



swiss
space center

Executive summary
EXECUTIVE SUMMARY

2020



Happy 30th Anniversary Hubble!

This beautiful and scientifically very interesting picture was published in 2020 to celebrate the 30th Anniversary of Shuttle Discovery's launch to install the Hubble Space Telescope on its orbit April 24th, 1990. The double nebula is located in the Large Magellanic Cloud, a satellite of our Galaxy 160'000 Light Years away from the Sun. The large red nebula (NGC 2014) is an active star forming region with its center, shaped like a nest, illuminated by very bright stars, and the cavity in this region is caused by the strong stellar wind emitted by these stars. The smaller blue nebula in the lower left (NGC 2020) is the result of a cloud of gas ejected by the central star in a series of eruptive events.

Prof. Claude Nicollier, former ESA astronaut



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INTRODUCTION



**Dear Members, Partners and Friends
of the Swiss Space Center**

Although the year 2020 had many challenges that we were not prepared for, we are glad to report that an amazing amount of activities and projects could be accomplished, thanks to our dedicated team and the trust we received from our members and partners. We are excited to share with you some of the highlights of the past year in the present Executive Summary.

The space domain is evolving rapidly and the need for disruptive innovation is more important than ever before. To better reflect this new reality, the Swiss Space Center has decided to strengthen the innovation focus of its activities by changing its name to "Space Innovation". This refocus will allow to best address its members' needs and to strengthen its collaborative potential to seize national and international opportunities.

We believe in the enormous untapped potential that space technologies hold. They generate valuable knowledge about our planet's ecosystem, climate and societies, thereby enabling solutions to resolve some of the major challenges of our time. In times of uncertainties and crisis, a strong Swiss space ecosystem is fundamental in paving the way for the next generation.

This evolution is occurring in accordance with our wish to provide proactive assistance to our members, establish and support innovative projects with partners and

to be our members' voice in national and international activities.

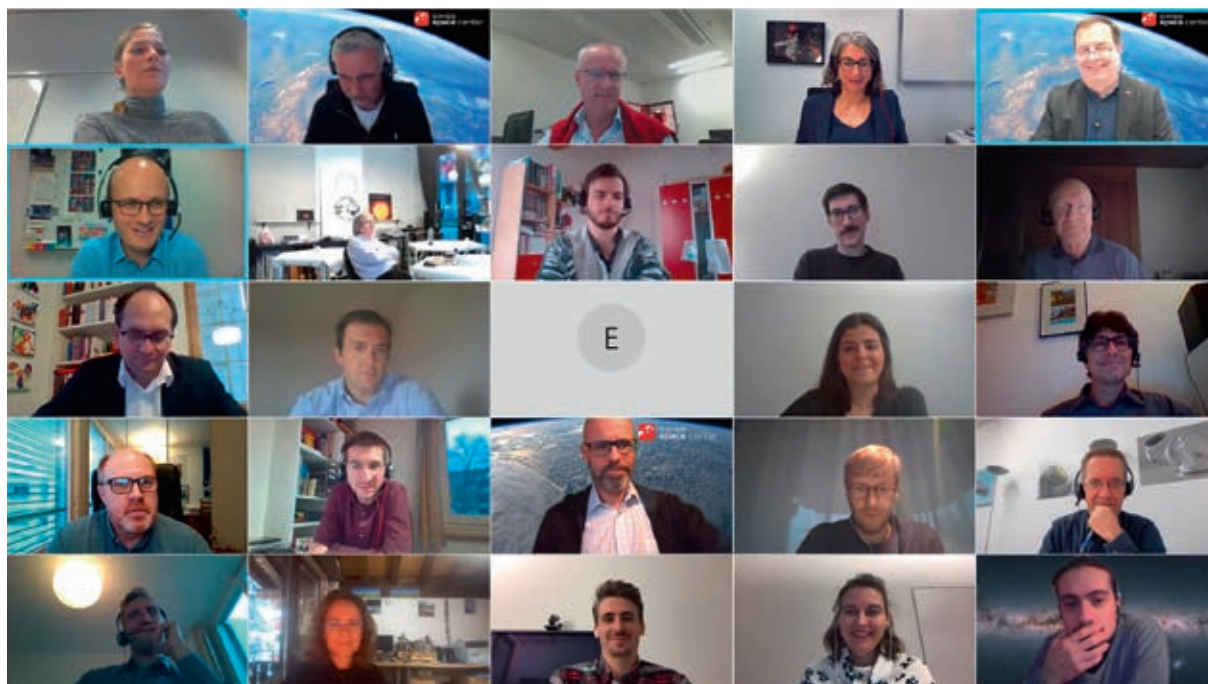
Our locations stay the same: EPFL and ETH Zürich are still hosting us to help us foster innovation for space; as well as our team which is looking forward to continuing working with our partners and space community with the same level of expertise and professionalism they have become accustomed to.

The strategic reorientation of the Swiss Space Center to Space Innovation is welcomed by the State Secretariat for Education, Research and Innovation, which is currently redeveloping their ANC (Activités Nationales Complémentaires) in the space sector.

We are looking forward to this new chapter of innovation in space with you.

A handwritten signature in black ink, reading "V. Gass".

Prof. Volker Gass, Director



Online annual assembly.



MISSION

FOSTERING SPACE TECHNOLOGIES

With the evolution of our activities, we have re-formulated our mission statement:

“ *Space Innovation builds on the multi-domain relevance of space technologies to support the development of disruptive innovation projects in the space sector.* ”

Our focuses are:

- Strengthening Switzerland's space capabilities
- Offering opportunities to involve players in space innovation
- Enabling space technologies to contribute to sustainable development

Our core capabilities are:

- An established network in Switzerland
- A solid national and international recognition and reputation
- Access to cutting edge technologies (from academia, RTOs and industrial partners)

Our value propositions are:

- Pro-active advancing of members' goals
- Establishing & supporting innovative projects with partners
- To be your voice in national and international activities

STEERING COMMITTEE

Tasked with the approval of new members, organization of working groups, the members of the steering committee met regularly under the chair of Dr. Julia Binder.

