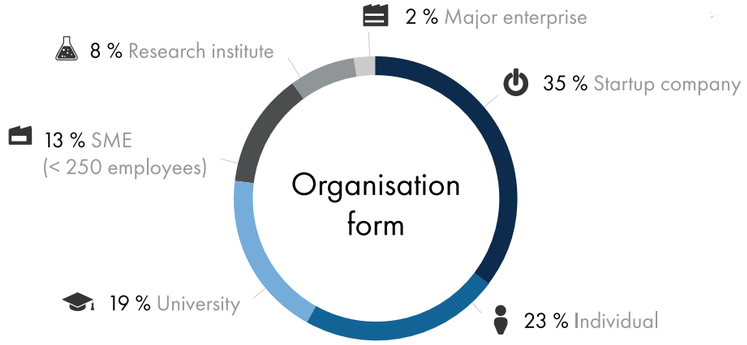
APPLICATION FIELDS

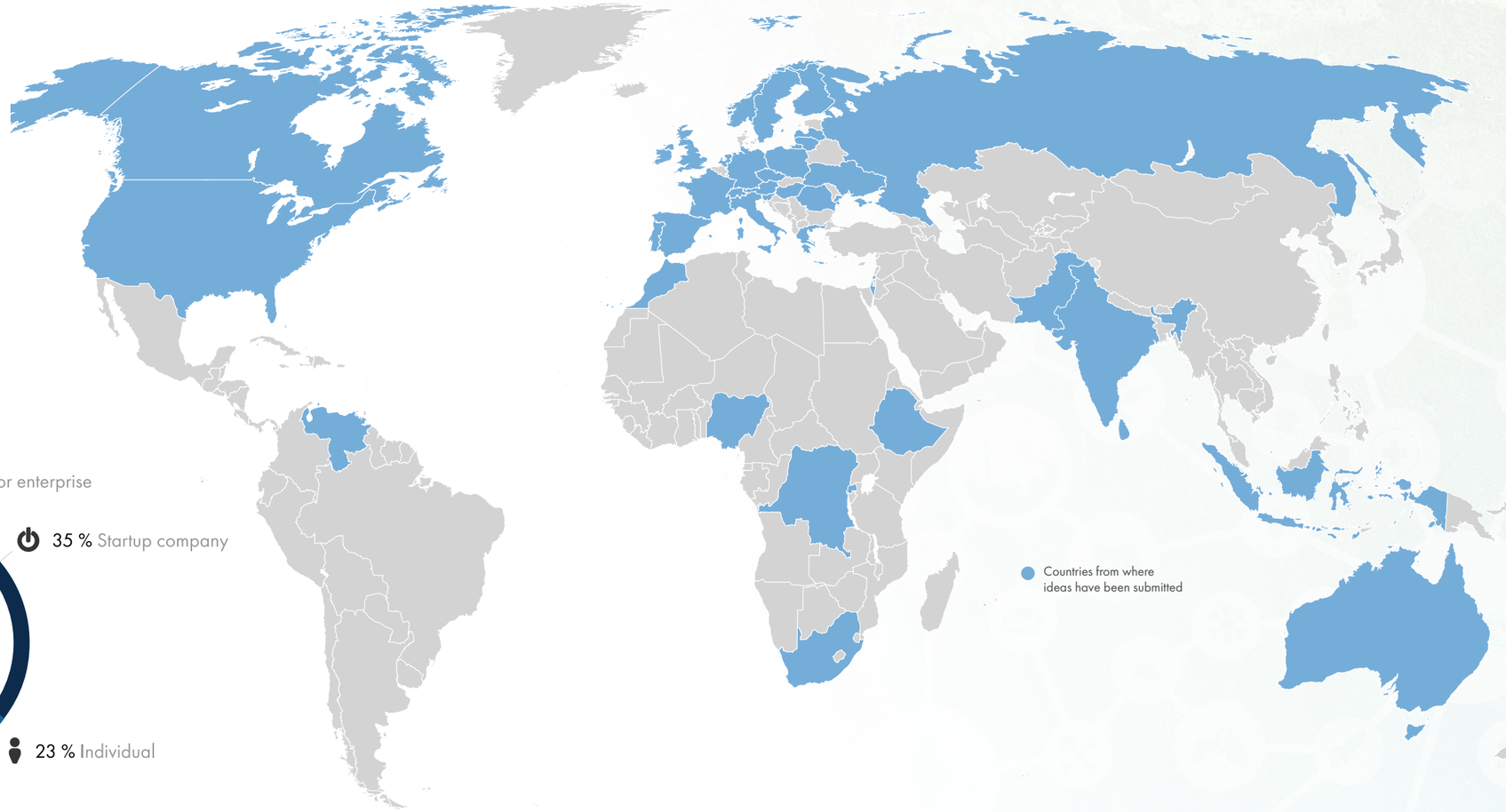
Earth observation offers tremendous opportunities for creating pioneering applications and solutions. Enabled by the Copernicus programme, a wide variety of industries and fields of major European public interest can benefit from these innovations.



STATISTICS

From the very beginning, the Copernicus Masters has emphasised the importance of Earth observation in all areas and aspects of life. More than 900 completed ideas from over 70 countries all around the world have been showcasing the exciting future of EO solutions and applications. Have a look where the 2016 edition's winners are from and how their organisations are formed.





