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Space Cops and Cyber Cowboys: An Institutional Comparison of the Governance of Space Exploration and the Internet

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SPACE COPS AND CYBER COWBOYS: AN INSTITUTIONAL COMPARISON OF THE GOVERNANCE OF SPACE EXPLORATION AND THE INTERNET

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For all those who dream and dare to go higher, faster, further, and reach for more.

I like to be involved in things that change the world. The Internet did, and space will probably be more responsible for changing the world than anything else. If humanity can expand beyond the Earth, obviously that's where the future is.

– Elon Musk

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LIST OF ABBREVIATIONS BY APPEARANCE

OST 1967	Outer Space Treaty of 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies
COPUOS	Committee on the Peaceful Uses of Outer Space
UN	United Nations
UNOOSA	United Nations Office of Outer Space Affairs
UNESCO	United Nations Educational Scientific and Cultural Organization
WMD	Weapon of Mass Destruction
SPT	States Party to the Treaty
Rescue Agreement	The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Space of 1968
Liability Convention	Convention on International Liability for Damage Caused by Space Objects of 1972
Registration Convention	Convention on Registration of Objects Launched into Outer Space of 1975
Moon Treaty	Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1979
CHM	Common Heritage of Mankind
ITU	International Telecommunications Union
WMO	World Meteorological Organization
INTELSAT	International Telecommunications Satellite Organization
INTELSAT S.A.	Private Company Version of INTELSAT
COSPAR	Committee on Space Research
ICSU	International Council of Scientific Unions
GA	General Assembly (in reference to UN)
IGO	Inter-Governmental Organization
ITSO	International Telecommunications Satellite Organization
ORBIT Act	Open-Market Reorganization for the Betterment of Telecommunications Act of 2000
WWW	World Weather Watch (In Chapter 4)
WWW	World Wide Web (All other uses)
FKA or RKA	Russian Federal Space Agency
Roscosmos	Russian Federal Space Agency
RSC	Russian Space Company
ESA	European Space Agency
JAXA	Japanese Space Agency
NASA	National Aeronautics and Space Agency (US Federal Space Agency)
SpaceX	Space Exploration Technologies Limited
LCO	Lifeline Connectivity Obligation
ICANN	Internet Corporation for Assigned Numbers and Names

DNS	Domain Name System
IP	Internet Protocol
IP	Intellectual Property (only in chapter 7)
ISOC	Internet Society
DARPA	Defence Advanced Research Programs Administration
RFC	Request for Comment
ISI	Information Sciences Institution at the University of Southern California
IANA	Internet Assigned Numbers Authority
IAB	Internet Activities Board
ARPANET	Advanced Research Projects Administration Network
IETF	Internet Engineering Task Force
IRTF	Internet Research Task Force
CERN	Center for European Nuclear Research
HTTP	Hypertext Transfer Protocol
URL	Uniform Resource Locator
TLD	Top Level Domain
FTP	File Transfer Protocol
NSF	National Science Foundation
gTLD-MoU	General Top Level Domain Memorandum of Understanding
IATG	Internet Advisory Transition Group
IFWP	International Forum on the White Paper
GAC	Governmental Advisory Committee
SSAC	Stability and Security Advisory Committee
RSSAC	Root Server System Advisory Committee
ALAC	At-Large Advisory Committee
RALO	Regional At-Large Organization
DoC	US Department of Commerce
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
WIPO	World Intellectual Property Organization
UDRP	Uniform Dispute Resolution Policy
ITR	International Telecommunications Regulations
WCIT-12	World Conference on Information Technologies, 2012
NTIA	National Telecommunications and Information Administration (US Department of Commerce agency)
ccTLD	Country Code Top Level Domain
WCT	WIPO Copyright Treaty
WPPT	WIPO Performances and Phonograms Treaty
DRM	Digital Rights Management
ODii	Organically Developed Internet Institutions- ICANN and ISOC
CEO	Chief Executive Officer

ICPEN	International Consumer Protection Network
IPTF	Internet Policy Task Force
AoC	Affirmation of Commitments
BRICS	Brazil, Russia, India, China, and South Africa
WSIS	World Summit on the Information Society
IGF	Internet Governance Forum
UNDP	United Nations Development Program
UNCTAD	United Nations Conference on Trade and Development
UKUSA	United Kingdom- United States Security Agreement
NSA	National Security Agency
FISA	Foreign Intelligence Surveillance Act

ABSTRACT

A growing concern for human society is the question of technology, how they are to be used and how can they best be governed. The very question of whether technology is governable remains for the most part unexplored. This work will seek to examine these important questions. By utilizing a historical institutional perspective, two case studies of the governance of technologies that have emerged in the last century will be explored. Space Exploration technologies and the advanced networking of computers known as the Internet will serve as the case to illuminate the question of governing technology. Deep qualitative functional analysis of both the primary and peripheral institutions will provide insight into how technology is governed in theory and in practice, as well as how institutions are created and change over time. By moving beyond questions of governance for states and societies, this work will attempt to contribute to the literature of political science as the study of governance broadly speaking. This work will contribute to and speak to newer works on the governance of non-explicitly political realms, as opposed to more traditional approaches to the study of governance, perhaps allowing new insight and avenues of research into both the question of technology and governance more broadly. Distinct policy prescriptions will be created to both better govern these particular technologies as well as lay the foundation for effective institutional governance of technologies in the future.

CHAPTER 1: INTRODUCTION AND PLAN OF ACTION

"The full cosmos consists of the physical stuff and consciousness. Take away consciousness and it's only dust; add consciousness and you get things, ideas, and time." – Neal Stephanson, Anathem

Prologue: Shackling Atomic Fire

At approximately 21 seconds after 5:29am MWT on July 16th, 1945, following light rains in the previous few hours of the early morning, the pre-dawn sky over Alamogordo, NM erupted in the brightness of thousands of suns. This exact moment in time signaled both the culmination of years of government directed innovation and the beginning of a new epoch of human existence. The Trinity test demonstrated that mankind had achieved the technological prowess to tear atoms apart and release nuclear fire on the world. Ever cynical, the scientists responsible for this event were said to have taken bets in the hours preceding this moment on the outcomes of this test, ranging from a complete failure to the ignition of the Earth's atmosphere and the subsequent death of all surface life. The outcome of the test, a 20 kiloton explosion and the accompanying nuclear fireball exceeded the predicted yield of 8 kilotons, allowing Isidor Isaac Rabi to collect the pool with a bet of 18 kilotons. Yet these scientists and their efforts, collectively known as the Manhattan Project, succeeded in producing a novel technology before their enemies and accordingly set the pace for the next era of political interactions between world powers. Within the next month the output of this program of induced innovation would be unleashed upon the world twice more, this time producing catastrophic destruction and loss of life on civilian populations.

While much of the frenetic pace of research under the Manhattan Project was driven by fears that Nazi German researchers would develop this technology first, the

culmination of the project occurred after the war in Europe had ceased. The dissolution of the Nazi regime and the subsequent realignment of scientists and research projects between Axis powers, known to Americans as Operation Paperclip pushed technological research to new limits in the coming decades, with research into aeronautics taking a massive steps forward. In the Soviet Union, research rapidly expanded on nuclear sciences based both on the introduction of new scientists as well as espionage, resulting in the August 29, 1949 detonation of the first non-American nuclear weapon. From this point on, international relations would be heavily influenced by a multiplicity of technological factors, and technology would also come to be impacted to a much higher degree by politics.

As the bipolar world of the Cold War developed, a new international institution was created to avert the need of large-scale wars from ever erupting again. The United Nations, established in 1946, would serve as a forum for the nations of the world to settle their conflicts in a peaceful, diplomatic fashion, essentially outlawing war. While these high-minded goals have fallen short many times since then, the UN has allowed for the creation of other international institutions that expand the realm of governance beyond simply states and people. These new institutions would attempt to bring states and peoples together to foster development across the world, with the hopes of creating a more peaceful and prosperous world. Yet international politics still reigned. In the early days of the Cold War, the same early days for the UN, saw relations between the Western powers (dominated by the United States) and the Eastern powers (dominated by the Soviet Union) sour. The creation of the atomic bomb and the fear of nuclear fire destroying the world led to both political conflict between the superpowers, and

eventually, to the creation of new political arrangements to govern the use of these immensely powerful weapons.

By 1963, several new nuclear capable states had emerged, leading to a proliferation of live fire atmospheric nuclear tests. Fearing the fallout (both political and nuclear) the first steps were taken to create and institution governing the testing of nuclear weapons. Proposed by the Soviet Union and agreed to by the United States and the United Kingdom, the Limited Test Ban Treaty of 1963 represented the creation of a new institutional framework to govern a technology. Atmospheric, oceanic, and space-based tests of nuclear weapons would be forbidden, and distinct limits on underground testing of nuclear weapons would be given distinct limitations. Interestingly, the next treaty concerning nuclear weapons is found as a part of the Outer Space Treaty of 1967, banning nuclear weapons from being permanently emplaced in outer space. Following on that treaty, expansion of the nuclear governance regime would occur next with the Nuclear Non-Proliferation Treaty of 1968. This treaty would hold that no nuclear state would give the technology of atomic weaponry to another state, and those states without nuclear weapons would only attempt to gain them for peaceful purposes. With all but five states being signatories (with potentially four of these states have nuclear weapons), the NPT has been relatively successful in limiting the number of states with nuclear capabilities.

During the height of the Cold War the Anti-Ballistic Missile Treaty of 1972 drastically reduced the anti-ballistic missile capabilities of the superpowers, extending the governance of nuclear weapons to anti-nuclear countermeasures. While upheld during the Cold War, the United States terminated the treaty in 2002. Further treaties

would be created to limit the yield of nuclear tests, as well as begin talks on limiting nuclear arms. These Strategic Arms Limitation Talks would not yield great results due to the Soviet war in Afghanistan. The Intermediate-Range Nuclear Forces Treaty would eliminate nuclear weapons with a range of 500-5500 kms. The end of the Cold War would see a new era of global nuclear weapons governance emerge, with the United States and Russia agreeing to limit their offensive nuclear capabilities, as well as de-targeting each other with their remaining offensive weapons. With the New START treaty, both the United States and Russia agree to an inspection and verification regime for the reduction of stockpiles of active nuclear weapons, as well as intercontinental ballistic missiles. The strategic nuclear capability of each signatory would be greatly reduced, although no changes would be made to tactical nuclear capabilities.

In the decades since the Trinity test an elaborate international legal regime has been crafted to govern the technology of nuclear weapons. During this period the international system has undergone many changes, resulting in an international system that has distinctly different characteristics than those of the international system during the Second World War. What was once a multipolar world has progressed through bipolar and unipolar phases, and is perhaps once again on the verge of becoming multipolar. Through these changes the institutions governing the nuclear weapons have grown and changed as well, but nuclear weapons have not been used for military purposes outside of testing in all this time. It would appear that the international institutional regime governing nuclear weapons has been successful and resilient, capable of dealing with changes in the international political system.

This brief illustration of the technology of nuclear weapons illustrates several interesting ideas about technology and governance. First, technology does not evolve in a vacuum. The Manhattan Project required deliberate action to spur study and innovation in a new area of science and technology. The context of international conflict with other advanced nations pursing similar research increases the efforts expended in research in a field that might have otherwise been slow to develop. Secondly, technology requires politics and institutions to flourish and be properly utilized. Nuclear weapons pose an existential danger to humanity, and as such distinct international rules and norms have been adopted to prevent their use and proliferation. While there may be some lapses, for the most part these norms and rules, as enacted by international treaties, have prevented the use of nuclear weapons in anger since 1946. Finally, while we typically think of international institutions in the context of governing people or money, they are capable of providing governance structures for a much wider variety of human activities. Nuclear weapons fall firmly within the realm of international security, but also stand on their own as an independent technology capable of being used for peaceful purposes, namely power generation.

As this is being written talks are underway with the Iranian regime about governing nuclear technologies in that country. While the primary concern from outside Iran stem from issues about the proliferation of nuclear weapons, a complete moratorium on nuclear activities is not feasible due to the potential for Iran to use nuclear power to provide electricity to their citizens. While it is clearly a matter of international security that is driving this discussion, the technology of nuclear weaponry/power generation is central to this discussion. As technologies become more

prevalent, giving greater power to smaller groups of people, these discussions should only become more common in international society.

The Question

Politics is rapidly changing in today's contemporary world. Although politics is always under a state of flux, the politics of the last several hundred years seem to be shifting more than has been previously understood. The Westphalian world of nation-state and international power politics, while still highly relevant, has been claimed to be breaking down (Newman, 2007). The world that is emerging perhaps does not orient itself with the traditional problems of states disputes over resource allocation. While all politics essentially boils down to resource allocation, the players in this dispute are in flux, along with the medium of conflict. Since the fall of the Iron Curtain and the so-called "end of history" (Fukuyama, 1992), states have lost their place as the sole major actors in the world system. Non-state actors, from corporations to international terrorist groups have begun to play large roles in the shape of the international system. And while power is still important to the system, the definition of power is also in flux. From traditional understandings of power as military might and the industrial capacity to support warfighting, cultural persuasion has also joined the discussion as a type of soft power that can be wielded to great effect. (Nye, 2004)

A large part of this shift, both in the definition of power and in the efficacy of non-state actors can be attributed to the increasingly rapid evolution in technology over the last several decades. Communication and transportation technologies have resulted in the compression of both subjective time and space of a global human existence (Harvey, 1989). Modern economics and international politics have become predicated

on a technological society reliant on innovation and the emergence of new and novel technologies. Yet as the brief illustration of nuclear weapons shows, these technologies often require governance, typically taking the form of international institutions.

These considerations lead to the following major research question for political scientists: How can technology best be governed? Simply put, this question serves as the major research question for this entire work. While this question might seem peripheral to mainline political science, the growing role of technology in our society as an area of activity separate from simple economic or social uses begs the examination of technology as a political object. That is to say, technology viewed as something to be governed and something that impacts governance. Using a comparative approach, this work will seek to address this big question in at least some respects, as well as some of the issues that emerge with the governance of new and emerging technologies. Understanding that the political process is still dominated by nation-states and their international institutions, the role played by these actors, as well as non-state actors, serves as an excellent jumping on point for the study of the governance of technology. While technology may fundamentally alter the international political system going forward, we would be best served by examining technologies that have in the last several decades come to fruition, allowing time for an institutional governance regime to be created and tested. This historical institutional focus should allow us to use lessons learned from the past to prepare ourselves for the problems of the future.

As an illustration of the importance of being able to govern technology, and the international imperative to do so, over the course of the last several decades, attempts have been made to limit mankind's impact on the climate. As this is a question of

technology, and is a problem of international scale, many different attempts and approaches have been tried to govern a wide variety of technologies that potentially negatively impact the climate. Yet in this time little true success has been found in attempting to govern the use of technologies that possibly cause anthropogenic climate change. The very question of which technologies to govern has yet to be settled. Yet in the closing months of 2015 in Paris, another attempt to combat climate change through governmental means will take place. It is clear that this is a matter of governing technology, but the methodology of this governance is still up for heavy and heated debate. Perhaps some lessons could be learned by examining technologies that have already been successfully governed at the international level, even if circumstances and contexts vary widely.

By examining the attempts that have been made to govern space exploration and the Internet, new insights into the problem of governing technology should be gained. Representing some of the most important and recognizable technological achievements of the past century, each of these cases follows a somewhat related path as that of nuclear weapons, and even intertwine their own technologies with those of nuclear weapons. All of these technologies began life as projects with distinct national interests of a military nature, with the government playing a leading role in pushing research and development into the technology. They have all subsequently found life outside of their originally planned role, be it as power generation source, a private commercial and exploration medium, or as the engine of a massive economic and social boom. And most importantly for the purpose of this work, they have all required an international

institutional framework to govern their functioning and interaction with society, whilethe institutions have dramatic differences in a comparative context.

While this work is primarily to be focused on questions of the governance of technology, by focusing on and comparing the institutions governing space exploration and the Internet the black-box of international institutions can also be opened up and examined. Taking a direct look at the processes involved in crafting new institutions should yield interesting insights. While much emphasis has been placed on the results of having good institutions, much less of an emphasis has been placed on how to create these institutions. This situation is especially true when dealing with international as opposed to national level institutions. By holding the object of governance constant, experimentation on institutional composition should be possible. The end result should allow for the comparison of international institutions. Recognizing that these institutions exist within a context of political, social, and institutional arrangements should also allow for a more comprehensive approach to the study of international institutions. Perhaps these approaches will lead to new insights on the comparative constitutional engineering of international institutions, exposing new avenues of research for scholars of international institutions.

It should be noted that while this is primarily a work of political science, working within the traditions of comparative politics, international relations, and political economics, it does push out at the margins to a degree. That is to say that a more interdisciplinary approach has been applied. History, sociology, political science, economic, all of these disciplines have at least some representation in this work. Perhaps this work would best be understood in the terms of science and technology

studies, but with an explicitly political angle. While the trend recently is for extreme specialization within a narrow discipline, there are still important questions that require an interdisciplinary worldview. Technology, once out of the laboratory and into the hands of actual humans, appears to be one of these areas needing a wide approach, at least in its current position in human activity. As such, this work will treat technology and its governance as a political question, but with the recognition that other social science disciplines have much to say about the subject.

Plan of Action

In order to answer the big question about the governance of technology, careful research will have to be conducted with an eye towards the evolution of institutions. While technology has been governed at the national and sub-national levels (e.g. Murmann, 2003), with widely varying results, for the purposes of this study, research will be conducted at the international level. Future work will be able to examine these questions from an empirical and quantitative approach, but this work will examine this question from a qualitative, case-study based approach. These case studies, space exploration and the Internet will hopefully provide insights into the governance of technology that can prove useful to policymakers as well as provide new avenues of research for academics. With these particular cases, we can also examine the causes of retarded development in space exploration and what has caused the Internet to become so widely adopted and embedded in nearly all aspects of human activity.

This study will continue in chapter 2, examining the current literature on institutions. Particular attention will be paid to the literature on institutional impacts on developmental outcomes, a very close parallel to the question of governing technology.

The research on international institutional development will be highlighted. Previous work on the question of technology will also be explored, laying out a path for research into the governance of technology. Although the question of technology has been previously examined from philosophical as well as industrial/economic approaches, political elements of technology will be highlighted. The inductive, narrative methodology derived from a historical institutional approach will be introduced. The two cases for this study will be justified apart from their inherent interesting properties, focusing on the least similar case selection model. The model of subversion of institutions will be explained and will serve to inform the thick descriptions to follow.

From this point, the main body of this work will begin. The following 6 chapters will comprise two mirror image case studies following a similar trajectory. The first part of each case study will be fairly functionalist in nature. A direct examination of the dominant institution governing each technology will be conducted, with a brief historical note to place the institution in its context. These chapters serve as the foundation for the case studies as wholes, but do not reflect the entirety of the institutional structures for the technologies. The second part examines this wider institutional context, placing the primary institutions at the center of a constellation of institutions, each playing a distinct role in governing the technology. Each institution is examined on its own as well as in the context of the wider institutional governance structure, with particular emphasis placed on the relationship between the peripheral and core governance institutions. The final segment of the case study deals with questions of subversion. Each case study, and for that matter most institutions in general, experience attempts at subversion. The manner in which the institutions of the case study weather and respond to these

subversion attempts has a great bearing on the evolution of these institutions, and deserves special focus on its own. These subversions will be examined in light of the subversion model presented in chapter 2. These three parts are seen in both case studies, while the particular players vary to a significant degree.

More specifically, Chapter 3 begins the case study on space exploration. By focusing on the formal institutions governing space exploration, namely the five UN administered treaties collectively known as the Space Treaties, a better view of how states create international institutions can be gathered. These five treaties, starting with the Outer Space Treaty of 1967 and ending with the Moon Treaty of 1979 are all predicated on the notion of scientific commons. This concept will be explored, as it underpins the treaties and has served to direct the types of activities mankind can pursue in relation to outer space. Most of this chapter is dedicated to understanding OST 1967, as further treaties build heavily on the work conducted in that treaty. Chapter 3 concludes by examining the strengths and weaknesses of the institution of the space treaties.

Chapter 4 examines the other institutions that play a role in governing mankind's activities in outer space. Included in this chapter are the United Nations Office of Outer Space Affairs, the International Telecommunications Union, the World Meteorological Society, and INTELSAT. Each of these institutions plays or has played a distinct role in executing the day-to-day governance of outer space activities. While each institution may have a distinct competency in governing outer space, taken together, there are still large areas of space exploration that remain under or ungoverned. The patchwork nature of this governance structure is highlighted, illustrating the need for a central

coordinating agency with real authority at the multi-national level to coordinate the governance of outer space.

Chapter 5 deals with attempts to subvert the institutions governing space exploration. In this case the focus is on non-state actors attempting to change the institutional structure to benefit themselves. In the case of space exploration, one of the major goals of the institutions, as stated by the primary parties to space exploration and noted in Chapter 3, is dissuading the introduction of new actors in the space exploration system. Yet these actors have emerged through the processes explored in this chapter. The primary processes through which this occurs are privatization and commercialization of outer space activities. Each of these processes is defined and examples are given. For privatization, the Russian Space Agency and INTELSAT are used as examples of the process. For commercialization, the entire process of commercial space exploration, spurred on by the Ansari X-Prize, is examined and special attention is paid to Space-X as a primary example of the commercial space industry. The impact of these two processes on the institutions governing space exploration is examined, with potential for change to the system discussed.

Chapter 6 begins the case study of the institutional governance of the Internet. This case, as well as this chapter, has significant differences compared to the other functionalist institutional chapter (chapter 3). Whereas space exploration has a series of treaties that can be examined in a very functionalist manner, the institutions of the Internet appear to be more organically developed, as opposed to negotiated at the international level. Therefore the process of the development of ICANN is the primary subject of this chapter. Once the process of creating ICANN, the multistakeholder

governance model of the Internet through these institutions is examined. Relying heavily on corporate governance documents, for ICANN is both an international institution and a private, not-for-profit corporation, this chapter seeks to understand how a private corporation can be responsible for the governance of a public good like the Internet.

Chapter 7, heavily reflecting chapter 4, examines the other institutions that play a role in governing the Internet. While the dominant question of governing the Internet is setting standards and controlling the Root Domain Name Servers, many other issues of governance surround the Internet. This chapter examines these other institutions and the role they play in solving questions of Internet governance. Their relationship to ICANN is also scrutinized. In particular questions of Intellectual Property management are probed, relying on the World Intellectual Property Organization as a primary institution. The ITU is also inspected for the important role played in setting standards for the technical operation of the Internet. Finally, the role played by the United States' National Telecommunications and Information Administration, a division of the Department of Commerce, is examined, as technical authority over Internet Assigned Names and Number rests with this group. The interaction and relationship between these institutions and ICANN is researched, showing that the Internet is much more thoroughly governed and administered than space exploration

Chapter 8 deals with the subversion attempts on the institutions of the Internet. As the Internet is essentially governed and operated by private entities, in the trust of the public, these attempts at subversion are shown to come from more traditional sources, namely states and international organizations. While the subversions at the international level are shown to be relatively benign, and perhaps will result in a more

open and better administered Internet, the national level assaults on the Internet's governing institutions and the Internet itself are more insidious and potentially damaging to the Internet. For international subversions, The World Summit on the Information Society and the Internet Governance forum serve as examples. The BRICS cable is also presented as a possible attempt at subversion. At the national level, Iran's "Halal Internet", China's "Great Firewall" and the United States and UKUSA's surveillance networks as exposed by Edward Snowden serve as our examples. The process of Internet Balkanization is also inquired into and shown to be a potential problem for the Internet as it currently exists.

Finally, Chapter 9 attempts to tie all of these disparate threads together, directly comparing these two case studies. From this comparison, many intersections and divergences are highlighted. Interesting lessons learned are derived, potentially answering the questions raised in Chapter 2. All of this eventually leads to distinct policy prescriptions. Some of these give advice for space exploration or the Internet specifically. Others of the prescriptions deal more broadly with questions of governing technology. Lastly, some of these prescriptions deal with the creation of international institutions as a whole. Lessons for academics and potential future avenues for research are proposed as well.