In 2020, the Steering Committee was composed of the following representatives:

- Dr. Julia Binder (EPFL), chair
- Prof. Markus Rothacher (ETHZ)
- Dr. Urs Frei (SSO)
- Prof. Marcello Righi (Academy representative)
- Dr. Ana Maria Madrigal (RTO representative)
- Mrs. Elisabetta Rugi Grond (Industry representative)
- Dr. Fabrice Rottmeier (Industry representative)

MEMBERS

A NETWORK IN EXPANSION

In 2020, the Swiss Space Center welcomed 7 new industrial members (Embotech, 9TLabs, INVOLI, Klepsydra, Menhir Photonics, Exolabs and Cysec). Apart from the founding members which constitute the BoD (EPFL, ETH Zürich), 42 members from each region of Switzerland, representing all the types of companies (large-sized, medium and start-up), academies (Swiss Federal Institutes, Universities, Universities of Applied Sciences) and RTO (CSEM, EMPA, PMOD/WRC, EAWAG) are part of the network.



Members of the Swiss Space Center (status December 2020)

A new version of our “Members’ Profiles” was edited in October 2020. This document is available electronically on the SSC website, as well as a limited number of printed hardcopies which are available upon request.

SWISS SPACE CENTER WEBINARS



During this peculiar year, which limited the possibility to organize physical events, Swiss Space Center decided to set up webinars instead of its traditional Mechanisms Roundtables in order to keep the community in touch and informed.

Two webinars related to additive manufacturing (AM) for space mechanisms were organized. The first one on June 3, 2020, with experts from ESA who presented the current status of the new ECSS (European Cooperation for Space Standardization) related to AM, ESA's roadmaps and key technologies required to develop AM. During the one-hour webinar, Benoit Bonvoisin, materials engineer at ESA's Materials & Processes Section and expert on AM, as well as Paolo Zaltron, mechanisms engineer at ESA's Mechanisms Section, made a presentation and answered questions.

The second one on September 16, 2020,

was focused on the industrial production side, with experts from the industry. Practical solutions for AM and topology optimization, emphasizing solutions to improve the design of AM parts, were addressed by AM pioneer Adrian Helbling, co-founder and head of Marketing & Sales of Ecoparts AG, as well as by Gian Hauenstein, mechanical engineer with focus on finite-element analysis at SMS Concast AG, who participated in research and teaching activities in the fields of finite-element modeling simulation and topology optimization at HSLU (Hochschule Luzern/Lucerne University of Applied Sciences and Arts). During the one-hour webinar both experts made a presentation and answered questions.

Both webinars received good success and feedback. 105 participants registered for the first one and 60 for the second one.

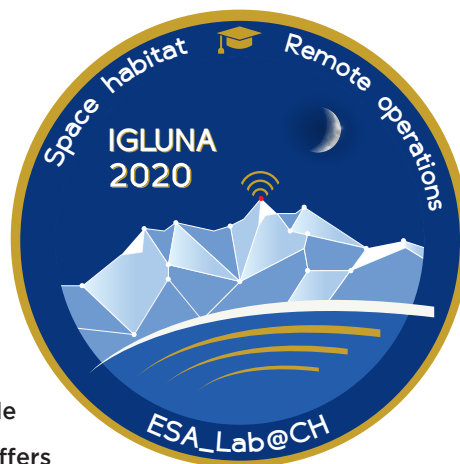
The good feedback received by Swiss Space Center revealed the interest for the organization of such events. New webinars will come soon, with the first one in February 2021. They will cover other aspects related to space technologies. Stay informed!



IGLUNA 2020

THE FIRST OFFICIAL ESA_LAB@CH PROJECT,
SUCCESSFULLY CONCLUDED WITH A VIRTUAL
FIELD CAMPAIGN DURING SUMMER 2020

Coordinated by the Swiss Space Center, IGLUNA is a platform implemented in the ESA_Lab@ framework to foster interaction between universities, industry and research organizations while supporting the next generation of space experts. IGLUNA offers hundreds of students the opportunity to participate in an international, collaborative project on a visionary space topic, fostering the rapid transition from academic research to commercial applications. IGLUNA 2020 follows the first edition carried out in 2019 and will be reiterated with new teams for a third edition – IGLUNA 2021.



In the IGLUNA 2020 edition, 15 student teams from 10 countries around the world worked together during one academic year. More than 150 international students covered the different interdisciplinary research areas necessary for human survival in space: habitat structures, production of oxygen, food and electricity, navigation and communication with the Earth, maintenance of physical and mental health as well as scientific experiments. The students designed their prototypes during the autumn semester 2019 and built their modules in the spring semester 2020 with a common objective: to test their technologies in a field campaign in Lucerne, with a test bed on top of Mount

Pilatus and a control room and exhibition at the VERKEHRSHAUS – Swiss Museum of Transport.

Due to the COVID-19 crisis, the Field Campaign could not take place in the planned format from July 10-19, 2020 in Lucerne. In order to still conclude the projects, the Swiss Space Center set up a Virtual Field Campaign on the same dates supporting the projects' tests remotely, bringing the spotlight on the teams' involvement during the past academic year, welcoming space experts for public presentations and enabling the IGLUNA outcomes to be accessible throughout the world.





The public had the opportunity to attend more than 25 online events presenting future space technologies and the new living conditions for humanity. The student teams each had one hour to explain their projects and perform their tests as the public interacted with them live through the YouTube chat. Invited guests included ESA Director General Jan Wörner, the Swiss Space Office, astronauts Claude Nicollier and Alexander Gerst, Astrocast, ispace, the University of Paris and ESA engineers.



In preparation for the Field Campaign, the student teams passed the Critical Design Review in February 2020, followed by the Mid-term Event in March 2020. This event, initially planned to be hosted at CERN IdeaSquare, was held online due to the COVID situation. These milestones, together with the Readiness Review in May 2020, helped forge the projects while training the students in systems engineering best practices, project management, sponsoring, the development of sustainable terrestrial applications inspired by space, as well as to work together through international and interdisciplinary collaboration.



