

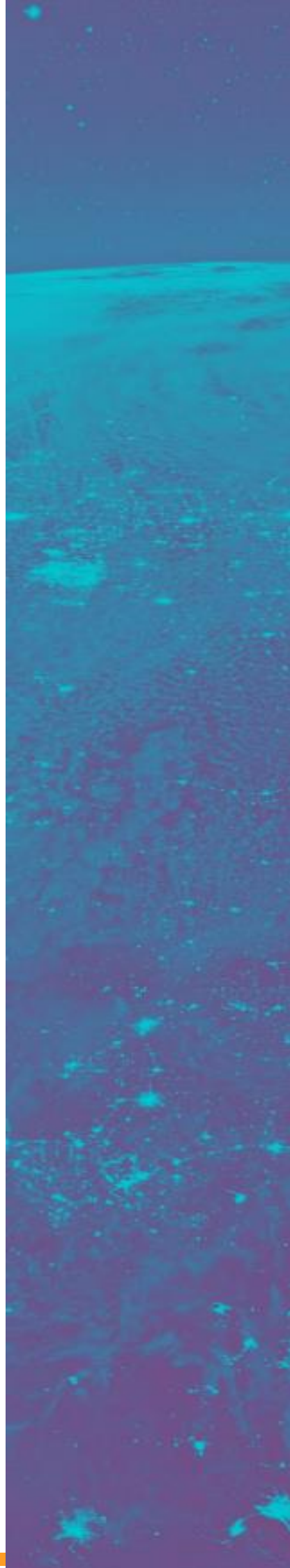
THE **SPACE ECONOMY** INITIATIVE

Access to Finance **Insights Report**

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UNITED NATIONS
Office for Outer Space Affairs



INTRODUCING THE **SPACE ECONOMY**

The level of political and economic capital being invested in space is higher than ever. Estimates indicate the global space economy grew to \$ 414,75 billion in 2018. Space and satellite technology are pillars of modern society. They provide policymakers with invaluable data and information, helping make effective fact-based decisions across a range of policy areas – from urbanisation to national crisis response, with the COVID-19 pandemic being the most recent example of ‘space-enabled’ policy decisions being made at scale.

Expanding the global space economy, responsibly and sustainably, is a fundamental driver behind efforts to bring the benefits of space to everyone, everywhere. Further, these developments can support countries in efforts to ‘build back better’ using space services to face policy challenges, while contributing to innovation, job and revenue creation.

Around the world, many space activities at the national level include a role for a publicly funded ‘space agency’ or similar institution. This central public entity is often also part of a much broader stakeholder ecosystem including both private and other public sector entities, all contributing to the national space sector. Moreover, to truly identify and realise the socio-economic benefits of a strong space sector, we must look beyond just the immediate context; from agriculture to finance, from education to transport, space is making tangible contributions across a huge range of fields.

At the United Nations Office for Outer Space Affairs (UNOOSA), ‘Space Economy’ is a concept that captures, in the broadest sense, the role space is playing to support sustainable socio-economic development. Unpacking such a complex picture is what we aim to achieve with the Space Economy Initiative. We seek to spotlight insights, success stories and experiences from across the international space community. We want to identify the key elements of growing healthy, prosperous space economies and then share such building blocks with all stakeholders pursuing responsible and sustainable space economy growth.

THE WEBINAR SERIES

To unpack how different countries are strengthening their respective space sectors UNOOSA has established a webinar 'space economy' series to bring together space economy experts from across the international space community.

The sessions are designed to tackle this complex subject by focussing on some of the more fundamental elements of a healthy space economy. For example, we will provide a platform to share insights from commercial space entities on how to go from the 'start-up' phase to being well-established. Further, we will look at financing space activities, exploring success stories on how mixed public-private funding models are helping space economies thrive. The series will touch upon the nexus between government, industry and academia, and how to leverage this nexus to maximise innovation and growth in the space economy. We will also look at what this all means outside the immediate domestic context and the link between growing space economies at the national level and supporting responsible and sustainable space activities at the international level.

