This monograph set out to accomplish several important tasks. First and foremost was to assist political leadership in making decisions with greater consideration of the broader impacts of space technology trade and proliferation control law & policy on global civil space cooperation in light of national security interests. This goal was analogized to revealing unseen pieces of a proverbial puzzle.

The principal method to assess this puzzle was a case study of the U.S. Comsat export control regime. The case study was undertaken in four primary steps:

– First, the international legal environment in which Comsat and other space technologies are exported, traded and controlled was examined.
– Second, an analysis of the unilateral *de facto* international regime of U.S. Comsat export control was undertaken.
– Third, the domestic economic and political implications of current U.S. law were assessed.
– Fourth, the issue of domestic U.S. reform was examined.

The key findings of this case study were:

(1) U.S. Comsat export controls are national centric and operate within a primarily unilateral paradigm in which States seek to maximize their legal discretion in exercising space technology trade and proliferation controls. This national centric paradigm is reflected in the absence of a legally binding supra-national space technology trade and proliferation control.¹
(2) The international system of space technology trade and proliferation controls is appropriately characterized as primarily a voluntary system of non-binding arrangements. States rarely enter into legally binding space technology control agreements, doing so only with their most “trusted” strategic allies.²

¹ See Chapter 2 of this thesis: *International Legal Obligations of a State to Control Exports of Spacecraft and Launch Vehicle Technologies.*
² See Chapter 2 of this thesis: *Export Controls and Sovereign Jurisdictions*, the example of U.S.-Canadian harmonization of export controls. Also See the Defense Trade Cooperation Agreements

of special case of EU regional integration, dual-use items are trusted for regulatory coordination, but those items deemed militarily strategic still remain within the legal discretion of the exporting State.\(^3\)

(3) The fractured international paradigm of space technology trade and proliferation controls creates an economic dilemma for exporting States. In light of regulatory divergence, exporting States face the choice of either modifying their export controls to meet the less restrictive standards of their export competitors, or absorbing the economic costs (i.e. loss of commercial exports) associated with stricter trade controls. This dilemma is exacerbated by the phenomenon of economic globalization which increases international competition and accelerates the rate at which markets respond to changes in costs associated with trade control restrictions.\(^4\)

(4) The sustainability of unilateral approaches to space technology trade and proliferation controls is questionable. States with technical superiority can temporarily impose unilateral export restrictions without a concomitant cost to their national economy. But unilateral control restrictions create incentives for foreign States to develop indigenous substitute technologies.\(^5\) In theory, the phenomena of techno-globalization facilitates the indigenous development of substitute technologies by providing foreign States access to human innovation networks that exists beyond the territorial delimitation of exporting States. Furthermore, due to technology advances in transnational human communication networks, the costs associated with benefiting from innovation networks should be lower.\(^6\)

(5) The economic benefits from trade, coupled with State divergence on trade controls, results in a fractured international regulatory system in which supplier countries may be in direct conflict. This lack of international export control harmonization increases the likelihood of space technology proliferation at the unilateral discretion of a supplier State.

(6) Current thinking on reform of the U.S. export control system reflects a national centric approach. Notably absent in the discourse is the idea of restructuring the international system of space technology trade and proliferation towards a globalized paradigm.

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\(^3\) See Chapter 4 of this thesis: European Comsat Export Controls. The ultimate decision on item categorization for items not listed in Council Regulation (EC) No. 428/2009 is at the discretion of the EU Member State. EU Member States retain authority over export authorization for items designated as military technology and equipment.

\(^4\) See Chapter 3 of this thesis: Economic Globalization.

\(^5\) See Chapter 4 of this thesis: Comparative Analysis and Chapter Summary. See also generally the findings of Chapter 5 of this thesis.

\(^6\) See Chapter 3 of this thesis: Techno-Globalization.
Based on these case-study findings, the monograph then engaged in an assessment of how the current international regime of space technology trade and proliferation controls impacts the ability of States to cooperate internationally on civil space endeavours. It was concluded that without an effective international regime of space goods and technology control, States are compelled by “national security” interests to protect against unauthorized technology transfers and use by unilateral measures. States supplement their unilateral measures with bilateral and multilateral arrangements, but these arrangements are of limited effectiveness, in large part because they are non-binding and are not purposed to serve as comprehensive international control regimes. This fractured system of controls is a hindrance to international cooperation in civil and commercial space endeavours. There is no centralized international organization with the authority to provide “rules of the road” for space actors, coordinate space missions, operate space missions and/or launch services, or undertake technology development. As a result, the interest of the global community is not represented; nor is the broader international community a participant in space activities.
Final Conclusions: Overcoming the Dilemma of National Security and International Cooperation in Outer Space

Taking a very gloomy view of the future of the human race, let us suppose that it can only expect to survive for two thousand million years longer, a period about equal to the past age of Earth. Then, regarded as being destined to live for three-score years and ten, humanity, although it has been born in a house seventy years old, is itself only three days old.⁷

James Jeans, English astronomer, physicist, and mathematician (1877–1946)

Men might as well project a voyage to the moon as attempt to employ steam navigation against the stormy North Atlantic.⁸

Dionysius Lardner, Irish Scientific Writer (1793–1859)

In every revolution there is one man with a vision.⁹

Captain J.T. Kirk

Humanity is at an important juncture in its legal-political evolution. The foundational principles of the *Outer Space Treaty* have provided basic guidance for State activities, but they are insufficient to direct States to engage in effective global civil space cooperation. The central issue is a self-justified security dilemma in which States prioritize immediate national security interests over cooperative engagement, resulting in a paradigm of unilateralism with regards to space technologies that retards mankind’s collective engagement in the peaceful use and exploration of outer space.