**THE THIRD EDITION OF IGLUNA - IGLUNA 2021 - HAS STARTED
AND WILL CONCLUDE IN A FIELD CAMPAIGN DURING SUMMER 2021
IN LUCERNE**

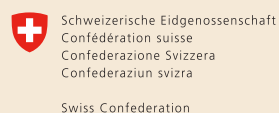
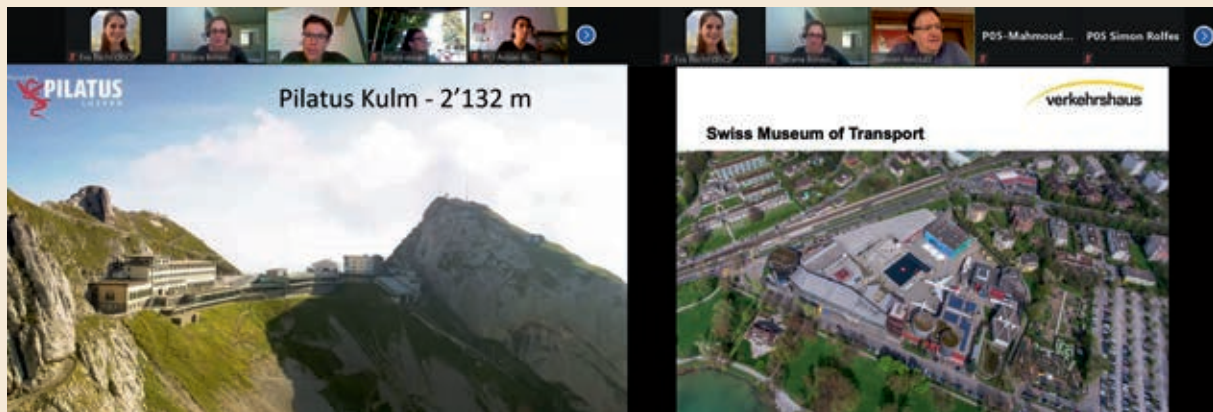
Based on the heritage of IGLUNA 2019 and 2020, the third edition of the project started in September 2020 and will conclude with a Field Campaign in Lucerne in summer of 2021.

In collaboration with ESA during this academic year, 12 different teams coming from 9 countries are working on their technologies focusing on the challenge of remote operations and pushing their business applications further. The technology demonstration scheduled for July 16-25 on Mount Pilatus with a dedicated exhibition and control room at the VERKEHRSHAUS – Swiss Museum of Transport will showcase the innovative technologies and serve as a testbed for the student teams to assess their developed concepts.



From September 9-11 the teams met virtually to kick-off their projects online and started working together towards the Field Campaign. In November 2020, the students passed the Preliminary Design Review milestone, as they presented the progress of their projects to the Swiss Space Center coaches and an expert panel comprised of representatives from ESA, industry, research organizations and other universities. The next step is the Critical Design Review scheduled for February 2021, followed by the Mid-term Event in March. Through the

collaborative aspect, concrete business models, the sustainability goal and the technological challenge, IGLUNA aims to familiarize students with the diversity and constraints of space projects and their terrestrial applications. With local and international partners and sponsors, the Swiss Space Center has set up a platform for international cooperation where students with different backgrounds learn to work together while developing technologies for the future of space exploration to create better quality of life on Earth.

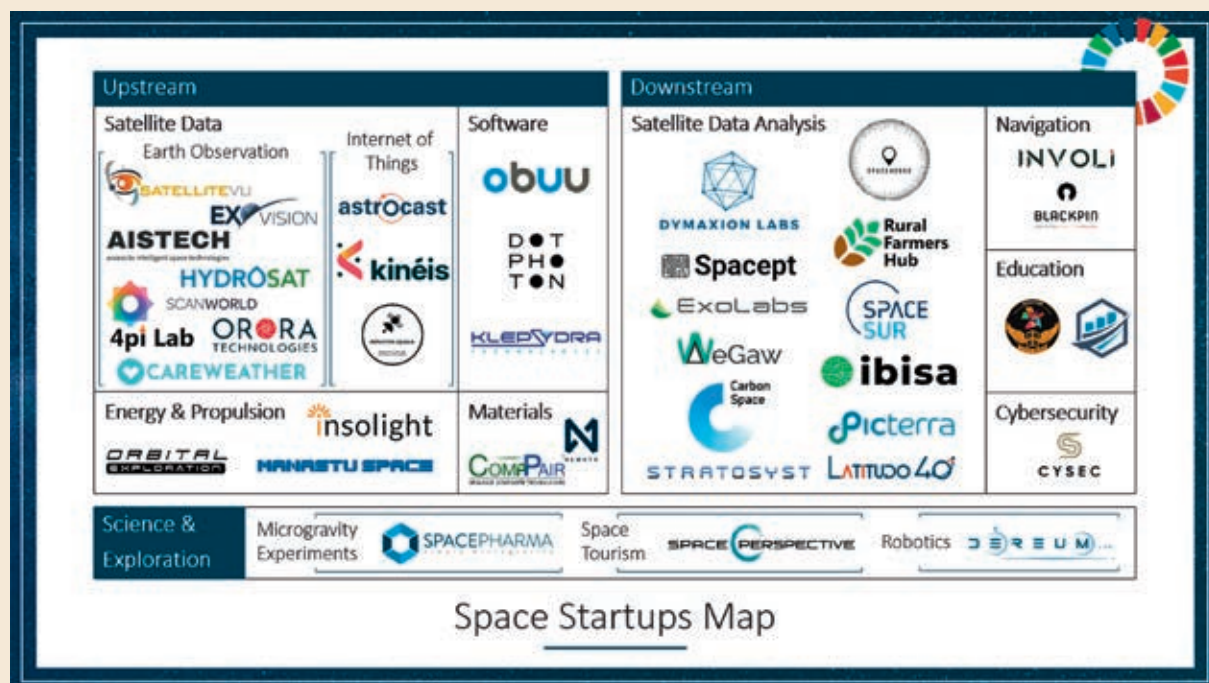


SPACE4IMPACT

SPACE4IMPACT BELIEVES THAT SPACE CAN DO MORE FOR EARTH

Space4Impact was launched in January 2020 and is a spin-off initiative from the Swiss Space Center and the European Space Agency (ESA) Business Incubation Center (BIC) in Switzerland. In February 2020, Space4Impact was invited to announce the initiative at the 57th Scientific and Technical Subcommittee session of the UN Committee on the Peaceful Uses of Outer Space. In November 2020, Space4Im-

pact organized an online kick-off event to raise awareness about space technologies and launch a digital marketplace platform to connect corporations, investors, organizations, and startups. Following an open call for New Space companies, in one year's time, Space4Impact received more than 70 startup applications from 28 countries requesting to join Space4Impact ecosystem.