It is my hope that this overview has stirred interest in the question of the best way to govern technology, as well as the particular cases that will be presented ahead. Although this work does not neatly sit within the mainline of political science, interesting findings from the study of technology, as well as these particular cases should fill in some of the gaps that currently exist in the study of institutions. Politics should be

concerned with more than voting, wars and foreign aid, and this work could perhaps expand the study of governance beyond that admittedly *reductio ad absurdum* take on political science. Technology has both extreme promise for progress and development of the human race and extreme threat for the ability of individuals and small groups to affect massive destruction. As technology become more important and embedded in human society we must both treat it as something governable and learn how to govern it, lest it be too late and the dark and destructive side of technology becomes unleashed.

CHAPTER 2: LITERATURE REVIEW AND CASE SELECTION

"The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' but 'That's funny...' –Isaac Asimov

Political Science is a discipline primarily focused on the study of systems of government, but the overwhelming focus on these types of governments is on the those systems of government that govern people and populations. Yet many other realms of human activity also require governance, ranging from business enterprises to sporting activities. While much of the study of these governance structures has been conducted in other academic disciplines, political scientists still have an overarching interest in the understanding the functioning of these different institutional types; lessons could still be learned from the other types of governance to be applied to the realm of the purely political. As pointed out by Giovanni Sartori, among others, the structures and incentives created by institutional arrangements can lead to vastly differing outcomes (Sartori, 1994). As this work seeks to understand the formation and operation of international institutions, as well as those institutions that specifically govern things (in this case, technology) as opposed to people, this chapter will examine the current and relevant literature on institutional structures, finding gaps in the literature that this work will subsequently attempt to fill.

The literature review will examine not only the literature on institutional impacts on outcomes, but also the literature on international institutional formation as well as institutional change. While these literatures are focused primarily on governmental structures for national and international governance, an examination of the impact of institutions on economic and business outcomes will also take place. The importance of understanding governance structures for non-political entities will be highlighted. From

the gaps in the literature that will emerge, the major research question of how to best govern technology will be broken into three distinct lines of questioning. Finally, the selection of case study will be explained and the comparative method of this work will be justified. The foundations for the two case studies in this work will be laid out to allow for conclusions about international institutional formation, change, and the governance of technology to be drawn.

Literature Review

Within political science, the study of institutions is a foremost concern, and more specifically the study of institutional formation is an endeavor of great importance. Understanding how institutions take their shape and the impacts these institutional structures have on outcomes is a key concern for a large swath of the works studying governance. It should be noted for the sake of this literature review, “institutions” and “organizations” shall be treated as basically interchangeable, although several authors assert that distinct nuances exist between these different terms (North, 1990, Hodgson, 2001, Leftwich, 2007 etc.), merely for the sake of expediency. Also, when institutions are referred to in this work, they may be either formal or informal (Hodgson, 2001; North, 1990), as the interaction between both types of institutions is important to the study of political processes of institutions (Lauth, 2000). While norms might be considered to be a part of institutions, for this work the conception of culture as an institution will be denied. Norms will serve as the linkage device between culture at the international and national level, and institutions.

It has been borne out by the literature that institutions are primarily shaped by political processes, and as noted specifically by James Robinson “…comparative

institutions [are] ultimately about politics and political institutions, since politics is precisely about how society decides on the things that affect it collectively" (Robinson, 2002: 511). These institutions can be created by cooperation between states (Weingast, 2002; Shepsle, 2006; Sanders, 2006; Keohane and Nye, 2012, etc.) to achieve collective goals and mutual benefits (Greif, 1993; Russett and O'neal, 2001, etc.), or may be the product of states themselves seeking to accomplish either national or international goals. In attempting to understand these institutions, there has been a focus on the search for the best institutional type (Leftwich, 2007), but the "new institutionalism" has expanded research in the direction of a more holistic approach of both formal and informal institutions and their impacts on political processes (Rhodes et al 2006; Peters, 1999; Helmke and Levitsky, 2006).

Much research dealing with institutions and institutional change has focused on the politics in developed and stable polities of a generally democratic bent (Moore, 1966; Skocpol, 1979; Steinmo, Thelen, and Longstreth, 1992; Rothstein, 1996; Thelen, 1999; Pierson and Skocpol, 2002; etc.), but some more recent work has begun to focus on development in non-democratic states (Booker, 2000; Gandhi, 2010; Levitsky and Way, 2010, etc.). Both of these research avenues are predicated on the notion that states must establish stable and sustainable political institutions in order to succeed (Huntington, 1967; Apter, 1966; Rawls, 1971). Leftwich (2007) points out this very problem, that most of the work that has been conducted on the development and impact of institutions has been done within stable societies, and those that have focused on revolutionary change still keep their focus on historical events within currently stable societies (e.g. Moore, 1966; Huntington, 1967; Scokpol, 1979 etc.). In answer to this

problem a new push in recent decades to “bring politics back in” has been driven by non-political scientists to begin examining the importance of political processes on non-political realms such as economics and market failures (Acemoglu, Johnson, and Robinson, 2002, 2009; Acemoglu and Robinson, 2005, 2012; Becker, 1986). Leftwich (2007), working again from an outsider’s perspective examining the question of political science and the study of institutions, notes that much of the policy world (best exemplified by the World Bank) attempts to remove political considerations and the political science community focuses largely on macro-institutional issues like state formation, nation-building and democratization to the detriment of the politics of institutional development.

Within comparative politics, the vast majority of work on institutions that has been discussed thus far is focused on institutions as an independent variable. Institutions cause outcomes, and are not themselves the outcome. This leaves a significant gap in the literature, one that requires departure from the standard operating procedures of institutional work. International relations theory supplies many interesting perspectives on the creation of institutions, focusing on rational development and design of international institutions. Koremenos, Lipson and Snidal (2001) provide a series of interesting conjectures laying a roadmap for research into rational institutional design. The work on rational institutional design anchors an entire special volume of *International Organization* (55,4. 2001). Many of the conjectures laid out in that work will inform the design of the case studies within this dissertation. Of particular importance are the elements of membership, scope, centralization, control and

flexibility. These elements will be crucial in case selection, as a least similar model will be adopted for this work.

Yet even this literature from international relations has its limit. The literature on public bureaucracy, as exemplified by Terry Moe (1989, 1990), points out that competing interest groups have different goals within an organization. Institutions are the product of their political environment (Moe, 1989). In the way that these institutions allocate resources, distinct interest groups will attempt to create the institutions in the way that best serves their interests (West, 1997). Yet the question remains where these interests originate. To answer this question a framework of understanding from the constructivist literature will be useful. Wendt (1991,1999, 2001) finds that many of the large structures that typically define relations between states are themselves constructed in a social context. While his most famous work, “Anarchy is what states make of it”, deals with the structure of anarchy, in the aforementioned volume of *International Organizations* (55, 4. 2001) he critiques the purely rational approach to institutional design.

Wendt (2001) points out this problem of political science lagging policymakers in understanding the institutional creation process. The process of institution creation is, in the view of Wendt, not a rational process. The problem is that most of the work on institutions takes actors and structures as given. Applied to the body of literature that has been examined thus far, this critique appears to be quite valid, and leads to the conclusion that truly to understand how institutions are created, a greater focus must be placed on the international structure and actors involved in the creation of the institution. The question of normative context must also be considered for institutions, in

that institutions convey the norms of their creators in the creation process, as well as the norms the creators wish to cascade across the community.

It has become clear that even with a widespread neglect of work on institutional development itself, institutions play a significant role in the political and economic development of states. A wide variety of economics literature has shown through quantitative research that institutions impact national economic development (Zysman, 1994; Sokoloff and Engerman, 2000; Aron, 2000, Acemoglu et al 2000; Rodrik, 2004, IMF, 2005, etc.), broadly finding that strong institutions can lead to better developmental outcomes. More recent works of political economics have examined the specific processes at work in more focused case studies. Mahoney (2010) examines in great detail the impact of institutions in the colonial and postcolonial development of Spanish America; showing not only that institutions do matter for development, counter the geographical determinist approach of Diamond (1997), but that institutions are capable of change resulting in different developmental outcomes. Vivek Chibber (2003) focuses on the dual cases of India and South Korea exploring the role of institutions in late development and industrialization. Much like the work on the so-called “developmental state” (Woo-Cumings, 1999; Leftwich, 2000; Doner et al, 2005, etc.) the importance of particular institutions (namely nodal agencies and export-oriented industrialization) on successful development outcomes is highlighted.

Yet it is not only the “developing world” that is subject to institutional impact on development, as highlighted by Thelen (2004). Western nations developed their institutional arrangements in certain social and cultural contexts leading to different varieties of capitalism delineated by their institutional arrangements (Hall and Soskice,

2001; Esping-Anderson, 1990). These differences in capitalism and democratic institutions can also have a distinct impact on the types of outcomes witnessed even in developed states. While this leads us back to a very Putnam-esque (1993) question of what comes first, the culture or the institutions, it remains clear that culture and institutions are interrelated, and that institutional arrangements lead developmental outcomes.

Much of the work discussed up to this point has been primarily functionalist in nature, that is to say ~~being~~ concerned with how the institution functions and the outcomes produced by the institutions. While a functionalist approach is useful, especially in the case of first attempts at understanding new institutions, Haggard (2004) suggests that we must look beyond the function of institutions to examine the political processes and structures that have formed these institutions. Some important historical works have been conducted to examine the political processes that support institutions, predominantly of an economic variety (Grief, 1993, etc.). Even the currently dominant economics institutions such as the World Bank and IMF have acknowledged that the role of politics and power in governmental and economic performance is a leading factor in outcomes (Levy and Manning, 2002; Dahl-Ostergaard, et al 2005; DFID, 2005). Leftwich (2007) points out that institutions themselves exist to support policy, and therefore political goals, even if his major focus is on economic institutions. Abbot and Snidal (1998) examine why states pursue the creation of international institutions, finding that international organization can aid state goals of distribution and norm creation. Putnam (1986) demonstrates that political action must play out simultaneously at the level of the international institution as well as domestically.

Institutions can also extend beyond the mere service of political goals and begin to serve their own interests as well, becoming “sticky” or “path dependent” (Pierson, 2000), but may also evolve and change over time due to internal political activities (Chang and Evans, 2005). Institutions may be subject to outside pressures to change, especially as the external balance of power begins to shift (Thelen, 2004). The political pressures played out surrounding institutions typically fall into several categories (Leftwich, 2004), politics as government, politics as class conflict, economics of politics, and politics as a process. All of these politics are subject to the level at which they are played out, be it games about the rules (constitutional issues) or games within the rules(normal politics) (Lindner and Rittenberger, 2003). For the purposes of the work at hand, the major focus will be on the games about the rules, or the decision-making political process about institutional formation. Another major focus will be on how the various institutions of governance compete with each other to exert power over a given area of policy.

Power is another major factor that impacts institutional creation and operation, and as such has been a major focus for political scientists over the last several decades (Lukes, 1974; Poggi, 2001; Weber, 1964; Dahl, 1957, etc.). First, the traditional first-level power as per Lukes (1974) comes into play with the interaction of states in the formation of institutions. The cultural climate of the day will be heavily influenced by traditional power distribution of actors in the creation of institutions (Gilpin, 1981). Economic, military and ideological powers come into play for these considerations. This would especially be the case under certain eras of institutional creation where nation-states hold more authority. Another type of power, infrastructural power, will also be of

great importance in understanding how institutions come to be, particularly in the case of institutions that manage infrastructures (Lem, 2013).

Another interesting concept that has captivated political science but which is to be applied in a different manner in this work is the concept of the state. Once the state was brought back in (Evans, et al, 1985), the institutional structures governing people and lands were once again a focus for research. The ideas of governance and state capacity were heavily explored by those interested in political economic development (World Bank, 1997, 2000; DIFD, 2001, etc.), with the focus being on the impact of a strong state on political economic outcomes within the territorial boundaries of the state. States themselves have goals and serve as more than simply the stewards of their lands and peoples, often coming into conflict with those being governed (Bates, 2001; Tilly 1975, 1992). While these states have goals of administration within their own territory, they are not the top-level of the international system. Instead they are also players at the higher international systemic level (Russett and O'neal, 2001; Watson, 1992; Bueno de Mesquita, 2005; Baldwin,1993, etc). It is this treatment of states as actors in a system that will be of importance to the work at hand.

As political scientists, we have become heavily focused on the idea of the state, be it as actor or sovereign, but it has become clear that non-state actors also play significant roles in the contemporary world system (Hoffman, 1998, etc.). This new view that states are not the only or necessary actors in the international system has opened up new avenues to understand how institutions can be crafted. One interesting new avenue that has been sorely underexplored in the political science community is the idea of the multistakeholder model (Utting, 2001). This model of governance allows for

more than states to participate in political and policy discussions without a hierarchical distribution of power, allowing for a wider range of voices and inputs to be heard. Studies in not being governed and anarchy have also been conducted, most prominently by James Scott (1997, 2009, 2012, etc.). It is clear that while we focus on the study of governance, we as political scientists should look beyond the state model, as enduring as it has been, for it might not always be the most important form of governance.

Understanding the basic concepts of national institutions, power and states, it now becomes possible to move up a level of analysis and examine international institutions, as opposed to the previously discussed national level political institutions. Similar processes as national institutions should be at work in the international level, yet there appears to be a relatively large gap in research on the creation and evolution of international institutions. Apart from the work on international economics institutions, the majority of work has focused on the role played by international institutions in security issues. While the UN has been examined rather extensively as a third party in internal conflicts (Oruci, 2012; Fortna, 2004), most of these studies have focused on the role played by UN Peacekeepers in prolonging or shortening conflict, as well as on human rights abuses committed by the blue hats themselves (Smith and Smith, 2010). Larger questions about the role to be played by institutions in an era of change in the international system are addressed by Newman (2007). Newman examines the question of multilateral action in a post-Westphalian system, and finds that there is a choice to be made by actors: to act within formal multilateral institutions or to operate in *ad hoc* multilateral coalitions. While he specifically focuses these questions on issues of

collective security, these questions seem readily extendible to other realms of cooperation.

The focus on international institutions appears to fall under two main categories: generalist transnational institutions and specific interest institutions. The generalist transnational institutions are best represented the United Nations, ASEAN and the EU. The primary and usually sole actors within these institutions are nation-states themselves, and the activities conducted are typically of a general nature. These institutions serve to help coordinate activity between states and foster interdependence under a liberal theoretical framework (Russett and O'Neal, 1993 etc.). Specific interest institutions are the more common type of institution and have specific mandates for action and behavior. These institutions can be initiated by a single state or multiple states, and my have actors other than states as participants. While a wide variety of these types of institution can exist, and for various purposes, most of these institutions focus on issues of economics or security (e.g. WTO, NATO, IMF, etc.). For the purposes of this work, this institutional type will exclude multinational corporations and non-governmental organizations, as states must play a fundamental role in the creation and operation of these institutions.

Most work that has occurred on this type of institution has focused on the security or economic institutions. Yet there is more to be governed, and institutions affect more than people or economic activity. This work will examine the growing governance of "things" beginning with a thing of growing importance in human life, technology. Academics have been exploring the question of technology and humanity for a quite some time now, but prominently began with the works of Heidegger (1954),

Lem (1964) and Ellul (1964). These early works examined the very concept of technology and how humanity interacts with technology as a tool and perhaps something more. Although these works are of a significantly philosophical persuasion, they greatly inform current thought on the role of technology in society, and underpin much of the bioconservative and transhumanist discussions.[1]

It should be noted that technology exists in a gap of typical understanding of the world. While the scientific process is typically considered embedded within culture and society, the application of science manifests in technology. These technologies have traditionally been treated as part of economic activity, but in recent years this treatment does not seem accurate. Technology has emerged as a linkage between all aspects of the traditional political economic triangle (per Weber, 1922). It has also perhaps become disembedded from society, existing apart from the traditional understandings of man's interactions with technology. A deeper understanding of humanity's relationship to technology is necessary, and this should be an appropriate realm of inquiry for political scientists.

From a historical perspective, the interaction between technology and society has been explored in depth by both McNeill (1982) and Pacey (1990). They find that technology has played an important role in shaping society, primarily by dictating they manner in which wars are fought. The technology of war facilitates a shift in the political economic arrangements of a society to make fighting possible (McNeill, 1982).

[1] Bioconservative and transhumanism refer to particular sides in the discussion about the role of technology in human life and society. Bioconservaties argue that the inclusion of new technologies should be restrained. Transhumanist argue for the integration of technology in human society, up to and including in the human body itself. See the work of Nick Bostrom, Ronald Bailey, Peter A Lawler, and Leo Kass for a much more in depth discussion of these topics.

Alternatively the dialogue and trade between world cultures is facilitated by exchange in new technologies (Pacey, 1990). Collins and Pinch (1998) explore the uncertainty that is faced by society employing a technology, focusing on disputed outcomes of technology, and places where failure of technology was in fact an option. This sociological approach places technology fully in the context of culture and society, and allows us to remember that technology, as familiar as it can become, always contains an element of risk.

A more practical approach to the interaction between technology and society (and specifically politics) occurs in the political economic, neoclassical economic, and business literatures. This literature typically treats technology as part of the overall business and economic environment. Responding to Polanyi's assertions leading up to his 1944 *The Great* Transformation, Schumpter (1942) shows the role to be played by technology and innovation in allowing the capitalist system to survive. Binswanger et al (1978) explore the notion of Induced Innovation, focusing specifically on attempts by political bodies to craft institutions that would spur innovation in the agricultural sector. They widely find that institutions do have a large degree of impact on the development of new and novel technologies, especially in routinized research and development based innovations.

There is also some evidence that proper institutions can help spur radical, disruptive innovations of the Schumpeterian variety. Ruttan (2001) builds on his prior work with Binswanger to explore the larger process of inducing innovations, finding that institutions do facilitate the creation and adoption of new technologies. The confluence of resources, culture, institutions and technologies builds and interacts to induce

innovation at the national and firm level. Narula (2003) explores the impact of the global society and globalization on innovation, finding that increased cross-national research and development can lead to new innovations. He also finds that national institutions can cause technology to be come “locked-in” to a particular avenue, despite overall cultural trends, as evidenced by a resource extraction economy in high human capital Norway.

Both of the previously discussed works, Binswanger et al (1978) and Ruttan (2001), focus on the national level, dealing specifically with processes inside the United States, while Narula (2003) deals with the international system as a whole. As has been shown in previously discussed works, processes function differently under different social, cultural and political environments. Murmann (2003) exposes this notion to technology and innovation by examining the nascent synthetic dye industries in England and Germany in the pre-WWI era of globalization. The contexts of each country led to vastly different institutions, and subsequently vastly different results. The legal and intellectual property regimes vary between the cases and, as such, different reward structures are created. By creating a beneficial reward structure in Germany, as well as investing heavily in human capital and research and development, Germany was able, in a very short period, to overcome an initial deficit in synthetic dye innovation to become the world’s leader in production. Murmann introduces many important concepts and approaches to the study of the interaction among technology, politics, institutions, and economic outcomes. Yet his work remains firmly rooted in a distinct historical era and on one particular niche of economic and technological activity. It will be important to build on his approach to see if similar process and trends hold up across industries and

time. This work will attempt to do just that, not just by comparing across national boundaries, but by comparing institutional structures at the international level against each other.

As a final interesting work, one with a heavy impact on the work at hand, Krasner (1991) deals specifically with the political question of communications coordination at the international level. His examination of the Pareto frontier for the governance of communication not only in part inspired this project, but deals directly with some of the second order institutions governing both space exploration and the Internet. He finds that power and past institutional choices play an important role in the creation of institutions, often leading to suboptimal results. This piece by Krasner serves to bridge the divide between traditional international relations, comparisons of international institutions, and studies of the governance of technology.

Gaps in the Current Research and Research Questions

As should be apparent by this point, some significant gaps exist within current research on institutions, across several fronts. While many of these lapses in research will be pointed out, only a handful will be truly addressed in this particular work. The major areas of concern for research that have not been adequately addressed fall into several major categories, all of which serve the overall question of the best way to govern technology. First are the questions about the creation and evolution of institutions. Second, there exist major gaps in the research into international institutions, particularly in how they function together in a horizontally integrated context. Third, there is the question of how institutions change over time. This work will attempt to

cover questions from all of these categories, while many gaps in research will remain for future work.

Some important questions about the creation and evolution of institutions are ripe for being addressed both by this work and others. While we appear to have some idea about how institutions are created through political processes (as shown in the records of UN treaty negotiations, among others), the exact nature of the political process that creates institutions remains murky. National institutions are influenced by the cultural elements of the state that is creating the institutions (Putnam, 1983, etc.), but is there a similar influence on the creation of international institutions? As suggested by Wendt (2001), is it possible that there could be an international culture, and if so where does it emerge? The literature on Hegemonic Stability theory (Gilpin, 1981 etc.) suggests that a hegemon creates norms and institutions for behavior. Is that really the case, and if so can the hegemon change its norms while still in power? This work will seek to address these questions of institutional development in the first chapter of each case study. The predicted outcome is that norms for institutional creation will be generated by the historical and geopolitical factors present at the creation of the institution.

Koremenos, Lipson and Snidal (2001a) predict that sets of institutions will function together to govern within a larger institutional context. While the research along this vertically nested line of questioning is carried out by Aggarwal (1985), this work will examine a more horizontal relationship between international institutions. The second chapter of each case study will examine the interlocking and complementary institutions that aid in the governance of technologies.

As to the final set of gaps in the research, as to how institutions change over time, a particular model of subversion by non-dominant actors within the institutional framework will be developed. Building on the work of the Stopler-Samuelson Theorem (1941), as well as Karl Polanyi's concept of the double movement (1944), the model of subversion works as follows. In institutional creation, a dominant player, as decided by the norms of institutional creation at the time of origin for international institutions, will be given preference by the institution. The non-dominant players will attempt to subvert the institution to give preference to themselves. If the international norms and power structures of institutional creation hold, then subversion will fail. If the international norms and power structures of institutional creation have shifted, then the subversion will succeed. This model will be examined in the third part of each case study.

As stated in the previous chapter, the major focus of this work will be on the question of how international institutions govern technology. In order to accomplish this goal, a comparison of two different technologies will be conducted, looking for similarities and differences in the way the institutions are created and the outcomes from these institutional arrangements. The above questions, best summed up as "How is technology best governed at the international level?", will be addressed by analyzing each of the institutions in a historical institutional framework. While technology on its own might not be overtly political, this question of governance requires a distinctly political approach. The decision to build an institution at the international level to regulate technological activities is both political and practical. This work focuses primarily on the political aspects of these decisions, but also allows for practical concerns to play a large rule. An inductive approach to actual world events and

structures will allow for conclusions to be reached. These conclusions, which will be featured in Chapter 9, can provide ample and fertile space for future work on both institutions and technology.

While a good deal of functionalist analysis will be employed, it is also important to look at how these institutions function in the context of the international system. It is better to see how these institutions develop over time than to simply take a snapshot of their functioning at one point in time. This approach will allow for the interaction of individuals, groups, and other institutions to impact and allow for the evolution of the institutions in question. While agents (in this case primarily states, working in an international context) do create institutions, they are also influenced by the institution's rules and norms of behavior in the subsequent modification of the institutions. As pointed out by Knight (1991), "institutional development is a contest among actors to establish rules which structure outcomes to those equilibria most favorable to them" (p20). The historical institutional approach will allow this work to remain flexible to the balance of power both nationally and internationally, and the context that causes institutional evolution, as well as acknowledging the power of ideas in institutional formation. As Charles Tilly was fond of saying, this will allow us to explore "Big Structures, large processes, [and make] huge comparisons" (1984).