UNIVERSITY CHALLENGE

Seeking to bridge the gap from Earth observation research and academia to entrepreneurship, the Copernicus Masters University Challenge was looking for students and research associates to compete for the chance to transform their bright ideas into successful commercial ventures. This challenge is designed to offer a creative platform for coming up with the most cutting-edge ideas using Earth observation data. Submissions were welcome in any relevant application field, including agriculture management, automotive, emergency management, environmental protection, marine monitoring, mobile applications, renewable energies and tourism/leisure. In addition to establishing links to the world of business, the University Challenge heightened the exposure and credibility of student-driven innovations at the global level. Those tasked with evaluating the ideas submitted thus focussed on creativity and market needs rather than technological maturity.

Lara Schaflinger
Anwendungszentrum GmbH Oberpfaffenhofen (AZO)
lara.schaflinger@azo-space.com, www.space-of-innovation.com

The winner aims at qualifying for one of the 16 ESA Business Incubation Centres across Europe. Corresponding incubation packages are valued at up to EUR 50,000

Along with a EUR 1,000 cash prize, the winner will receive a consulting package to develop the idea into a valid business case

The winner will benefit from a substantial satellite data quota worth EUR 10,000 made available with financial support by the European Commission

THE WINNER

SPACETOPLACE – EO TO EMPOWER UNESCO SITE MANAGERS

Around the world, UNESCO has designated 1,052 locations as World Heritage Sites worth preserving – but many of them are in danger. SpaceToPlace empowers UNESCO site managers and planning authorities to incorporate Sentinel data from the European Copernicus programme into their daily work routines. Its online training environment features easy-to-use, web-based, remote-sensing software alongside dedicated learning modules. Practical hands-on exercises impart the necessary knowledge and skills while also demonstrating sample workflows for monitoring ongoing environmental, economic and social processes. The uniqueness of this preservation through education approach is the concrete easy-to-use training incorporating Earth observation data which usually requires a set of demands, such as access to remote sensing data as well as certain specific technical and image analysis skills, in order to get started. By including these aspects within its application, SpaceToPlace thus helps spread the rich World Heritage of our planet, prevents UNESCO sites from becoming endangered, and promotes future pathways for their development with regard to the implementation of UNESCO's Sustainable Development Goals (SDGs).

Prof Dr Alexander Siegmund and Team
Research Group for Earth Observation (rgeo), Dept. of Geography,
Heidelberg University of Education & Heidelberg University, Germany
siegmund@ph-heidelberg.de, www.rgeo.de

THE EXPERTISE

"Efforts to preserve UNESCO heritage sites through Earth observation demonstrate the fundamental strengths of EO data analysis. Meanwhile, continuous global updates enable smart web applications to provide accessible insights into our planet. This web application educates UNESCO site managers about all kinds of EO data and has the potential to address a huge user base. After all, who isn't interested in UNESCO World Heritage Sites?"

Hinnerk Gildhoff, Development Manager, SAP SE

How can UNESCO Heritage sites be managed, preserved and developed with the help of Copernicus data?

ESA APP CHALLENGE

The European Space Agency (ESA) is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. To contribute to the success of Copernicus ESA is exploiting its 35 years of expertise in space programme development and management. While the Copernicus programme is politically led by the European Union (EU), ESA is the overall coordinator of the Copernicus Space Component and will, inter alia, ensure the uninterrupted delivery of data from the Copernicus Sentinel satellites and from an important number of Copernicus Contributing Missions at national, European and international level. Following the launch of Sentinel-1A on 4 April 2014 the Copernicus programme has entered its operational phase, serving users with an ever increasing mix of satellite imagery and other data.

Dr Thomas Beer
European Space Agency / ESRIN
thomas.beer@esa.int, www.esa.int

The winner will be awarded a support package tailored to the winning app; this can include tech support, design support, app marketing, and other services valued at EUR 10,000 in total

The winner will also have the chance to develop his idea further at one of the 16 ESA Business Incubation Centres (BICs) across Europe. These incubation packages are worth up to EUR 50,000

Moreover, the winner will benefit from a substantial satellite data quota worth EUR 10,000 made available with financial support by the European Commission

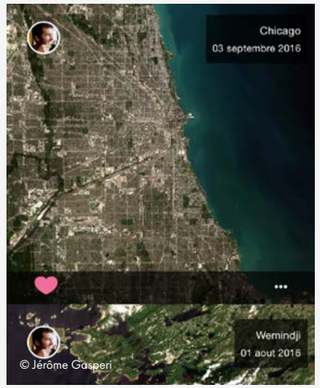
How can selfies from space engage citizens with Earth observation data?

THE WINNER

SNAPPLANET – THE SOCIAL NETWORK FOR EARTH OBSERVATION

SnapPlanet is a social network with the aim to harness the use of Earth observation data to address individual, societal, environmental and economic needs through user- and community-oriented services. SnapPlanet is a mobile application in which users can choose a location around the world at a given time, "snap" it, and share the precise pictures of places taken from satellites with their followers. SnapPlanet provides this service for free, using Sentinel-2 imagery. The medium-term objective is to extend this service to include commercial sub metric imagery. Combined with high user demand and the increasing acquisition capabilities of satellites and drones, this will make selfies from space possible at the cost of a few euros. By providing citizens with access to EO images, SnapPlanet will be a catalyst of innovation and the creation of new EO data-based services.

