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Outline for an

International Study on Global Space Governance

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BACKGROUND

On 29-31 May 2014, the 2nd Manfred Lachs International Conference on Global Space Governance was held at McGill University, in Montreal, Canada. This international and neutral forum was attended by over 120 experts from 22 countries (space-faring and non-space faring nations) involved in various aspects of space activities. The Conference recognized that the current global space governance system that was created during the 1960s and 1970s (essentially, during the Cold War period) has not been comprehensively examined by the international community since its establishment. However, numerous developments have since occurred in the world in general and the space sector in particular. Among them, are:

1. The Cold War era is over, the previous bi-polar global geo-politics has essentially become multi-polar and the global economic, and eventually political, power would possibly be shifting to Brazil, China, India, Nigeria, South Korea and other countries although traditional leadership from Europe, Japan, Russia, the US and other OECD countries still continue to play a major role.
2. No longer are space activities being undertaken by a handful of countries. Virtually every State uses satellites for vital services and over 60 countries currently operate their own satellites. More than a dozen countries have independent launch capability, and this number is growing. Space is vital to all countries. It plays a key role in: providing vital services for communication,

weather forecasting, and navigation; monitoring and addressing climate change and global pollution; monitoring compliance with disarmament agreements; preventing and mitigating chemical and biological accidents on Earth and in space; and disaster and risk management.

3. Currently, more than 70 governmental space agencies are encouraging and enhancing space capabilities world-wide, and the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) now has 76 member States.
4. Today, more than 1100 satellites are in orbit. Together, China, Europe and other countries operate more than 500 satellites while about 500 belong to the US and about 120 to the Russian Federation, the two pioneering space powers.
5. Space activities will be expanding further as more satellites are launched in the near future. This increase is due particularly to the proliferation of small and nano-satellites, which will facilitate access to space by developing countries, universities and small companies. They are placed in orbit via small launch vehicles, ejected from the International Space Station, or carried piggy-back on larger space missions.
6. The use of space for military purposes is expanding. Dual use and hosted payloads complicate the division between military, civil government, humanitarian and private commercial ventures. There are increasing concerns about the weaponization of space. Militaries are increasing their use of, and reliance upon, commercial satellites. The fear that terrorists might use space as their next battleground is beginning to emerge.
7. There is a growing concern about the safety of all types of space activities, and, in particular, there is concern for the threat of space debris, cosmic hazards and the need for planetary defense as well as the safe use of space that take into account the Earth-space environment, the space debris, and other potential dangers.
8. Governments are no longer the dominant space operators. Launching entities in the private sector have begun to take the lead in the global space sector--and their role is expanding fast. Space commercialization seems to be among the dominant contemporary themes. Private space stations, plans for commercial mining in space, and new commercial space tourism and hypersonic transport via sub-orbital trajectories complicate our ever more complex world.
9. Space activities are no longer limited to scientific explorations but are fast becoming important economic activities. The current level of global space activity is estimated at $320 billion per annum. The global space sector has achieved an impressive average annual growth of 11% since 2004.
10. Space is no longer a rarefied venture for just a few countries. The whole world currently depends heavily on space technology and applications, and life without satellites would be very difficult economically and socially, and could potentially be a nightmare for the commanders of the armed forces. It would be disastrous for the world in many ways if space technology and applications were threatened by cosmic hazards or if the Kessler Syndrome with runaway orbital debris were to become an actual reality. In short, increasingly, space matters and space risks need to be much better understood and managed.

11. Numerous new legal and political issues are fast emerging which relate to: the shortage of radio frequencies and geostationary slots; harmful interference to satellite signals; space debris; human space travel (space tourism, hypersonic transcontinental travel and private space stations); space-based solar power; commercial mining of the Moon and asteroids for natural resources; possible natural cosmic hazards; concerns about military, strategic or even terrorist use of space; and a host of other emerging issues (including the achievement of the millennium development goals) related to the equitable uses of outer space and the equitable sharing of the benefits of outer space exploration and use around the world.

These and many other unprecedented developments and unique issues, which were not known during the period of the formulation of the current global space governance regime, are believed to have serious implications for space activities in the near future and for the sustainable use of space for peaceful purposes and for the benefit of all humankind (i.e. for maintaining the global public interest in outer space).