Space4Impact map of the startups in our ecosystem

SPACE4IMPACT MAXIMIZES THE POSITIVE IMPACT OF SPACE TECH ON EARTH

The Space sector is a fast-growing market. Bryce Space & Technology and Morgan Stanley estimates that the roughly \$366 billion global Space industry in 2019 could surge to over \$1 trillion by 2040. The current growth in the development of Space infrastructures and production of data from Space is opening a full range of new applications with even more new potential businesses. This trend is difficult to follow for non-Space companies and investors, due to the lack of tech translating entities. In return, this makes it difficult for space startups to reach the right customer with their innovative products. This untapped potential is reinforced by the role that Space applications, such as Earth Observation (EO) and geolocation play when it comes to achieving the UN Sustainable Development Goals (SDGs). A simple example of Space applications is the use of EO data for smart farming, allowing farmers to improve their yields by knowing when to harvest and helping them protect their soils by knowing when to use fertilizers.

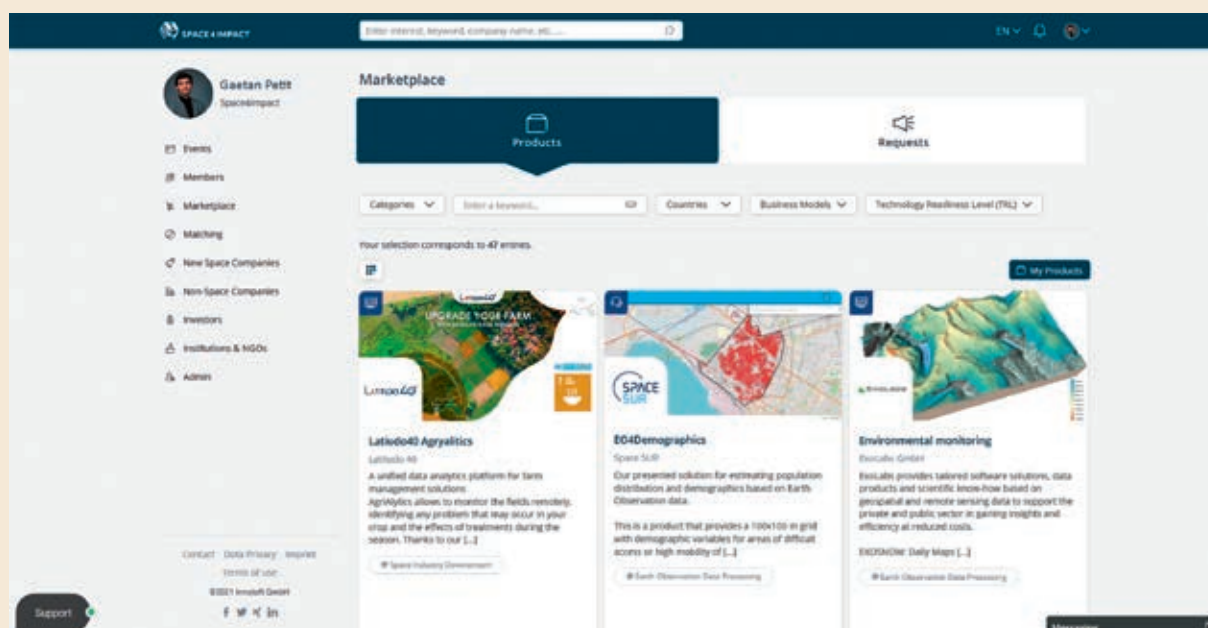
Seizing the moment, Space4Impact wants to maximize the positive impact of Space technologies on Earth by linking Space startups to non-Space markets, on a global level. The Space4Impact digital ecosystem platform will help corporations, investors and organizations who want to integrate disruptive solutions to innovate and accelerate their impact by initiating pilot projects with space startups.

KICK-OFF EVENT

NOVEMBER 25-26 2020

The event was supported by the Swiss Federal Department of Foreign Affairs, the Office for Economic Affairs & Innovation at the Swiss State of Vaud and the EPFL Tech4Impact initiative.

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Space4Impact Market place displaying the products of startups on the ecosystem digital platform

The summary of the event can be found on Space4Impact YouTube channel:

>> <https://youtube.com/playlist?list=PLI1mUkD-LLdVFGCKZAU2OShNu88AltKkS>

The morning session of the event broadcasted live talks and panel discussions to show how space applications provide positive societal and environmental impact. For this first session we invited Dr. Natalia Archinard – Deputy Head of Education, Science, Transport & Space Section at the Swiss Federal Department of Foreign Affairs, Ms. Simonetta di Pippo – Director of the UN Office for Outer Space Affairs (UNOOSA), Prof. Claude Nicollier – Former Swiss Astronaut for ESA and Ms. Isabelle Duvaux-Bechon – Head of the Member States Relations and Partnerships Office at ESA. We also invited other speakers from New Space companies like OroraTech, Dot-photon, Hydrosat, Astrocast and Planet or investors representing UBS, WEF, Refe-

rence Capital, Orbital Ventures and Airbus Ventures.