Jérôme Gasperi
Jeobrowser, France
jrom@snapplanet.io, www.snapplanet.io



THE EXPERTISE

"As the very first Earth observation social network, SnapPlanet brings EO data to the mass market in a fashionable and easy to use way. Amongst other benefits, the application provides its users the opportunity to explore, post, share and print the latest and best Sentinel-2 imagery. SnapPlanet combines the ever increasing availability of Earth observation images with the advantages of a social network for everyone."

Dr Thomas Beer, Copernicus Policy Coordinator, European Space Agency (ESA)

THE DLR ENVIRONMENT, ENERGY AND HEALTH CHALLENGE

The Earth Observation Center (EOC) of the German Aerospace Center (DLR) comprises the German Remote Sensing Data Center (DFD) and the Remote Sensing Technology Institute (IMF). The EOC works in all fields related to the development of algorithms and data analysis systems, as well as in the practical implementation of Earth observation applications and services – from satellite data reception and near-real-time services to disaster monitoring and environmental mapping. As such, the EOC is involved in many aspects of Copernicus' design, implementation and operations. In determining the focal points of its research, DLR is to a large extent guided by the demand for innovative products and services developed in close cooperation with industry entities. It also invests in promising technologies and offers its research and development capacities to partners for their own use.

Gunter Schreier
German Aerospace Center (DLR)
gunter.schreier@dlr.de, www.dlr.de/eoc

The winner will be rewarded with a cash prize of EUR 5,000

The winner will benefit from a substantial satellite data quota worth EUR 10,000 made available with financial support by the European Commission

How can satellites benefit forest managers to prevent bark beetle outbreaks?

THE WINNER

FOREST VISION – RISK ANALYSIS TO PREVENT INSECT OUTBREAKS

Forest managers worldwide are affected by insect outbreaks that threaten to destroy their stock of trees. Bark beetles, for example, can destroy entire forests within a short period of time. These beetles eat their way through trees, which interrupts the transportation of water and nutrients and eventually causes them to die. Outbreaks can be prevented in several ways. However, prevention often occurs too late and is extremely invasive and time-consuming. Viridian Raven offers a solution to help combat these pests. Using data from the Sentinel satellites, it provides an early warning system for forest managers. This makes it possible to take prevention measures that can save time, money and trees. Viridian Raven, combines satellite data from Sentinel and Landsat, in addition to user input and weather station data into one platform for the benefit of forestry companies and services as customers and the environmental protection in general.

Wendy Mensink and Team
Viridian Raven, The Netherlands
wendy@viridian-raven.com, www.viridian-raven.net

THE EXPERTISE

"Viridian Raven is an outstanding example how Copernicus Sentinel data help to identify forest areas at risk for bark beetle outbreaks. Thus, prevention measures are enabled at the right time and area, so that larger scale bark beetle outbreaks can be prevented or quickly responded to."

Gunter Schreier, Business Development & Copernicus;
Deputy Director German Remote Sensing Data Center, German Aerospace Center (DLR)

T-SYSTEMS OPEN TELEKOM CLOUD CHALLENGE

T-Systems is the corporate customers unit of Deutsche Telekom. Building on a global infrastructure of data centres and networks, it operates information and communication technology (ICT) systems for multinational corporations and public sector institutions. T-Systems is pursuing its mission to shape the future of the connected business world and society, by creating added value for customers, employees, and investors through innovative ICT solutions.T-Systems has divided its operational activities into three dedicated management divisions: the Telecommunications (TC) Division, the Information Technology (IT) Division and the Digital Division (DD). Each has entrepreneurial responsibility for the entire value chain within their designated business area, from product development to sales, production and delivery.

Dr Jurry de la Mar
T-Systems International GmbH
jurry.delamar@t-systems.com, www.t-systems.com

T-Systems International GmbH will assist the winner in getting their project off the ground, including assistance to realise it, which could lead to a long-term partnership

The winner will benefit from a substantial satellite data quota worth EUR 10,000, made available with financial support by the European Commission

How can cloud technology and efficient processing increase user uptake by facilitating access to EO data?

THE WINNER

SENTINEL HUB – A SATELLITE IMAGERY WEB SERVICE

Sentinel Hub provides unprecedented access to Earth observation data with a focus on Sentinel satellites and additional support for sources such as Landsat and Planet. By facilitating advanced Amazon Web Services (AWS) cloud technology and innovative methods of efficiently processing and distributing data in a matter of seconds without intensive pre-processing, it offers an easy-to-use and cost-efficient way to exploit the data in any GIS application or integrate it into web applications. Sentinel Hub thus eliminates the major hassle of downloading, archiving and processing petabytes of data and simply makes the full global archive available via web services. Application developers can therefore focus on value-adding services and end-user applications rather than dealing with the complexity of remote sensing data. In this way, Sentinel Hub will increase the uptake of the Copernicus programme.

