

Yearbook on Space Policy

Edward Burger
Giulia Bordacchini

Yearbook on Space Policy 2017

Security in Outer Space: Rising Stakes
for Civilian Space Programmes

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Edward Burger • Giulia Bordacchini

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Edward Burger
European Space Policy Institute
Vienna, Austria

Giulia Bordacchini
European Space Policy Institute
Vienna, Austria

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Foreword

Increasingly, space-faring nations have to deal with a wide range of security challenges threatening the sustainable operation of space activities. In this sense, security in outer space is of growing importance not only for operators but also for public and private entities using space-based data and services for their operations. This increasingly challenging security situation has been acknowledged by the global community at large, recognising that space security can only be achieved as the outcome of a global effort. The European Union upholds “the protection and resilience of critical European space infrastructure” as a flagship objective of the Space Strategy for Europe and stresses the importance of cooperation at European and also international levels, in particular with the USA. And across the Atlantic, space has always held a prominent defence and national security dimension, making space security of critical importance.

In considering the above, ESPI’s research team focused greatly on space security matters in 2017 and 2018. In this thread, we have recently engaged in research on security in outer space from European as well as transatlantic perspectives (provided in this Yearbook’s Part II). We likewise focused our annual Autumn Conference in September 2018 on “Security in Outer Space: Rising Stakes for Civilian Space Programmes”. Bringing together satellite operators, SMEs, European and American institutions and think tanks, the latest Autumn Conference served as a platform for fresh insights on security in outer space and the potential of transatlantic relations to address its challenges. Held over 2 days, the conference covered the following three focus areas: (1) the State of Play in Space Security Strategies: Space Assets in an Evolving Environment; (2) Forging Ahead with European Space Security Efforts; and (3) Rethinking Transatlantic Cooperation: towards STM. And in order to both highlight and share these findings, we have ultimately chosen to reflect this activity in the annual theme of the 2017 Yearbook.

Beyond this scope, plenty of developments outside the topic of space security have of course also happened during the Yearbook’s reporting period. This content is laid out in Part I, which provides a comprehensive overview of the economic, political, technological and institutional trends that affected space activities in the past year. It is prepared in-house by ESPI, and while its perspective is European, it

also provides a comparative review of space developments around the world. In 2017, we note in particular the private space sector, which continued to evolve at a fast pace with the consolidation of a number of private initiatives in the wake of the so-called new space approach, while major progress also occurred in space exploration, in particular on the Moon and towards Mars as well as in the discovery of exoplanets beyond our solar system. The first part moreover includes a collection of ESPI thought papers, covering selected topics of growing importance such as suborbital spaceflight, the multiplication of spaceports, super-heavy-lift launch vehicles, collaboration with China and the delimitation of outer space. Overall, the aim of this section is to offer the reader an overview of the development of several key features of European and global space activities during the reporting period.

The second part of the Yearbook begins with the Proceedings of ESPI's 12th Autumn Conference, held in late September 2018, which discussed the growing importance of security in outer space and the stakes for civilian space programmes in the public and private sectors. Part II additionally explores the rising stakes for Europe in security in outer space as well as perspectives on transatlantic relations in security in outer space.

The third part of the Yearbook serves as an archive of 2017 space activities prepared with ESPI's in-house database, including a complete launch log, a chronology of major policy and related events, data on ESA Member States as well as a comprehensive bibliography of space law and policy publications produced during the reporting period.

In closing, I would like to thank the contributors of the materials featured in Part II of the Yearbook as well as the ESPI staff that have been instrumental in its overall production.

ESPI, Vienna, Austria

Jean-Jacques Tortora

Acronyms

A

A3R	Arkyd 3 Reflight spacecraft
AAD	Advanced Air Defence
ABS	Asia Broadcast Satellite
ADPC	Asian Disaster Preparedness Center
AEGIS	Autonomous Exploration for Gathering Increased Science
AG	Aktiengesellschaft
AGRHYMET	Agriculture, Hydrology and Meteorology Regional Center
AIA	Atmospheric Imaging Assembly
AIM	Asteroid Impact Mission
Airbus D&S	Airbus Defence and Space
AIS	Automatic Identification Satellites
AIST	Advanced Industrial Science and Technology
ALR	Austrian Aeronautics and Space Agency
AMESD	African Monitoring of the Environment for Sustainable Development
AMS	Alpha Magnetic Spectrometer
APAC	China and other Asia Pacific
ARISE	Agricultural Resources Inventory and Survey Experiment
ASAP	Austrian Space Applications Programme
ASAT	Anti-Satellite
ASEAN	Association of Southeast Asian Nations
ASI	Agenzia Spaziale Italiana (Italian Space Agency)
ASL	Airbus Safran Launchers
ASPERA-3	Mars Express Analyzer for Space Plasmas and Energetic Atoms
ATK	Alliant Techsystems Inc.
ATV	Automated Transfer Vehicle
AWE	AWE Management Limited
AWS	Automatic Weather Stations