The afternoon session was a startup competition to showcase how space technologies can be applied in non-space industry verticals to create a positive impact. The session was introduced by Raphael Konz – Head of Office for Economic Affairs and Innovation at the Swiss State of Vaud, Etienne Schneider – Luxembourg Former Deputy Prime Minister and Minister of the Economy, Carlos Augusto Teixeira de Moura – Brazilian Space Agency President. The Jury of the startup competition gathered actors from RUAG, Switzerland Innovation, AP-Swiss, Innovaud, EPFL Tech4Impact, the WWF, ESA BIC CH and the Luxembourg Space Agency.

The startups pitching were a selection of companies from our ecosystem:

>> <https://ecosystem.space4impact.org/public/>



Space4impact kick-off event compilation of presentations

NATIONAL ACTIVITIES

“MESURES DE POSITIONNEMENT” (MDP)

On February 13th, the SSC organised at the Swiss Tech Convention Center on EPFL campus the public event “Space Technologies Studies 2018 – Results”.

This event gathered about one hundred participants from the Swiss space community. ESA was represented by Mr. Eike Kircher. The public learned about the achievements reached by the eleven projects funded under the call MdP 2018 and ten studies carried out in the Call for Ideas 2019. This was also the occasion to announce the new MdP call for proposal opened on February 20th.

The SSC was entrusted by the SERI/SSO to implement the 6th call for proposals “Mesures de Positionnement”. Due to the COVID-19 situation, the submission period was extended by two weeks in May which



allowed the organizers to receive 41 proposals. The technical evaluation process under the lead of SSC was carried out virtually with external experts and, in October, the SERI/SSO announced the selection of 10 studies. These studies will be directly followed by SERI/SSO until their end in January 2022. We wish them all the best and a successful implementation.



Space Technologies Studies 2018 - results event at EPFL STCC

SPACE COMMERCIAL TECHNOLOGY ROADMAP 2020

In highly industrialized countries such as Switzerland, technology development plays an important role in the economic balance of the local industry. This is due on the one hand to the availability of state-of-the-art technical education as well as relatively high wages. Interest and competition push companies to seek innovative products and to apply new technological approaches to remain competitive in a global market.

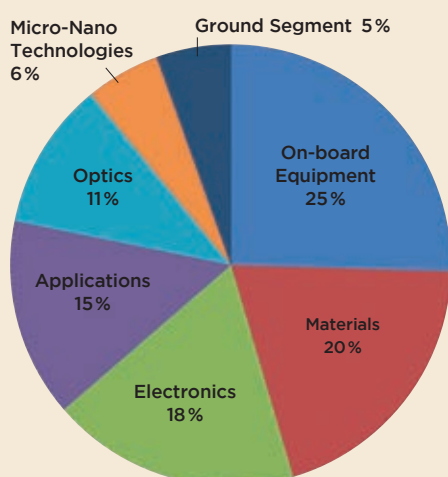
We conducted a study to try to understand the needs of the industrial companies working and delivering products and services in and to the space sector. Included are parts components and subsystems for satellites, launchers, ground support equipment as well as certain customer services based on data obtained from or relayed through space-born systems.

Data has been obtained by reviewing technology studies reports established in the last ten years and by conducting personal interviews with managers from industry in order to assess their future needs and orientations. This data set included the results from 55 studies in various technology areas. We observed that in more than 90% of the cases, a follow-up project or product was implemented. A case-by-case look at

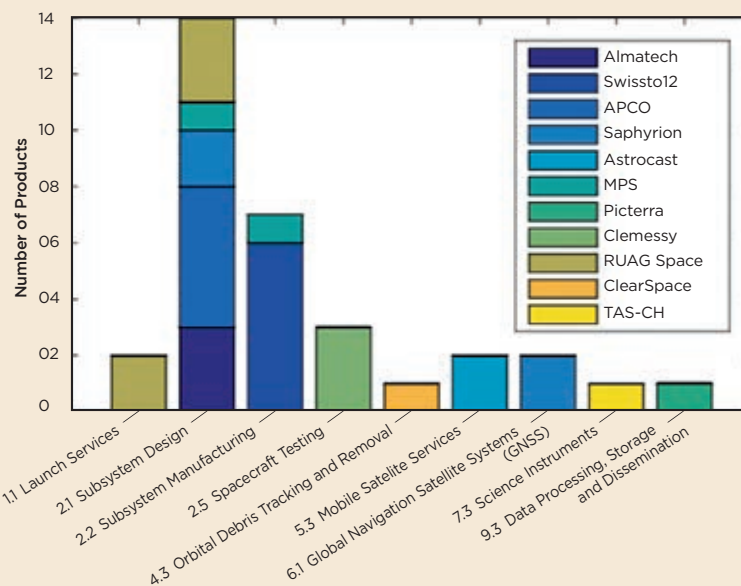
the individual project development reports to identify technology thrusts, shows unsurprisingly that design and miniaturization are the tools used by industry to bring to and maintain their products in the market. Discussions about future needs with managers show that products need to be on the market in less than 4 years and that in more than 70% of the cases government funding amounted to less than 50% of the development costs.

However, it was clearly mentioned in all interviews that without a national program to drive such technology development and the corresponding transfer from academia to industry, and without the readiness of the different actors to work with each other, the position of the Swiss Space Industry will soon be in jeopardy.

TECHNOLOGY AREAS



SWISS SPACE COMPANIES BY SPACE ECONOMY SUB-SECTOR



BE A STAR IN ESA'S UNIVERSE



This year, the “Be a Star in ESA’s Universe” event took place under a new format considering the current sanitary situation. Instead of a roadshow and panel discussions in several Swiss universities, we organized on 26-27-28 October and on 2-3 November five online sessions to tackle fields of study now playing a key role in the current space ecosystem:

- Cybersecurity
- Space law
- Life support systems
- Engineering (focus on robotics & photonics)
- Science missions (focus on exoplanets)