Grega Milcinski and Team
Sinergise Ltd., Slovenia
grega.milcinski@sinergise.com, www.sentinel-hub.com

SENTINEL Hub

THE EXPERTISE

"Sentinel Hub is a pathbreaking application which facilitates access to EO data and its respective fast-track processing, based on cloud technology. This innovative approach will have great impact on the daily work routines of innovators, developers, scientists and many others, since Sentinel Hub's flexible solution can be used for any GIS and web application."

Dr Jurry de la Mar, Account Director, T-Systems International GmbH

The Earth Monitoring Competition
Copernicus masters
OVERALL WINNER

SUSTAINABLE LIVING CHALLENGE BY THE SATELLITE APPLICATIONS CATAPULT

This challenge has been set by the Satellite Applications Catapult in partnership with Innovate UK, the UK Space Agency and the Science and Technology Facilities Council. The Catapult is an independent innovation and technology company, created to help organisations make use of and benefit from satellite technologies, and brings together multi-disciplinary teams to generate ideas and solutions in an open innovation environment. A not-for-profit company, the Catapult provides facilities, platforms and expert knowledge to enable the translation of ideas from concept to market.

In partnership with

Kirsten Robinson
Satellite Applications Catapult
kirsten.robinson@sa.catapult.org.uk, www.sa.catapult.org.uk

In addition, the winner will receive satellite Earth observation data from the European Commission to the value of EUR 10,000 to help accelerate their idea

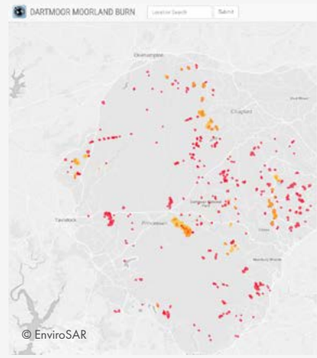
The winning proposal will be awarded a business support package from the Challenge partners valued at £5,000 and tailored to the requirements of the winning team

How can an EO-based mapping and monitoring tool for wildfires help moorland and heathland restoration?

THE WINNER

ENVIROSAR© – MANAGING WILDFIRE DISTURBANCE IN MOORLANDS AND HEATHLANDS

Wildfires are a major hazard and produce devastating environmental and economic impacts. In moorland and heathland areas, wildfires discolour drinking water supplies, release carbon dioxide and damage these unique ecosystems. Around £55 million a year is spent by the emergency services on fighting wildfires. EnviroSAR is a targeted service for peat moorland and heathland restoration and management using Copernicus Earth observation (EO) satellite data to deliver burned-area products, and will be the first national mapping and monitoring tool for UK wildfires. The EnviroSAR geoportal will understand patterns of wildfire occurrence, help mitigate their risks, target land management and reseeding, reduce water discolouration and the associated costs.



Dr Gail Millin-Chalabi and Team
The University of Manchester, United Kingdom
Gail.Millin-Chalabi@manchester.ac.uk, www.envirosar.com

THE EXPERTISE

"EnviroSAR was a clear winner for the Sustainable Living Challenge. The team proved there was a genuine market opportunity for a national wildfire mapping and monitoring tool to support the restoration of some of the UK's most important natural habitats. Their solution is built on an innovative application of Sentinel SAR data and a huge network of organisations they have connected with over the past five years. The team impressed the judges with their technical skills, combined with their energy and commitment to rapidly developing their idea into a commercial service."

Stuart Martin, Chief Executive Officer, Satellite Applications Catapult

THE BMVI EARTH OBSERVATION CHALLENGE FOR DIGITAL TRANSPORT APPLICATIONS

Federal Ministry of Transport and Digital Infrastructure

This challenge has been issued by the German Federal Ministry of Transport and Digital Infrastructure (BMVI) with support from the DLR Space Administration. The BMVI is the German Ministry in charge of transport, mobility and digital matters, as well as the digital infrastructure, intelligent transport systems in the field of road transport and Global Earth Observation System of Systems (GEOSS), including Copernicus.

Christiane Hohmeister
Federal Ministry of Transport and Digital Infrastructure
christiane.hohmeister@bmvi.bund.de, www.bmvi.de/EN

The winning proposal will be awarded a cash prize (EUR 5,000) and a support package tailored to the requirements of its realisation

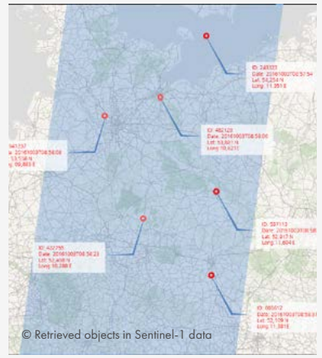
The support package includes free access to the expertise of Copernicus-related agencies and free access to cloud computing facilities and Copernicus data archive CODE-DE

The winner will benefit from a substantial satellite data quota worth EUR 10,000 made available with financial support by the European Commission

THE WINNER

RETRIEVE – SENTINELS FOR SAFE TRANSPORTATION AND RETRIEVAL OF HIGH-VALUE GOODS

RETRIEVE is a service that identifies and tracks goods all over the world. It is the first solution to leverage Earth observation as a logistics tool that is fully independent of global navigation satellite systems (GNSS) – of which the number of global devices is estimated to increase from EUR 3.6 up to 7 billion by 2019, according to the GNSS Market Report – and mobile radio. RETRIEVE enables freight forwarders to monitor their entire fleets and even find lost or stolen assets. Invisible, low-cost ID tags that require no power are fully integrated into the surface of goods. This "identity by design" function is detected remotely by radar satellites, to cross-check the position of goods against other sources. RETRIEVE also maps containers, freight liners, trailers and premium cars to help find them within remarkably short time while saving transportation costs and insurance fees. Fresh satellite data is used for change tracking across countries and entire continents to secure supply chains, prevent delays and keep unique valuables safe.