Case Selection and Justification

The search for two compelling cases of international institutions governing technology presents some interesting options, along with some vexing obstacles. While in an ideal world a random selection of technology governing institutions would be used for this study, in practice there are simply not enough cases to allow for this to occur.

Also, due to the relative paucity of cases, quantitative work will not be possible at this time. While many cases of technologies exist, being one of the major distinguishing features of human society, relatively few of these technologies have had such a large reaching impact as to require international coordination. A qualitative, historical institutional approach will allow the cases to be fully explored, perhaps leading to new avenues of research on the governance of technology that could be conducted in a more technically rigorous manner moving forward.

Technologies for consideration in this study generally fall into three categories: transportation, communication and weaponry. This is due, in part, to most other technologies not requiring a significant international coordination. In order to properly test the impact of norms in institutional creation, as well as dealing with the problems of international coordination, the question of power must be controlled for. Power and war are such large problems, that they will overwhelm any discussion of weapons technology, maximizing the role played by superpowers and hegemons. This leads to the disqualification of weapons technologies from consideration as cases. In order to see the role played by structures and actors, the focus must be placed on more heavily civilian technologies. The categories of transportation and communication will become the primary pools of technologies for consideration in this study.

As mentioned above, one of the major obstacles to this study is that technologies with a far-reaching impact have only rather recently (within the last two centuries or so) come into existence. While two hundred years appears to be a long time for the human scale, at the scale of the development of society and technological progression, this two-hundred-year period places us in the midst of the industrial

revolution. Many tectonic shifts in society have occurred within this period, and technology has greatly progressed in a relatively short period of time. Generally, technologies are governable with local rules and do not require a great deal of international standardization. The standardization and governance required can typically be handled internally by the companies or individuals that have created the technology.

A prime example for this phenomenon is the variation in standards for electrical power delivery. Many different voltages, wattages, and physical plugs have been adopted around the world, with regional standards emerging either naturally or through agreements. This problem has been mostly settled without need for a large international institution, leaving it up to individual travelers to overcome issues that arise with the aid of travel adapters. Perhaps another obvious example for this problem can be observed with railroad track gauging, one of the earliest cases of a technology requiring some degree of coordination across national lines. Many different standards for railroad gauges exist, but there has been no move to standardize international railroad gauges, as this is a problem that can be dealt with via a technological fix.

While many different technologies have a large enough international reach to require some sort of international governance regime, these technologies have only recently been developed, essentially within the last two centuries, with most major innovations coming in the last century. The previously mentioned railroad technology could potentially require an international governance regime, but for the most part has been able to exist without an overarching regime. Similar is the notion of sea travel, which has existed for as long as human history exists. It is only in recent years that an overarching international governance regime, the UN Law of the Seas, has been

established. Previously, sea travel relied on informal norms of behavior or much more limited treaties to govern behavior, with little actual governance of the technologies of ocean going itself.

Apart from transportation technologies, early communication technologies also present some interesting possible early cases. While some international agreements regarding postal deliveries eventually coalesced into the Universal Postal Union in 1874 (UPU, 2015), the first major international institution governing a communication technology is the International Telecommunications Union established in 1865. While this international institution was initially established to govern international telegram communications, it would prove to be highly important for the governance of many different communications technologies that followed. The ITU provides a highly compelling case deserving of much deeper study, but does not make itself readily available as a central case study for this work, as it covers a wide variety of technologies.

To be a valid case for this work, the technologies must be of a rather consolidated nature, meaning that while they may be highly related to other technological activities, they must be able to stand on their own as a technological achievement. The technology must also require international coordination in order to operate effectively. As an added consideration, the technology should be primarily civilian, to allow for some freedom in the creation of a governance institution. Nuclear weapons are one of the most obvious technologies where some sort of international regime would be important, but due to the almost exclusively military nature that they have taken on, they have been ruled out as a case, along with the other major weapons

of mass destruction. Some sort of international institutions must obviously have been established for this study to be valid for any case, so many of the currently emergent biological and medical technologies rule themselves out.

The choice remains between selecting cases with a high degree of similarity or cases that do not have many similar characteristics within the typology of international institutions governing technology. The major variable will be the type of technology that is governed, e.g. airplanes, trains, radio, televisions. Both approaches have their merits and drawbacks; most similar cases would allow us to see the variations put into place when creating institutions for technologies, but it is also very likely that similar technologies would build on each other and the institutions would follow suit. For example, most telecommunications technologies have come to fall under the purview of the ITU. While this case would create an interesting study into how one institution was created and evolved over time, as the ultimate goal of this work is to compare international institutions with each other, a single institutional case will not suffice. This situation leads to the preference for least similar cases. Radical differences in technologies should lead to different institutional outcomes, and if not, then much can be learned overall about how the governance of technology occurs.

Also in play, but of secondary consideration, is that of the time period where the technology and institutions emerge. One of the major research questions is the effect of international political context on institutional creation. As most major technological breakthroughs of the last century that readily present themselves occurred during the Cold War period from 1946 until the late 1970s, this situation sets one of the major time periods for study. The second case should come from either before or after the Cold

War/Modernity period of the international system. While many technological innovations occurred before the Cold War international system emerged, during what will be termed the interwar period, these technologies were mostly of the type not requiring large international regimes, or were of a military application. As such, the period after the Cold War/Modernity international system, the much better defined Neoliberal international system, seems a much better time period for case selection.

Using these criteria, the two cases that have been selected are space exploration and the Internet. It should be noted that while the term space exploration is used in this case, the implication of a focus on early rocketry and the 'Space Race' is not intended. What would perhaps be better would be the idea of spaceflight, while that too has implications of simply manned activities in space. And although space exploration has connotations of scientific activity, commercial, and to some extent, military activity should also be implied. So while the term space exploration is not ideal, for the purposes of this work it will suffice. Space exploration represents a technology in the realm of transportation, perhaps even representing the pinnacle achievement in that realm that has occurred to this point in history. The technology was brought into full development during the Cold War and the intricate institution governing space exploration was also created during this period (Ogunbanwo, 1975). With a distinct, formal set of international laws and institutions established, space exploration makes an excellent case for study, and will serve as the base for comparison in the work.

The Internet presents some interesting qualities and extreme differences from space exploration, as well as some intriguing similarities and overlaps that allow for it to fit as the second test case for this study. While the roots of the Internet extend back to a

military research project during the height of the Cold War, the technology has significant civilian roots at the University of Southern California (Mueller, 2003). The Internet as it is known and experienced today emerged firmly during the Neoliberal period, which for the purposes of this study begins in the early 1980s (Kahin and Keller, 1997). Moving ideas as opposed to things, the Internet represents a communication technology. The institutions of the Internet do not follow a distinctly international and formal political institutional framework, instead relying on what has been termed the multistakeholder model of governance (Utting, 2001). The processes involved in the creation of these institutions should provide a great deal of insight into the decision making process for crafting international institutions.

Each case study will occur in three parts. The first part shall be primarily functionalist, examining the primary international institution responsible for governing the technology. Although attention will be paid to the political elements at play during the creation of the institutions, the majority of the research will attempt to simply understand the regime as it was set up initially. Other works (Oganbanwo, 1975; Mueller, 2003, Mueller, 2007, Denardis, 2009, etc.) have focused specifically on the political and cultural forces at play in each case study, and are mentioned and highly recommended reading to further understand the processes in each individual case. But in the interest of comparison, the focus will remain on the functional elements of the institutions. This section of each case study will address the question of how to best form the initial institution to govern a technology, as well as providing insight into the question of overall institutional formation.

The second part of the case study will look at the institutional context of the governance regime. The interactions between the main institution and other institutions that support the primary institution will be of great importance, as well as the role played by the peripheral institutions. Using the framework of rational institutional design as a guide (Koremenos, Lipson, Snidal, 2001b), the horizontal integration of institutions for governance of technologies will be highlighted.[2] This second part will address the manner in which interlocking international institutions work together to more completely govern a technology.

Finally, each case study will examine the attempts at subversion faced by each regime. Using the model based on the Stolper-Samuelson Theorem and Polyani's conception of the double movement, both cases will be examined for subversion from non-dominant factors. The question at hand will be how institutions weather subversion attempts or succumb to subversion, as well as to what degree institutional inertia keeps the institutions the same. This final part of each case study addresses how the institutions governing technology can deal with change over time.

The three-stage approach to these case studies will allow the best possible observation of the cases as they formed and developed. The functionalist chapters will answer questions about the ability of international institutions to govern technology, as well as the contextual issues about institutional creation. The more historical institutional chapters on institutional context will allow a wider lens to be applied in order to answer questions about reward structures and outcomes of governance. The chapter on subversion will also take an historical institutional approach, but with a much more

[2] An interesting role is found in both case studies for the ITU, something that is examined in the conclusion.

refined and focused view on questions of institutional change and evolution in the face of both external and internal pressures. These case studies should reveal much new information across a wide variety of questions about international institutions and the governance of technology. Hopefully, steps can be taken to answer the major question of this work: How can technology best be governed?

CHAPTER 3: THE OUTER SPACE TREATY OF 1967 AND OTHER INTERNATIONAL TREATIES FOR GOVERNING SPACE

"They didn't want it good, they wanted it Wednesday"- Robert A Heinlien

This chapter serves as the first part of the case study for space exploration. In this chapter, the historical and geopolitical contexts of the creation of the treaties governing outer space will be explored. Although the major focus lies in the functional institutional elements of the outer space treaties, the importance of the historical power dynamics and the impact these have on norms will be highlighted. The early Cold War era is highlighted as an era of contrasting ideologies: avoiding nuclear war and newly independent countries asserting their newfound role in international society.

The institutional story of outer space begins in 1957, with two unrelated but ultimately highly important events. The first is the beginning of negotiations on the Antarctic Treaty, which was ratified on 1 December, 1959. The second event is the launch of the Sputnik satellite by the Soviet Union in October of 1957. While these two events might not appear to have a great deal in common, both play large roles in the eventual creation of the international legal regime that governs space exploration. Without the actual launching of an artificial satellite into space, the theoretical discussion on the governance of space would have remained in the realm of the theoretical. And without the structures that were enacted by the Antarctic treaty, the eventual treaty that was created to govern space exploration, the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies,* henceforth referred to as either the Outer Space Treaty of 1967 or OST 1967,would most likely have taken an entirely different form. Taking into account these two crucial events, this chapter will seek to address three

major questions. First, how did this treaty come to take the form it did? Second, what does the Outer Space Treaty of 1967 actually govern? Finally, how does OST 1967 and its other cousin treaties actually go about the day-to-day business of governing outer space?

Prior to the launch of Sputnik, the question of legal regimes concerned with outer space was strictly academic, yet with the launch by the USSR, the question quickly moved from the realm of science fiction into reality. Within two and a half years the question of governing space was quickly addressed and the decision was made to explore the construction of intergovernmental organizations to deal with outer space activities (Miles 1970). While the initial institutional response was to address outer space issues under the framework of nuclear arms, the Ad Hoc Committee on the Peaceful Uses of Outer Space (hence forth referred to as COPUOS) was quickly established and made a permanent feature of the United Nations. By December of 1959 movement was already underway to explore the creation of a permanent treaty on outer space.

COPUOS and OST 1967

COPUOS was formed with the distinct mandate to create law in regard to outer space, and as such had to begin immediately addressing problems that were still non-existent. The committee was tasked with the difficult duty of writing laws for problems that only existed in the realm of the theoretical. One of the problems faced by COPUOUS was simply the matter of defining and delimiting outer space (Benko, 1985). While this might seem a fairly straightforward issue in the first decade of operation, during which time the Outer Space Treaty of 1967 was formalized, the Legal

Subcommittee of COPUOS “arrived at the conclusion that no scientific and technical criteria could be found which would permit a precise and lasting definition of outer space” (Benko, 1985, p121). The very question of defining the limits of outer space remains unresolved in international law to this day, but has generally come to be recognized as everything above 60 miles from sea level. While this issue is not the major focus of the chapter at hand, it does serve to illustrate the various difficulties encountered in crafting the law on outer space.

With resolution 1721B from the United Nations General Assembly on December 20, 1961, COPUOS took on the cumbersome task of extending international law into outer space, and in turn began to accept state level submissions on the shape which space law should take (Forkosch 1982). Over the course of the next two years a draft on Declaration of Legal Principles was crafted and eventually presented to the General Assembly for adoption. At this point, however, COPUOS began to take a much more cautious view of their work. The committee became reluctant to rush the process of crafting the law, which would govern outer space, and instead began to adopt the “legal stepladder approach” (Forkosch 1982, p30). This new, cautious approach had the unfortunate side effect of angering the General Assembly, prompting the committee to continue work on the draft Declaration of Legal Principles. This rushed draft was quickly commended for signature in 1966, eventually becoming the Outer Space Treaty of 1967 signed by over 100 nation-states. This treaty was recognized at the time as a stop-gap measure for later treaties that would truly shape the international legal regime concerning outer space. While there were subsequently three further treaties adopted (to be discussed in a later section), OST 1967 still stands as the primary treaty shaping

the international law of outer space. The next section will directly address the treaty, examining the various legal principles enacted to create the current regime.

Legal Principles of OST 67

One historical note should be made before beginning the true study of OST 67, namely, that the historical period in which the legal regimes for outer space were crafted is a very peculiar moment in history. While on the surface the Cold War seems to hold the most sway over any discussion of this era, it is also very important to remember that this was also the era in which most European and western powers were giving up their hold on their colonies. The impact that the decolonization period had on the legal frameworks of OST 67 would perhaps make for very interesting separate future work, as norms regarding ownership of colonies and non-contiguous national territories were in flux. For now, however, we must turn the question at hand, the Legal Principles of OST 67. The treaty fall into roughly four categories to be examined individually: Ownership and Access, Weapons and Military Activities, Liability and Responsibility, Notification and Registration, and Rescue and Return of Astronauts.

Ownership and Access

Perhaps the most fundamental role of any institution is to define property rights. As such, OST 1967 follows on the heels of another UN treaty in the type of property rights regime enacted in outer space. Both OST 1967 and the Antarctic Treaty of 1959 start with the premise that certain lands and areas should be held as “scientific commons for all mankind”. Article I of the Outer Space Treaty is as follows:

> The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries,

> irrespective of their degree of economic or scientific development, and shall be the province of all mankind.
> Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.
> There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation.

This opening article of the treaty sets the stage for a more complete commons-based property regime in several ways. First, the treaty places emphasis on the notion that there should be access of all mankind to outer space, without regard to any level of difference along scientific or economic lines. This approach creates a situation where all of humanity should have access to space on a theoretically equal basis. While this might hold to the high-minded political and ideological aims of COPUOS, it has little to no bearing on the actual realities of space travel, which at the time was restricted to only a handful of highly advanced technological and economic societies. With this particular approach to property rights in outer space a situation has been created where further down the line any nation-state could possibly (yet highly unlikely) petition for access to space, even if they do not have the ability to reach outer space on their own. It is foreseeable that some less developed nation could bring suit against either a space faring nation or a private space company, which have their own legal issues as well, for access without being able to pay full price for said access[3]. An interesting precedent for

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[3] While the author does not necessarily agree that this is a likely outcome, potential avenues for developing nations to petition for access to space exist. The following is the text of Article 2 of the1996 *Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries* **"**2. States are free to determine all aspects of their participation in international cooperation in the exploration and use of

this situation could be the current geopolitical conflict concerning mineral use in the Arctic and Antarctic. (Leighton, 2014) There is also the possibility that a formerly space-capable nation such as the Unites States could use OST 1967 to gain access to space for free from another state with space capability. Although this idea may seem ludicrous on the very face of it, the legal justification could be extracted from the first article of OST 1967.

Secondly, Article I places a great deal of emphasis on outer space being available for scientific exploration. The greatest emphasis for the outer space treaty seems to be on studying outer space. This emphasis is perhaps reasonable in light of the level of development of space exploration techniques at the time. Very little work had been done to advance economic interests in space, and COPUOS was an offshoot of UNESCO, a United Nation body concerned first and foremost with culture and science. This confluence of prior work, institutions, and era of international politics lead directly to a particular institutional arrangement for space exploration, one that privileges scientific exploration as opposed to economic investment. While this institutional regime is perhaps an offshoot of the earlier Antarctic Treaty, it bears repeating that even COPUOS believed they were rushed and that the treaty they put forth was ill advised.

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outer space on an equitable and mutually acceptable basis. Contractual terms in such cooperative ventures should be fair and reasonable and they should be in full compliance with the legitimate rights and interests of the parties concerned as, for example, with intellectual property rights." From this, as well as the remainder of the *Declaration* special attention towards developing countries and space is to be given. Already, space faring nations have given access to space to astronauts, cosmonauts, and taikounauts from non-space faring countries. The author predicts this trend to continue in the future.

Yet this treaty serves as the least bad example of policy that could be crafted in such a short period of time and be deemed acceptable to all signatories (Ogunbanwo, 1976).

While Article I delineates access to outer space, this is not the only aspect of ownership. Instead we must turn to Article II to gain a more complete understanding of what property should look like in outer space. Article II is as follows: “Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” These thirty words make up the vast majority of property rights that can be held in outer space, and have caused a great deal of ink to be spilled in frustration over such limitations. This article is very clear in language and intent, leading to the conclusion that no part of outer space can be claimed by any nation on earth. While this article does further the goals of peaceful scientific exploration, it leaves little room for possible economic activity. The situation is further complicated when one thinks about the possibility of future colonization of outer space and celestial bodies, a notion that was already in the common discourse of the time. It would appear that OST 1967 was crafted intentionally in such a way as to limit economic growth and expansion of property into space, as well as to limit new entrants into outer space activities, primarily through its treatment of liability as described in a later section. While this treaty was a rushed first pass at governance of outer space, the sentiments expressed therein seem to hold in the subsequent treaties that deal with celestial bodies. This notion of property ownership in space will be revisited later in this chapter, but for now we must turn to the question of weapons in space.

One final note must be made before the discussion about weapons in outer space can commence. While there has been particular difficulty in actually delimiting outer space in a legal sense, the concept of a celestial body has not been as difficult to define. Celestial bodies include all natural objects that are not the earth. As a consequence of this accepted legal definition, all objects in outer space that are not man-made or the Earth itself are considered property of all mankind (Ogunbanwo, 1975. p.95). While this concept is not a particularly difficult to grasp, it does lead to possible problems further down the road, especially as the likelihood of finding other intelligent civilizations seems to be increasing. However, discovery and interaction with a non-Terran intelligent civilization would create other, perhaps more pressing matters of law and treaty for Parties to the Treaty to deal with. This example simply highlights the difficulties and problems to be found within the current legal framework under which space exploration and exploitation takes place.

Weapons and Military Activities

While much academic and policy work has been focused on the question of placing arms, and more specifically nuclear arms in outer space, very little attention is paid to this problem within OST 1967. Article IV, the relevant article when discussing arms and military activities in Outer Space, reads as follows :

> States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.
> The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be

> prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited.

OST 1967 utilizes very clear language in relationship to the emplacement of nuclear arms and other weapons of mass destruction in outer space. No weapons of mass destruction are to be put into space in a semi-permanent or permanent fashion. This understanding does leave room for such weapons to make sub-orbital flights, but no weapons can be left in space for positioning in the case of war. The treaty also does not have anything to say about the manufacture of such weapons (Ogunbanwo, 1975p.92). There does appear to exist a series of so called loopholes within Article IV as was specifically pointed out by Italy in subsequent attempts to amend OST 1967 carried out in 1968, namely weapons could be placed into semi-orbit or on crafts that are sent into deep space. The so called Three Powers of space, the United States, the Soviet Union, and the United Kingdom, clarified that they already believed the loopholes to be closed by the treaty as written, a situation that satisfied Italy's needs and the request for amendment was subsequently withdrawn (Ogunbanwo, 1975. p. 102).

While placement of Weapons of Mass Destruction (WMDs) in space is prohibited, the treaty has nothing to say about conventional weapons. A simple iron or tungsten mass, when dropped from orbit can still have a very large impact without the negative radiological or biological consequences outside the initial blast radius (Menon, 1987. p.44). Yet given the distinct geopolitical power structure of the day, most policy concerns were focused on the concept of WMDs, and OST 1967 served as an extension of the Limited Test Ban Treaty of 1963 (Menon 1987, p44). It is interesting to note that this treaty, OST 1967, served as one of the many and earliest stepping stones along the road of nuclear disarmament talks, even though the treaty is nominally

concerned with outer space activities. This concern might be a left over from the earliest days of international discussion on outer space, which were initially conducted under the guise of arms control and limitation (Ogunbanwo, 1975).

Moving on from the strictly limited concept of WMDs in outer space, the second paragraph of Article IV deals more broadly with the concept of militarization of outer space. This particular paragraph deals dictates a much more limited scope than the other parts of OST 1967. While most sections refer to outer space, the moon and other celestial bodies, this paragraph deals only with the moon and other celestial bodies. This focus is clearly a deliberate choice, opening up orbit and space stations (man-made celestial bodies) to occupation by military forces. This prohibition on military installation is very clearly modeled after Article I of the Antarctic treaty (Menon 1987, p44). Yet there exists one particular phrase that opens up military uses in outer space to less clear interpretation. The phrase “peaceful purposes” when used in conjunction with the use of military personnel, creates a good deal of confusion about the proper role for the military in space exploration. While it is clear that military personnel, such as pilots, can be used for scientific research, as is directly stated by the Article, the true meaning of “other peaceful purposes” remains occluded.

Two separate approaches exist in the interpretation of the peaceful purposes clause. First is the nonaggressive approach. This approach, as favored by the United States of America, is generally held to mean that no use of military force will be allowed against sovereign states, especially with regard to territorial integrity or political independence. This leads to the United State possibly putting military astronauts into space, but these astronauts may not act in a military manner against other sovereign

nations. The second approach to the peaceful purposes clause, the non-militarization approach, was that favored by the Soviet Union and many other states. This approach is much less nuanced, and leads to the demilitarization of space and other celestial bodies by those who hew to this interpretation. As such, those who hold this view do not believe that the military should have installations at all on celestial bodies, be they for peaceful purposes or otherwise.

In order to keep Article IV functioning, another series of articles were enacted, namely Articles X and XII. Article X reads as follows:

> In order to promote international co-operation in the exploration and use of outer space, including the moon and other celestial bodies, in conformity with the purposes of this Treaty, the States Parties to the Treaty shall consider on a basis of equality any requests by other States Parties to the Treaty to be afforded an opportunity to observe the flight of space objects launched by those States. The nature of such an opportunity for observation and the conditions under which it could be afforded shall be determined by agreement between the States concerned.

And Article XII reads as follows:

> All stations, installations, equipment and space vehicles on the moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may betaken to assure safety and to avoid interference with normal operations in the facility to be visited.

The former article makes all launches public, or at the very least open to observation by any other States Party to the Treaty (hence abbreviated as SPT). This measure is fairly straightforward and is a non-rigorous attempt to keep all treaty parties honest and open in their space launches by keeping all events open to outside oversight. There does exist the caveat that the conditions under which observation of

launch may occur will be determined by “agreement between the States concerned.” While this clause does provide for some conditionality for observation to be put into place, the overall thrust of the Article is to foster transparency in outer space activities.

The latter article deals with visitation to foreign space installations and vehicles by other treaty signatories. Again, this provision is rather straightforward but is a bit more rigorous in allowing other parties to the treaty to actually visit space installations given some “reasonable advanced notice.” What this notice would be has never truly been determined, as no permanent or semi-permanent installations have ever been installed on any celestial bodies. The closest that humanity has come to any installation that would be affected by Article XII are the various space stations that have been launched. This provision is focused on maintaining safety for any astronauts, as space travel is currently an inherently risky proposition. The “reasonable advanced notice” and “appropriate conditionality” are focused on technical concerns regarding safety, not on any security dilemmas that might occur between SPTs (Oganbanwo 1975. p.105). It is unusual that this provision has not truly emerged as an issue of contention, as it could clearly be used by space capable nations to visit other SPT’s space stations. Given current space capabilities, this article could be cited by the Chinese to gain access to the International Space Station, a space station from which they were specifically excluded by the ISS board of governors at the planning stage.