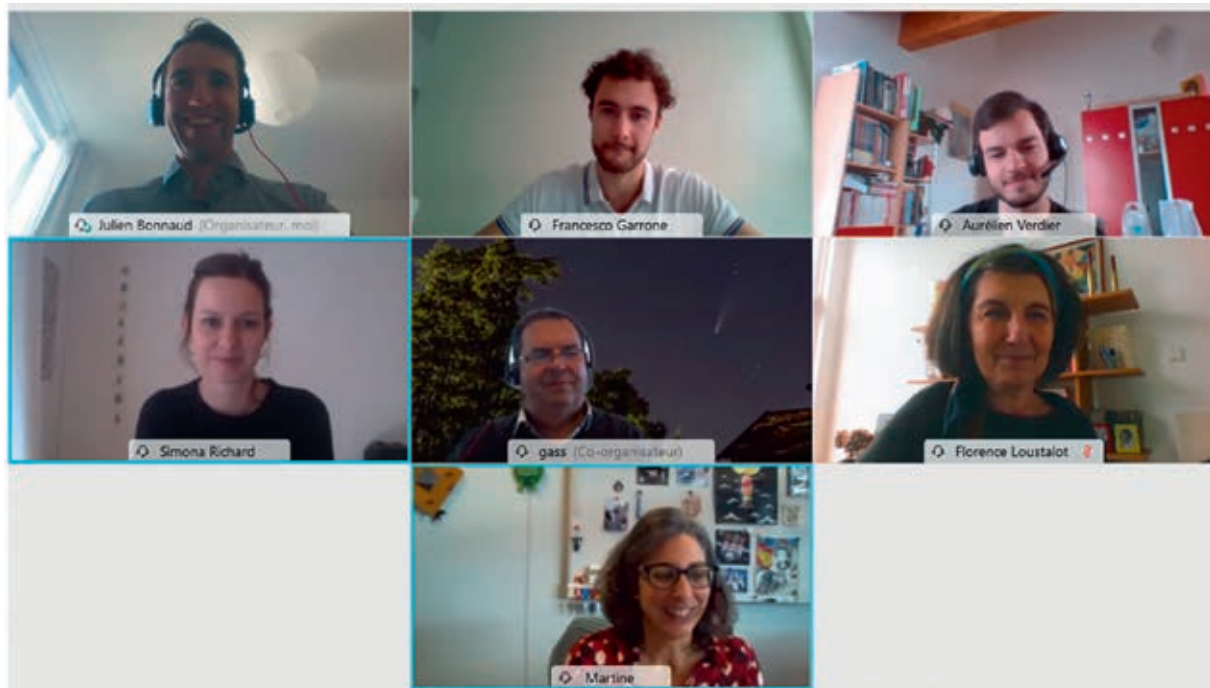


Each event took place on our YouTube channel and included a Q&A session to foster interaction between the speakers and participants. The event gathered high-ranked experts from ESA and Swiss industries/academia as well as an ESA HR and SSO representative for each session (17 speakers in total). This format has been very successful as we managed to gather 358 viewers during the live feeds and more accumulated views as the videos are now available on our YouTube channel. We currently have 3'097 views (status 21 December 2020) on all sessions. We also conducted a satisfaction survey to gather valuable information on the public's interests, nationalities and wishes in order to improve and implement adaptations in the upcoming years. Finally, this format made us strengthen our collaboration with ESA, in particular with the Human Resources and Communication departments.

NATIONAL TRAINEE PROGRAM

Following the success of the first calls since 2014, eleven new positions were proposed to young graduates with Swiss citizenship. This special initiative, aimed at increasing the number of Swiss staff at ESA, is similar to other national trainee programs operating in Germany, Portugal and Belgium. At the end of the process, three candidates were selected and began on December 1st:

- Simona Richard, Associate Strategy Analysis, ESRIN
- Francesco Garrone, System Engineering Support for ExoMars 2022, ESTEC
- Aurélien Verdier, Euclid Survey Detection of solar system object, ESAC



Kick-off event done on-line with the new NTPs, SSC, SSO and ESA representatives

Scientific Assistant at the Swiss Space Center and specialized in mechanical engineering, Lorenz Affentranger is currently based at the European Space Research and Technology Centre (ESTEC) in The Netherlands. He explains what his tasks are...

I am stationed in the Human and Robotic Exploration (HRE) directorate of ESA with a function of a Systems Engineer on the Earth Return Orbiter (ERO). The Orbiter is the third out of three missions within the larger Mars Sample Return (MSR) Campaign. The primary goal: for the first time to bring Martian soil back to Earth. My main role consists of supporting the systems team in various aspects such as introducing new tools in the form of model-based system engineering (MBSE), producing analysis on electric propulsion models for the mission analysis as well as performing requirement traceability and impact analysis. In addition, I am involved in various project design reviews like the System Requirements Review (SRR) and the Preliminary Design Review (PDR).

• **What are the most interesting tasks or events you participated in?**

I joined the ERO working group when it was still in its conceptualisation phase, meaning there were still design choices to be made on the mission. The time leading up towards and including the SRR allowed me to follow and contribute to the selection processes behind our main industrial partners. Following the switch to an official project meant I was able to see a 10-fold growth of our ESA internal team within a couple of months. This represented (and still does) an extremely dynamic environment. But probably one of the most interesting aspects is the daily collaboration with NASA. It represents a unique insight into the challenges of international collaboration, especially on a project of this magnitude.



• **How will this experience be useful to your career?**

It is hard to put this question into perspective as this experience has been and still is unique. For any future work in the space sector, knowing the intricate workings of the agency is an undeniable advantage, as all the industries in that segment will work with ESA in one way or another. Looking at the processes and steps behind spacecraft development, here again this experience has been very useful as I am involved in the day-to-day work of a challenging mission involving multiple actors across the world while pushing back many current technical boundaries. The planning and execution of a development plan which will span over a decade also adds towards my already fruitful experience.

Lastly, an aspect which might be overseen is the exposure to people who have dedicated their lives to space topics, people who are counted as the world's top experts in their fields. It does not matter if I work directly with them or not, the contact is present in one form or another. It can be via one of the multiple internal conferences, a project review or simply a morning coffee in the common room during which they more than gladly share their experience.

• **What are your projects for the future?**

Rumours in the corridors of ESA point towards the start of a recruitment process for the next generation of astronaut in the not-too-distant future. So, I'll keep the dream going!