© Retrieved objects in Sentinel-1 data

Hartmut Runge and Team
German Aerospace Center (DLR), Germany
Hartmut.Runge@dlr.de, www.dlr.de

THE EXPERTISE

"RETRIEVE is an innovative service that combines state-of-the-art technologies on the ground (radar retro-reflectors) with Sentinel-1 images and near-real-time image processors. It can provide tremendous benefits to users, including in finding stolen cars and lost containers and monitoring valuable goods in transit."

Christiane Hohmeister, Policy Officer, German Federal Ministry of Transport and Digital Infrastructure


© Airbus Defence and Space

How can EO be used as a logistics tool to track goods and monitor fleets – independently of GNSS?

ASTROSAT END-TO-END EO CHALLENGE

ASTROSAT

This challenge has been set by Astrosat in association with Teledyne Brown. Astrosat is a private sector managed Earth observation company based in Edinburgh, Scotland that focuses on commercial development and exploitation of EO data. Their clients are spread internationally from South East Asia to Central America and consume products as diverse as deforestation monitoring to energy efficiency in the urban environment.

Alan McLarney
Astrosat
alan.mclarney@astrosat.biz, www.astrosat.biz

Winners will also get the opportunity to potentially partner with Astrosat in further developing their service to sell to select existing end user clients

The winner will be awarded a bespoke support package prize (valued at EUR 8,000) that includes business and technical assistance that will help bring the product closer to market

Moreover, the winner will benefit from a substantial satellite data quota worth EUR 10,000 made available with financial support by the European Commission

How can satellites help in the exploitation and protection of seaweed as a key food product?

THE WINNER

SCAMPER – SAFEGUARDING A EUR SIX BILLION GLOBAL FOOD RESOURCE FROM SPACE

NATIONAL SPACECENTRE

In 2014, the global seaweed harvest's value was estimated to be EUR six billion. SCAMPER is a decision support software tool that will aid seaweed industry stakeholders in the best exploitation and protection of this key food product. Seaweed grows in two areas:

- Intertidal seaweed – fast growing
  Exposed at low tide, use synchronised remote sensing to monitor and measure quality and quantity of exposed „standing seaweed".
- Submerged seaweed – slower growing
  Under water, use colour variation (consistent measurement at same point in tidal cycle, e.g. low water spring tide).

SCAMPER will provide the ability to accurately estimate the quantity of exposed "standing" seaweed. In addition to the use of Copernicus datasets, SCAMPER seeks to investigate an ISS-mounted sensor cluster that would provide higher resolution measurement of this resource, possibly independent of visible spectrum detection methods, to enable day/night observation. This would maximise revisit capabilities and thus the quantity of commercially viable data obtained.

Bruce Hannah
National Space Centre, Ireland
bruce.hannah@nationalspacecentre.eu, www.nationalspacecentre.eu

THE EXPERTISE

"National Space Centre (Ireland) was chosen as winner for the Astrosat challenge as their SCAMPER concept targets a real world commercial need which can not yet be served from space. Most importantly they present solid technical benefits and a realistic business case for how this service would run if it were to be deployed, this shows National Space Centre has really thought through what the benefits of using MUSES for both themselves and for their end customers are. We really like that kind of thinking at Astrosat and are looking forward to working with them closer".

Alan McLarney, CTO, Astrosat Ltd.

GET INVOLVED

Become a sponsoring partner and discover innovative space-based solutions from all over the world. Benefit from pioneering Earth observation applications that leverage your technologies. Enhance international collaboration and profit from cross-industry synergies. Meet forward-thinking business partners from renowned EO stakeholders, obtain extensive promotion within the international EO community and get access to a unique international network of innovation and expertise.

Do you want to become a prize sponsor for the leading Earth observation platform...

...the Copernicus Masters?

We are happy to welcome you at:

lara.schaflinger@azo-space.com

Join us and introduce yourself to the world's major Earth observation community which is ready for you!

Copernicus Masters Team

Lara Schaflinger
Project Management

Silvia Corti
Project Management

Lena Nietbaur
Head of Marketing & Communications

Mathias Kimbacher
Art Director

esa business incubation centre
Bavaria

ESA BIC BAVARIA INCUBATION PROGRAMME

FINANCIAL SUPPORT

› EUR 50,000 cash incentive

› Loan of up to EUR 50,000 from local supporting bank

TECH SUPPORT

DLR: 30 institutes with expertise in Galileo, remote sensing, robotics & mechatronics, simulation, optical systems

Fraunhofer IIS: high precision localisation systems, sensor networks, RFID, WLAN applications, energy harvesting

Airbus: communication, electronics, space systems, security, manifacturing

WFG BGL: GNSS-services, mobility and transport logistics, health, tourism

NETWORK SUPPORT

› Meet with core contacts from industry, research, business angles and investors

› Become part of the unique European-wide ESA BIC network

› Discover myriads of networking and promotion opportunities to accelerate your business

Keys to your success

Excited? Contact us!