Yet again, as with Article X, the actual enforcement of the clause seems to hinge on consultation between the parties in play. While there is clearly a sense that parties should, if not freely, easily allow access to their space based facilities, it does rely in the end to negotiation between the parties involved to arrive at complete understanding as

to how access will be given. Yet the interpretation of this conditionality comes down to conditions of visit as opposed to veto on access (Ogunbanwo, 1975. p.104). Again, these conditions are more focused on safety and the materiel necessary for visits as opposed to any vetoes on security concerns. It should also be noted that this Article does not mention nor include access to satellites. Verification of Article IV in relation to satellites in orbit would therefore be entrusted to individual nation's methods of verification. What this would entail would be left up the nations themselves and falls outside of the realm of the work at hand. But it is interesting to note that manned facilities and permanent facilities on celestial bodies are open to visitation and verification while satellites are left up to verification methods available to individual State Parties to the Treaty.

Military Activities

When it comes to the legality of military activities in outer space, Hurwitz (1986) has identified three rights that are held by all space-faring nations. These are the Right to Exploration, the Right to Self-Defense, and the Right to Overflight. If a military activity does not fit under one of these rights, then it should be considered an illegal activity. Several interesting concepts must be addressed to see how this treaty applies to military activities in space. First, the right to exploration does not seem to be directly related to military activities in space. Hurwitz identifies 5 requirements for any activity, military or otherwise, to be considered legal in outer space under the legal regime of OST 1967 (Hurwitz, 1986. P.55-81). The first of these principles is that any activity in space must be "For the Benefit and in the Interest of All Countries." This language is drawn directly from the text of the first Article of OST 1967. Broadly understood, this

means that the action must further international peace, promote co-operation and understanding, and if information is obtained the results must be released to the general public. The question of whether or not any activity must exclusively benefit all countries, however, remains in doubt (Goedhuis, 1970. p.27). In direct relation to military activities in space, this principle seems to denote that the military may only be involved in peaceful activities, generally related to science and exploration. This principle seems to rather clarify the role of the military in space, but the inclusion of the other 6 principles, also derived from Articles I, III, and IV, helps to create a full picture of the role of the military in outer space.

The second requirement for military activities in space under the right to exploration as per Hurwitz, states that space activities should be carried out "Without Discrimination … on a Basis of Equality," directly quoting from Article I of OST 1967. Hurwitz does go a step further in his interpretation of this clause, noting that "Equality" is more of a legal fiction than a political fact. He derives this interpretation from the notion that states are only equal in deriving benefits that are open to others. This appears to be a rather narrow, if perhaps reality grounded, reading of the law at hand. But on the specific notion of military activities in space, these actions should hold to the notion of a basis of equality. This approach has more to do with the notion that all SPTs should have equal legal footing in making proposals. No state should be allowed to undertake military activities in space simply because they wield a technological or military power advantage. All SPT must be held to the principles of the rule of law as established by OST 1967.

The third requirement builds on this notion of respect for the rule of law, making a deliberate reference to carrying out space activities “In Accordance with International Law”. Building on Article III of OST 1967, this principle asserts that any military activities that take place in outer space must hold to international law. While some observers have noted that respect for international law seems to be taken for granted within OST 1967, this claim can be clearly refuted by the two specific references within the treaty to acting “in accordance with international law,” seen in Articles I and III. All activities in space should be held to the scrutiny of international law, including the charter of the UN and any normal international prohibitions on military action.

The fourth requirement is that any military action in space must be carried out “In the Interest of Maintaining International Peace and Security and Promoting International Co-operation and Understanding.” This requirement greatly limits the freedom of the military to operate in outer space, leaving them only with the role of keeping up international peace and fostering co-operation. Translated to tangible activities, some operations could be monitoring of international agreements from space (perhaps giving legal cover for orbital spy satellites), protecting the world from bolide collisions, and conducting scientific missions (which seems to be the primary concern for almost all activities under the treaty).

Perhaps the most important, and the most disputed, of the requirements is that military activities be carried out “Exclusively for Peaceful Purposes.” This requirement, as derived from Article IV, is the requirement that has caused the most debate between the various space powers and SPT. As previously mentioned, the Unites States and the Soviet Union took drastically different stances on the interpretation of “peaceful

purposes," breaking down into the debate between non-aggression and non-militarization. Yet more interesting to this debate are the locations where this principle applies. While all previous principles and requirements applied to outer space and celestial bodies, this requirement applies only to celestial bodies. This interpretation leaves open the possibility not only to orbital military space stations, as long as they do not contain WMDs, but also to space stations at various other points, including but not limited to the LaGrange points. As previously mentioned, this outcome is considered to be a deliberate action by COPUOS in drafting the treaty. It should be noted that the generally accepted interpretation of "peaceful purposes" aligns with the non-military approach outside of the United States, but that even the then-Secretary of the UN, U Thant stated that the door was not completely barred against military activity in space.

Right to Self Defense The next major right identified by Hurwitz in relation to the militarization of outer space is the right to self-defense (Hurwitz, 1986. P. 82). This right is derived not from OST 1967, but from the UN Charter of 1947. As OST 1967 deliberately mentions that outer space activities must take place in accordance with international law, especially the UN Charter, Hurwitz derives that a right to self-defense must exist in outer space. Yet this notion that states have a right to self-defense is not universally held by all parties in either academia or the policy realm. Many authors, including Chandrasekharan, Markov and even the Argentine delegate to COPUOS have explicitly state that the right to self-defense does not apply to outer space, and the principle of non-military presence in space supersedes even the UN Charter in regards to the right to self-defense. (Chandrasekharan, 1967; Markov,1968, Ogunbanwo, 1972).

Hurwitz, however, argues against the strictly non-military interpretation of Article IV, instead preferring the non-aggressive interpretation as favored by the United States. As such, he finds that a rather extended right to self-defense exists in outer space. He finds that states not only have a right to self-defense *in* space, but that they also have self-defense rights *from* space and *through* space. This interpretation is perhaps the most expansive right to self-defense that one could derive from OST 1967. The right to self-defense in space is a rather straightforward affair, meaning that if attacked while in outer space, states have a right to use military force in defense from these attacks in space. The right to self-defense from space is a bit more complicated, but from a legal perspective remains relatively straightforward. States have the right to defend themselves from attacks that originate or travel through space and reach their home territories. This defense can take place both terrestrially and in space (perhaps being extended to the destruction of space-based weapons platforms). The most complex of these rights to self-defense comes in the right to self-defense *through* space. This right involves using space as the medium through which the defensive action takes place. Given this interpretation, any retaliatory strike or method of interception could travel through space. As has already been discussed, it appears that SPTs do have the right to use ballistic weapons that are sub-orbital in nature. This action would appear to be what Hurwitz has in mind when he discusses the right to self-defense through space (Hurwitz, 1986).

The right to self-defense in relation to space, be it *in, from,* or *through,* is derived by Hurwitz from both international law, as laid out in Article 51 of the UN Charter, and from US jurisprudence. While Article 51 is rather simple in its provision of the right of

states to self-defense, the use of US jurisprudence to create a right to self-defense in space is a bit more convoluted and controversial. His approach relies heavily on two cases from the 19th century, both of which focus on maritime incidents. While the analogue between maritime and outer space is one that is commonly applied, the particular instances used by Hurwitz might be a bit suspect. The first instance was decided by Chief Justice Marshall in the case of Church v. Hubbart, in which an absolute right to defense of sovereignty is extended beyond even the sovereign territory of the state. Daniel Webster furthered this interpretation during the *Caroline* incident of 1841. These two avenues taken together, both international law and US jurisprudence, do seem to create a distinct right to self defense, and the qualifications of location where this defense may take place does not clearly exclude outer space. This matter is indeed a complex one that has not been cleanly resolved, but Hurwitz does indeed make a rather compelling argument to support a right to self-defense in outer space.

Right to Overflight The final right identified by Hurwitz that would allow military activity in space is the right to overflight. This right in one of the most important rights surrounding space flight in general, as by its very nature, space travel must occur over the airspace of more than one country. No state on earth is capable of sustaining an orbital path over its sovereign territory, and as such space flight must encroach over sovereign airspace in a way that is much more complicated than simple air travel. While airplanes can simply fly around sovereign claims, orbital paths are much more determined by gravity and cannot be as simply rerouted. Even on the question of launching an object into space only a handful of nations would be capable of putting an

object into space over their own territory.[4] The early concerns about overflight were addressed in several ways.

In the earliest days of space flight, the United States and its facilities in Florida had a launch path that passed over Santo Domingo and the United Kingdom. The US negotiated a treaty for access to overflight of these countries during launch. This regime of almost ad hoc negotiated treaties for overflight quickly gave way to a new paradigm of third party recognition of overflight rights, especially during the launch phase of a spaceflight. Yet is perhaps most interesting to note that this new paradigm did not emerge from specific negotiation, but instead from "tacit consent." Without this consent to overflight, tacit or otherwise, it would be impossible to conduct space exploration.

Much like the law in relation to ship travel through territorial waters on the high seas, the regime for airspace above a sovereign state is divided into several different areas of legal jurisdiction. The closest to the ground, and the area over which the state maintains full control, is the so-called "territorial airspace." The volume above the territorial airspace, but not quite to outer space is called the "contiguous zone." While the state still retains full control over this airspace, any space object may traverse this airspace freely during take-off and re-entry. Finally there is the area that is free for use by all and where no nation may stake a sovereignty claim: outer space proper. The problem of delineation of these areas has been discussed above, but very few claims and disputes are actually raised in practice. This situation creates a rather

[4] United State, Canada, Russia, Brazil, China, India, Japan. It should be noted that Russia currently launches from Kazakhstan. Canada does not launch from their own territory either. It is merely the case that these states could theoretically put an object into space within their own territorial holdings. Once in space their orbital trajectories must still travel over other sovereign lands.

straightforward legal regime for understanding the problems inherent in overflight of other sovereign states with regard to space travel.

With respect to the specific right for military activities to overfly other sovereign states, Hurwitz argues that since no body exists to rule any particular space launch as illegitimate, then all launches must be considered legitimate. If a launch were to be declared illegitimate, and any state were to actually veto said launch, then this veto would have the effect of preventing development in the field of space flight, something that directly contradicts the spirit of exploration for all mankind.

The logic employed by Hurwitz appears to be tenuous at best, perhaps relying too much on extending the principles of self-defense to space flight. While Hurwitz might overstretch his arguments, his interpretation does seem to stand firm. While his views on the militarization of space may side with a pro-militarization approach, he does not find a right to weaponize space. This view, along with the actual policy of space faring nations thus far, has lead to a regime where military activity in space, aside from reconnaissance and remote sensing, has generally been avoided. Much like the tacit agreement on overflight, there appears to be a tacit agreement not to undertake military activities in outer space. This agreement, perhaps more than the treaties, has been most effective in keeping outer space free for scientific exploration by all mankind.

Liability and Responsibility

The next aspect of space travel that must be understood from a legal perspective is the notion of liability and responsibility for any launches. At issue is the question of who holds liability when an object is launched into space and who will be responsible for

damages, should any occur. The relevant section of OST 1967 is Article VII, which reads as follows:

> Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air or in outer space, including the moon and other celestial bodies.

Also relevant as to the question of responsibility for any space launch is Article VI, which reads as follows :

> States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.

While these articles clearly place the burden of liability on the launching state, a situation that will undoubtedly change as private space travel is expanded, there is much debate over how a damages claim is to be leveled. Ogunbanwo (1972) identifies three particular approaches to the establishment of liability for damages claim. The first is based on the notion of negligence, and as such a very heavy burden of proof is put in place on the side of the damaged party. The second approach is '*res ips loquitar,'* or the thing speaks for itself. Under this theory there exists a presumption of negligence on the part of the launching state. The final theory is the principle of absolute liability. This theory is based on the injured state showing that damages were caused by equipment launched by another state, and this claim is then brought to the launching state. The

third theory seems to be supported most heavily by previous treaties that uphold the concept of absolute liability[5].

Morris Forkosch (1981), the foremost authority on liability in relation to outer space, finds any mention of responsibility of states for liability as prescribed by Article VI to be loose, precisely in its lack of clarifying language about state responsibility. He also finds the relationship between non-state actors and SPTs to be lacking, as there is no regimented and regularized process by which NSAs should gain permission to conduct outer space activities from SPTs. Forkosch notes that the situation as created by Article VI leaves NSAs free from international liability for their actions in outer space (p47). While any action or liability by a NSA would be held to the standard of national law, in the international arena, it is the SPTs themselves that bear the brunt of international liability. If a state's domestic laws put the liability directly on the NSA, then the true international burden of liability remains in doubt. Forkosch concludes his examination of Article VI by noting that there are many consortium structures, i.e., International Organizations and Transnational Corporations which might have an interest in conducting space activities, and that the current legal regime, as laid out by OST 1967, does not even begin to address the question of liability in such cases.

Article VII, while shorter than Article VI at only one sentence long, actually deals with liability in a much more direct manner, yet one that is still found to be truly inadequate for the purpose of dealing with liability in outer space. First and foremost,

[5] IE. The Rome Conventions on Damage cause by Foreign Aircraft to third parties on the Surface of 1952, The Paris Convention on Third Party Liability in the Field of Nuclear energy, 1960; Brussels Convention on the Liability of operators of Nuclear Ships, 1962; International Convention on Civil Liability for Nuclear Damage, Vienna, 1963. Etc.

this article is limited to SPTs, and as such any non-SPTs are not subject to the conditions of liability as established by this treaty. Forkosch also points out that the term "internationally liable for damage" has no true legal meaning, merely serving as high-minded language that does not exclude other law (p53). Article VII may establish a separate set of law for SPTs, but non-signatories are clearly not to be excluded from making claims for damages. The creation of a dual system of international liability, whatever that may be, creates further confusion around legal liability for space activities. As Forkosch elegantly states "…a cacophony of legal voices may join in a paen of discord to partial remedies and improper law"(p52). It becomes apparent at this point that OST 1967 serves merely as a stop-gap measure of a document with regard to liability in space exploration. Yet even with subsequent treaties coming into place, such as the Liability Treaty of 1972, the law as established by OST 1967 has not been completely replaced. As such, the principles established above stand to this day, as problematic a situation as that may be. A more in-depth discussion of the changes brought into place by the Liability Treaty shall be found in the last part of this chapter.

Notification and Registration

One of the major principles for space flight as laid out by OST 1967 is the notion that SPTs shall inform other SPTs and the broader international community of their actions in space. This principle is laid out in Article IX, whose full text reads as follows:

> In the exploration and use of outer space, including the moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space, including the moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty. States Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth

> resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose. If a State Party to the Treaty has reason to believe that an activity or experiment planned by it or its nationals in outer space, including the moon and other celestial bodies, would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space, including the moon and other celestial bodies, it shall undertake appropriate international consultations before proceeding with any such activity or experiment. A State Party to the Treaty which has reason to believe that an activity or experiment planned by another State Party in outer space, including the moon and other celestial bodies, would cause potentially harmful interference with activities in the peaceful exploration and use of outer space, including the moon and other celestial bodies, may request consultation concerning the activity or experiment.

It appears that the primary purpose of notification and registration of space launches and discoveries is based primarily upon the notion of safety, both for astronauts and the general public. Due to the early and uncertain nature of spaceflight at the time of writing OST 1967, it made sense for all SPTs to share scientific data about the dangers encountered during spaceflight. While Hurwitz (1986) suggests that SPTs are not necessarily required to notify other SPTs of their outer space activities, Article V does require states to disclose any information that may cause danger for any astronauts. Article IX requires, among other things, that any information and discoveries made in outer space that could possibly create public health concerns, especially due to "contamination from extraterrestrial matter." Perhaps most interestingly, Article IX also allows states to request consultation in the event they believe another SPTs actions would cause harm to either the Earth or other outer space activities.

According to Ogunbanwo (1972) the last notion of consultation based on harmful actions, is also the most contentious part of Article IX. First and foremost, this clause does seem to create an awareness that as launches become more commonplace moving into the future, any new launch could potentially interfere with previously

occurring space activities. This clause presages the notion of space junk and orbital debris that has accumulated in the half-century or more since the launch of Sputnik. The treaty as a whole, and Article IX in particular, is predicated on the notion that SPTs should work together in outer space activities, especially in coordinating missions for the safety of both astronauts and the general public.

While the idea of working together to keep astronauts and the general public safe during outer space activities is not a radical idea, a problem does arise when focus shifts toward the idea of consultation between SPTs. The treaty itself does not provide any method for consultation, nor does it establish any institution to evaluate any potential experiments for possible harm. OST 1967 lays the legal foundations for institutions governing space exploration, but does little in the way of creating the more tangible aspects of institutions. While some SPTs have suggested using the Committee on Space Research of the International Council of Scientific Unions' Consultative Group on Potentially Harmful effects of space experiments,[6] little has been done by way of actually setting up an institution to deal with these issues. Ogunbanwo (p108) notes that this issue will be of interest to future researchers and policy makers in the field of space law. It should be noted that eventually a framework for a brick and mortar physical institution, in the guise of the UN Office of Outer Space Affairs (UNOOSA), was established, but the original language of OST 1967 does not have much to say on how these consultations and oversight should take place. A further exploration of UNOOSA, and other physical institutions that govern and regulate spaceflight will follow in the next chapter.

[6] henceforth referred to as COSPAR

One other article is highly relevant to the exchange of information between SPTs Article XI reads as follows:

> In order to promote international co-operation in the peaceful exploration and use of outer space, States Parties to the Treaty conducting activities in outer space, including the moon and other celestial bodies, agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities. On receiving the said information, the Secretary-General of the United Nations should be prepared to disseminate it immediately and effectively.

This article furthers the principles of scientific discovery that permeate the entirety of OST 1967, requiring any results of outer space activities to be disclosed not only to other SPTs, but also to the Secretary-General of the UN and the "international scientific community." Like many of the preceding articles, while the sentiment may be for the free flow of information, the method by which this information flow takes place is not elucidated. OST 1967 does not establish a protocol or institution through which to provide notification and results. Nor does it provide for any way to verify that the data being disclosed is valid data. Yet this sharing of information is specifically an obligation, which legally speaking lies in the murky area between being purely voluntary and mandatory (Ogunbanwo : p. 115). So the actual degree to which SPTs are required to report their findings, and where they should report them, remains up for debate.

Rescue and Return

Building on the principles of safety and cooperation already elucidated in OST 1967, especially the notion of "for all mankind," the treaty takes great care to establish rules for the rescue and safe return of astronauts should they become stranded in space or land outside the territories of the launching nation. OST 1967 itself only

spends the barest of time establishing rules for rescue and return in Article V, which reads as follows:

> States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle.
> In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other States Parties.
> States Parties to the Treaty shall immediately inform the other States Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the moon and other celestial bodies, which could constitute a danger to the life or health of astronauts.

This article focuses primarily on safety issues, and is comprised of three distinct parts. First is the notion that all SPTs should regard astronauts as “Envoys of Mankind.” The new legal fiction of such an envoy raised many questions among those states that were parties to the treaty but not space powers themselves. Most notable was the objection by Austria that if astronauts were to be envoys of all mankind, then should not non-space powers have a say in what these astronauts should be doing (Ogunbanwo: p125). Perhaps the most telling response to this objection came from Argentina, another non-space power which stated that this term had no actual definition, something that seems to be supported by other drafters of the treaty. This interpretation does not, however, have much bearing on the notion that SPTs should help astronauts in need. A distinct obligation is placed on all SPTs to render assistance in the event that astronauts require rescue or help. This obligation is placed on all SPTs, as it refers specifically to accident, distress, or emergency landing in the territory of the non-launching country or

on the high seas. This paragraph is fairly limited in scope, but still has a much larger audience than subsequent paragraphs.

The next paragraph in Article V has a much more limited scope than the first paragraph, but a scope which is much more high-minded and idealistic, while still having safety concerns for astronauts as paramount. This paragraph is aimed squarely at states that have the capacity to put astronauts into space. At the time of drafting, this audience consisted solely of the United States and the USSR. While the audience of this paragraph is rather limited, the implications are rather large. Simply stated, astronauts should help other astronauts in carrying out their missions. This simple principle, however, has great bearing on geopolitics. As the United States and the USSR were the only space powers at the time capable of putting astronauts into space, as well as the world's only superpowers who were locked in a cold war, this paragraph could have essentially remained ignored. Yet this was not the case. This paragraph was used to foster fairly amicable relations between the space programs of the United States and the Soviet Union, including many reciprocal agreements and several joint missions, namely the Apollo-Soyuz Test Project (Ezell and Ezell, 2010).

The final paragraph of Article V has already been discussed in the previous section on notification and registration. This paragraph deals with notification of any discovery that may be harmful to astronauts. As was previously noted, the manner in which this disclosure is to take place, and the framework to assist in this disclosure is not established by OST 1967, and though the treaty states that such disclosure should take place immediately, this is still rather legally ambiguous. Yet the overall sentiment and meaning of the treaty remains, all activity in space should be done for the common

good of all mankind, and great care and attention should be paid both to the public and to astronauts specifically.

Other Articles

The other articles in the treaty are of much less importance to the overall legal structures governing outer space. They are more concerned with the diplomatic business of concluding a treaty, from the signature process through amendment procedures. Article XIV delineates the procedures for ratifying and signing the treaty. Article XV allows for amendment. Article XVI also makes it possible for any SPT to withdraw from the treaty, given one year's written notice. Article XVII states that the official languages for this treaty are English, French, Russian, Spanish and Mandarin. What should be noted is that no procedure for the settlement of disputes is formally put into place, though both the United States and the Soviet Union had such provisions in their proposed drafts. No agreement was ever reached on this subject.

While this concludes the discussion of OST 1967, there do exist several subsequent treaties that delve into some of the aspects already covered in OST 1967. The subsequent treaties are the Rescue Agreement of 1968, the Liability Treaty of 1972, the Registration Convention of 1975, and the Moon Treaty of 1979. It should be noted that the Moon Treaty is considered a failed treaty, having only been signed by four states, even though two of those states are the United States and the Soviet Union. The remainder of this chapter shall take a very brief look at the modifications to the legal body created by OST 1967 as created by these subsequent treaties.

The Rescue Agreement of 1968

While OST 1967 was under negotiation, the first treaty that would modify international space law was already under negotiation as well. *The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Space of 1968*, hereafter referred to as the Rescue Agreement, seeks to address the more humanitarian concerns of space travel, namely the bodily safety of astronauts who might find themselves in danger. While this agreement was adopted by the General Assembly, the major negotiating partners were practically limited to the only countries that could successfully put men into space, the United States and the Soviet Union. This new treaty did not serve as a great overhaul to the rules of conduct as laid out by OST 1967, but instead serves to clarify and elucidate some of the issues of astronaut rescue which remain occluded by the text of the previous treaty.

The first four articles of the Rescue Agreement deal directly with astronaut safety, both from the standpoint of launching nations and other SPTs. Article 1 creates an obligation of any SPT to notify the launching authority and the Secretary-General of the UN in the event of discovery of astronauts in distress, be they in space, on land, or in the oceans. This article also expands beyond the simple language of astronaut to include all personnel of the craft, meaning other persons on board a spacecraft. Article 2 places an obligation for all SPTs to promptly attempt to rescue and recover any astronauts who might land in their sovereign territory. A burden to assist in such a rescue is placed on the launching authority as well. This particular article received the most attention during the ratification process, as there were fears among potential signatories that this article would allow personnel from the launching nation to freely

enter any sovereign territory. The article as adopted makes allowances that the contracting Party, namely the party that is conducting the search and not the launching state, is responsible for the search. This position allows for states to call in the assistance of the launching party as necessary, but still allows for sovereign territorial integrity.