EDUCATION AND PUBLIC AWARENESS

A few days before confinement, EPFL was able to hold the Science Championship for Curious and Inventive Children ranging from 8 to 15 years old. The event was held on Saturday 29th February with the participation of the Swiss Space Center and gathered more than 100 children around fun scientific activities.

At ETH, **Globis Astronautenschule**, the discovery trail about physics, outer space and planet Mars for children, had less luck with the pandemic and was obliged to cancel many school visits. The Swiss Space Center was not directly implicated in the organization of the trail, but Claude Nicollier was to inaugurate it on the 28th March and the SSC had planned to promote this fascinating initiative with the ETH organizer, Roland Jaggi.

The company **EXPLORiT** was introduced to the Swiss Space Center by SwissApollo back in 2019. At the heart of Y-Parc in Yverdon-les-Bains, EXPLORiT is developing a science city in the form of exhibitions that will reach out to a multi-generational audience. "Sciencity" aims at inspiring the visitors by offering a practical approach to science, technology and nature through a number of activities. One exhibition mostly for children, teenagers, and families, will be called "On the Road to the Stars". The second exhibition targets a young audience and will be called "the Wonder Burrow". The exhibitions were to open at the end of 2020 but inauguration is now postponed to Spring 2021 with the hope that the pandemic will be alleviated. The aim of these exhibitions is to show the wonders of past space exploration and the hope in future space endeavors which enable the development of new technologies applicable on earth. The Swiss Space Center helped



EXPLORiT to find the right experts on the topics they wished to address in their exhibition. The Swiss Space Center thanks the space community for their openness and their collaboration. We are certain that EXPLORiT will be extremely successful.

Unfortunately, **school visits** traditionally held in May/June were canceled. School activities continued in Autumn, but mostly online. Unfortunately, all 3 GE girls' camps were canceled. One **TecDay** was held in Romanshorn in February, then 4 were canceled and 1 virtual session was finally held in Wohlen.

After many cancellations in Spring, **Claude Nicollier** was able to maintain over 100 conferences, interviews, PR events and school visits virtually.

Fortunately, the **François-Xavier Bagnoud Observatory in St-Luc**, Wallis maintained their 25th anniversary and invited the Swiss Space Center to hold an educational booth from Friday 31st July to Sunday August 2nd. More than 80 children accompanied by their parents participated in the events and built paper rockets. The observatory would like us to come back next year.

From October 9th to 11th, the SSC was invited by the Transport Museum and our member SwissApollo for the Air & Space Days 2020. During this event, several activities were proposed to the public and an updated version of the space exhibition was unveiled. An average of 5000 people per day visited



the museum. SSC was represented by 4 staff members over the three days. They held a booth on the project IGLUNA and conducted a paper rocket activity.



Astronomy on Tap was maintained on April 3rd during which CHEOPS was presented by Dr. Andrea Fortier to an audience of about 60 people.

GALILEO DRAWING COMPETITION

A drawing competition with the topic «Dream of Space» organized by the European Commission was open to children between 6 and 12 years old in Switzerland, Norway and Croatia, end of 2019

and beginning of 2020. The Swiss Space Center helped to promote the competition in Switzerland and 264 children sent out their drawings. The jury, consisting of Katrin Schneeberger (Stv. Direktorin Bunde-



samt für Strassen ASTRA, Eidgenössisches Departement für Umwelt, Verkehr, Energie und Kommunikation UVEK), Gion Capeder (Artist), Stephan Libiszewski (Policy and Media Advisor, Delegation for Switzerland and the Principality of Liechtenstein), Prof. Volker Gass (Director, Swiss Space Center) and Martine Harmel (Administration and Educational Outreach, Swiss Space Center) met on 20th February to select the best drawing of the 30 contestants. The jury chose the drawing belonging to Julina Smid of Berne. Julina will give her name to a satellite of the European navigation system, Galileo, which will be launched in 2021. The Swiss Space Center helped ASTRA (Bundesamt für Strassen) and the EU delegation in Switzerland to set up the Galileo Drawing Completion Award. The event was to take place in June with the 30 best artists and their families, but was postponed



to September and finally held with only Julina, her family and official representatives because of the pandemic.

VIVALYS MISSION

The Vivalys Mission is a test project implemented in Vivalys elementary school, Ecublens, in partnership with the EPFL student association recognized by EPFL Space@yourService (S@yS). S@yS specializes in the promotion of space sciences to perform educational outreach projects such as Astronomy on Tap, and Asclepios. Starting out as a short-term analogous mission simulating life on a celestial body such as the Moon or Mars, Asclepios has become an acclaimed interdisciplinary and international student project aiming to plan analogue missions in Europe. The project is mainly directed by students from EPFL, but also integrates students from other Swiss universities and from other countries. It is an interdisciplinary project, as students from many different scientific fields contribute to it. Laboratories and start-ups are also involved, allowing technical expertise, financial support and counseling.

The principal of Vivalys elementary school heard about Asclepios in the news and decided to contact Chloé Carrière, President

of S@yS and master student in Management of Technology and Entrepreneurship with a minor in Space Technologies. His idea was to adapt an analogous space mission, such as Asclepios, to the program of a class of 16 children, aged 7 to 8. Chloé Carrière turned this opportunity into a semester project entitled Analogous Missions: Learning by Doing, supervised by Prof. Gass. As a result, the entire class program was integrated in a space analogous mission.





One of the headlines in the Davoser Zeitung regarding Solar Orbiter



Outdoor light projection on the PMOD/WRC building during January providing a countdown to the launch



A packed seminar room at PMOD/WRC with a live-link to Kennedy Space Center.

Not only did the children learn to read, write and calculate with a purpose, but they also integrated typical mission terms such as “SWOT analysis”, “Standard Operating Procedure” or “Preliminary Design Review”! The young analogous astronauts followed a workshop on leadership and systems engineering and will soon have a space biology course given to them by Prof. Marcel Egli from HSLU. During the Critical Design Review, the experts, composed of Prof. Volker Gass, Martine Harmel and Simon Hamel (an eSpace engineer), noted how the children had improved their presentation skills. Their next tasks will be to learn to read time so they may refine the schedule of their mission field trip. Learning how to multiply will also be necessary to calculate the budget of the mission!