We are happy to support you, get in touch with us via email **esa-bic@anwendungszentrum.de**, or call us:

Oberpfaffenhofen
Ottobrunn
Berchtesgadener Land

Cornelia Gebath, +49 (0)8105 7727720
Fabian Lindermer, +49 (0)8105 7727715

Nuremberg

Bianca Niemann
+49 (0)173 1673596

partners

esa
Bavarian Ministry of Economic Affairs and Media, Energy and Technology
DLR
AIRBUS DEFENCE & SPACE
LUDWIG BÖLKOW CAMPUS AEROSPACE | SECURITY
Fraunhofer IIS
WFG BGL
SATELLITE NAVIGATION

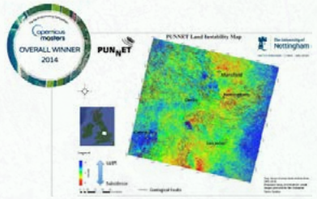
managed by
AZO Space of Innovation

SUCCESS STORIES FROM PREVIOUS YEAR'S WINNERS

WINNER 2014 IDEAS CHALLENGE

CyanoLakes – Public Real-Time Information Service on Blue-Green Algal Blooms
The world's growing population and expanding large cities lead to an increasing demand of access to fresh water. At the same time, millions of lakes and other freshwater bodies around the world are threatened by harmful blooms caused primarily by blue-green algae (also known as cyanobacteria). CyanoLakes, which won the Copernicus Masters 2014 Ideas Challenge, offers a public information and warning service that analyses satellite data using innovative algorithms and advanced research to differentiate between harmless and toxic algal blooms. Through mobile applications, the public service provides weekly updates, forecasts, and real-time information on cyanobacterial blooms as a means of conserving and protecting water ecosystems across the globe. It will also benefit those members of our society who use water bodies recreationally, such as for fishing, boating, and water skiing. *"Having my idea scrutinised by the expert Copernicus Masters jury was very valuable. It not only helped to precisely define the business concept, but also encouraged me to start a business,"* states Dr Mark Matthews, founder of CyanoLakes (Pty) Ltd.

WINNER 2014 RADAR CONSTELLATION CHALLENGE BY AIRBUS DEFENCE AND SPACE & HISDESAT & COPERNICUS MASTER



PUNNET – An Innovative Service in Natural Resource Exploration
Paul Bhatia and Dr Andrew Sowter took home the grand prize in the Copernicus Masters 2014 for PUNNET, an innovative technique they developed for detecting and mapping land deformations with millimetre-level precision. This procedure is capable of identifying land subsidence and upheaval across large areas in mining regions, during groundwater extraction, and in connection with drill holes. Among other benefits, this opens the door to many new possibilities in the construction and oil and gas industries (particularly for exploration companies), as well as for public agencies and environmental protection organisations. Energised by their win and the positive feedback they received from industry experts during the Copernicus Masters, the team behind PUNNET resolved to take the next step in founding their own company. Geomatic Ventures Ltd – a spinoff of the University of Nottingham – has now been undergoing incubation at the ESA Business Incubation Centre Harwell (UK) since March 2016. *"As a pre-startup, winning Copernicus Masters encouraged us to take the first step into the industrial realm. The credibility we gained in the process enabled us to make rapid progress,"* affirms Paul Bathia, CEO of Geomatic Ventures Ltd.

WINNER 2015 EUROPEAN SPACE IMAGING HIGH-RES URBAN CHALLENGE & COPERNICUS MASTER

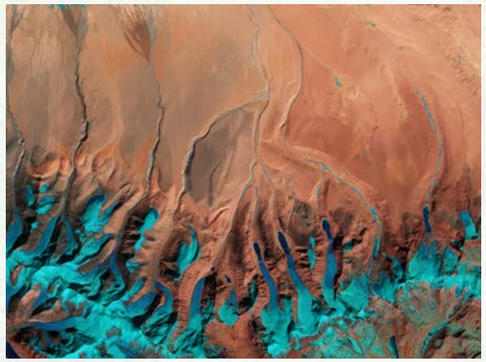
Building Radar – A Satellite-Based Search Engine for Construction Projects
The startup Building Radar, the overall winner from 2015, has also become part of the international ESA BIC network. Using an algorithm its founders developed themselves, this company's online platform identifies new building projects around the world – a key feature for customers in the construction and maintenance industries. Building Radar merges Earth observation data (including optical data from the Sentinel-2 satellite), machine learning, and data mining in an innovative way to offer an all-new service to these sectors. Here, satellite imagery makes it possible to verify online search results and track changes in specific construction projects. *"The Copernicus Masters is a unique opportunity to present your project to the international Earth-observation community, engage with experts, and make some valuable new contacts,"* states Paul Indinger, managing director of Building Radar GmbH.