What is needed is for the political leadership of space-capable States to recognize that self-enlightened interest calls for a re-conceptualization of national

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⁹ See Paul Christopher Manuel, “In Every Revolution There is One Man with a Vision: The Governments of the Future in Comparative Perspective” in Donald Hassler and Clyde Wilcox, Eds., *Political Science Fiction* (Colombia: University of South Carolina Press, 1997).
security interests towards greater international civil space cooperation. This re-conceptualization requires States to adopt new approaches towards space technology trade and proliferation controls that facilitate global cooperation.

To be certain, transforming the current paradigm carries with it particular challenges and opportunities. Historically, the security dilemma associated with technology proliferation has been justified because there is a lacuna in the current corpus of public international law that does not effectively ameliorate the security threats associated with unauthorized transfer and use of space technologies. Politically there is the challenge of overcoming asymmetric incentives associated with the continuation of current policy for the benefit of particular domestic constituencies. Economically, the liberalization of trade may negatively impact particular subsets of a domestic space industrial base. But the benefits of effective global civil space cooperation justify overcoming the legal, political, and economic challenges.

Global civil space cooperation will allow the international community to effectively combat emergent threats to international peace and security, threats that in many ways necessitate global participation. The global security benefits of space applications can also be distributed to the broader human population, providing public goods through a diversity of terrestrial activities such as natural resource management, communications, and navigation. Culturally, the identity of a world community will be strengthened through global participation. The inclusion of developing States into space endeavours will also enhance the knowledge of its citizens and inspire a new generation to engage in space-related educational and professional endeavours.

In addition to the immediate benefits gained through cooperation, there is also the impact that adopting a global approach for the use and exploration of space will have on our future. As States venture farther into outer space, establish manned and unmanned bases on celestial bodies, exploit outer space natural resources, and engage in activities not yet imagined, whether or not the fundamental international legal principles of peaceful use, non-discrimination, and non-appropriation remain intact will, in large part, be determined by State practice. Establishing the precedent of global consideration before State practice can erode these principles will be a just service to the evolution of international law.

In this monograph it has been proposed that the way forward for the international community is to advance a global paradigm of space technology trade and proliferation controls. The strategic logic of this global regime is that States benefit more from cooperation and transparency in their space activities than from unilateralism. Linking space technology controls to an outer space disarmament agreement further strengthens this logic. If outer space disarmament is achieved, States no longer have the strategic benefit of unilateral military space technology development and production. Complementary to a global space technology trade and proliferation regime should be the establishment of a World Space Organization. The WSO should be established as an umbrella organization from which the global community can engage particular space-related issues. As an organization not linked to
any particular problem, but instead to purposes and principles, this organization can respond organically over-time as new challenges arise in outer space.

But this proposal is only one possible solution and whatever path is ultimately chosen will depend on the enlightenment of the global community. What is most required for global cooperation in outer space is for the community of States, its politicians, its thinkers, its technicians, artists, academics, and most importantly, its people, to awaken to the near limitless opportunities space can provide humanity and courageously assess and overcome the challenges of cooperation.
Epilogue: Future Areas of Research

During the writing of this monograph several areas of research were uncovered that could not be further expanded due to time and length limitations. Each of these areas warrants additional research and development. It is my intention to pursue research in these areas with the goal of providing original contributions in the field of outer space law and policy. The following is illustrative of future areas of research derived from this monograph:

(1) Create a quantitative database that can be used to analyze the impact of space technology trade and proliferation controls on U.S. manufacturers.

(2) Assess emergent international legal conceptions of humankind/mankind as a distinct international legal personality. Assess parallel legal developments to determine whether there is a broader evolution of public international law towards recognition of mankind as a distinct international legal personality.

(3) Investigate non-institutional agreements and arrangements that can facilitate international civil space cooperation (as part of an evolution of the international community towards the establishment of a World Space Organization).

(4) Elaborate and analyze possible future WSO charter structures, provisions, and organizational mandates.

(5) Investigate human security and its legal nexus to space based applications.
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A poem by Dr. Michael C. Mineiro

The traveler arrived by means unknown
  Unremembered form
  Delivered upon the Shore

  Awakening, eyes slowly rise
  Illuminating a beautiful sky
  Sharing the horizon – a Road

  Brightly shown is this path ahead
  Except when darkness covers him
  As it often does

  No longer concerned with his origin
  Mesmerized, the beauty of the land
  Captures him holding him tight

  Transcendent Illusion

  Till one day he comes to the End of The Road
  Crying out: “Where I am to go now?”
  And in the distance, oh so far away
  A gentle voice hears what he prays
  “Tis not the first time nor the last
  That a traveler will ask . . .”