Article 3 deals with landings of astronauts on the high seas. In much the same way that SPTs that have spacecraft land in their territories must render assistance in rescuing the Astronauts, those nations closest to the landing site must render assistance in rescuing and recovering astronauts who land on the high seas. These SPTs must also keep the launching authority and the Secretary-General of the UN informed of their actions and next steps in recovery. Article 4 states that astronauts who land off course should be promptly returned to the launching authority. This article provides for a speedy return so that any recovered astronauts do not have to worry about becoming prisoners of the rescuing state.

The final amendment of any real consequence to international space law is Article 5, which shifts the focus from the astronauts themselves to spacecrafts and their components more generally. This article follows the same requirements as Articles 1-3, merely applying that logic to physical objects as opposed to people. The fourth paragraph of Article 5 removes any requirement to recover and return space objects or crafts if those objects are of a “hazardous or deleterious nature.” If those objects would cause harm, then any duty to deal with said objects is removed from that state and placed fully upon the launching authority. Paragraph 5 of Article 5 requires costs incurred in recovery of off-target spacecraft or components to be reimbursed by the

launching authority. This point is meant to help compensate those states less capable of conducting a recovery operation (read developing nations).

While the remainder of the Articles of the Rescue Agreement deal with standard treaty operations, two points should be noted. Article 6 sets out to define Launching Authority, and does so as the states or inter-governmental agency that is responsible for a space launch. It is interesting to note that private parties do not enter into the logic applied by this treaty, one of the many problems with international space law that will be further explored in chapter 6. Secondly, Article 7 paragraph 1 applies this treaty to "All States," be they recognized by the United Nations or not. This clause creates a unique circumstance that could lead to non-UN members being party to a UN treaty. It should be noted that later negotiation made clear that SPTs could operate within the framework of the Rescue Agreement and still not recognize other signatories.

The Liability Convention

The question of liability for damage caused by space objects remains unsettled by OST 1967, but was quickly addressed in subsequent treaties, namely the *Convention on International Liability for Damage Caused by Space Objects of 1972,* hereafter referred to as the Liability Convention. The Liability Convention is perhaps the most complex piece of international space law yet crafted, and is most certainly the most detailed of the five major UN treaties on outer space issues. It is also the most legalistic in form and function, as the subject of this treaty, liability, is perhaps the focus of the majority of lawyers, be they concerned with space or more terrestrial matters. In its twenty-eight articles, the groundwork for the establishment of international liability for damage caused by space objects is detailed in such a manner as is consonant with

OST 1967, placing the burden of liability on the launching state. As is stated by Article II, absolute liability for damage on the surface of the earth or to aircraft lies solely on the launching state. Article VII limits claims of liability only to inter-state interactions, and only when foreign nationals are not invited participants in the space activity. National law or bilateral agreements will cover those cases.

The majority of this treaty deals instead with issues of in-space damages, possibly being related to crashes between craft in outer space. In these cases, Article III makes clear that only states that are proven to be at fault are to be given liability. Article IX states that liability claims must be made through regular diplomatic channels, and in the event that no diplomatic ties exist, another state may pass the claim instead, and such claims will be considered fully legal. Article XIV establishes a one-year statue of limitations on liability claims. If after that one-year period passes and no action is taken by the launching state to address the claim, then the claim can be brought to a Claims Commission as established in Articles XV through XX. The Claims Commission maintains responsiblity for assessing liability in these cases and meting out penalties as necessary.

One final note about this treaty should be stated, namely that while the focus is primarily on state agents, either as claimants or as the launching state, there is an explicit role for intergovernmental launches. International intergovernmental launching groups can be given full liability for launches according to Article XXII, with the various member states sharing liability. This feature of international space law is fairly consistent with OST 1967, especially with regard to the focus on states being the primary actors, even within international organizations. While it is clear that the focus of

the verbiage surrounding international intergovernmental organizations is primarily on the European Space Agency, there does appear to be a broad applicability for this approach. Yet one of the major flaws of this approach becomes apparent upon examination of recent developments in the field of space exploration. As international non-governmental organizations, namely multinational corporations such as SpaceX, Orbital, RSC Energia, and Untied Launch Alliance, become major players in space exploration taking over larger percentages of launches. the question of liability must be reopened. As the law stands currently, liability can only be assigned and designated through states. This flaw is one of the most damning for the current international legal regime on outer space and is representative of many of the other flaws that can be found, and which shall be addressed in Chapter 5.

The Registration Convention

Addressing one of the neglected mandates of OST 1967, *the Convention on Registration of Objects Launched into Outer Space of 1975*, henceforth referred to as the Registration Convention, is actually the shortest and simplest pieces of international space law. Standing at a mere 13 articles, of which the last 8 deal with the end matters of enacting the treaty and the first merely sets up definitions in exactly the same way as in the Liability Convention, only 4 articles actually deal with the details of establishing a regime of space object registration. Perhaps the most relevant of the various articles in this treaty is Article II, which establishes the duty for launching states (defined similarly in the Liability Treaty) to register the objects that they launch into space. They must then report their registry to the Secretary-General of the United Nations.

Article III mandates that the Secretary-General of the United Nations must establish a Register of space objects to coordinate and collate the data from the various national registries. This new registry, in turn, must be fully open to access by all. Article III goes the furthest of any of the outer space treaties in explicitly creating an institution following the reasoning of liberal international relations theorists as appropriate for creating institutions. This treaty has the explicit purpose of sharing information to reduce costs. Article IV details what information must be shared in the registry for space objects, which includes the following:

> Name of launching State or States; an appropriate designator of the space object or its registration number; date and territory or location of launch; basic orbital parameters, including: nodal period; inclination; apogee; perigee; general function of the space object.

With this information, it should become possible to reduce the likelihood of collisions in outer space between objects launched into similar orbits. Article VI deals with registration regarding liability claims. Much like all of the other international space law treaties, Article VII places a particular focus on international intergovernmental organizations conducting space activities for registration while neglecting even the possibility of non-governmental organizations participating in launching space objects. The final five articles, as previously mentioned, deal with treaty signing and ratification processes for the treaty and follow an almost identical pattern as the other space treaties. All told, the Registration Convention furthers the general shape of international space law, while creating a mandate for registration, something that was left somewhat unsettled by OST 1967

The Moon Agreement

The final treaty that comprises international space law, the *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* of 1979, hereby referred to as the Moon Treaty, is an attempt to clear up many of the previous problems that have existed with international space law. Yet even as the Moon Treaty attempts to fill in some of the gaps and deal with the contradictions in previous international space law, it is not typically considered to be a successful treaty, as it has not been ratified by the majority of SPTs for OST 1967. Among those states that have not ratified the Moon Treaty are all states currently capable of placing a man in space, much less onto another celestial body. While OST 1967 was written prior to any state landing on the moon, once the reality of states actually traveling to the moon was established, newer, clearer rules had to be established. It should be noted that the negotiation process for this treaty was very contentious, with battle lines being drawn with the space powers, including Cold War adversaries, on one side, and developing countries, on the other.

The primary concern during negotiations for this treaty was addressing the problems of material exploitation of celestial bodies, specifically Earth's moon. To undertake this problem, a shift in language was required. While previously outer space and all celestial bodies were considered to be held as the Scientific Commons for all mankind, (OST 1967), the Moon Treaty adopts a new set of language to describe man's relationship with outer space and celestial bodies. The newly modified regime places outer space in the same realm as the ocean's floor by moving to a new category of classification, namely the Common Heritage of Mankind, henceforth abbreviated as CHM. This new approach, while only slightly changing man's relationship to outer

space, does allow for the exploitation of natural resources on the moon and other celestial bodies (Christol, 1982). It should be noted at this point that the general international consensus is that this treaty, in its references to the moon and celestial bodies, applies to our solar system only. This scale is much more limited than the previous treaties, and it is perhaps this deliberate limitation that allows for a shift to possible exploitation.

In Article 11, the relevant article that shifts the language to CHM, there is a legal requirement to establish an international regime to manage the exploitation that is expected to occur in the future. During the negotiations for this agreement it was realized that the technical capability required to exploit the natural resources that exist in our solar system, so the necessity of establishing an institution or regime to govern and fairly administer the exploitation of said resources was not particularly pressing. This maneuver effectively tabled the tricky negotiation that would be required to establish an international regime governing non-terrestrial natural resources, delaying decision-making to a time when this exploitation would be technically feasible.

Article 11 is the major shift in space law that comes from the Moon Agreement, while the remainder of the Agreement follows very closely to the format as laid out by OST 1967. This particular agreement as a whole, while adopted without vote by the General Assembly, is considered to be a failed treaty. Unlike the other four treaties that comprise the international space law regime, this treaty was adopted and ratified by only a handful of countries. No country with space flight capability has signed on to this treaty, rendering it effectively moot. The evolved understanding of space as exploitable

remains un-adopted by the international community, especially by those who would potentially be doing the exploitation.

Conclusions

At this point several observations about the International Space Law regime can be made. First, the regime that was created was very much a product of the cultural and political forces of the day. In the middle of the Cold War, when relationships between the Soviet Bloc and the Western countries were tenuous at the best of times, any piece of far reaching legislation at the international level would require a great deal of compromise. It is particularly treacherous when the only actors capable of accessing space were embroiled in a cold war. This balancing act between the goals of the United States and the USSR led to the creation of a legal regime that ends up serving almost no one's real interests.

Secondly, the regime of international space law reflects the general trends of decolonization inasmuch as the regimes are cognizant of the impact declaring ownership of space might have on non-spaceflight capable nations. Great care is given to ensure that the benefits of spaceflight were to be reaped by all mankind, not only those nations that were capable of launching in to space on their own.

Thirdly, the regime of international space law is not particularly forward-looking with regard to the technical advancement that would be possible in the realm of spaceflight. Specific gaps were left on the question of exploitation of space due to technical inability, and little work has been done to address these legal gaps. There is also a particular bias towards the nation-state as the entity that would conduct spaceflight. This situation leaves out advancement in technology to the degree that

private spaceflight operators might not only be possible, but also commonplace to the degree that they could be considered to be the leaders in spaceflight, as is arguably the case today, and described in chapter five.

Finally, and on a more positive note, the vast majority of the international community has chosen to adopt the legal regime as proposed by COPUOS in OST 1967 and the subsequent treaties. For all the various faults of the legal regime, it is generally considered to be a successful regime, one that is capable of mitigating potential disasters of the sole superpowers competing over the boundless frontier of space. The solutions arrived upon in the realm of space weaponization and militarization are rather exemplary and represent one of the first major steps taken in diffusing the tensions and scope of conflict during the Cold War. While the Moon Agreement is considered to be failed, the remaining treaties create at minimum a workable base from which state can cooperate in spaceflight and exploration.

Overall, the International Space Law regime is a rather flawed creature that leaves much to be desired and much to still be negotiated, especially on the front of a regime to oversee the exploitation of the resources in our solar system. The tensions of the Cold War, between avoiding conflict between two superpowers and newly independent states asserting themselves played out to create institutions that have highly uneven results. While militarization of space is well handled, as the primary actors with significant power were able to negotiate these clauses well, the question of resource allocation remains unresolved. Newly independent states were able to constrain technologically infeasible actions by western powers and assert their positions in the international system through relatively costless legislation at the time. Also, in

practice, the laws and treaties as written have little practical effect on the everyday governance of outer space. The disconnect between the International Space Law regime and the day-to-day institutional governance of space will be explored further in the next chapter.

CHAPTER 4: THE (IM)PRACTICAL INSTITUIONAL GOVERNANCE OF SPACE

"Us with our busy, busy little lives, finding no better way to pass our years than in competitive disdain" – Iain M Banks- Consider Phlebas

This chapter serves as the second part of the three-part case study on outer space. The primary concern in this chapter is the horizontal integration between international institutions to create a functional regime for the governance of technology. As the previous chapter showed, there exists a high degree of dysfunction in the governance of space exploration. This chapter will reveal how a series of seemingly disparate institutions work together to create a functional governance regime for outer space.

The rules and legal institutions crafted to govern often bear little resemblance to the real world conditions and actions undertaken to govern. This situation has been often borne out in the governance of men and nations, and the same also holds true for technology. The practical, day-to-day governance of outer space resembles this disconnected situation quite nicely. While the previous chapter outlined the contours of the international space law regime, this chapter will explore the real world governance of outer space exploration and exploitation. The almost ad hoc hodge-podge of brick and mortar institutions that seek to practically govern outer space as described in Miles (1971) represent a series of intercommunicating institutions and agencies that should theoretically be coordinated by a central institution. Yet in practice this institutional arrangement experiences a high degree of variation in efficacy and efficiency. This chapter will attempt to make sense of this web of institutions that governs outer space by examining the role played by each institution as well as the effectiveness of the institutions together in governing space.

The individual international institutions that constitute the overall international space governance regime are as follows. The central coordinating agency is the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS[7]), which is responsible to the United Nations General Assembly. Three major institutions which play large roles in governing space, and which should cooperate with each other and with COPUOS are the International Telecommunications Union (ITU), the World Meteorological Organization (WMO),the International Telecommunications Satellite Organization (INTELSAT[8]), and the Committee on Space Research (COSPAR), a subcommittee of the International Council of Scientific Unions. Some other minor institutions will also be examined, only briefly covered, as they play very small roles in the practical governance of outer space.

These institutions can be placed into two broad categories, those institutions that are primarily political in nature and those that are scientific in nature. The political institutions, in this case COPUOS, INTELSAT, and the ITU, deal directly with practical governance efforts for outer space activities. The scientific institutions, namely COSPAR and the WMO, exist to provide scientific advice and input to the political institutions, but also play a role in the actual governance of scientific activity in outer space. This chapter will examine the interplay between these different institutional

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[7] COPUOS is, as this chapter will bear out, the UN committee responsible for the oversight of outer space, as well as a sub-group of a larger office that was created to oversee all matters of outer space from an international perspective. This larger group, the UN Office of Outer Space Affairs, is a rather interesting case in and of itself. However, for the purpose of this work, the major focus will remain on COPUOS, with only slight mention of UNOOSA.

[8] Until 2001. After 2001 INTELSAT becomes a privatized corporation known as INTELSAT, S.A. This chapter will deal with the international organization INTELSAT. Further discussion of the shift to a private space entity will be carried out in chapter 5.

types, exposing the many of the gaps and overlaps in governance mandates that have emerged from this patchwork approach to the practical governance of outer space.

It should be noted that while a wide variety of institutions have some claim on the practical governance of outer space, they primarily exist within the framework of the United Nations generally and UNESCO more specifically. This chapter will examine the individual institutional structures of each of these governing groups, focusing on the efficacy of each institution in both fulfilling their mandate and maintaining relevance as an institution within the larger patchwork of international institutions governing outer space. Finally, it should be noted that special consideration shall be given to the examination of the ITU. This consideration is due to the fact that the ITU, for all intents and purposes, is today the only truly relevant and effective international institution governing the resource allocation in outer space. The reasoning behind this particular efficacy will be explored in the conclusion of this chapter.

COPUOS and oversight of outer space governance

Swiftly after the launch of Sputnik by the Soviet Union in 1958, the international community came to the realization that this action was not merely a scientific milestone for humanity, but also the first in a series of actions that had international political implications. Within the next fifteen months, a further eleven space launches were attempted, of which five were successful. During this period, the international community did not just stand by idly, but instead took the first early steps in the creation of international institutions to govern outer space. The first step in the direction of establishing an international institution came with the 792nd plenary meeting of the United Nations General Assembly in GA Resolution 1348, “Question of the peaceful use

of outer space." This resolution "*Recognizing* the common interest of mankind in outer space and recognizing that it is the common aim that outer space should be used for peaceful purposes only," established an *ad hoc* committee to explore the peaceful use of outer space, comprised of representative from eighteen countries.

The *ad hoc* COPUOS was primarily tasked with furthering cooperation and study of outer space, extending beyond the framework as had been established during the International Geophysical Year.[9] *Ad hoc* COPUOS was also responsible for studying the future organizational arrangements necessary to facilitate international cooperation within the framework of the UN. Finally, the committee was given the job of addressing the legal issues that might arise from programs of space exploration. This final task would turn out to be one of the most important functions undertaken by COPUOS, as has been detailed in the previous chapter.

Within less than a year, based on the preliminary reports of the *ad hoc* COPUOUS, the General Assembly passed GA Resolution 1472 "International co-operation in the peaceful uses of outer space." This resolution formalized COPUOS as a permanent standing committee of the United Nations, with a mandate to foster international cooperation in the study of outer space. COPUOS is tasked with helping to exchange and disseminate information on outer space research as well as fostering national programs of the study of outer space. Finally, COPUOS was given the mandate

[9] The work that had been conducted in space exploration in the 15 month period of furious satellite launching was conducted under the framework of the International Geophysical Year. This 15 month long year of scientific study was meant to act as a catalyst for research in geophysics. Clearly the IGY had the desired effect, but as in most of these issues, the scientists did not fully think through the social and political consequences of their actions. The work of the *ad hoc* COPUOS was necessary to allow for further study of outer space, as well as to deal directly with the political and social implications of man's activities in relationship to outer space.

to study the legal problems that might emerge from the study of outer space. These various mandates serve as a permanent extension of the mandate delivered to the *ad hoc* version of COPUOS. Yet COPUOS was also tasked with the organization of conferences to foster cooperation in space exploration, with consultation and co-operation from the office of the Secretary-General. Reports are also to be delivered by COPUOS at every session of the General Assembly.

COPUOS is largely free to determine the makeup of international institutions governing outer space. This freedom also includes the ability to alter the makeup of COPUOS itself. Two major changes have been ongoing since the very first report from the committee given at the Seventeenth Session of the United Nation General Assembly in 1962. First, COPUOS has seen fit to further subdivide itself into two subcommittees to deal with the two particular mandates that have been rendered to itself. These mandates fit roughly into the scientific and legal categories, and as such the two subcommittees represent those two mandates. The Scientific and Technical subcommittee works to understand the technical and scientific issues that are deemed relevant to space exploration. This subcommittee is responsible for carrying out the mandate of fostering international cooperation in the exploration of space, and serves as a primary advising for technical and scientific considerations for the United Nations on matters of space exploration.

The Legal subcommittee has an obvious, but much more difficult mandate. This subcommittee is tasked with identifying, studying, and addressing the legal issues that might emerge surrounding the study, exploration, and exploitation of outer space. The primary expression of this mandate came in the crafting of the five treaties that

comprise the institutional framework for the governance of outer space. These treaties are detailed in the previous chapter. The committee also provides guidance to COPUOS, the General Assembly of the UN, and those who request it on matters pertaining to outer space. Finally, the legal subcommittee is responsible to overseeing the interaction between the various international legal frameworks that govern outer space, many of which will be further explored within the body of this chapter.

COPUOS was given a specific mandate under the Registration Convention to serve as a clearinghouse for information about registered space objects. This mandate was further endorsed by the General Assembly under GA resolution 1721. COPUOS, acting on behalf of the Secretary-General's office, is to maintain relationships with both national and international governmental and non-governmental space agencies in order to keep abreast of developments in space exploration, as well as to keep a record of objects in outer space. It is then the duty of COPUOS to report back to the Secretary-General and the General Assembly on these activities. This function further ties into OST 1967's mandate to foster communication and the sharing of information regarding space exploration not only between space-faring states, but also to all mankind in general, as laid out in OST 1967 Article XI.

In order to dutifully conduct the mandates given to COPUOS, the committee was, upon its transformation into a permanent standing committee of the United Nations, turned into the Outer Space Affairs Division, under the Department of Political and Security Council Affairs in 1968. Less than 25 years later, the Outer Space Affairs Division was again transformed into the Office of Outer Space Affairs within the Department of Political Affairs, and was relocated to the United Nations office in Vienna.

The Office of Outer Space Affairs (OOSA) is responsible for the day-to-day management and provision of secretarial services for the intergovernmental discussion within COPUOS as well as its various subcommittees. UNOOSA is also now tasked with assisting developing countries in using the technologies of outer space in their development, as well as the provision of information on developments in outer space to Member States of the UN, international organization, and other UN bodies.

While COPUOS, and its supportive organization, UNOOSA, are responsible for the political management of much of outer space activities, when it comes to actual governance of outer space, these organizations do not play nearly as important a role as other international organizations. For much of the actual decision-making that comes to the practical governance of outer space, the International Telecommunications Union plays a much larger role with more actual impact on how activities in outer space are conducted.

The International Telecommunications Union

The very fact that the International Telecommunications Union has the large degree of influence over the governance of outer space activities is somewhat counter-intuitive, but upon further examination of the various issues over which the ITU has dominance, the situation begins to resolve in a much clearer light. This section, while primarily focused on the role that the ITU plays in governing outer space activities, will also seek to examine how the ITU came to play this prominent role. The ITU governs outer space come in two major arenas: 1) the location of satellites and outer space objects in orbit, and 2) the transmissions that these satellites send out. It is interesting to note that one of these powers, namely the governance of orbits, derives from the

original power to govern the transmissions of satellites. This power of governing transmissions is well within the original mandate of the ITU, and is actually the very reason why the ITU was created in 1865. Only later did the ITU become a subsidiary of the United Nations, and it still retains significant autonomy to this day. It should be noted at this point that the ITU is the major institution that will be discussed in both the exploration of the governance of outer space and the internet, and as such serves as an interesting institutional bridge between the two case studies.

The primary impact of the ITU in the governance of space comes from its role as arbiter of satellite and other space objects' orbits. While space is exceedingly large, the areas of practical and exploitable value are much less so. Our technical capabilities thus far have for all intents and purposes kept us locked with the gravity well of our own planet, save for a few dozen deep space probes. The orbits available within the gravity well are rapidly being used up, creating a large space debris problem that is going largely unaddressed. It became clear early on that some organization would need to take responsibility for the governance of these orbits, as is clearly seen in UN Resolution 1721.

Yet while the formal mandate to maintain a registry of outer space objects falls to COPUOS, a more formal and rigorous governance structure would be necessary to keep objects from occupying the same place in the same orbit, which would result in catastrophic failure for both objects. Even more importantly, the most useful orbits, those of the geosynchronous variety, are highly limited, as they can exist only within a very strict range of distance and inclination from the equator. These highly sought after

orbits have been a source of much political maneuvering,[10] especially by the developing nations who exist on the terrestrial areas underneath these orbits. While little success has been achieved in negotiating ownership of orbital space, the task has been taken up by the ITU section on space issues to oversee the distribution of orbital space in a just manner.

The method by which the ITU sets up their governance of orbital space is laid out under the Constitution, Convention and Administrative Regulations of the International Telecommunications Union (Jakhu, 2013). This set of rules and regulations, however, essentially centers on a series of bilateral agreements with the parties involved on radio frequencies and orbital positions. What the rules of the ITU do allow for, however, is that a first-come-first-served policy is in place on any arrangement, and any latecomers do not have to be accommodated by the parties who already occupy the orbital and frequency positions. Yet this situation does not leave out the possibility of dispute, a situation the ITU is more than equipped to handle. The primary source of governance for outer space activities, especially orbital placement, comes from the resolution of disputes, and not through any true procedural action.

The ITU does maintain a database of frequencies and orbits used by space objects, in much the same manner as COPUOS, but when there is a dispute about allocation of space that cannot be resolved by the parties involved the ITU steps in and begins to truly govern outer space, to the degree that outer space is governed. A series of protocols for negotiation of the settlement of disputes is explicitly laid out in Article 41 of the Constitution of the ITU. Yet even these protocols leave the ITU capable of merely

[10] The Bogatota Agreement of 1976. An attempt by those countries located on the equator to claim sovereignty over geosynchronous space.

examining the problem and providing a non-binding recommended outcome. This non-binding outcome is the most enforceable international outcome that can come from any international institution with regard to a dispute concerning outer space. While there exists a predefined procedure for the settlement of disputes over orbits and frequencies, the manner in which this resolution is conducted still appears largely to be *ad hoc* (Roberts, 2000).