All these considerations will be taken in the context of the current developments with regards to how space economy can play a key role in supporting socio-economic development, as countries build-back-better in response to the COVID-19 crisis.

The series is composed of topic-specific sessions, touching upon the elements below:

- **Introducing 'Space Economy'**
- **Making the Case for Space:** building the policy case, public support and initial investment.
- **Scaling-Up:** Success stories from the scale-up to established phase.
- **Access to finance:** building a sustainable financial system for space
- **International cooperation to grow responsible and sustainable space activities:** bringing the international normative framework into the domestic context.
- **Innovation and growth in the Space ecosystem:** the nexus between government, industry and universities.
- **Using space to building back better:** supporting countries post-COVID 19 recoveries.

During the series UNOOSA collates the experiences being shared by experts, to build insights of 'what works' with regards to building strong, responsible and sustainable space economies.

These success stories will play a key role towards publishing a set of 'building blocks' that can be used as a reference point in support of further growth in the global space economy and how this growth can help bring the benefits of space to everyone, everywhere.

INSIGHTS REPORT

Access to Finance

This insights report captures the remarks and experiences shared during our fourth webinar session with space economy experts. This webinar addressed a critical element and significant challenge that space entities face: Access to Finance and securing funding for companies and activities that contribute to the space economy.

In this session, we heard from experts from Bryce Space and Technology, the Australia Financial Security Authority, and the European Investment Bank who delivered insights on the existing financial landscape and what is needed to further build up and develop financial systems for the sustainable growth of the space sector and space economy.

The recording of the webinar is available on oosa.org and can be viewed [here](#).

SPEAKERS

INSIGHTS

Space Economy experts from across the international space sector were each given time for remarks on their personal experiences working in the field before switching into a moderated discussion to dig deeper into the topics and insights that had been shared.

- *Ms Carissa Christensen, Bryce Space and Technology*
- *Mr Gavin McCosker, Australia Financial Security Authority*
- *Ms Shiva Dustdar, European Investment Bank*

Carissa Christensen

Bryce Space and Technology

Ms Carissa Christensen is the CEO and founder of Bryce Space and Technology. She previously co-founded a defense and a quantum computing software company. She is an active investor who serves on several early stage boards. Ms Christensen is an internationally-recognized expert on R&D processes, technology forecasting, and the space industry. She is currently a member of the National Research Council Space Technology Industry Government-University Roundtable, which advises NASA. She has served on the World Economic Forum Global Future Council since 2018. She is a Senior Advisor to the annual US Air Force Schriever Wargame. She serves on the Advisory Council of the Aerospace Corporation's Center for Space Policy and Strategy.

Ms Christensen spoke about data and trends around space startups and funding, including information about the number and kinds of existing companies and sources of funding. The data from her presentation is collected and analysed by Bryce Space and Technology, an evidence-based, non-advocate analysis and forecast company focused on the space sector.

The global space economy is \$360 billion, and additional downstream markets associated with GPS and other space technologies increase it to over \$400 billion. About a quarter of the space economy is government budget, with three-fourths of the sector driven by industry. Within the commercial sector, established and longstanding firms drive the main space economy.

One of the key changes in the last several years has been an infusion of venture capital funding for space companies. Since 2015 there has been a dramatic increase in funding for space startups. In 2019, total investment in space companies was almost \$6 billion, mostly through venture capital, and at least 135 companies were invested in. “Super angels” are often a key source of this kind of funding. Four companies accounted for nearly 70% of venture capital investment: SpaceX, Blue Origin, OneWeb, and Virgin Galactic.

At the beginning of the trend towards venture capital investment in space companies, investors and companies were mostly focused in the U.S. However, today while the majority of investment is still flowing into the US, there are now more investors outside the U.S. than in the U.S., and there are more space companies being established outside the U.S. than in the U.S. Venture capital is becoming more global.