Believing that the time has come to assess the efficacy of the current regime of global space governance and to propose an appropriate global space governance system that addresses current and emerging concerns, the Montreal Conference adopted, the *Montreal Declaration* by consensus,. The *Montreal Declaration* called upon civil society, academics, governments, the private sector and other stakeholders to consider convening an international conference to deliberate and agree upon recommendations to governments and relevant international organizations aimed at the establishment of an effective global governance regime for peaceful and sustainable exploration, use and exploitation of outer space for the benefit of all humankind.[1] In addition, it called upon the McGill University Institute of Air and Space Law to take the lead in initiating, completing and broadly distributing through all forms of media, an international interdisciplinary study that examines drivers of space regulations and standards prior to, and in support of, the proposed international conference, to be convened possibly in May 2016. It was agreed that the Study, should, *inter alia*:

1. examine the changing global economic, political and social conditions and space infrastructure dependence;
2. identify and assess all known space threats and risks;
3. examine space opportunities and the need for the sustainable and peaceful use of outer space, and the exploration and exploitation of space for the benefit of all humankind;
4. identify safety, technical and operational gaps to be filled; and
5. recommend appropriate space governance agreements, arrangements, regulations, standards, and appropriate institutional mechanisms, innovations and practices relevant to current and emerging space activities.

[1] It is recognized that this is one of the fundamental pillars of the existing global space governance regime. This Study would go further and examine whether or not the vestiges of this existing regime should be kept, modified or replaced given the changing nature of space activities.

In order to undertake this Study, several topics of interest have been selected. The world's leading experts have been invited to lead the drafting of specific chapters, with input from academics and knowledgeable professionals in the public and private sectors, intergovernmental organizations and non-governmental organizations from all the regions of the world. Part I sets the stage and lays down the general context and importance of the discussion on global space governance. This section identifies existing issues, trends and lapses in the current general global governance regime and its implications for global space governance. In Part II, each chapter, possibly 15 to 25 pages in length, will contain (a) discussion of the evolution, current status and key future trends in the development of space activities that are the subject matter of the respective chapter, (b) analysis of the adequacy and/or inadequacy of the currently applicable governance system, and (c) specific and appropriate recommendations (including, those that may appear politically unrealistic at present) as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind. The Study will attempt to identify which, or what aspects of, space activities necessitate global governance, and where, when and to whom this system of governance are applicable, and if it does not yet exist or is not adequate, how it can be built or strengthened and by whom. Part III addresses those new and general challenges that have emerged due to significant changes in the scope and nature of global space activities since the 1970's as well as those wide-ranging issues that are necessary to be addressed in order to maintain space for the benefit of current and future generations of humankind. Part IV contains conclusions, consolidated findings and recommendations for an appropriate future global space governance system.

The final report would potentially be a 500 page document. The report, which will be a collective work of all the contributors, will be drafted in accordance with the Chatham House rule of non-attribution in order to include frank and truthful ideas expressed without any fear of political, national and occupational pressures and implications. There will also be an executive summary, a summary report video and a Global Space Governance website.

Global governance is a wide term that is open to multiple elucidations and versions. For the purpose of this Study, global space governance refers to the international action or manner (process) of governing or regulating space-related affairs or activities. The concept encompasses a wide range of instruments, institutions and mechanisms, including international and/or regional treaties, agreements, and regulations, model national laws and regulations; technical standards and procedures, codes of conduct, 'rules of the road', guidelines; and transparency and confidence building measures that are discussed, formulated and implemented at various international fora. More importantly, a governance system is a means to achieve a stated goal that is shared by the parties governed under the system. The nature and the level of acceptance of global

governance system determine the effectiveness, predictability, and stability of the order intended to be created by that system.

We believe that such a comprehensive, international, interdisciplinary, objective and synoptic overview of all global space governance-related topics and issues has never been attempted to date. Therefore, we intend to accomplish this challenging task with the active participation of knowledgeable people, acting in their personal capacities, and in close collaboration with space-related institutions from around the world.

Outer space is an internationally shared domain (a global commons) whereby the action of one country is most likely to affect the interests of other(s). Therefore, this Study will identify and assess all known implications and risks related to space activities that cannot be effectively governed only at national level but would require international coordination, harmonized rules or guidelines and their effective enforcement.

It is believed that global problems require global solutions that are sought and implemented through global participation. Therefore, the International Conference planned for 2016 will be convened in the form of an international, interdisciplinary and neutral forum aimed at taking a comprehensive look at the "Big Picture" of global space activities and global space governance. Following a bottom-up approach, the Conference will address the following specific question:

> *In order to achieve, effectively and in practice, the goal of the sustainable use of space for peaceful purposes and for the benefit of all humankind, what should be the format and substance of global space governance in the next 20-30 years?*

Therefore, it is important for all involved to keep in mind that the central purpose of this Study is to prepare a final report that will form the basis for deliberations and decisions at the 2016 International Conference at McGill University in Montreal, Canada.