This *ad hoc* governance of orbits in outer space, while typical of outer space resource allocation, is seen to be highly inefficient along several dimensions of analysis. First, and perhaps most relevant to the problem of trying to govern outer space, is the high cost of maintaining multiple organizations with similar mandates grows to be quite high. Both COPUOS and the ITU maintain databases of information regarding both orbital usage and signal frequencies. The fact that both are offshoots of the United Nations[11] serves to exacerbate this problem of duplicated services.

The ITU lacks procedural efficiency inasmuch as it does not truly serve to reduce costs in the creation of a regulatory scheme. Because a new set of negotiations must be entered into with each orbit and frequency allocation, no real reduction in costs is gained by having the ITU in charge of regulating the allocation of spatial resources in Earth orbit. In fact a strong argument can be made that the ITU does not truly exist as a regulatory agency *vis-a-vis* resource allocation in outer space, but is instead an arbitration agent for instances of agreement breakdown. No quick process for this arbitration exists, and even the guidelines in place only work when the participant in

[11] While the ITU does predate the United Nations in creation, it has since come under the fold of the UN, and is considered to be a UN body, even though membership in the ITU is separate from UN membership.

negotiations agree to stick to the outcome. The ITU has no legal recourse to enforce its settlements, and can merely give non-binding suggestions for outcomes. This situation leads to a highly inefficient regulatory structure for resources in outer space. Yet at the same time this institution is the most effective and has the largest impact of any institution that attempts to regulate and govern activities in outer space. At this point it appears that the practical, everyday governance of outer space can be best described as ramshackle. Perhaps in examining the remaining organizations, a clearer picture of the state of affairs of the governance of outer space will emerge, and some conclusions about effective regulation can be reached.

INTELSAT

One of the earliest non-scientific uses for outer space, especially near Earth orbit, was for the purpose of allowing humanity to communicate in a faster and more direct fashion. This new use, the telecommunication satellite, was originally proposed in 1945 by famed science fiction author Arthur C Clarke in *Extra-Terrestrial Relays – Can Rocket Stations Give Worldwide Radio Coverage?* (Clarke 1945). In order to make this vision a reality, distinct and directed work needed to occur to create and place the geosynchronous telecommunication satellites into orbit. For the administration of this network of satellites, a new institution was required.

The International Telecommunications Satellite Organization was formed in 1964, and was able to place the first telecommunications satellite in geosynchronous orbit over the Atlantic Ocean on April 6, 1965. From that point on, INTELSAT, as the organization would come to be known, would become the chief administrator of international telecommunications satellites, an increasingly important backbone for

international communication. Beyond its importance for governing and administering international telecommunications satellites, INTELSAT is also of interest due to its own organizational history. INTELSAT, while originally created as an international inter-governmental organization, has since evolved into a commercial but public entity, finally ending up as a publicly traded private corporation.

It is also important to note that a new IGO was created to oversee and guarantee that INTELSAT provides “public telecommunication services on a non-discriminatory basis” (ITSO website). The IGO, called the International Telecommunications Satellite Organization, or ITSO, is a vestigial offshoot from INTELSAT becoming a private corporation, in order to oversee public interests. This institutional evolution somewhat mirrors the overall governance of outer space, especially in the transfer from a large governmental agency to being more of a private, profit driven entity. More on this evolution will be discussed in the next chapter.

In its original incarnation, INTELSAT existed as an international intergovernmental organization designed to foster an international telecommunications system backboned on geosynchronous telecommunication satellites. This international organization was successful in creating the backbone system of the current international telecommunications regime with a relatively short period and has had a great deal of success in maintaining this system. Yet as an international organization responsible for administering some facet of mankind’s activities in outer space, INTELSAT can be considered much less successful. The primary interest of INTELSAT had always been focused on the commercial side of establishing a satellite network (GAO 2005). The original signatories for each member state were primarily telecommunications

companies, typically part of a public-private partnership,[12] much like the French signatory, France Telecom. This initial practical monopoly was necessary to jumpstart the commercial satellite industry, and allowed for a great deal of public investment in this international infrastructure project. Yet within a matter of two decades, the private aerospace industry and communications industries were capable of producing similar or better satellites than the international consortium of INTELSAT. This sea change in private technological capabilities prompted the major private players to lobby for INTELSAT to be made into a private entity that would be required to compete in the market for international telecommunications satellites. The ORBIT[13] act of 2000 was passed in the United States and prompted the intergovernmental organization INTELSAT to become a fully privatized entity. By 2005 the transition from IGO to private entity was completed, and the de facto monopoly that was held by INTELSAT on the global telecommunications satellite market was heavily eroded. Furthermore, by 2013 INTELSAT had become a publicly traded company (NYSE : I) now responsible not only to a board of directors, but also to its shareholders. A more in-depth analysis of this institutional change will be presented in chapter 5.

While this shift of INTELSAT from an IGO to a public traded company is rather indicative of the overall shift in the way mankind practically handles its affairs in outer space, it also shows the erosion and unstable nature of the governance of outer space. With no single major entity having legal jurisdiction over matters in outer space, when mankind conducts activities beyond the boundaries of Earth's atmosphere, only a

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12 And in the case of the United States, the primary actor in INTELSAT upon creation, the signatory power was vested in Comsat Corporation, a newly created private entity designed for commercial communications satellites.

13 Open-Market Reorganization for the Betterment of Telecommunications Act

patchwork of less-than-functional organizations exists to govern these activities. INTELSAT was created with a specific mandate to create an international telecommunications satellite network, and greatly succeeded in this goal. However, along the way, due to the de facto monopoly on the creation and launching of these satellites, INTELSAT became one of the major governing and enforcement institutions in outer space, especially in the realm of telecommunications and the placement of satellites in geosynchronous orbit. The transition away from being an IGO and towards being a private entity, this has not only opened up the market for telecommunication satellites, but has also caused the loss of de facto governance of an important area of mankind's activities in outer space. The duties that were once covered by INTELSAT have since transitioned over to the ITU, which as previously discussed is not truly equipped organizationally to handle the governance of near-earth orbit.

COSPAR

In 1958 the International Council for Science created the Committee on Space Research (henceforth referred to as COSPAR) to foster the exploration of outer space from a scientific perspective at an international level. This forum was to discuss the findings and challenges of space research within an open international community (ICSU 1998). Undertaking one of the major functions necessary for the exploration of space as laid out by OST 1967, COSPAR has been a highly important institution for the governance of mankind's activities in outer space. Yet COSPAR's role is limited to a relatively narrow area of activities. As is fitting of its name, COSPAR is solely concerned with the scientific research that takes place in outer space, but within this realm of scientific research COSPAR serves as a governor par excellence, as the vast majority

of participants in COSPAR are willing to share and coordinate activities of scientific research.

In the earliest days of space exploration, the primary focus of space launches was learning how to operate in outer space. While a large degree of competition between the primary space-faring countries was predicated on Cold War geopolitical dynamics, a great deal of cooperation was possible based on the interest of both the United States and the Soviet Union in furthering man's scientific knowledge of outer space. This cooperation led to the formation of COSPAR in 1958, less than one whole year after the launch of the first artificial satellite, and was further enshrined in OST 1967. In what is a bit of a chicken-and-egg dilemma, COSPAR began to govern the scientific aspects of outer space exploration even before the law on outer space was written, and continued to be the primary scientific body responsible for coordinating and governing man’s efforts in outer space. And in a mirror image to INTELSAT, the primary members of COSPAR are not the states themselves, but subsidiary organizations within the various signatory states.

While in the case of pre-privatization INTELSAT the signatories were primarily telecommunications companies, that were generally state owned, the primary signatories to COSPAR are national science organizations and international science unions. This situation removes a great deal of politicking at the international level and allows for the focus to remain on matters of scientific importance. The institutional structure of COSPAR also plays a role in reducing conflict and increasing the level of scientific cooperation in regards to space exploration. COSPAR, based on its most recent charter, signed in 1998, has a structure that should be relatively familiar to all

academics, as COSPAR has become focused on the academic and research side of governing space exploration, with biennial conferences as the chief governmental meeting.

COSPAR is governed by a council made up of members from the various member scientific bodies. This council then selects through a nomination committee the Bureau, which oversees the day-to-day functioning of COSPAR, with the assistance of the secretariat. The primary function of this Bureau is to provide oversight of the various committees, ranging from publication, to finance, awards and programming. The major caucus for this organization occurs on a biennial basis, in locations that rotate around the world. Perhaps the most important group within COSPAR, from a governmental perspective, is the Scientific Commission. The Scientific Commission has seven particular responsibilities, most of which align with the governance and coordination of scientific activity in outer space. According to the 1979 and 1980 COSPAR Plenary the responsibilities for COSPAR's Scientific Commission are as follows:

1. To discuss, formulate and coordinate internationally cooperative experimental investigations in space;
2. To encourage interactions between experimenters and theoreticians, in order to maximize space science results, especially interpretation arising out of analyses of the observations;
3. To stimulate and coordinate the exchange of scientific results;
4. To plan symposia and topical meetings for discussion of the results of space research, with an appropriate mixture of review and contributed papers;
5. To carry out these tasks in the closest possible association with other organizations interested in these and related tasks;
6. To select an editor for the "*Advances in Space Research*" Journal for each symposium and for each topical meeting organized by the Commission;
7. To prepare a statement on recent scientific developments in the area of interest to the Commission for the COSPAR Report to the United Nations.

The first three of these responsibilities align almost directly with articles III, V, VI, IX,XI, and XIII of OST 1967. The remainder of the responsibilities establish the more academic nature of COSPAR and assist in the activities that would support proper research and international scientific cooperation in the exploration of outer space. This direct mandate and the generally collegial nature of the international scientific community has lead to COSPAR being one of the more effective institutions that have some impact on the governance of mankind's activities in outer space.

The World Meteorological Organization

One of the first benefits gained from the exploration of outer space was the ability to examine our own planet from a distance for the first time in human history. In fact, the largest early push for space exploration came as part of the Geophysical Year to focus scientific research on understanding the processes of the Earth. Part of this push came from the World Meteorological Organization (the WMO). From the early days of space exploration, the WMO was concerned with its role in man's interaction with outer space. In 1959, the Board of Directors set up their first working group to explore the possibility of weather satellites, to be launched as early as the next year. (Miles 1980) This discussion led to the eventual creation of the World Weather Watch, an institution that is heavily dependent on international cooperation, and which has been a major success story for this level of cooperation (Landis 1999). While the World Weather Watch (WWW) is a strictly voluntary organization based on individual members cooperating, it has seen a great deal of success in organizing states and activities within its particular niche of outer space activities. It should be noted that the WMO and the WWW are much more strictly focused entities than COSPAR, but this focus has perhaps led to a

greater deal of success in governing an area of mankind's activities in outer space than has been observed from other institutions.

The WWW organizes three major technical programs that operate in outer space and require the cooperation of many different states on Earth. These programs are the Global Observing System, the Global Data-Processing System, and the Global Telecommunication System. Each of these organizations is specifically tasked with one of the various facets of the production of meteorological observations and predictions for the world, be it observation of actual weather conditions, communicating about findings, or processing the findings and generating the predictions. Two of these facets, the Global Observing System and the Global Telecommunication System require direct interface with outer space, with their observation specifically focused on Earth itself. This system requires the coordination and administration of a system of international satellites. While this particular aspect of governing outer space exists within a fairly narrow niche, the effectiveness and success that has been observed in this institution is an example to other groups that purport to govern space. It is a shame that the example of international weather watching and their interactions in outer space does not extend to other areas of outer space governance.

The Delicate Web of International Governance of Mankind's Activities in Outer Space

At this point the nature of the governing institutions of outer space activities should be coalescing to create a picture of a rather incomplete coverage of mankind's actual and potential activities in outer space. Some areas of governance are well covered, specifically scientific activities in outer space, and the results of those activities. COSPAR and the WMO (and its WWW) seem not only to allow for a large

degree of cooperation in outer space activities, but also do an excellent job of preventing overlapping missions. This relationship leads to a much more efficient and beneficial allocation of resources in the scientific exploration of outer space.

When it comes to the actual utilization of outer space outside of scientific pursuits, the governance of outer space activities is not quite as exemplary. The primary utilization of outer space at this point as been the placement of satellites into low earth orbit, something that has been governed in a somewhat *ad hoc* fashion by the International Telecommunications Union. The ITU has created a database of orbital locations and transmission frequencies for artificial satellites for use in their placement into outer space. Yet the ITU does not have real international legal authority to administer this aspect of outer space, but instead has taken on this role as an extension of its mandate to coordinate the use of airwaves terrestrially. Concerning the most useful orbits, the geosynchronous orbits, the de facto governance came from an ersatz monopoly held by INTELSAT, but which has eroded and disappeared due to the privatization of INTELSAT. This situation has lead the ITU to take up the slack and expand its role in the practical governance of the placement of satellites within Earth's gravity well.

For exploitation of resources other than transmission bands and orbital placements within the gravity well, the governance situation is even thinner than that of low earth orbit placements. In reference to Article 11, section 7 of the Moon Treaty of 1980, the international regime for the governance of the exploitation of minerals and materials in outer space should be established once technology has reached the point where exploitation is possible. This technological situation has been in place for at least

the last decade, and even though the actual exploitation has not begun the institution to govern this exploitation has not been created.

The absence of this international regime creates many problems that will need to be addressed in the coming years. First and foremost is the actual legality of exploiting celestial bodies, as defined in OST 1967. Second is the question of ownership of any profits derived from the exploitation of celestial bodies. While the general property rights regime in outer space could be classified as a scientific commons based regime, it is apparent that all parties agree that some degree of exploitation is allowed. But in allowing some exploitation, the idea of the scientific commons becomes undermined. Without an institutional framework in place to make decisions about the exploitation of outer space resources, when companies[14] and other entities begin to exploit outer space, the legal situation will remain ambiguous and will potentially stifle future advancements in outer space activities. Finally, there is a question of what role private entities play in outer space activities. The institutions that have been established deal with space exploration and exploitation as a state endeavor. The realm of outer space activities has not been the sole provenance of national space agencies for several decades now, and even manned space exploration is on the cusp of being conducted by private entities.[15] The lack of an institution to deal with these private space companies, outside of the international oversight committee of INTELSAT, creates a

[14] Namely Planetary Resources Inc.

[15] Both SpaceX and ULA have planned manned launches to the International Space Station in 2017, taking over the role of ISS resupply from NASA. This also makes private entities the fourth member of the manned space club, behind Russia, The United States, and China. SpaceX is also set to unveil plans for manned missions to Mars, outside of national space authorities for the coming decades.

real dilemma for the future, especially with regard to potential utilization and permanent occupation of celestial bodies.

While the international community has done an admirable job of creating or modifying institutions to govern some areas of space exploration, other areas have been left woefully unaddressed. The ITU has been a useful stopgap institution for the first half-century of mankind's use of outer space, when unmanned satellites have expanded both the knowledge and interconnectedness of man, and when manned nation missions have laid the intellectual groundwork for future exploitation of outer space. However, moving forward into an era of privatized exploitation and exploration of outer space, the institutions that exist will be taxed beyond their own capabilities. With the failure, for good or ill, of the Moon Treaty a distinct international legal framework for the exploitation of outer space has been left without much guidance. From an institutional perspective on the same issue, this deficit of both legal and regulatory institutions has left open the question of the legality of exploiting outer space and celestial bodies. As has been recently witnessed, national regulatory bodies, especially the United States' Federal Aviation Administration, have begun to fill this regulatory void. Balancing the potential benefits from exploiting outer space with the legal requirements from the treaties on outer space that have been ratified and upheld will present many problems moving forward, problems that could be alleviated with the creation of international regulatory bodies.[16]

[16] A potential solution to this problem could also be to adjust the role of an already extant international institution to govern commerce and activities in outer space. The final chapter of this work will expand on this idea in two ways: 1) expanding the UN Office of Outer Space Affairs into a true regulatory and coordination agency as seems

The question of the impact of private space activities on the legal and institutional frameworks of outer space will be the focus of the next chapter of the volume. But for now it would be safe to say that the regulatory institutional framework for activities in outer space other than purely scientific endeavors is deeply flawed and in need of revision. Without a quick and thoughtful revision of outer space institutions, the world and the entire Sol system could become a new frontier free from law and accountability of actions. Or, conversely the benefits from exploring and exploiting outer space could be dis-incentivized to such a degree that humanity could remain stuck to the surface of our home planet. Either of these extreme outcomes could be forestalled by addressing both the legal and regulatory institutions that have become outdated and underpowered from almost the time of their inception. It appears that having the correct institutions in place can truly play an important role in the success or failure of a new technology.

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to be the initial intent of this agency or 2) shift the regulatory burden for outer space to another agency with actual enforcement powers.

CHAPTER 5: THE COMMERCIALIZATION AND PRIVATIZATION OF SPACE ACTIVITIES- A TALE OF NEOLIBERALISM

"When something is important enough, you do it even if the odds are not in your favor"- Elon Musk

This chapter is the final part of the case study on the governance structure for space exploration. The focus of this chapter will be placed on the attempt to subvert the institutions of space exploration. For this case, the dominant actor is the state, with the non-dominant actor being private interests. Private interests will attempt to change the way that space exploration is governed and conducted in order to support their interests. As the international system underwent a normative and geopolitical shift in the 1980s, the subversion should be observed as successful.

Beginning in the early 1980s, a paradigm shift in the types of activities mankind undertakes in outer space has been underway for over three decades. With the earliest shifts from national to sub-national and private entities as participants in outer space activities, space exploration has since left the realm of a purely national activity and has become something that private and commercial entities could participate in as well. These commercial and private entities have progressed from merely outside players in the system reliant on national space programs to grant access in space to the point where national space programs rely on these private providers to place materials and personnel into space. Additionally, private space entities are developing parallel mission to national space programs, and are attempting to leapfrog the capabilities of national space programs with an eye towards placing humans back on the Moon and on Mars before national or international space programs.

The story of this shift to private and commercial space activities will be the foundation of this chapter, focusing on several important issues. First, the very idea of privatization and commercialization within outer space activities will be explored. A distinct definition of these terms will be proposed with examples being given. Second, an examination of the phenomenon of privatization of space activities will be conducted, with a focus on the Russian Space Agency as a representation of the privatization of a national space program, and on INTELSAT on the privatization of the international institution. Third, an examination of commercial space will be conducted, with a focus on Space Exploration (SpaceX) as the primary commercial entity. This section on commercialization will also examine the role of private incentives in spurring on the commercial space industry, namely the various X-Prizes as a market incentive made to counter the dis-incentivization that has been built into international outer space law. Finally, this chapter will examine the interaction between commercial, private, and national space programs with an eye towards future trends that could potentially create massive governance problems for a potentially wide-open and unexploited arena for human activity.

Privatization

The process of privatization in space exploration has been decades-long and is still undergoing many interesting developments. In order to better understand this process, a functional definition must be developed and agreed upon. Privatization is not a new concept on the world stage, but has only fairly recently become important to the realm of space exploration, although researchers have been examining the question of privatization of space activities since at least the 1980s (Tatsuzawa 1988). The very

nature of the laws and institutions of space exploration has been focused on keeping space accessible, but almost exclusively accessible by a small cadre of national space programs. While space exploration is both highly technical and expensive, leading to the so-called space club to remain a very exclusive group, the laws and institutions of space exploration have served another important role in keeping the club small. Yet recent technological developments have seen a shift in who precisely can join the club, from both a technical and legal perspective. The beginning of this change has occurred with the initial privatization of space activities.

Coined in the 1930s by *The Economist* in reference to the role of Germany's government in economic policy, the concept of privatization is most commonly associated with the actions of Prime Minister Margaret Thatcher's selling off of publicly owned industry in 1980s Great Britain (Bel, 2006). This definition of privatization is highly useful for the current situation and circumstances of space activities. When referring to privatization in the case of space activities, there are two ways to examine this phenomenon. The first is a specific process of transitioning from wholly publicly and governmentally owned entities to privately held entities is the sphere that is being examined. For the time being, this definition shall be termed ownership privatization. While this can take one of several possible routes, from selling off of a portion of shares in a public industry, to the start up of new businesses meant to supplant the former public industry,[17] some particular aspects of privatization must be held in common. First, the entity involved in privatization must begin its life as a governmental organization or publicly (state) owned industrial concern, be it national agency (such as the Soviet

[17] This particular case will be treated as an entirely separate concept, commercialization, as seen below.

Space Agency) or international consortium (INTELSAT). Secondly, a distinct policy decision must be made within the national government or among the international partners that privatization should occur. Finally, the endpoint of this process is an entity with at least a substantial private ownership (be it privately held or publicly traded). The final entity does not have to be entirely private, and can result in a public-private partnership, with either the public or private aspect being dominant.

The second approach to privatization is at the same time simpler and more complex. This second definition can be termed mission privatization. Regardless of ownership of space industries, be they fully publicly owned, public-private partnerships, or fully privatized (using the previous definition of privatization), the entities can shift their goals. If they shift away from merely national provision of space services[18] to providing these services for a fee to either other states or to commercial entities, this shift can be considered to be privatization. This type of privatization stems from a change in mission away from the previously understood scientific endeavours of national space programs towards more commercial goals, hence mission privatization.

Up to this point, the vast majority of space activities have been conducted by either wholly national entities or by privatized industry. There are several important examples of privatized space entities that must be mentioned at this time. Perhaps the most prominent example of a privatized space agency is Roscosmos, the Russian Federal Space Agency, also referred to as FKA or RKA. While RKA exists as a national agency responsible for Russia's activities in space, RSC Energia, itself part of the recently privatized Russian space industry, undertook a large percentage of its space

[18] These services include launches, monitoring, planning, and communication. They can also include the provision of information, mostly remote sensing data.

operations. While the reality is that Roscosmos was mostly informally privatized, it still provides one of the finest examples of privatization of a space agency, indeed, Moscow has recently decreed that the Russian space industry must be re-nationalized following gross mismanagement of the industry and the agency as a whole. The story of privatization of Russian space activities will be further elucidated in a section below, but is a very interesting tale of privatization and re-nationalization through a joint-stock corporation.

In the realm of satellite operation, many privatized entities have emerged in the last three decades. Aside from the international case of INTELSAT, which will also be further examined below, many other national and international satellite entities have emerged. The vast majority of these concerns are related to remote sensing capabilities, and are part of the European Space Agency (ESA) and the Japanese Space Agency (JAXA). The satellites were originally owned and operated by these various national (and in the case of ESA, international) space agencies, yet their day-to-day operations have been turned over to private entities. This trend illustrates privatization in using publicly created goods for private gains.

It is also worth noting that various calls have been made to partially privatize NASA. While it could be readily argued that NASA has been privatized under the second conception of privatization as described above, these calls pertain mostly to the first type of privatization (concerning ownership). Primarily originating with Washington think-tanks with a libertarian orientation, such as CATO and the Reason Foundation, these calls believe that due to the rapidly evolving nature of space exploration, a much less bureaucratic entity would be more suited to planning and operating space exploration

missions (Summers, 2013). Proponents for privatization of NASA also believe that costs of administration and conducting missions would be drastically reduced with privatization, possibly opening up outer space to much wider usage. While full privatization does not seem possible for NASA at this point, another current in space activities, commercialization, has seen significant movement in the last few decades.

Commercialization

The terms privatization and commercialization are often used interchangeably in the context of space exploration. While this might work for the layperson, when trying to understand the processes and effects of the entry of non-governmental entities into the realm of space activities, a clearer definition must be drawn. While the concept of privatization has been explored and defined as a governmental entity becoming at least partially a privately held enterprise, the concept of commercialization must be drawn out as a separate process. Commercialization has been associated traditionally with the idea of bringing a new technology into market for commercial and financial gains (Jolly, 1997). While this definition is not an entirely inaccurate portrayal of the recent occurrences of the last few years in the private space exploration field, it does not fully encapsulate the process of commercialization as it is currently underway.