WINNER 2015 UNIVERSITY CHALLENGE

FORESIGHT CROPS – INSECT SWARM PREDICTION MODELLING
In 2015 Foresight Crops by Dr O. Ogundipe won the Copernicus Masters University Challenge. This idea sought to utilise multi-temporal satellite Earth observation data combined with crowdsourced information, historical records and weather data to model the forming conditions for insect swarms which are detrimental to crops. This will provide a platform to enable risk prediction mapping. Following the award ceremony in October 2015 a startup company called Global Geo-Intelligence Solutions (GGIS) Ltd. was formed in early 2016 to build, develop and exploit this application. GGIS has been able to participate in the Space Placement in Industry (SPIN) programme run by the Satellite Applications Catapult in the UK. GGIS has also been accepted into the new Space Tech Incubator based at the University of Nottingham. This incubator is supported by the UK Space Agency and other partners. *"Thus GGIS is on its way to fulfilling one of the goals of the University Challenge which is to transform bright ideas from researchers into successful commercial ventures,"* affirmes Dr O. Ogundipe.

ABOUT COPERNICUS

By rising to the global challenges of climate change and responding to the ever-growing and divers stress factors placed on the environment and civil security, Europe's Copernicus programme is set to take a significant step forward in the way we care for our planet. Copernicus is the most ambitious Earth observation programme to date and presents a cornerstone of Europe's ambitious activities in space. It responds to the needs of its users and ultimately serves European citizens – both directly through its products and applications and indirectly through its social, economic and environmental benefits. The Copernicus programme is conducted under the overall leadership of the European Commission, which is acting on behalf of the European Union and is responsible for the programme's Services Component. The EU's main partner in this endeavour is the European Space Agency (ESA), coordinating the Space Component which is at the heart of Copernicus. In addition, the European Environment Agency (EEA) gathers data from an in-situ network of various airborne and ground-based sensors. Copernicus thus consists of a complex system of systems that collects information from multiple sources, including the aforementioned sensors and Earth observation satellites. The Space Component comprises two types of satellite missions: the dedicated Sentinel missions, which were developed by ESA specifically to meet the Earth observation needs of Copernicus users; and the Contributing Missions, which involve a number of existing and planned Earth observation satellites from other space agencies or organisations that also provide data to the programme. The Sentinels, each of which carries state-of-the-art technology, provide a unique set of observations. The data generated are not only open to users worldwide, but also



Contains modified Copernicus Sentinel data [2016]

provided free of charge. This enables Copernicus to contribute to the development of a wide variety of innovative applications and services tailored to specific public or commercial needs. As a result, business opportunities are emerging in air-quality forecasting, flood warning systems, early detection of drought and desertification, early severe-weather warnings, oil-spill detection and drift prediction, sea-water quality, crop analysis, forest monitoring, changes in land use, agriculture, food security, and humanitarian aid – to name just a few.

Sentinel-2 © ESA/ATG medialab

THE SPACE COMPONENT

The Space Component forms the heart of the Copernicus programme. This element allows for the delivery of a wealth of data from six families of Sentinel satellites, which are being developed specifically for Copernicus by ESA. In addition, data from more than 30 additional Contributing Missions are used to complement the Sentinel missions. ESA ensures that the data from the Sentinels and Contributing Missions are channelled through a unified system and made available for Copernicus services. The majority of the Sentinel missions is based on constellations of two satellites to optimise global coverage and revisit times.

Data from the Sentinels are fed into six types of services – marine, land, atmosphere, emergency, security and climate change – to benefit the environment and the way we live. These data are used in myriad areas, including in mapping land cover and changes in the way land is being used, improving agricultural practices and forest management, monitoring the oceans for maritime safety and efficiency, and tracking pollution in the air we breathe. The Sentinels also offer key information that supports rapid responses to natural disasters and promotes humanitarian efforts in times of crisis.

Once the data are received on the ground, a network of corresponding archiving centres provides systematic data processing. All data products are archived and disseminated to users online. While the ground segment of each Sentinel mission includes specific components, all the related facilities are united to form the Copernicus Space Component Ground Segment. In particular, access to the Copernicus Space Component (CSC) data is coordinated through the CSC Data Access System.

These are the currently six Sentinel families:

Sentinel-1 is a polar-orbiting, all-weather, day-and-night radar imaging mission for land and ocean services. The first Sentinel-1 satellite, Sentinel-1A, was launched on a Soyuz rocket from Europe's Spaceport in French Guiana on 3 April 2014. Sentinel-1B was launched in April 2016.

Sentinel-2 is a polar-orbiting, multispectral high resolution imaging mission for land monitoring to provide, for example, imagery of vegetation, soil and water cover, inland waterways and coastal areas. Sentinel-2 can also deliver information for emergency services. Sentinel-2A was launched on 23 June 2015 and Sentinel-2B will follow in the first half of 2017.

Sentinel-3 is a multi-instrument mission to measure sea-surface topography, sea- and land-surface temperature, ocean colour and land colour with high-end accuracy and reliability. The mission will support ocean forecasting systems, as well as environmental and climate monitoring. Sentinel-3A was launched on 16 February 2016. Sentinel-3B is scheduled for launch in 2017.