B

BDS	BeiDou Navigation Satellite Systems
BELSPO	Belgian Federal Science Policy Office
BHRS	Belgian High Representation for Space Policy
BIS	Business, Innovation and Skills
BMD	Ballistic Missile Defence
BMVIT	Austrian Federal Ministry for Transport, Innovation and Technology

C

CAD	Computer-Aided Design
CALET	CALorimetric Electron Telescope
CAPE	Crop Acreage and Production Estimation
CASC	China Aerospace Science and Technology Corporation
CAST	China Aerospace Science and Technology Corp.
CATHALAC	Water Center for the Humid Tropics for Latin America and the Caribbean
CBERS	China–Brazil Earth Resources Satellite
CCP	Central Committee of the Communist Party of China
CD	Conference on Disarmament
CDOP 3	Third Continuous Development and Operations Phase
CDRA	Carbon Dioxide Removal Assembly
CDTI	Centre for the Development of Industrial Technology
CEC	Consortium for Educational Communication
CELAC	Community of Latin American and Caribbean States
CENI	Commission Électorale Nationale Indépendante
CEOS	Committee on Earth Observation Satellites
CERSGIS	Centre for Remote Sensing and Geographic Information Services
CET	Centre for Education Technology
CFAS	Federal Commission for Space Affairs
CFOSat	Chinese-French Oceanography Satellite
CGWIC	China Great Wall Industry Corporation
CHEOPS	CHaracterising ExOPlanet Satellite
CHF	Swiss franc
CIET	Central Institute of Educational Technology
CILSS	Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (Ghana)
CIS	Communications, Intelligence & Security
CLARREO	Climate Absolute Radiance and Refractivity Observatory
CMA	Governing Body of the Paris Agreement
CME	Coronal Mass Ejection

CMSA	China Manned Space Agency
CNES	Centre National d'Études Spatiales (French Space Agency)
CONAE	Argentinian Space Agency
CONCORDi	European Commission's biennial Conferences on Corporate R&D and Innovation
COP	Conference of the Parties
COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
COSPAR	Committee on Space Research
COSTIND	Commission for Science, Technology and Industry for National Defense
CRESDA	Centre for Resources Satellite Data and Application
CRISM	Compact Reconnaissance Imaging Spectrometer for Mars
CRS	Commercial Resupply Services
CSA	Canadian Space Agency
CSDP	Common Security and Defence Policy
CSE	Centre de Suivi Ecologique (Senegal)
CSES	China Seismo-Electromagnetic Satellite
CSLCA	Commercial Space Launch Competitiveness Act
CSS	Chinese Space Station
CTX	Context Camera
CubeSats	Cube Satellites

D

DAMPE	Dark Matter Particle Explorer
DARS	Digital Audio Radio Service
DBS	Direct Broadcast Services
DECU	Development and Educational Communication Unit
DJEI	Department of Jobs, Enterprise and Innovation
DLR	Deutsches Zentrum für Luft- und Raumfahrt (German Aerospace Center)
DoD	Department of Defence
DRDO	Defence Research and Development Organisation
DSC	Decision Support Center
DSCOVER	Deep Space Climate ObservatoRy
DSI	Deep Space Industries
DTH	Direct To Home