A better definition of commercialization points to a wholly private entity, using its own equipment, selling its services either to other private concerns or to governments and international agencies. The key difference between the process of privatization and the process of commercialization is the original condition of the business entity. For privatization, the agency must have at one point in its creation been a public governmental agency. For commercialization, the business must begin its life as a

wholly private concern. Also of great importance is the origin of the equipment being utilized by the company. For privatization, the equipment can come from in-house, meaning developed and manufactured by the entity or government agency (as in the case of RKA), or can be sourced from outside the concern (many of the satellite corporations in existence today). For it to be a case of commercialization, the equipment must have been developed in house, and this equipment, and services provided are in conjunction the primary revenue source for the business. The end user must go through the commercial entity to operate and achieve their goals.

Perhaps the most important thing to consider when examining commercialization is that the commercial entity seeks to operate at least to parallel or at best to supplant any national space agency. An important consideration is that the equipment and service can be provided at a higher quality and lower price than any national space agency. Under commercialization we also have the process of a national space agency turning over some operation to the private and commercial entity. While the primary actor to be examined later in the chapter to clear up the question of commercialization is Space Exploration Technologies (SpaceX), many other commercial agencies have provided their service to national and international space agencies. The two other major and operational commercial space entities of note are Bigelow Aerospace[19] and Orbital Sciences.[20] While other commercial space entities exist, these providers operational equipment that has already been successfully deployed.

[19] Bigelow Aerospace does not exist as a launch provider, but instead focuses on the creation of usable habitat space in outer space. They focus on inflatable habitats, both for public (read national and international) and private (tourism and industrial) uses.
[20] Orbital Sciences was the first major non-governmental provider of launch to orbit capability from the United States. Though they have had a large degree of success with

The nascent space-based industrial sector is primarily theoretical at this point in time, but future work should focus on this aspect of the commercialization of space activities.[21] It should be noted that previous space-based industries, primarily of the communication variety, have sought to operate in parallel or supplant national capabilities, but have also seen themselves become service providers for national actors.[22] Also, there exist many so-called space tourism companies, namely Space Adventures and Virgin Galactic. These companies focus on providing tourists with rides into outer space, be they the small sub-orbital hops to be provided by Virgin Galactic or the longer stays by private individuals aboard the International Space Station as arranged by Space Adventures. While these examples provide some interesting cases, especially in infusing private money into public space agencies, these cases are not really relevant to the commercialization process. This work will not examine the role of space tourism, but will instead focus on commercial or scientific activities in outer space.

Now that clear and separate definitions have been created for both privatization and commercialization, the focus of this chapter will shift to a deeper examination of these different processes. The next section will look at two prominent examples of the

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satellite launches, they have begun to lag behind SpaceX in provision of launches to the government (mainly resupply missions to the ISS).

[21] Both Planetary Resources and Deep Space Industries provide interesting cases for future space industry, namely asteroid mining. But at this point in time neither has begun full operation. Planetary Resources has begun launching of satellites to remotely prospect for asteroids containing valuable minerals.

[22] The major example of this type of commercial space industry is the IRIDIUM network as designed and launched by Motorola. This company sought to create a satellite telephone network for the masses, but the primary buyers have been military clients. IRIDIUM has since been spun off from Motorola and is generally considered to be a commercial failure.

privatization process. For a national agency that has been privatized, Roscosmos will serve as the deeper case study. Roscosmos also has the interesting characteristic that it has recently undergone a process of re-nationalization, something that will provide an interesting insight into the process of privatization. As the example for an international organization that has been privatized, we will return to a deeper analysis of INTELSAT, as it transitioned from national, to international, to private, finally ending up as a commercial entity, but a commercial entity that has a designated oversight international organization.

ROSCOSMOS, RSC ENERGIA, and Informal Privatization of Russian Space Activities

With the collapse of the Soviet Union in the aftermath of a failed coup attempt by the Communist Party of the Soviet Union, many of the important state-run activities of the newly reformed Russian Federation found themselves in an institutional lurch. The old Soviet era space industry was not immune to this condition. The activities of the old Soviet Space Program were lumped together and on February 25th, 1992, the new Russian Space Agency was created. Known commonly as Roscosmos, this new institution was from its earliest inception very poorly managed and funded. The first leader of this new institution, Yuri Koptev, was not a bureaucrat with institutional experience, but was instead a designer of Mars landers. The organization itself was not centrally controlled or organized, but instead had various competing design bureaus, all constantly struggling to keep their preferred projects afloat.

While Roscosmos was never formally privatized, a large degree of decision-making and profit seeking was directed by a storied privatized space industry in Russia, the OAO S.P. Korolev Rocket and Space Corporation Energia, or RSC Energia for

short. RSC Energia was itself a product of privatization in the same period as Roscosmos, having been previously known as Scientific-Production Association Energia (NPO Energia). During the Soviet era, NPO Energia had been the primary design and construction contractor for the Soviet Space Program. The role played during the Soviet Era by Energia was so great that there is very little practical separation between Energia and the Soviet Space Program. This special relationship between Energia and the Russian Federal Space Program continued once both were moved out of the Soviet system. But instead of this relationship being one between various government entities with similar interests, the new relationship reflected a much more public-private partnership. With decision-making capability at a minimum within Roscosmos proper, RSC Energia began to play a much larger role in deciding the direction of Russian space activities (Harvey, 2007).

The era of informal privatization of Roscosmos began with the question of continued operation of the Mir space station. With the station reaching the end of its own predicted usable lifespan, but showing signs that it could survive beyond the “use-by date,” a decision had to be made concerning the continued operation of the station by Roscosmos. RKA was at the time in an institutional crisis, with the various competing factions of design bureaus unable to reach any decision on the operation of Mir in the future. It was at this point that the private shareholders board of RSC Energia convened to come to a decision about Mir, as they had been instrumental in the design and construction of the station, as well as its operation. Seeing that the station was sound and that there were good financial and scientific reasons to keep it in orbit, the board of RSC Energia made the decision to continue operations of Mir well past the 1999

operation window. The board of RSC Energia was also instrumental in the Shuttle-Mir program, a program that would lay the groundwork for the creation of the International Space Station, the follow-on project from Mir. RSC Energia also maintained control over the manned space flight aspects of the Russian Space Program, not only handling the launch of Russian astronauts, but also expanding manned launch services to other states and private individuals through a partnership with Space Adventures.

Beyond simply the question of continuing to operate the Mir station, RSC Energia also expanded its role in the other operations of Roscosmos. While Roscosmos began to suffer from management issues, larger problems in Russian society also began to affect the Russian Space Program. From the inception of the Russian Federation until well into the early years of the 2000s, Russia suffered from massive cash flow problems related to the wider privatization of Russian industry. This situation saw Roscosmos privatized in a second informal manner. The mission parameters of Roscosmos expanded beyond simply operating Russian space missions to become the world's largest provider of space launches. On the back of the RSC Energia-designed Soyuz and Proton rockets, Russia executes in a single year almost the same number of launches as the rest of the world combined (SpaceFlightNow, 2015). By switching from strictly the government's route to orbit to becoming the space travel equivalent of UPS, Roscosmos was able to counteract the problem of declining cash flow from the government. Roscosmos continues to supplement its own governmental budget by acting as the world's orbital delivery service. Furthermore, Roscosmos has expanded its orbital delivery offerings, becoming one of the primary operators of the Sea Launch initiative. This expansion into money-earning activities, both commercial and tourism-

based has been crucial in keeping Roscosmos afloat and growing during several periods of turmoil since the creation of the Russian Federation.

Roscosmos has been rather successful during the period of two-pronged privatization, but, as with all things in Russia, the situation is contingent of political activity. With the beginning of Vladimir Putin's third term, a push originating from Roscosmos itself has begun to change the status quo of both Roscosmos and the Russian space industry as a whole (Harvey, 2007). In dealing with the various problems of mismanagement that have come from both the institutional structure and poor leadership of Roscosmos, Vladimir Popovkin, the then head of Roscosmos, called for RKA to be made into a wholly state-owned corporation for a period of five-seven years. Following this period of re-nationalization, RKA should then be turned into a joint-stock company. The argument put forth by Mr. Popovkin is that it would take a period of government direction to correct the systemic mismanagement that has characterized Roscosmos up to this point in time. State ownership would also allow the country to restructure the space industry to remove much of the redundant capacity left over from the Soviet Era (Interfax 2012).

On September 3, 2013, Deputy Prime Minister Dmitry Rogozin announced that the entire space industry in Russia would be nationalized under the United Rocket and Space Corporation or URSC (Messier, 2013). This renationalization plan is slated to consolidate and reorganize the redundant elements of the old Soviet aerospace industry. RSC Energia was also leveraged into this new corporation, less by federal dictate and more by the government purchasing a controlling interest (up from the previous 38 percent state ownership) (Henry, 2015). Initially the head of RSC Energia,

Vitaly Lopota became the head of URSC, but was removed in an attempt to shake up the overall decades-long mismanagement of the Russian space sector.

By focusing the efforts of the Russian space industry's infrastructure on a new lean-manufacturing concept, the hope is that URSC could remain competitive as an international commercial launch provider in the face of purely commercial launch and service companies entering the field. Furthermore, in January of 2015, URSC was merged with Roscosmos to create a unified space industry in Russia, eventually to be held under the newly minted Roscosmos Space Corporation. It is hoped that by unifying the space industry in Russia, many of the chronic problems that have plagued the industry can be solved. Dmitry Rogozin has characterized this move as the beginning of the second stage of reform of the space sector. The merger of URSC and Roscosmos into one entity has been proclaimed to be the beginning of reforms not only to the Russian space industry, but to the entire space sector (Henry, 2015). URSC and Roscosmos can best be viewed as two parts of a larger whole of the nationalized space sector, with URSC responsible for design and manufacture of space equipment (the material side of space), and with Roscosmos responsible for the services necessary for space operations.

While these reforms have been hailed as good and necessary by those within the organizations, the heavy-handed reorganization and renationalization has been view by some outside the industry as "radical centralization," even in the mainstream Russian media (RIA Novosti, 2013). This centralization is aimed at making the Russian space sector competitive with purely commercial providers while restoring integrity and innovation to the industry as a whole. Even the renationalization of the space sector is

at the service of a privatized interest, namely making money with these public goods. Yet the plan does not end with Roscosmos Space Corporation remaining wholly nationalized. From its very inception, the end goal has been to have Roscosmos Space Corporation be a joint-stock company and, after the reforms and reorganization have been completed, within a decade to have a public offer for at least partial stake in the company. This public stock sale to take place at an unspecified point in the future would result in a second wave of privatization for the Russian space industry, taking this story full circle and resulting in a much more clearly privatized Roscosmos.

The previous chapter of this work has focused on the governance oriented role of INTELSAT, yet did mention the interesting shift that took place from international organization to publicly traded stock company. At this point a more detailed look at this interesting case is appropriate and necessary.

INTELSAT, International Telecommunications Satellite Organization, and $I

Upon its chartering in 1964, the International Telecommunications Satellite Organization would set out to create the geosynchronous telecommunications satellite network that would serve as the backbone for the interconnected contemporary world. In the following five decades, international society has been massively transformed due in no small part to the actions undertaken by INTELSAT. During that same period, a large degree of institutional change has occurred, as the rest of the world has not only adopted and caught up to the technical capabilities of INTELSAT, but has in many ways surpassed the former international organization. In order to adapt and compete in this new world, INTELSAT has undergone a complete transformation in the privatization of space activities.

Beginning in the late 1980s, the technical capabilities of telecommunications providers and private space satellite firms had reached a rough parity with INTELSAT. The institutional structure of INTELSAT, however, allowed for an unfair market advantage for the institution in the face of competition from commercial providers of telecommunications satellites. In the United States, the position of COMSAT, the signatory to the body of INTELSAT, was previously held as a joint position between the federal government representing the public and private telecommunications companies. A similar situation existed in most other state signatories to INTELSAT, although many states, e.g. Great Britain and France, were represented by wholly state-owned telecommunications companies. In 1985 the Federal Communications Commission in the United States, following a letter by President Reagan in 1984 officially allowed competition against INTELSAT by private companies.

A decade later, President Clinton began negotiations with other parties within INTELSAT to initiate a privatization process. These negotiations were completed and approved by the Assembly of Parties in Malaysia in 1999 (DalBello, 2013). Domestically, the United States Congress passed the ORBIT Act in 2000 to manage the privatization of the COMSAT seat within the United States[23]. This act would also impact the overall privatization process for INTELSAT guiding it into a more competitive position in the overall telecommunications satellite market. The competition that had been driven by the creation of PanAmSat in the late 1980s had finally reached a peak when INTELSAT itself recognized the need to become a private entity in order to better compete in the market (Hinson, 1999).

[23] The seat on the governing board of INTELSAT.

Yet unlike many other privatizing organizations in the 1990s, INTELSAT had distinct mandates that had to be upheld beyond making a profit. The primary mandate that impacts INTELSAT is termed the Lifeline Connectivity Obligation, or LCO. This obligation ensures that international public telecommunications services will be available to the entire world. While certain provisions of the LCO expired in July 2013, there still remains the obligation for INTELSAT to maintain global satellite coverage and global connectivity. The manner in which these obligations were to be met created a great deal of frustration during the process of negotiating the privatization of INTELSAT. When it became clear that INTELSAT would have to privatize, several options were proposed. Of the major options presented to the governing board, only two were considered realistic. These options were (1) creating a private INTELSAT with a vestigial IGO to offer oversight and ensure LCO was maintained, and (2) creating a private INTELSAT that had LCO as corporate values. In the end, the board of INTELSAT adopted the option creating a vestigial IGO for oversight (Hinson, 1999).

Once a path was chosen for full privatization of INTELSAT, many other distinct problems had to be dealt with, especially the issues of governance and the maintenance of ITU orbital registrations. These issues were quickly dealt with and by 2001 INTELSAT was fully privatized. Private INTELSAT was initially based out of Washington DC, where its primary regulation came not from international norms, but from the dictates of the FCC. More importantly, the market protections that had been afforded the IGO INTELSAT were revoked, causing INTELSAT to compete freely in the telecommunications satellite market. At this point, INTELSAT was still primarily held and

owned by public ownership blocks. A further amendment set INTELSAT on the road to full private ownership.

Over the course of the 2000s, INTELSAT established itself as one of the primary providers of international telecommunications satellites, based on previous work as an IGO. INTELSAT also remained committed to the concept of LCO as a key feature of their services. Corporate headquarters were moved to Luxembourg, with administrative headquarters being moved to Tyson's Corner, VA. Finally, in 2013, an initial public offering brought INTELSAT into the fully privatized and commercial world. Yet this is not the end of the story, for INTELSAT does not exist fully on its own.

The International Telecommunications Satellite Organization remains as a vestigial, but nevertheless important oversight IGO. ITSO's mandate is now focused on verifying and maintaining access to the international telecommunications regime as established by Intelsat, Ltd by making sure that decisions made by Intelsat, Ltd. are made fairly and on a global non-discriminatory basis (ITSO, 2013). The ITSO, an organization freely joinable by any UN member state, also guides Intelsat, Ltd. in the provision and improvement of future services to fill the information and communications needs of society. While Intelsat, Ltd. is free to make business decisions on its own, if a decision was made that was deemed counter to the interests of ITSO, then perhaps some tension would emerge. But in the last decade and a half since the privatization of INTELSAT was initiated, this situation has not been the case.

The transition of INTELSAT from internationally managed and publicly owned IGO to publicly traded telecommunications satellite company Intelsat, Ltd. provides an excellent case to illustrate both types of privatization. With competition in the market

against commercial entities, we see INTELSAT acting in a way to seek profits for the IGO. On the other hand, this competition drove the creation of the privatized entity Intelsat, Ltd. In an interesting twist, Intelsat, Ltd. has chosen recently to shift their launch provider away from their traditional provider, NASA, towards a new commercial entity, SpaceX, launching a satellite aboard the very first commercial launch conducted aboard their Falcon 9 rocket. SpaceX is of great importance to this chapter, as it will serve as the primary example of process of commercialization in space activities.

Space Exploration Technologies, Ansari X-Prize, and the birth of a new Space Race

In the early 1990s, the very notion that a privately designed and operated spacecraft could safely put a man into space and return him to Earth's surface would have been considered science fiction. But this era of space exploration was a time of great promise for change to the status quo. Peter Diamandis, a former medical student and aerospace engineer, believed that a new era of space exploration could be coaxed into existence in a manner similar to the early days of manned flight nearly a century earlier, through privately funded barn-burning competitions. On May 18, 1996 the X-Prize was announced for the first team to successfully place a manned spacecraft into suborbital space twice within a two-week period. With the financial assistance of Anousheh and Hamid Ansari, the $10 million Ansari X-Prize attracted over 26 teams into a competition to complete this once unthinkable feat. Mojave Aerospace Ventures, a design team run by Burt Rutan and funded by Paul Allen, won the prize on October 4, 2004 (Solomon, 2012). While the ship and launch system were successful, little commercial potential for this type of craft existed beyond space tourism, as exemplified by Virgin Galactic.

The successful completion of this competition served not as an end, but as a beginning for a new type of space race, leading to the creation of a proliferation of commercial space ventures. Perhaps the most interesting of these ventures, and the subject of this case study, is Space Exploration Technologies, or SpaceX. Founded in June of 2002 by Elon Musk, the goal of this new company was to make access to space much more affordable, making space commerce a much more realistic proposition. While SpaceX was not part of the original X-Prize competition, Musk set his sights a bit higher than simply winning the Ansari X-Prize. SpaceX seeks to introduce the idea of creative destruction into spaceflight by reducing launch costs by over 90% from their own initial costs, much less the cost of a NASA launch, over the course of a decade (Solomon, 2012).[24] To accomplish this industrial feat, a new approach to space launches would be required.

In order not only to compete with, but to hopefully supplant,NASA as a provider for space launches, massive cost reductions for weight-to-orbit would be necessary. The key to this cost reduction, SpaceX believes, is a shift towards fully reusable launch vehicles. Although this idea of reusable launch vehicles is a dream that extends back to the Space Shuttle program, great increases in actual reusability would be required over the Shuttle. Whereas the Space Shuttle relied on a disposable external fuel tank and extensive reconditioning of the orbiter itself, SpaceX has sought to create a rocket that would return to its own launch pad and be reusable with only minimal reconditioning and refueling. Over the course of the first decade of SpaceX's existence, great progress has

[24] Musk set his sights on unseating Lockheed Martin and Boeing as the primary providers of launch services to NASA, viewing them as "…operat[ing]…with horrendously poor efficiency" and "the bureaucratic tendency to cling to obsolete hardware" (Solomon 2012)

been made in that direction. This progress has also occurred during a time of stagnation in both vision and funding for NASA, causing a disruption in the traditional order of access to space.

After the destruction of the Space Shuttle Columbia in February of 2003, the decision was made to retire the Shuttle fleet following the completion of the International Space Station, limiting the ability for the United States to place both material and personnel into low Earth orbit. While President Bush proposed the Constellation Program to replace the Space Shuttle, the economic crisis in the late 2000s, paired with sever design flaws in the program caused this route to space to be cancelled as well. This loss of capacity to launch to orbit opened up a new avenue that was ripe for exploitation by commercial space providers. While NASA could rely on Roscosmos to give astronauts access to the ISS, and could continue to uses its non-shuttle rocket fleet to place material into orbit, the administration opened up competition to provide a commercial solution for access to low earth orbit and the ISS.

This competition and program, known as Commercial Orbital Transportation Services or COTS, was initiated in 2006 to award contracts to three companies who demonstrate the capability to service the ISS with resupply missions. This program infused $800 million into the coffers of the competitors, and resulted in what is considered to be an unqualified success (NASA, 2014). SpaceX and Orbital Sciences eventually became the two commercial entities to receive the contracts, and as of April, 2015 have both had several successful resupply missions to the ISS.[25]

[25]Several companies have contended for the third spot, but the two closest competitors, Rocketplane Kistler and Sierra Nevada have both had significant funding and design

While SpaceX has won a contract for several resupply missions to the ISS, this economic role is not the end goal for the company. A large part of the corporate mission has also been to develop a manned spaceflight capacity. Using the same Falcon 9-r rocket system and a variation on the automated Dragon capsule used for resupply missions, SpaceX has also won contracts for another NASA program, the Commercial Crew Development Program. SpaceX currently plans to launch its first manned mission to the ISS in 2017, fulfilling the first of several contracted resupply and re-crewing missions for NASA. This commercial crew program cost NASA approximately $1.5 billion, of which $544 million was awarded to SpaceX. In contrast, the Orion program, NASA's attempt to regain manned spaceflight capability totals $12 billion. SpaceX is capable of completing very similar missions for a fraction of the developmental costs of the government-created program, even before accounting for the reusability of the launch vehicles.

These demonstrated capabilities for launch at much lower prices have not only begun to affect NASA, conducting launch operations and missions the governmental agency would have traditionally conducted internally, but they have also begun to gather a large non-governmental manifest of missions. This 50+ manifest of missions includes many satellite launches to geosynchronous orbit that would have typically been conducted by NASA, including the first completely commercial launch of an Intelsat, Ltd. telecommunications satellite (SpaceX, 2015). Not only has SpaceX successfully caught up to NASA's launch capabilities in the course of less than a decade, but they have also begun to supplant NASA as a launch provider for both commercial and NASA payloads.

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issues. This has resulted in their being dropped from contention, in the case of RpK after a contract for resupply had already been signed with NASA.

The rapid advances and innovations that have come from the commercial space field have seen NASA change its own policies and strategic plans, abandoning low Earth orbit launches to commercial entities in preference of deep space missions such as asteroid capture and exploration. Yet SpaceX and most other commercial space entities are not content to stay in the realm of LEO and launching of commercial satellites.

One of the primary missions within SpaceX's corporate identity is to make humanity a multiplanetary species (SpaceX, 2015). In order to accomplish this feat, SpaceX would need to be able to provide transportation of personnel and material safely across interplanetary space to Mars within a reasonable timeframe after launch, as well as being able to make a return trip. This transportation capability will require a much more powerful and reusable launch system than even the planned Falcon-9 heavy rocket. The proposed launch system, the Mars Colony Transporter, is expected to be operational by the mid-2020s, much faster than a NASA-funded and developed competitor (Thomson, 2014). With NASA shifting towards strategic mission goals that do not support a trip to the moon or an eventual landing on Mars[26], it appears that commercial entities, especially SpaceX, are poised not only to run in parallel to government space entities, but could very well surpass publicly operated space exploration missions (Binzel, 2014). The earliest hoped-for ARM would occur in 2025,

[26] While both Moon landings and Mars missions have been proposed, the only currently scheduled mission is that of asteroid capture in Lunar orbit. This mission is considered to be a dead end mission, as it has no real applicability as a stepping stone to more deep space exploratory missions.

barring further NASA cuts; while Musk believes that his first MCT launch to Mars could occur the same year[27].

As a privately funded commercial space provider, SpaceX gives the best real world example of the commercialization of space activities. Beginning as the brain-child of a Silicon Valley startup millionaire, this company has rapidly innovated in the space field, one which had been stagnant for several decades. Musk's company has not only managed to catch up to the capabilities of public space agencies such as NASA, it has begun to supplant them as a launch provider. The launches that are being provided are not merely to other commercial entities, but to the public space agencies themselves. Distinct plans are underway in the coming decades not only to supplant NASA and other public agencies as a launch provider, but to surpass the exploratory achievements. This switch towards commercial space provides many distinct challenges to the current governance regime for outer space, as capabilities to reach space have rapidly spun out of governmental control.