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- Definitions, including that of 'global space governance'
- Mandate of, and preparations for, the 2016 International Conference

PART I: THE LEGAL AND REGULATORY FRAMEWORK FOR SPACE ACTIVITIES

CHAPTER 2: OVERVIEW OF THE EXISTING MECHANISMS OF GLOBAL SPACE GOVERNANCE

- Whether the existing global space governance regime has succeeded or failed in achieving the global public interest in outer space?
- Recap of the 5 existing UN space law treaties, their current impact, breadth and status of ratification. What are their main features that relate to global space governance and what perceived deficiencies exist? Are the United Nations (UNCOPUOS-UNISPACE) and its specialized agencies (i.e. ITU, ICAO, WMO, UNEP, UNESCO, etc.) the best organizations to regulate, coordinate, or standardize space activities and practices?
- What alternative fora exist, such as the International Standards Organization, the Inter-Agency space Debris Committee (IADC), the Commercial Spaceflight Federation, the International Astronomical Union (IAU), the Committee on Space Research (COSPAR), the International Association for the Advancement of Space Safety (IAASS), UNSPIDER, the Disaster Charter, the International GNSS Committee Charter, and how can they contribute to effectively address issues of global space governance?
- How and to what extent do existing and emerging "customary law" and "soft law" (e.g., transparency and confidence building measures) regimes influence global space governance?
- Are there alternative or complementary mechanisms--such as standards, codes of conduct, coordinated national space laws--available and to what extent are they effective for achieving an internationally acceptable form of global governance in outer space, taking into account current and future uses of space?

CHAPTER 3: GLOBAL SPACE GOVERNANCE FROM REGIONAL PERSPECTIVES

- What are the governance implications (merits or demerits) of regional cooperative regimes and intra-regional and inter-regional space governance

initiatives such as, the EU/ESA, the Asia-Pacific Regional Agency Forum (APRSAF) and the Asia-Pacific Space Cooperation Organization (APSCO)?
- Are there any other alternative or complementary regional space governance mechanisms?
- What are the prospects for regional space agencies in the Middle East, Africa or Latin America?

CHAPTER 4: NATIONAL SPACE POLICIES AND LAWS AND GLOBAL SPACE GOVERNANCE

- Problems of fragmentation and conflicting legal regimes: How can national space policies and laws be harmonized?
- How do national space policies and implementing laws influence global space governance and *vice versa*?
- Which national space laws are currently most significant in establishing the most important precedents?
- Why is it important for a State to have a clear national space policy and national space law(s)?
- What are the limits of extra-territorial exercise of jurisdiction? Can States assert their national regulation to activities in Outer Space, for instance the U.S. FAA licensing exclusive landing rights on the Moon? Are there or should there be different zones of jurisdiction such as "subspace" or "protospace" (21km to 100km), low earth orbit (below the first Van Allen Belt), etc.? This would be for purposes of safety, frequency regulation, etc.

CHAPTER 5: THE ROLE OF PRIVATE COMMERCIAL SPACE ENTERPRISES IN THE REGULATORY PROCESS

- What are the main drivers for the increasing role of private commercial space enterprises?
- Are the existing mechanisms of global space governance compatible with the increasing trend of space commercialization? What are the legal and policy hindrances that stifle commercial space operations?
- How best can commercial considerations be balanced against issues of global space governance?
- Are there any alternative or complementary global governance mechanisms that are likely to facilitate space commercialization?
- Given increased participation by private enterprises in all space activities, how to best regulate (public and private law) issues such as liability, change of ownership, response to emergencies, exercise of jurisdiction and control, financing?

- Should there be an international agreement to achieve uniformity in national space laws and regulations? Are featured model national laws another alternative?

PART II: SPECIFIC SPACE APPLICATIONS (USES) AND TRANSPORTATION

CHAPTER 6: SATELLITE TELECOMMUNICATIONS (including broadcasting, other communication services)

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 7: REMOTE SENSING AND EARTH OBSERVATION (including weather forecasting, global climate change, disaster management, search and rescue, etc.)

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
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- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 8: GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS) & SERVICES (including space situational awareness)

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sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 9: SPACE-BASED SOLAR POWER (including space elevators)

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
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- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 10: SPACE LAUNCH SERVICES

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

PART III: GLOBAL SPACE SAFETY AND SECURITY CONCERNS

CHAPTER 11: HUMAN SPACE FLIGHT (including Commercial and Tourism)

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 12: GLOBAL SPACE SECURITY (including military and strategic uses of space and controls on weaponization, consideration of space-based terrorism, disarmament efforts, etc.)

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 13: SPACE TRAFFIC MANAGEMENT AND COORDINATED CONTROLS FOR NEAR SPACE

- Space traffic management system for seamless operation of all types of transportation vehicles in the airspace and outer space.
- Zoning of space regions with special capabilities (e.g. Clarke orbit, polar orbits, LaGrange points,). Developing safety processes to address the Protozone (i.e. the area above air space and below outer space (above 21 km and below 100 km), etc.) and exploring coordinated regional and international programs to cope with activities in this region such as dark sky station, commercial sub-orbital space flights, robotic freighters, hypersonic transport, high altitude platform systems, ion engine powered flights to low earth orbit from dark sky stations or sub-orbital launches, and possibly in time operation of space elevators or funiculars.
- Examination of other issues related to near space or the protozone such as environmental controls for the stratosphere and above, health standards for radiation exposure, etc.