E

EBIT	Earnings before Interest and Taxes
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization
ECA	Evolution Cryotechnique type A
ECSS	European Cooperation for Space Standardization
EDM	ExoMars Entry, Descent and Landing Demonstrator Module
EDT	Electrodynamic Tether
EELV	U.S. Evolved Expendable Launch Vehicle Program
EIB	European Investment Bank
EIC	East India Company
EIF	European Investment Fund
EIT	Extreme ultraviolet Imaging Telescope
ELIRG	Extremely Luminous Infrared Galaxies
ELV	European Launch Vehicle
EM	Exploration Mission
EMEA	Europe, the Middle East and Africa
EMMRCs	Educational Multimedia Research Centres
EO	Earth Observation
EON-MW	Earth Observing Nanosatellite-Microwave
EPS-SG	European Polar System Second Generation
ERG	Exploration of Energization and Radiation in Geospace
ESA DG	ESA Director General
ESA	European Space Agency
ESEC	ESA Space Security and Education Centre
ESM	European Service Module
ESMD	Exploration Systems Mission Directorate
ESPI	European Space Policy Institute
ESSO	Earth System Science Organization
ETC	Emergency Telecommunications Cluster
EU	European Union
EUISS	EU Institute for Security Studies
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUTELSAT	European Telecommunications Satellite Organization
EVE	EUV Variability Experiment

F

FAA	Federal Aviation Administration
FASAL	Forecasting Agricultural output using Space, Agrometeorology and Land based observations

FCT	Foundation for Science and Technology
FFG	Austrian Research Promotion Agency
FFL	Fondation Follereau Luxembourg
FLPP	Future Launchers Preparatory Programme
FOCAC	Forum on China–Africa Cooperation
FSS	Fixed-Satellite Service
FY	Fiscal Year

G

GAFAs	Google, Amazon, Facebook, Apple
GCSP	Geneva Centre for Security Policy
GDP	Gross Domestic Product
GEO	Geostationary Earth Orbit
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GERD	Gross Domestic Expenditure on R&D
GFDRR	Global Facility for Disaster Reduction and Recovery
GGIM	Global Geospatial Information Management
GmbH	Gesellschaft mit beschränkter Haftung
GMT	Greenwich Mean Time
GNI	Gross National Income
GNSS	Global Navigation Satellite Systems
GOES-R	Geostationary Operational Environmental Satellite R
GOLF	“Global Oscillations and Low Frequency” instrument
GOVSATCOM	Governmental Satellite Communications
GPS	Global Positioning System
GRaND	Gamma Ray and Neutron Detector
GSA	European GNSS Agency
GSLV	Geosynchronous Satellite Launch Vehicle
GSRT	General Secretariat for Research and Technology
GSSAP	Geosynchronous Space Situational Awareness Program
GTO	Geosynchronous Transfer Orbits

H

HAT	Human African trypanosomiasis/Sleeping sickness
HDTV-EF2	High Definition TV Camera—Exposed Facility 2
HFA	Hyogo Framework for Action
HMI	Helioseismic and Magnetic Imager
Hot DOG	Hot, Dust-Obscured Galaxy

HR	High-Resolution
HRE	Human and Robotic Exploration
HSO	Hungarian Space Office
HSTI	Human Space Technology Initiative
HTV	H-2 Transfer Vehicle

I

I&B	Information and Broadcasting
IAA	International Academy of Astronautics
IAC	International Astronautical Congress
IADC	Inter-Agency Space Debris Coordination Committee
IAEG-SDGs	UN Statistical Commission's Interagency Expert Group
IARI	Indian Agriculture Research Institute
IASC	Inter-Agency Standing Committee
ICBM	Intercontinental Ballistic Missile
ICG	International Committee on Global Navigation Satellite Systems
ICIMOD	International Centre for Integrated Mountain Development
ICoC	Draft International Code of Conduct for Outer Space Activities
ICRC	International Committee of the Red Cross
ICS	Information and Communication Systems
ICT	Information and Communications Technology
IEA	International Energy Agency
IEV	Intermediate Experimental Vehicle
IFIs	International Financial Institutions
IGMA	International GNSS Monitoring and Assessment
IGS	International GNSS Service
IISL	International Institute of Space Law
IKAR	Interdepartmental Committee for Space Affairs
ILS	International Launch Services
IMF	International Monetary Fund
IMU	Inertial Measurement Unit
INCOIS	Indian National Centre for Ocean Information Services
INTA	National Institute of Aerospace Technology
IODC	Indian Ocean Data Coverage
IOs	Regional Organizations and International Organizations
IoT	Internet of Things
IPP	International Partnership Programme
IR	Intermediate Result
IRIS	Interface Region Imaging Spectrograph
IRNSS	Indian Regional Navigation Satellite System
ISC	International Satellite Company Limited