Multiple VCs invest in space start-ups, and Bryce tracks this information, as well as common traits shared by investment sources and companies that successfully attract investment. Data and a report for 2019 is available on the website (the report will be updated for 2020) at www.brycetech.com.

Ms Christensen's slides are available [here](#).

Her insights start at 4:40 min in the recording [here](#).

Gavin McCosker

Australia Financial Security Authority

Mr McCosker is Deputy Chief Executive at the Australia Financial Security Authority, where he started as National Manager in Corporate Strategy and Support. Prior to that Mr McCosker worked as Chief Finance Officer and Director in other government services. He was also Senior Financial Sector Specialist at the World Bank Group. Executive expert in service delivery and service transformation, McCosker worked in the private sector, including large multinational such as City Bank.

Mr McCosker discussed debt financing, particularly collateralized debt financing and moveable asset-based lending, which is a relevant instrument for space companies to acquire financing in the startup phase.

Traditionally, land and buildings are widely accepted as collateral for loans, however the use of moveable assets for collateral is more restricted due to a lack of legal and institutional frameworks. In essence, moveable asset-based lending is an important instrument for businesses to gain access to financing by using their assets – rather than land and buildings which they may not have – as collateral for loans. Movable assets include tangible items such as inventory, equipment, components, and robotics which are relevant to the space industry where companies may not have extensive land/ buildings as traditional collateral. Also included are intangible items such as intellectual property, accounts receivable, and future revenue streams.

The goal of modern regimes and frameworks for moveable asset-based lending is to allow the borrower to retain and use the asset (rather than having the asset held by the creditor) and to improve the efficiency of enforcement of the security to reduce transaction costs. In a modern framework, it is important to have a secure transactions registry to increase access to finance for businesses and to protect the balance sheet for businesses.

International standards for secure transactions regimes include: UNCITRAL Model Law Registry Guide and Practical Guide, the World Bank Principles for Effective Insolvency and Creditor/ Debtor Regimes, and the G20 Action Plan on SME financing. In Australia, the secure transactions regime is called the PPSR, which Mr McCosker focused his remarks on.

Australia's PPSR is a centralized means for securing property rights for finance and is an online registry. In the 8 years since the PPSR has been in operation, there have been over 22 million registrations and over 68 million searches of the PPSR (these numbers represent the overall economy). Part of the PPSR specifically identifies space assets as assets that can be used as collateral including robotics, automation, advanced manufacturing, and other intellectual property. This is relevant for space startups, because prior to the company having hard assets, finance can be advanced on the strength of the work that is being developed.

Mr McCosker also highlighted the role that a secured transaction registry play in space industry financing. There are three business transactions in particular which are relevant in this area:

- (1) Protection when selling on retention of title terms. This helps protect creditors by indicating that they are “first in the queue” to get the value of an asset back if a customer cannot pay.
- (2) Protection when leasing out assets. Also allows priority rights over any revenue streams arising from the leasing arrangement.
- (3) Improved access to finance. PPSR provides a means for a business to use a much wider range of tangible and intangible items to raise capital.

Finally, while national regimes have an important role for business in their countries, international laws may also come into play. The nature of domestic secure transaction regimes has given rise to an international regime for high value, highly moveable assets. The Cape Town Convention (under the guidance of UNIDROIT), establishes an autonomous international framework for securing interests in relation to high value, highly moveable assets including space assets.

Mr McCosker's slides are available [here](#).

His insights start at 12:57 min in the recording [here](#).

Shiva Dustdar

European Investment Bank

Ms Shiva Dustdar is Head of Division Innovation Finance Advisory at the European Investment Bank.