Sentinel-4 is a payload devoted to atmospheric monitoring that will be embarked upon a Meteosat Third Generation-Sounder (MTG-S) satellite in geostationary orbit.

Sentinel-5 is a payload that will monitor the atmosphere from polar orbit aboard a MetOp Second Generation satellite. Sentinel-5 Precursor satellite mission is being developed to reduce data gaps between Envisat, in particular the Sciamachy instrument, and the launch of Sentinel-5. This mission will be dedicated to atmospheric monitoring and will be launched in the first half of 2017.

Sentinel-6 carries a radar altimeter to measure global sea-surface height, primarily for operational oceanography and for climate studies. Its launch is planned for the second half of 2020.

THE EXPERTS

UNIVERSITY CHALLENGE

Dr Thomas Beer
European Space Agency (ESA), Copernicus Policy Coordinator

Thibaud Delourme
European Commission, DG for Internal Market, Industry, Entrepreneurship and SMEs, Space Data for Societal Challenges and Growth| I.3 Unit, Team Leader

Hinnerk Gildhoff
SAP SE, Development Manager

Thorsten Rudolph
AZO, Chief Executive Officer

Sven Schade
European Commission, Joint Research Centre Scientific Project Officer

Peter Seige
Seige Consult, Consulting

ESA APP CHALLENGE

Dr Thomas Beer
European Space Agency (ESA), Copernicus Policy Coordinator

Michaela de Lorentiis
European Space Agency (ESA), Head of the Corporate Applications Services Section

Pierre-Philippe Mathieu
European Space Agency (ESA), Earth Observation Applications Engineer

Dr Robert Meisner
European Space Agency (ESA), Communication Programme Officer

Bruno Naulais
European Space Agency (ESA), European Space Incubators Network Manager

Thomas Obst
Telekom Deutschland GmbH, Sales Consultant

THE DLR ENVIRONMENT, ENERGY AND HEALTH CHALLENGE

Dr Rolf-Dieter Fischer
German Aerospace Center (DLR), Head of Technology Marketing

Dr Jutta Graf
German Aerospace Center (DLR), Head Scientific Information

Dr Stephan Illerhaus
Stadtwerke München (swm), Director, Portfolio Management and Energy Trading

Robert Klarner
German Aerospace Center (DLR), Technology Marketing Oberpfaffenhofen

Dr Doris Klein
German Aerospace Center (DLR), Science Advisor, German Remote Sensing Data Center

Dr Astrid-Christina Koch
European Commission, DG Enterprise & Industry Copernicus Services Programme Officer

Claus Kumutat
Bayerisches Landesamt für Umwelt, President

Dr Wolfgang Rathgeber
European Space Agency (ESA), Head, Programme Planning & Coordination Earth Observation Programmes Directorate

Dr Klaus-Dieter Rockwitz
German Aerospace Center (DLR), DLR Program Directorate Space (PD-W)

Gunter Schreier
German Aerospace Center (DLR), Business Development & Copernicus; Deputy Director German Remote Sensing Data Center

T-SYSTEMS OPEN TELEKOM CLOUD CHALLENGE

Kaspar Duetting
T-Systems International GmbH, Manager Platform Development

Dr Jurry de la Mar
T-Systems International GmbH, Account Director Global Accounts & International Business

Michael Neuß
T-Systems International GmbH, Head of KAM Research & Education

Gert Ohme
T-Systems International GmbH, Senior Consultant

Dr Michael Pauly
T-Systems International GmbH, Marketing Public Sector & Healthcare

Thomas Wetzler
T-Systems International GmbH, Manager Platform Development

Natascha Zierow
T-Systems International GmbH, Marketing Public Sector & Healthcare

THE BMVI EARTH OBSERVATION CHALLENGE FOR DIGITAL TRANSPORT APPLICATIONS

Michael Altenweger
DHL Parcel Germany, Project Manager, Product Management Fulfillment

Roman Beck
DB Netz AG, Head of Infrastructural Data Management and LuFV-Coordination

Dr Michael Bock
German Aerospace Centre (DLR), Space Administration, Project Officer EO Applications

Christiane Hohmeister
German Federal Ministry of Transport and Digital Infrastructure, Policy Officer

Dr Vanessa Keuck
German Aerospace Centre, Space Administration, Project Officer "Copernicus in Germany"

SUSTAINABLE LIVING CHALLENGE BY THE SATELLITE APPLICATIONS CATAPULT

Matthew Edwards
Science & Technology Facilities Council (STFC), Relationship Manager – Space Business Incubation

Andy German
Innovate UK, Lead Technologist Satellite Applications

Emily Gravestock
UK Space Agency, Head of Application Strategy

Tim Just
Innovate UK, Head of Space

Stuart Martin
Satellite Applications Catapult, Chief Executive Officer

Stephen Spittle
Satellite Applications Catapult, Senior Earth Observation & Technology Specialist

ASTROSAT END-TO-END EO CHALLENGE

Steve Lee
Astrosat, Chief Executive Officer

Alan McLarney
Astrosat, Chief Technical Officer

Anwendungszentrum GmbH Oberpfaffenhofen, Friedrichshafener Straße 1, 82205 Gilching, Germany
Phone: +49 (0)8105 7727710, info@azo-space.com, www.space-of-innovation.com