ISED	Innovation, Science and Economic Development
ISIS	Islamic State
ISO	International Organization for Standardization
ISRO	Indian Space Research Organisation
ISS	International Space Station
ITAR	International Traffic in Arms Regulations
ITU	International Telecommunication Union
IUCAA	Inter-University Centre for Astronomy and Astrophysics
IUVS	Imaging UltraViolet Spectrograph
IXPE	Imaging X-ray Polarimetry Explorer

J

JAXA	Japan Aerospace Exploration Agency
JIRAM	Jovian Infrared Auroral Mapper
J-PAL	Abdul Latif Jameel Poverty Action Lab
JPSS	Joint Polar Satellite System
J-SSOD	JEM Small Satellite Orbital Deployer
JUICE	Jupiter Icy moon Explorer

K

K2	Kepler 2
KARI	Korea Aerospace Research Institute (Korean Space Agency)
KITE	Kounotori Integrated Tether Experiment

L

L2	Earth-Moon Lagrange
LAXPC	Large Area X-ray Proportional Counter
LEE	Latching End Effectors
LEO	Low Earth Orbit
LRO	Lunar Reconnaissance Orbiter
LTS	Long-Term Sustainability
LULC	Land Use and Land Cover

M

MARSIS	Mars Advanced Radar for Subsurface and Ionospheric Sounding
MAVEN	Mars Atmosphere and Volatile Evolution
MDA Corp.	MacDonald, Dettwiler and Associates Ltd.
MDGs	Millennium Development Goals
MDI	Michelson Doppler Imager
Melco	Mitsubishi Electric Co.
MEO	Medium Earth Orbit
MERLIN	Methane Remote Sensing LIDAR Mission
MESA	Monitoring for Environment and Security
MESSENGER	MERCURY Surface, Space ENVIRONMENT, GEOchemistry and Ranging
Metop	Meteorological Operational Satellite
Metop-SG	Metop Second Generation
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MFG	Meteosat First Generation
MHI	Mitsubishi Heavy Industries
MIT	Massachusetts Institute of Technology
MIUR	Ministry of Education, University and Research
MMO	Mercury Magnetospheric Orbiter
MOD	Ministry of National Defense
MOKV	Multi-Object Kill Vehicle
MOM	Mars Orbiter Mission
MOSDAC	Meteorological and Oceanographic Satellite Data Archival Centre
MoU	Memorandum of Understanding
MPO	Mercury Planetary Orbiter
MRO	Mars Reconnaissance Orbiter
MSF	Médecins Sans Frontières
MSG	Meteosat Second Generation
MSL	Mars Science Laboratory
MSM	Methane Sensor for Mars
MSS	Mobile Satellite Service
MTG	Meteosat Third Generation
MTM	Mercury Transfer Module

N

NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NCERT	National Council of Educational Research and Training
NCSTE	China's National Centre for Science and Technology Evaluation

NDAAs	National Defense Authorization Act
NDCs	Nationally Determined Contributions
NEC	Nippon Electric Company
NEO	Near-Earth Orbit
NextSTEP	Next Space Technologies for Exploration Partnerships
NGA	National Geospatial-Intelligence Agency
NGCV	Next-Generation Crew Vehicle
NGO	Non-governmental Organization
NNRMS	National Natural Resources Management System
NOAA	National Oceanic and Atmospheric Administration
NOW	Netherlands Organisation for Scientific Research
NRO	National Reconnaissance Office
NRSC	National Remote Sensing Centre
NSA	National Security Agency
NSC	National Space Council
NSC	Norwegian Space Centre
NSO	Netherlands Space Office

O

OBIA	Object-Based Image Analysis
OCO	Orbiting Carbon Observatory
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OHB	Orbitale Hochtechnologie Bremen
OOF	Other Official Flows
OPEC	Organization of the Petroleum Exporting Countries
ORU	Orbital Replacement Units
OST	Outer Space Treaty

P

PACE	Plankton, Aerosol, Cloud, ocean Ecosystem
PAD	Prithvi Air Defense
PAROS	Prevention of an Arms Race in Outer Space
PAS	Polish Academy of Sciences
PES	Payment for Ecosystem Services
PHA	Potentially Hazardous Asteroids
PLA	People's Liberation Army
PLATO	Planetary Transits and Oscillations of stars