Ms Dustdar has over 25 years of experience in the financial industry working for large private and public institutions in New York, London and Luxembourg. Since joining EIB in 2003, she has worked in risk management, lending and investing in innovative companies and currently heads the Innovation Finance Advisory (IFA) Division in the EIB which she was tasked to set up in 2013. Shiva started her career in 1993 at J.P. Morgan Investment Banking in New York working in M&A, Project Finance and Emerging Markets before joining Fitch Rating Agency in 1999 to set up its European High Yield rating business.

Ms Dustdar highlighted trends and analysis of access to finance in the space sector, as well as the role of the European Investment Bank in providing financing for space enterprises.

The European Investment Bank (EIB) is the investment bank of the European Union. EU member states are the shareholders, and the EIB is a policy-driven bank established in 1958 that supports EU policies and has lending priorities aligned to those policies,

including: environment, infrastructure, innovation, and SMEs. Activities and companies in the space sector could fall into any one of those four priority categories.

The EIB Group consists of the EIB and the European Investment Fund (EIF) and has a wide range of financing tools. The EIB has primarily lending products (from equity to debt products) for established/ later stage development companies, and the EIF provides indirect source of financing to the banking sector (such as guarantees in securitization) and to the venture capital sector for smaller/ earlier stage companies. This suite of instruments from the EIB and the EIF are designed to support companies as they grow from startup stage to late stage of development.

Ms Dustdar provided examples of the range of EIB operations in the space sector, including: a quasi-equity loan for Skeleton Technologies, a loan under the Risk Sharing Financing Facility for Inmarsat, an investment loan for AVIO, and an example of risk sharing contingent on commercial success with Ariane 6 heavy launcher.

In addition to financing, the EIB also provides advisory support. Their three categories of advisor support are:

- (1) Light project advisory (support project pipeline development, advise on financing options, etc.),
- (2) Thematic studies (improve framework conditions for financing, develop business case for new financing mechanisms in RDI sectors, funding gap analysis), and
- (3) Ecosystem development (targeted market consultations, mobilization of industry, investors, and a wider ecosystem of actors to develop new financing solutions, best practice dissemination, etc.).

Ms Dustdar also highlighted observations and implications of challenges for financing in the space sector from a study conducted by the EIB, the Space Study on Access to Finance:

- *Market maturity and sector risks*: there are information asymmetries and a general lack of understanding of the space sector and its risks.
- *Access to finance challenges*: raising late stage finance remains a challenge, there is a general lack of growth capital in Europe, and a lack of more institutional money in the late stage investment segment.
- *Role of the public sector*: “pull factor” of the public sector is missing today in Europe, there is a need for a role of public institutions to connect pools of capital and pull in additional private capital with right kinds of policies and support in place.

Recommendations from the Space Study on Access to Finance include:

- *Support for the ecosystem*: strengthen the ecosystem of public support mechanism by introducing more flexibility and commercial orientation.
- *Innovative pull mechanisms from the public sector*: develop and deploy innovative pull mechanisms from the public sector to stimulate technology development and its commercial uptake. Also adopt a strengthened European defence policy as a driver.
- *Access to finance*: Increase volume of risk capital and catalyse additional private investment into the sector.

- *Advisory and soft measures:* Establish a “space finance lab” with representatives from the finance community, academia, policymakers, and industry.

Regarding the last recommendation, a Space Finance Lab has been established with the objective to be a discussion forum to shape new financing instruments and to provide opportunities to showcase the latest thinking and developments in the financing of space ventures. A couple meetings of the Space Finance Lab have already occurred and helped to raise awareness of existing funding programs and identify projects that could benefit from them. These meetings identified a need to better tell the story of how life on earth can benefit from space technologies.

Ms Dustdar's slides are available [here](#).

Her insights start at 26:24 min in the recording [here](#).

QUESTIONS & ANSWERS

What metrics exist on exploration-related companies and activities? How do those compare to metrics on downstream activities?