This mission was made possible thanks to the fantastic collaboration between the school teacher, Mr Roussel, and EPFL students Chloé Carrière and Kevin Pahud. We believe that with great teaching, children learn with enthusiasm and success.

SOLAR ORBITER LAUNCH ACTIVITIES AT PMOD / WRC

During January 2020 a series of activities took place in Davos building up to the launch of Solar Orbiter. Firstly, we had a series of articles in local newspapers building up the launch. During January we also used an outdoor projector to light up the building so that passers-by could see the countdown to the launch. A launch event was held on 5th February which was an open door to the public. This was advertised well locally, including through movies on public buses. It was well attended – with a series of talks, a live link to the Kennedy Space Center for a Q&A with staff at the launch site and an apero. Some presentations were given at Kennedy Space Center as well, and some TV articles released afterwards.

>> <https://www.srf.ch/play/tv/tagesschau/video/raumsonde-solar-orbiter-schickt-erste-bilder-der-sonne?urn=urn:srf:video:58d7404e-bac5-47cc-aafc-d35299b48a86>

>> <https://www.bbc.com/news/av/science-environment-51407501>

MASSIVE ONLINE OPEN COURSE ON SPACE MISSION DESIGN AND OPERATIONS

This year the students have access to a major update of Claude Nicollier's Massive Online Open Course (MOOC) on Space Mission Design and Operations. Since MOOC's first edition in 2016, the space business has evolved dramatically with the arrival of newcomers who changed the approach for accessing space and using it. The update of the course took into account this new paradigm, but presented the space mission concepts as timeless as possible. The technologies change or evolve but the physical concepts behind space travel do not.

More than 27'000 students from all over the world (over 137 countries) registered for the course, from which more than 1'000 registered for the graded course in order to get a certificate (the course is free of charge but a small fee applies for the certificate track). From the beginning, 843 students received the certificate, successfully passing the graded tests.

Surveys show a very high satisfaction from the students, who rate the course as difficult and requiring commitment, but very inspiring and educational.

With this new update of Claude Nicollier's MOOC it has been decided to switch from instructor-paced to self-paced mode in 2021. Up to 2020 the course duration was 8 weeks, starting at the end of February, with sessions and exercises being published on a weekly basis, for a total of 8 sessions, covering all aspects of space missions. Prof. Nicollier and his teaching assistants were following the progress of the students and extensively answering their questions on the forum. Since 2021 the totality of the course will be published once and the students will be able to follow it at their own pace. Prof. Nicollier and his teaching assistants will be much less involved in the follow-up activities. The forum will be monitored once a week for moderation purposes and to take action in case of any issues.



The course is still a unique way to get a comprehensive introduction to human space activities, with much information covering various aspects of space environment and constraints. It is recommended as an introduction to all people wanting to work for space activities or for those who are passionate or simply curious.

Basic registration for the course is free of charge on <https://www.edx.org/course/space-mission-design-and-operations>.

Students must, however, pay a reasonable fee for acquisition of the graded tests and to get a certificate if they successfully pass the assignments.

CLAUDE NICOLLIER

Claude Nicollier was a member of the first group of ESA astronauts selected in 1978. He joined Group 9 of NASA astronauts in 1980 for Space Shuttle training at the Johnson Space Center, Houston, Texas, where he was stationed until September 2005. From 1996 to 1998, he was Head of the Astronaut Office Robotics Branch. From 2000 on, he was a member of the Astronaut Office Extravehicular Activity Branch, while maintaining a position as Lead ESA Astronaut in Houston. Claude Nicollier is Honorary Professor of EPFL and joined the Swiss Space Center, supporting the Swiss space activities.

MEMBERS' WORD



Prof. André Csillaghi
Head of FHNW Institute
for Data Science

2020 was both the best and the strangest year at the FHNW Institute for Data Science.

On February 9th, just a few weeks before the spring lockdown, ESA's mission Solar Orbiter launched from the Kennedy Space Center with our X-ray telescope STIX on board – a highlight for our fantastic team of engineers and scientists who worked hard to make this happen. For most of those who witnessed the launch on site, it was the last trip abroad until today.

28 million kilometers from Earth, our telescope was turned on for the first time. The teams worked from their homes rather than ESA's control center in Darmstadt. We are happy and also proud that everything on board works as expected. All 32 X-ray detectors perform as expected.

Teamwork continues from the home offices in a highly concentrated manner, as we test all possible functions of the instruments and start science investigations with our first observations. Although solar activity is still very low, we were lucky to be able to record a few solar flares already (purpose of STIX).

While STIX is our flagship mission, we are also engaged in further space-related projects. Over the last years, an entire field of research both in heliophysics and astrophysics could be established. We are looking forward to continuing on this path: non-stop from home to space.

More information: >> <https://astro-helio.ch>



Emile De Rijk
CEO Swissto12

in the Aerospace and Defense industries.

The company's patented 3D printing and associated engineering technologies are unique to deliver lightweight, highly performing and competitive RF communication products and payload systems. SWISSto12's prominent partners and customers are Thales, Airbus Defense & Space, Elbit, IAI ELTA, Maxar, Cobham Advances Electronic Solutions, European Space Agency and Armasisuisse. SWISSto12 is the fastest growing

Swiss space company, spun off from the Swiss Federal Institute of Technology in Lausanne (EPFL), privately owned and backed by Swiss and European investors like Swisscom, Zürcher Kantonalbank and Constantia New Business.

SWISSto12 joined the Swiss Space Center back in 2015 when it entered into the space industry and has ever since benefited from the organization's network and services. The organization that has now evolved into Space Innovation, has provided critical input in ramping up SWISSto12's business with the European Space Agency, contributed to national funding programs such as MdP, offering platforms for national and international visibility to SWISSto12, assisted with networking new customers and partners in Switzerland, but also in the USA and in Japan. SWISSto12 looks forward to the coming years of collaboration and to contributing to the local Space ecosystem through Space Innovation's activities.

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