PND	Portable Navigation Devices
PNTAB	Position, Navigation and Timing Advisory Board
POLSA	Polish Space Agency
PPP	Public–Private Partnership
PPWT	Draft Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects
PRM	Period Reduction Manoeuvre
PROBA	PRoject for OnBoard Autonomy
PRS	Public Regulated Service
PSA	Programme on Space Applications
PSLV	Polar Satellite Launch Vehicle
PS-TEPC	Position-Sensitive Tissue Equivalent Proportional Chamber
PUMA	Preparation for the Use of MSG in Africa programme

Q

QZSS Quasi-Zenith Satellite System

R

RCM	RADARSAT Constellation Mission
RCMRD	Regional Centre for Mapping of Resources for Development
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RHESSI	Reuven Ramaty High Energy Solar Spectroscopic Imager
RKV	Redesigned Kill Vehicle
RLV	Reusable Launch Vehicle
ROSA	Romanian Space Agency
Roscosmos	Roscosmos State Corporation
RRS	Regional Radiocommunication Seminars
RSCC	Russian Satellite Communications Company

S

SAARC	South Asian Association for Regional Development
SAB	Security Accreditation Board
SAB	Space Advisory Board

SAC	Space Applications Center
SACRI	Space and Advanced Communications Research Institute
SAF	Satellite Application Facilities
SAHEL	Sub-Saharan initiative for Telemedicine
SAOCOM	Satellites for Observation and Communications
SDA	Space Data Association
SDGs	Sustainable Development Goals
SDO	Solar Dynamics Observatory
SDP	Space for Development Profile
SEI	Stockholm Environment Institute
SEP	Solar electric propulsion
SEPP	Space Environment Protection and Preservation
SEPs	Solar Energetic Particles
SERI	State Secretariat for Education, Research and Innovation
SES	Single European Sky
SES	Société Européenne des Satellites
SHARAD	Shallow Subsurface Radar
SHLLV	Super-Heavy-Lift Launch Vehicle
SIA	Satellite Industry Association
SIETs	State Institutes of Educational Technology
SIG	Spatial Informatics Group
SIS	Space Infrastructure Security
SITE	Satellite Instructional Television Experiment
SLS	Space Launch System
SMILE	Solar Wind Magnetospheric Ionospheric Link Explorer
SMPAG	Space Mission Planning Advisory Group
SNC	Sierra Nevada Corporation
SNSB	Swedish National Space Board
SOHO	SOlar and Heliospheric Observatory
SpaceX	Space Exploration Technologies
SRC	Space Research Centre
SRON	Netherlands Institute for Space Research
SS/L	Space Systems/Loral
SSO	Sun-synchronous orbit
SST	Space Surveillance and Tracking
SSV	Space Service Volume
STEM	Science, Technology, Engineering and Mathematics
STEREO	Solar TERrestrial RELations Observatory
STSC	Scientific and Technical Subcommittee

T

TCBM	Transparency and Confidence-Building Measures
TDP	Technology Demonstration Programme
TEU	Treaty on European Union
TGO	ExoMars Trace Gas Orbiter
THAAD	Terminal High Altitude Area Defense system
THEMIS	Thermal Emission Imaging System
TRAI	Telecom Regulatory Authority of India
TRAPPIST	Transit Planets and Planetesimals Small Telescope

U

U.S. MDA	Missile Defense Agency
U.S.	United States of America
UAE	United Arab Emirates
UAV	Unmanned Aerial Vehicle
UGC	University Grants Commission
UK	United Kingdom
ULA	United Launch Alliance
UN	United Nations
UNCOPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNDSS	United Nations Department of Safety and Security
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNGIWG	United Nations Geographic Information Working Group
UNIDIR	United Nations Institute for Disarmament Research
UNISPACE	United Nations Conference on the Exploration and Peaceful Uses of Outer Space
UNOOSA	United Nations Office for Outer Space Affairs
UNSDI	United Nations Spatial Data Infrastructure
UN-SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response
USAID	U.S. Agency for International Development
USAT	Ultra-Small Aperture Terminals

V

VAST	Vietnam Academy of Science and Technology
VHR	Very High Resolution
VIR	Visible and Infrared Mapping Spectrometer
VKO	Aerospace Defence Forces
VSAT	Very Small Aperture Terminals

W

WFP	World Food Programme
WG	Working Group
WGP	World Gross Product
WISE	Wide-field Infrared Survey Explorer
WRC	World Radiocommunication Conference
WRS	World Radiocommunication Seminar

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About the Authors

Giulia Bordacchini is a Resident Fellow at the European Space Policy Institute (ESPI) in Vienna, Austria. Giulia joined ESPI shortly after completing her Master of International Relations at the University of Rome *La Sapienza* as well as the Master Course in Space Institutions and Policies with the Italian Society for International Organizations (SIOI) and the Italian Space Agency (ASI). Giulia holds a Bachelor of Political Science and International Relations and was also a Trainee at ALTEC, dealing with suborbital spaceflights and spaceport capabilities and export control, in Turin. Currently, Giulia's other works at ESPI deal with the policy and business issues related to in-orbit services in the new space economy.