PART IV: "NEW SPACE" ACTIVITIES

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- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 15: SMALL SATELLITES, LARGE CONSTELLATIONS (including Registration Procedures)

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.

CHAPTER 16: MINING AND UTILIZATION OF SPACE NATURAL RESOURCES

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
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PART V: INTO THE LONGER TERM FUTURE

CHAPTER 17: COSMIC HAZARD AND PLANETARY DEFENSE

- Coordinated mechanisms for planetary defense and global disaster recovery from cosmic hazards (i.e. Coronal Mass Ejections/Weakening Geomagnetosphere and Protective measures for Satellites and Global Electric Power Grids.)
- Examination of new patterns of global risk due to growth of megacities, urban distribution networks, and potential loss of jobs and starvation due to cosmic "black swan" events such as severe space weather, asteroid impacts,
- Consideration of new international coordinative efforts and mechanisms to protect against cosmic hazards

CHAPTER 18: GLOBAL SPACE ENVIRONMENTAL ISSUES (including space debris, sustainability of access to space, on-orbit satellite servicing, pollution, planetary protection, etc.)

- Do the existing global space governance regimes address the environmental aspects of human exploration and use of outer space?
- Does a combination of emerging rules and guidelines addressing space debris, on-orbit satellite services, and sustainability of space activities provide an adequate solution?
- What are the global governance challenges posed by the proliferation of small satellites (i.e., cube, micro, nano and pico satellites etc.)

CHAPTER 19: SPACE MIGRATION AND COLONIZATION

- Evolution, current status and key future trends in the development of space activities that form the subject matter of this chapter;
- Analysis of the adequacy and/or inadequacy of the currently applicable governance system; and
- Specific and appropriate recommendations as to global governance actions that should be taken to ameliorate current and future conditions, along with the forum or fora where positive action might be taken, in order to ensure the sustainable use of space for peaceful purposes and for the benefit of all humankind.
- New governance rules for living in outer space and/or celestial bodies, particularly issues related to scarcity of resources, acceptable behavior for living in outer space, independence of outer space settlements and possible encounters with extraterrestrials.

CHAPTER 20: THE ROLE OF SPACE IN LONG-TERM ECONOMIC DEVELOPMENT ON EARTH

- Review of vital space industries and enterprises and their contribution to the global economy
- Identification of prime opportunities for new space ventures and global space infrastructure to create new jobs and foster renewed global economic growth.
- Assessment of new space activities and risks and their potential impact on the global economy.
- Assessment of space regulations, standards, codes of conduct, conventions, or guidelines that could advance global economic development or preservation of world economic security.
- The role of New Economies; how it can be ensured they obtain the benefits of the Outer Space economy as well taking part as active participants in the Outer Space economy.

CHAPTER 21: EDUCATION AND CAPACITY-BUILDING FOR SPACE DEVELOPMENT AND GOVERNANCE

- What role higher education and research can play in space sustainability, peaceful purposes and the benefit for all humankind?
- What kind of capacity-building in educational and training institutes, space agencies, governments, and private companies will be needed for global space governance in order to achieve the goal of sustainability, peaceful purposes and the benefit for all humankind in the space sector?

CHAPTER 22: EXTENDING THE BENEFITS AND USES OF SPACE TO ALL HUMANKIND

- Review of the uses and potential of outer space in the Global South for the achievement of the Millennium Development Goals.
- Do current space laws, regulations, conventions, codes of conduct and confidence building measures now observed or proposed for implementation equitably apply to all countries of the world?
- Are specific steps needed to ensure equitable access to, uses of and sharing benefits of outer space across the planet, especially to protect and enhance the special needs of the developing countries?
- Are special environmental protections concerning the use of outer space needed to protect the seas, the atmosphere, and the interests of all peoples and nations?

PART VI: CONCLUSIONS AND THE WAY FORWARD

CHAPTER 23: CONCLUSIONS, CONSOLIDATED FINDINGS AND RECOMMENDATIONS

- What form(s) should global space governance take, both in terms of format and substance, in the next 20-30 years?
- Given the multifarious nature of global space governance, are there any emerging non-traditional trends that should be encouraged?
- What are the major challenges to achieving effective and acceptable global space governance, and how can they be best addressed?
- How to best regulate the increasing involvement of the private entities in the space exploration and use?
- Which institutional mechanisms, model national laws, standards, international and regional agreements, regulations, codes of conduct, "rules of the road", and transparency and confidence building measures can be identified and supported to ensure the effective and in practice sustainable use of space for peaceful purposes and for the benefit of all humankind.

- How to enhance capacity-building in educational and training for global space governance?

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