Ms Christensen: Looking at developments in new LEO platforms, activities for the moon and Mars, etc: those activities are still significantly funded by governments. However, there are commercial activities and opportunities available because the governments are collaborating and working with the industry, for instance, for risk sharing, joint development of capabilities, reliance on innovation and design. It is certainly a government-dominated market, but with plenty of opportunities for companies.

How is collateral collected in the event of a default? How would an insurance company ensure that their salvage is available in the event they pay a claim for a loss and have the right to take title?

Mr McCosker: These specifications are laid out in the contract. Enforcement provisions are written into each contract and are defined in terms of what would occur in the event of a default. In terms of taking control of assets, it often comes down to insolvency provisions and the insolvency practitioner to sort out the specifics. Likely, similar conditions would be in place for insurance.

What is the work of the EIB at the start-up phase, how investment come in from established to emerging space-faring nations?

Ms Dustdar: the European Investment Fund supports early stage companies primarily through venture capital funds that have a space-focus. The Innov-Fin Equity provides equity investments and co-investments to start-ups, in particular those focusing on space. There are roughly 100 million going into venture capital funds. When

companies become more mature, they are eligible for the quasi equity financing. The minimum amount that the EIB provides to them is 7.5 million euros. In addition, the European Innovation Council provide grants or grants and equity.

How do we get this international investment going and what do investors look for?

Ms Christensen: From a venture capital standpoint, there are transnational investments and they entail tax and legal complexities. Space companies, particularly hardware companies, require a high technical expertise. Space founders are more focused on the importance on the technology and less on the returns that this would bring. However, investors look for returns and this aspect must be included in the equation if companies want to attract investments. The first venture capital that flowed in were remote sensing companies looking to generate revenues by blending images with analytics and taking advantage of computing power and artificial intelligence to deliver value to users. Investors invest where they see returns.

What is the biggest risk for growth in the space economy

Ms Christensen: the major risk is the lack of assets, the industry needs to demonstrate that investment in space is profitable for investors if it wants to grow.

Ms Dustdar: space technology companies are not able to have access to sustainable sources of financing and are not able to position themselves. Technology companies are part of the digital transformation and need to respond to the challenges that we face on earth e.g. climate change, they need to be connected to societal challenges and this is not always the case.

CONCLUSIONS and NEXT STEPS

Challenges to build sustainable space economies include difficult access to finance. While funding for space companies has increased substantially in recent years, both early and late stage financing remain a crucial issue to be solved.

Among others, key elements that can address these challenges are a better understanding of potential investors of the space sector and its risks; stronger public support mechanisms that introduce more flexibility and commercial orientation; and debt financing to acquire funding in the startup phase. For the sector to grow and attract investments, the industry needs to guarantee benefits, both at social and economic level. It is only with these premises that a sustainable growth of the space sector and space economy is possible.

The transnational nature of investments refers automatically to other important elements: the international and national legal frameworks that set the conditions to conduct space activities, and the importance of international cooperation.

Countries are developing legislation and practices to grow their space sector and are doing so in different ways. By looking at Germany, Angola and Costa Rica, the next webinar presents trends and differences in the evolution of national and international frameworks to facilitate space activities. Such developments remain within the context of international cooperation, promoted by UNOOSA, that represents the only way forward to support space economies and grow space activities in a responsible and sustainable manner.

THANK YOU

The webinar was made possible with time, support and expertise of our speakers: Carissa Christensen, Gavin McCosker, and Shiva Dustdar.

Thank you to all UNOOSA colleagues who supported the webinar's delivery, including Julia Milton for her assistance in drafting this report.

Moving forward, the Space Economy Initiative aims to support healthy space economies in both theory and practice. For an initiative funded entirely by voluntary contributions, donor support is crucial to realising this vision. Should you be interested in contributing to this work to build responsible and dynamic space economies that accelerate sustainable socio-economic development, please get in touch with Ian Freeman at ian.freeman@un.org or Veronica Cesco at veronica.cesco@un.org.