Edward Burger is a Research Fellow at ESPI. Edward joined the ESPI team in February 2018 after interning at the space markets consulting firm Euroconsult, in Paris. In 2018, he worked on the present publication as well as the *Space Policies, Issues and Trends in 2017–2018* report. In December 2017, he completed a Master in the Law of Space Activities and Telecommunications at the *Université Paris Sud* in France. He has also participated in the ECSL Summer Course on Space Law and Policy (2014, held at the premises of the ITU in Geneva, Switzerland) and the ISU Space Studies Program (2016, hosted by the Technion in Haifa, Israel). Previously, Edward worked as a Project Officer at the Geneva Centre for the Democratic Control of Armed Forces.

Part I
The Year in Space 2017

Chapter 1

Global Space Policies and Programmes



1.1 Global Political and Economic Trends

1.1.1 Global Economic Outlook

The “World Economic Situation and Prospects” report is the United Nation’s leading publication in the annual discussion of current economic trends and prospects. Its 2016 reporting painted a bleak picture, and the global economy looked to be held back by both slow growth and reduced international trade. However, 2017 has seen a turnaround, and it was estimated that global economic growth reached 3%, representing a large step up from the 2.4% of 2016 and also the greatest global growth rate since 2011. Furthermore, about two-thirds of countries have seen increased growth from the sluggishness which characterised 2016, and globally levels are expected to hold at 3% into 2019.¹

WGP growth in developed economies increased from 1.6% in 2016 to 2.2% in 2017, with decreases to 2.0% in 2018 and 1.9% in 2019 estimated. As of 2017, synchronised growth is seen across all of the major developed economies. In Europe, both the Union and the Euro Area saw growth improvements over 2016–2017, with the new members (EU-13) in particular showing significant growth from 2.9 to 4.2%. This growth among Eastern European and Baltic EU members is attributed to improvements in productivity and capital accumulation. The EU-15 rate also rose to 2.0% in 2017 from 1.8% in 2016, although for all aforementioned regions, decreases are forecasted in 2018. Across the Atlantic, the same trend is seen, where the USA also saw a rise from 1.5% in 2016 to 2.2% in 2017, but with a drop to 2.1% expected

¹“World Economic Situation and Prospects 2018.” 11 Dec. 2017. United Nations, 15 Mar. 2018 <https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/WESP2018_Full_Web-1.pdf>.

in 2018. Likewise, Japan has seen growth in output from 1.0% in 2016 to 1.7% in 2017, and again a decrease in 2018 to 1.2%.²

Overall, transition economies follow a pattern of overall general growth each year in the same period, from a rate of 0.4% in 2016 to an estimated 2.4% in 2019. However, looking at individual regions, different fluctuations are observed: South-Eastern Europe, for example, demonstrates an opposite pattern from the developed economies, with a drop from 2.9% in 2016 to 2.5% in 2017, followed by an estimated growth toward 3.2% in 2018 and on to 3.3% in 2019. The Commonwealth of Independent States and Georgia saw significant growth from a rate of -2.4% in 2015 to 0.3% in 2016 and again significant growth to a rate of 2.2% in 2017. Developing economies overall, however, have also seen a general rise from 3.8% in 2016 to 4.3% in 2017, with further growth estimated at a rate of 4.6% 2018 and 4.7% in 2019, and as a group they are considered to remain the primary drivers of growth worldwide in 2017. South America's rate of -2.7% in 2016 turned up to 0.4% in 2017 and is also forecasted to reach 1.8% in 2018. The African continent is also demonstrating an overall fast upward trend, with its 2016 rate of 1.7% increasing to 3.0% in 2017 and again to 3.5% in 2018.³

The recent strengthened activity seen in global averages and the developed countries has not been observed across all parts of the world. The growth, and in some regions' cases rapid growth, in world gross product is largely attributed to (in order of the scale of contribution to the change in world gross product growth) the USA, Japan, the Euro Area and Canada. In addition, a third of 2017's global growth is also attributed to cyclical activity in Argentina, Brazil, Nigeria and Russia. Despite these general improvements, though, effects from the low investment and productivity growth rates resulting from the global financial crisis are still observable in wage growth, debt levels and policy uncertainty, which themselves are holding back aggregate demand. And despite the general growth rate improvements of 2017, the prospects are not secure regarding the Sustainable Development Goals (SDGs), which aim to eradicate extreme poverty and create decent work for all. In fact, despite the overall positive global trends, forecasts reflect decreased growth for some regions, including for some of the poorest countries. And due to the decrease in GDP per capita in West, Central and Southern Africa, as well as Latin America and the Caribbean in 2016, SDG progress has even been reduced in some countries.⁴

²Ibid.

³Ibid.

⁴Ibid.

1.1.2 Political Developments

1.1.2.1 Geopolitics

North Korea's Weapons Testing in 2017

North Korea's missile and nuclear testing activities continued into 2017 with a series of missile tests including three intercontinental ballistic missile (ICBM) tests and its sixth nuclear test.⁵ The ICBM flight tests were the first for the state led by Kim Jung-un, with the first test announced by North Korea on 4 July 2017, as the USA celebrated its national Independence Day; North Korea state television highlighted that the country is now "a full-fledged nuclear power that possesses [a] powerful inter-continental ballistic rocket capable of hitting any part of the world". And as a follow-up in the media, Kim Jung-un also reportedly stated that the USA would not be pleased by this "package of gifts".⁶ The third test flight in November flew 960 km and reached an altitude of 4500 km, thousands of kilometres higher than the International Space Station, and is considered capable of reaching any point in the continental USA.⁷ The development marks a steady growth in North Korea's technical capability, while the rhetoric between the state, its neighbours and the USA has remained aggressive. It is however not clear how the global community can respond to de-escalate the situation. Further complicating the matter, deployment of the American-built Terminal High Altitude Area Defense (THAAD) system began in South Korea in early 2017 but sparked significant diplomatic tension with China.⁸ The latter does not consider the system to be a strong deterrent and has concerns about whether THAAD's radar is capable of reaching far into its own territory.⁹ And for its part, international relations experts are growing sceptical of China's ability to deter North Korea.^{10,11} And this in itself further raises the question of if a military response is the only means capable of deterring the state's behaviour, and US President Donald Trump has repeatedly made clear that this would indeed be an

⁵"North Korea: A Timeline of Missile and Warhead Tests in 2017." Time.com, 26 Feb. 2018 (retrieved) <<http://time.com/5040375/north-korea-nuclear-missile-tests-2017/>>.

⁶Campbell, Charlie. "How North Korea's ICBM Test Could Bring Negotiators Back to the Table." 5 July 2017. Time.com, 26 Feb. 2018 <<http://time.com/4844829/north-korea-missile-icbm-negotiation/>>.

⁷*Op. cit.* – "North Korea: A Timeline of Missile and Warhead Tests in 2017."

⁸Westcott, Ben and Suk, Lauren. "China, South Korea end year-long diplomatic feud over missile system." 31 Oct. 2017. CNN, 26 Feb. 2018 <<https://edition.cnn.com/2017/10/31/asia/china-south-korea-thaad/index.html>>.

⁹"South Korea to deploy more THAAD units after North Korea ICBM launch." 29 July 2017. Reuters, 26 Feb. 2018 <<https://www.reuters.com/article/us-norhtkorea-missiles-thaad/south-korea-to-deploy-more-thaad-units-after-north-korea-icbm-launch-idUSKBN1AE02L>>.

¹⁰Albert, Eleanor. "The China–North Korea Relationship." 28 Mar. 2018. Council on Foreign Relations, 26 Feb. 2018 <<https://www.cfr.org/backgrounder/china-north-korea-relationship>>.

¹¹Fisher, Max. "Bad News, World: China Can't Solve the North Korea Problem." 6 Sep. 2017. The New York Times, 26 Feb. 2018 <<https://www.nytimes.com/2017/09/06/world/asia/china-north-korea-nuclear-problem.html?mcubz=0&r=0>>.