Challenges to the Governance Regime of Outer Space from Non-Public Space Entities

Under the four primary treaties governing mankind's activities in outer space, the primary assumption is that national entities will be the primary participants in space activities. It is often noted that international and non-governmental organizations can become signatories to the treaties, but only real international participants are consolidated national space programs such as ESA. This institutional state of affairs, it

[27] SpaceX would fund development for these missions to Mars by utilizing the profits from the 50+ mission manifest. While most companies would be beholden to a board or stock holders, Musk has no such limitations, as his board are currently aligned with his plans to have manned missions to Mars. Musk in on record stating that no public offer of stocks will occur until boots are on the ground on Mars and the MCT is regularly flying.

should be clear at this point, is fundamentally under attack by new commercial and privatized entrants into the space field. When the current legal regime was created, access to space was a very difficult undertaking. To quote Richard Branson, CEO of Virgin Galactic, “Space is hard”(Cheng, 2014).[28]

But in the nearly fifty years since the signing of OST 1967, great changes have occurred in both international politics and in the technologies of space travel. Many of the most important signatories of the various treaties have undergone fundamental changes in the way they access or deal with outer space. The Soviet Union has become the Russian Federation and 14 other countries, and the Soviet Space program has become Roscosmos. Various European states that signed the treaty have joined an international organization to pool resources in order to access outer space. NASA and the United States have lost the capacity to put astronauts into space, and have suffered a severe crisis of funding and vision.

On the other hand, great innovation has been seen by commercial space entities. This innovation is driving down the costs necessary to reach into outer space, and more nations and organizations will soon be able to utilize outer space in ways that were only science fiction when the treaties were signed. As the capacity to explore outer space becomes the ability to exploit outer space for commercial gain, the question of who will benefit from this exploitation will become highly salient. The world as envisioned by policymakers and elites in the 1960s, 70s and early 80s held the state as the primary actor in a world of slow, deliberate action within international institutions. By the end of the 1980s the world had already begun to shift, as policy makers within states and

[28] Richard Branson addressing the media on October 31, 2014 following the crash of Spaceship Two.

international institutions lost control over actions within the international system. Non-state actors, namely corporate commercial entities, began to increase their prominence in directing the shape of the world. With an increase in technological capacity of non-state actors, and a shift in the overall state in world politics, the treaties governing outer space have begun to erode.

Questions of liability have also been raised about the participation of commercial and privatized actors in space activities. The treaties as they stand place the onus of legal liability on the states where launches occur. This assignment of liability is clearly predicated on the notion that any launches that occur from within national boundaries will be conducted by national space agencies. Yet with a privatized entity like Roscosmos conducting launches from within the borders of another country, Kazakhstan,[29] the assignment of liability could technically be argued. Roscosmos Sea Launch launches, occurring in international equatorial waters, provide an even more questionable case. More importantly, fully commercial space programs could potentially shirk legal liability by placing the liability on the state from which they have launched. While these cases will most likely be settled within domestic courts, the international nature of liability caused by non-state space launches could become highly complicated.

Perhaps the largest issues caused by commercial space entities comes not from liability or questions of exploitation, but from the very fact that their activities are most likely to supplant and out-pace state space agency missions. This problem is exacerbated by a lack of funding that has become emblematic of national space

[29] Baikonour Cosmodrome, while located in Kazakhstan, is technically Russian territory. This example is merely to provide a thought experiment.

programs. With a lack of funding comes a decrease in vision and possibility of grand scientific missions. Most traditional space exploration scenarios place national space programs or international cooperative missions at the fore of human exploration of the solar system and beyond. But in the last few years it has begun to seem that individuals outside of the state system will be the ones to drive mankind beyond Earth. With stagnation from NASA, a focus on robotic missions by both NASA and ESA, and political difficulties surrounding Roscosmos, the formerly national and international nature of space exploration is in great jeopardy. As states abandon their leadership role in space exploration, new entrants who were not considered in the creation of the legal regime governing space exploration have stepped in to keep mankind moving towards the stars.

Since the 1980s, a shift in the way that states deal with one another has occurred. Where states once chose to act in a cooperative manner, building institutions and trusting that the state would continue to be the primary actor in the international system, now the role of markets, individuals and companies have become much more important. This process of privatization of once national or international space organization has accelerated in the face of economic hardship. Commercial space entities have come to play an increasingly important role in space activities, a trend which does not appear to be weakening. On the back of individuals with large personal economic bases, space exploration is once again becoming a focus for mankind, and with the innovation being created by these individuals and their commercial space entities, space may become accessible to a much wider portion of humanity. The institutional structures created at the dawn of the space age reflect an outmoded view of

how mankind should interface with the realm beyond our own atmosphere. The gaps in law and institutional mismanagement of outer space must be addressed soon, or they will be left far behind as elements of mankind leave Earth behind when they head further out into the solar system.

CHAPTER 6: THE INSTITUTIONAL GOVERNANCE OF THE INTERNET, ODiis, AND THE CREATION OF A NEW INSTITUTIONAL TYPE

"The 'Net is a waste of time, and this is exactly what is right about it"- William Gibson

This chapter serves as the first part of the case study for the governance of the Internet. Much like chapter 3, the focus will be on answering the question "How can technology best be governed?" To answer this question, this chapter will take the approach of a historical and functional institutional analysis of the creation of the institutions governing the Internet. Of particular interest to this story, and providing an interesting challenge to the traditional literature on institutional formation. Is the end result of the so-called organically developed internet institutions following the multistakeholder model.

Originally a brainchild of various US military agencies and academic groups,[30] the interconnected network of interconnected networks known today as the Internet provides an interesting case of the governance of technology. Unlike the institutions governing space exploration, the international community has created very little formal governance structure for the Internet. States, other than the United States of America, have not been major players in the creation of the governance structures of the Internet. What has been seen instead are the roles of individuals and interest groups in the creation of a workable and beneficial governance structure for the Internet. While the medium of the Internet would seem to fall naturally under the control of a treaties based regime, namely the ITU, a much different process for the creation of governance was observed.

[30] Primarily DARPA- the Defense Advanced Projects Administration and ISI- Information Sciences Institute at the University of Southern California.

The problem of governing the rapidly evolving information technologies of the Internet can be divided roughly into two separate concerns. On the one hand is the question of root access of the Domain Name System (DNS). This question deals with how computers and systems are named and how they can be accessed, primarily a software issue. The other question is of a more technical hardware nature, dealing with the technical underpinning and standardization of Internet Protocol (IP). Other technical standardization issues also exist, e.g., transmission technologies such as undersea cables and Wi-Fi standards.

This chapter will examine the creation of the formal structure of the most important governing body of the Internet: The Internet Corporation for Assigned Names and Numbers, or ICANN. The relationship between this privately owned and administered governance agency responsible for DNS issues on the one hand, and both the United States government and the international Internet community on the other hand, will be explored. A discussion of the non-governmental self-regulatory nature of this corporate governance structure will also be highly important. The Internet Society, or ISOC, will also be examined for its role in the governance of Internet Protocol. It should be noted that ISOC is an even more loosely governed organization than ICANN. This highly unorthodox governance structure should serve as an interesting case of how open collaboration can create a different, and perhaps more efficient, way of governing new technologies.

Governance before ICANN

From the earliest days of the Internet, questions of governance abounded. The very concept of the Internet, an interconnected series of networks to allow for easy

transmission of data and collaboration between various research institutions, requires a distinct set of hierarchies and clear rules for operation. While these questions may not be political in the way that political scientists typically deal with governance, the unique interaction between government, academia, and technologists created a fertile ground for the creation of new and innovative governance structures for a technology poised to remake society. The primary method for Internet governance from the very beginning was a continuous series of collaborative papers called Requests for Comment, or RFCs. These RFCs would define the actual realities of the Internet in ways that government authority was simply incapable of doing.[31] The original players in these RFCs were researchers at DARPA and ISI, and include many of the fathers of the Internet such as Vint Cerf, Jon Postel, Steve Crocker, and Robert Kahn (Mueller, 2002). Cert, Postel, et al. would, through their technical contributions and the level of respect they generate in the early Internet field, greatly direct not only the technical aspects of the Internet as we know it today, but also the governance structures that would eventually emerge for the Internet. These RFCs continue to be highly important in the governance of the Internet, and have been adopted as a technology for the governance of most technical projects within the realm of information technologies.

In the days before the creation of ICANN, the governance structures for the Internet were much less formalized. Building on the early working groups within the old

[31] RFCs are essentially ideas postulated by one thinker, who then through a collegial series of interactions with other participants would attempt to arrive at a workable consensus about whether and how these ideas of Internet functioning should be implimented

ARPANET,[32] IANA (Internet Assigned Numbers Authority) was created by participants in the Internet Activities Board (Mueller,2002).[33] Upon the opening of the Internet to commercial entities in 1991, IANA would take on the responsibility of governing the Internet, primarily at the root and top-level domains. First referenced in RFC 1083, dated December 1988, IANA was stated to be headquartered at the Information Science Institute in Marina Del Rey, California, under the administration of Jon Postel (Mueller, 2002). This new institution would carry on the previously contracted work of IP and DNS assignment functions between DARPA and ISI.

Yet in the RFCs, IANA would not derive its authority from these previous DARPA contracts, instead drawing governance authority from the work done in the IAB. Although authority was initially given by the government, in the main through DARPA, the operating community of the Internet began to think of itself as “an autonomous, self-governing social complex” whose “claims on the right to manage name and address assignments were being made by an authority structure that existed solely in Internet RFCs and lacked any basis in formal law or state action” (Mueller, 2002 p93). This RFC, and subsequent actions of IANA would set the Internet down a path of governance that is highly different from traditional treaty-based governance structures that have been observed for many other technologies. While government managers played a role in the management of the Internet, the model was much less supervisory and much more participatory, leading to the impression of the Internet as “working anarchy” (Kapor, 2000).

[32] Advanced Research Projects Administration Network, the DARPA created precursor to the modern Internet.
[33] Internet Activities Board-IAB

Yet Cerf and Postel realized that this new organization could not function on its own. As the entire project of the Internet was the product of, and under the guiding arms of the National Science Foundation, and with DARPA beginning to wrap up its work on supporting the early Internet, the end goal was for the Internet to become a self-sufficient project. The funding that had originally been provided to establish and administer the Internet was sure to dry up. By 1990, Cerf had written to colleagues about his idea for "the Internet Society" which could hopefully be a funding avenue for the continued "operation of IAB/IETF/IRTF" (Cerf et al., 1992).[34] This Internet Society or ISOC, would become an independent corporation that could also be used to limit individual liability around standards decisions, as per the contribution of Noel Chiappa, and could act as a liaison between the established telecommunications standards organizations[35] and the Internet community. The chartering of ISOC took place in January of 1995, establishing a board of trustees with many familiar players in the early Internet, and by June of that year had made great strides in unifying the activities of the IAB and ISOC.

The self-privatization of the Internet's governing structures would expose many problems that would eventually lead to the downfall of IANA and ISOC, setting the stage for the almost inevitable creation of a new institution. Interestingly, the majority of problems would not be disagreements of a technical nature. Any technical problems could be easily dealt with inside the RFC system. The biggest problems for ISOC would show themselves to be of a political nature. The selection of leadership would prove to

[34] Internet Research Task Force
[35] Namely the ITU. The role of the ITU in the Internet, though limited, will be examined in a later section.

be one of the largest problems for ISOC; self-selection by the old elite was preferred by some participants, while new participants advocated for a much more democratic process. RFC 1396 would state that “IAB and IESG members should be selected with the consensus of the community.” While this was certainly not a call for fully democratic elections of leadership, it did demonstrate that rank-and-file participants in ISOC wanted to have some voice in the selection of leaders. This democratic movement ran counter to the wishes of the previous elites, with Postel on record as saying they would refuse to run for any democratically elected positions, betraying a mistrust in democratic methods and public accountability. These actions would serve to discredit ISOC and IAB until well into 1996, leaving a bit of a leadership vacuum in Internet governance.

ISOC, IANA, and IAB provide only part of the picture for early Internet governance. Prior to 1991, the Internet was still primarily militarized and not open to commerce. The battle to control the definition of the root zone file[36], and who could therefore authorize new top-level domain registries would begin to have a great deal of importance for both governance and commerce. Prior to the early 1990s, the Internet was vastly different than the Internet of today. Direct access to documents and text was limited to a specific technical class, and very little commercial activity was even possible. File Transfer Protocol was the order of the day, and file swapping was the primary purpose of the early Internet. The concept of a World Wide Web as understood today was created by physicists at CERN in 1990. This new approach to the Internet was based on hypertext transfer protocol or HTTP. A graphical web browser utilizing HTTP, Mosaic, was released to the public in early 1993, and within two years made up

[36] The tool for defining top-level domains on the Internet.

the majority of packet transfers on the Internet. HTTP's introduction spawned a new industry of browsers and web software, with Netscape at the vanguard, leading to a commercial boom in the late 1990s.

The introduction of this new application for the Internet brought in technological and governmental issues requiring their own solutions. HTTP and the web allowed for a new standard of access, Uniform Resource Locators, or URLs, that functioned in a manner similar to networked file extensions on a computer file name. The domain names would become top-level directories to access information on the Internet. Access to information was made easier with the introduction of HTTP and URLs, causing a proliferation of domain names, far beyond their original intention of designating computers and networks. Along with a proliferation of domain names came a huge increase in users, many of whom did not understand the concept of DNS. To alleviate many of the growing pains and smooth the learning curve for new users, browser manufacturers began to make *.com* the default top level domain, autocompleting searches for terms as cheese to be *cheese.com.* This process, while beneficial for uses, would create many intellectual property issues moving forward, requiring the creation of a new governing process for DNS, as the default use for DNS shifted from location of hardware for FTP to access of Web sites for HTTP.

The confluence of these two trends, governance struggles of the root DNS and the commercialization of the Internet exacerbated by a switch to HTTP, led to the NSF suggesting that a fee should be charged to register domain names, starting with *.com* and later expanding to all other domains. Charges for registration began on September 14th, 1995, creating a new industry of registration of domain names, and the industry of

deciding correct ownership of domain names. It should be noted at this point that this commercial process of domain name registration does vary from country to country, and wildcat speculative domain name registration for commercial domain names can be greatly restricted by some states. In other countries internationally, proof of a legitimate claim to a certain domain name, such as http://www.jamesgilley.com[37] could be required. From 1991-1997, IANA and IAB attempted to deal with many of these issues of registration on their own, especially the issue of registration of new top-level domains. But over these years their "informal chain of authority" failed to convince leaders of commerce and government that they could capably govern the root (Mueller, 2002 pp125). It is at this point that calls for a new organization began, one that would have a much more formal position and chain of authority. Internet engineers, while still important to the system, would no longer have sole governing authority over the Internet's root.

From ISOC to ICANN[38]

While ISOC was able to consolidate the actions of IAB, IETF, and IRTF, the attempt to move IANA under the umbrella of ISOC was much more complicated, as IANA had distinct obligations to fulfill based on contracts between ISI and the NSF and DARPA. The attempt to charter IANA into ISOC began in July 1994 driven by Postel (Mueller, 2002). The explosion of domain names in the period beginning in 1994 proved that a distinct institutional home for root governance was necessary, and at the time

[37] In an interesting turn of events, the author of this document does not own the aforementioned website. It is owned by a Knoxville, TN based percussionist, with no known relationship to the author. For the authors website, please visit jamesgilley.co

[38] This section will only cover briefly the transition from ISOC to ICANN. For a more complete treatment of this interesting tale, please consult Mueller, Martin. 2002. "Ruling the Root" Massachusetts Institute of Technology Press. Cambridge, MA.

ISOC appeared to be the natural fit. The Internet Society put forward the idea that through the IAB and IANA, they would be able to control the commercial selling of domain names, under the name draft-postel (Mueller, 2002). ISOC would function as a warehouse for top-level domains, to be sold off to other competing registries. It would also collect fees from these licenses and establish itself as the root-level DNS manager, all without any formal governmental approval (Mueller, 2002). This audacious plan to expand the role of ISOC would not go uncontested, as the Federal Networking Council's Robert Aiken would ask "Is ISOC claiming it has jurisdiction and overall responsibility for the top-level address and name space? If yes, how did ISOC obtain this responsibility; if no, then who does own it?"(Aiken, 1995).

Once these questions of root ownership came into view, demands for answers began to come from many different quarters. More importantly, questions about the international standing of the Internet Society with regard to their authority for the root also appeared, driven by Aiken and DARPA's Mike St. John at the 1995 NSF conference on Internet governance. International representatives also urged participants at this conference to take an international perspective, as the discussion on root ownership had begun to trend in the direction of US government intervention (Kahin and Keller, 1997). Draft-postel, upon going live for comment using a similar system as RFC, was quickly under assault from many parties, including the ITU who believed they should play a role in Internet governance and standards creation. By the end of 1996, draft-postel was effectively killed, leaving a gap for actual governance of the root.

In order to fill this gap, and as an attempt to keep ISOC in a position of authority, the International Ad Hoc Committee was formed. The IAHC was to be comprised of 11

members representing a wide variety of interests, from ISOC itself, the NSF, the ITU, the World Intellectual Property Organization, IETF, and other interests. Representatives were predominately from the technical community within the Internet governance structure, but they stepped beyond the traditional procedures. This body met in closed-door meetings with an aggressive timetable to address issues of Internet governance (Mueller, 2002). The final report was issued in early 1997, laying out a new plan for root DNS governance, one treating the top-level domain (TLD) as a public resource subject to public trust. This language reflects the role played by the ITU participant in IAHC, introducing concepts in common to other telecommunications methods to the governance of the Internet.

IAHC's proposal established a clean break between wholesale DNS registration and retail domain name registration, and created a global cartel for retail sale of domain names. Strict rules about ownership of TLDs were put into place under the new plan, with a 60-day delay between purchase and activation, allowing the WIPO to deal with intellectual property claims. Institutionally speaking, IAHC recommended a corporate structure which could straddle the line between the public and private sectors. The structure proposed by IAHC was known as the Generic Top-Level Domain Memorandum of Understanding (gTLD-MoU). The gTLD-MoU was fairly well received by the Internet community, but did have several challenges from outside, with the largest challenge coming from the United States' Department of Commerce. In 1997 the United States published the so-called Green Paper, proposing an alternative solution for root governance, a plan that looked much more like clear-cut privatization. In response Postel attempted to pull control of the root under IANA's authority unilaterally. This

attempt at shifting root ownership resulted in threats of criminal prosecution from the US government towards Postel should he ever attempt to manipulate the root without government approval.

This period of uncertain root-level Internet governance created a movement to institutionalize the root, and led to the early working negotiations for the creation of ICANN. While many US domestic players welcomed the framework of the Green Paper, some technical and international players viewed it as an attempt by the United States to usurp the international nature of the Internet, and as an overreaching governmental intervention into what had until that point been a mostly self-governing community (Muller, 2002 pp165). While gTLD-MoU was still in play, and had fairly widespread support, two major constituencies resisted it, namely the US government and the large business coalition spearheaded by AT&T and IBM. Agreement was reached that any new institution governing the root should be a continuation of IANA, and in February of 1998, a transition advisory group was formed for IANA, the IATG. During this time, the US government released its final draft recommendation on the governance of the Internet, the White Paper, which formally recommended that private stakeholders determine the institutions necessary to govern the Internet. This relatively surprising outcome lead to the creation of the International Forum on the White Paper (IFWP).

Competing processes by IATG and IFWP, with the former being closed-networking based and the latter being open consensus building, continued through the summer of 1998. A negotiation session was then held in mid-September in an attempt to reconcile the disparate goals of the two groups. The negotiations were held behind closed doors at Harvard University's Berkman Center, so little is known publicly of what

occurred within the negotiations. But from this process emerged the draft articles for the incorporation and the bylaws of the Internet Corporation for Assigned Names and Numbers. A very contentious process of transition driven by large personalities and competing institutional interests resulted in the creation of the current institutions governing the root level DNS of the Internet.

ICANN's Institutional Corporate Structure

In a somewhat ironic turn of events, the acceptance of the ICANN proposal for Internet governance was in direct contradiction of the recommendation of the US government's White Paper. While the White Paper called for the establishment of an open and democratic international corporation to be established, the end product was a backroom, closed deal leading to a private non-profit corporation. The overall structure of ICANN fit with the goals of the White Paper, but the means used to achieve these goals were not in accordance with the wishes of the US government and the international Internet community. In the closing days of 1998, the US government entered into a Memorandum of Understanding with ICANN to transfer root-level governance of the Domain Name System to ICANN. ICANN then went on to meet with the Information Sciences Institute at the University of Southern California to take over the role of the Internet Assigned Numbers Agency, moving IANA into ICANN's organizational structure.

ICANN was formally chartered on November 21, 1998 with the signing of the Articles of Incorporation of Internet Corporation for Assigned Names and Numbers. More important than the simple chartering of ICANN, the US Commerce Department accepted ICANN as the governance agent for Root Level DNS on February 26,1999.

After a long and contentious process of dueling proposals for DNS governance, ICANN emerged as the representation of the Internet community's consensus building, even if the process did not follow traditional consensus-building methodology. ICANN was established as a 501(c)(3) Nonprofit Public Benefit Corporation under its Articles of Incorporation with the expressed:

> … charitable and public purposes of lessening the burdens of government and promoting the global public interest in the operational stability of the Internet by (i) coordinating the assignment of Internet technical parameters as needed to maintain universal connectivity on the Internet; (ii) performing and overseeing functions related to the coordination of the Internet Protocol ("IP") address space; (iii) performing and overseeing functions related to the coordination of the Internet domain name system ("DNS"), including the development of policies for determining the circumstances under which new top-level domains are added to the DNS root system; (iv) overseeing operation of the authoritative Internet DNS root server system; and (v) engaging in any other related lawful activity in furtherance of items (i) through (iv).

These broad goals established a large and far-reaching role for ICANN, placing the corporation in a role of responsibility for the international stability of the Internet. To accomplish this task, many specific steps and institutional programs would have to be established. The remainder of this section will explore the institutional nature of ICANN and the various programs established to meet the goal of maintaining operational stability of the Internet. As opposed to analyzing a treaty, as would be the normal approach for institutional analysis, due to the corporate nature of ICANN, the major focus will be placed on analyzing the By-laws and functioning of ICANN.

Corporate Structure- Board of Directors

Borrowing heavily from the corporate structures that emerged in Silicon Valley during the early days of the Internet, ICANN predicated its corporate structure on a Board of Directors meant to represent the various stakeholders in the Internet

community. While the traditional focus of representation for international organizations are the various states who become party to treaties, for the non-profit corporation governing the deep structures of the Internet the major constituencies are other Internet organizations.[39] Article III of the By-laws of ICANN lay out that sixteen members comprise the Board of Directors, hence referred to as the Board. These sixteen members of the Board each have an equal vote, and represent various Internet constituencies. There are also an additional four non-voting liaisons, representing the internal committees of ICANN.

Section 9 of the ICANN By-laws states that seats 1-8 of the Board are selected by a nominating committee made up of the following: one non-voting chair appointed by the ICANN board, a non-voting advisory Chair-elect, a non-voting representative of ICANN's Root Server System Advisory committee, a non-voting representative for ICANN's Security and Stability Advisory committee, a non-voting representative from ICANN's Government Advisory committee, five voting members from the At-Large Advisory committee, one vote for the Registries Stakeholder Group, one vote for the Registrars Stakeholder group, one vote representing small business and one vote representing large businesses, one vote for Internet Service Providers, one vote for Intellectual Property, one vote for consumer and civil society groups, one vote for the Council of the Country Code Names Supporting Organization, one vote for the Council of the Address Supporting Organization, and one vote for the Internet Engineering Task Force.

[39] Many of these organizations, such as the Generic Names Supporting Organization, Address Supporting Organization, and the Country-Code Names Supporting Organization, will be the subject of Chapter 7.

Seats 9 and 10 are selected by the Address Supporting Organization. Seats 11 and 12 are allocated to the Country-Code Names Supporting Organization, while Seats 13 and 14 are given to the Generic Names Supporting Organization. An At-Large Community representative occupies seat 15, and the final seat belongs to the President ex officio of ICANN. Along with the representation of constituencies of the Internet community, the Board is also to be representative of the international community, with a diversity requirement laid out in Article III, Section 5 of the By-laws, namely that no more than 5 Directors may be from the same geographic region. These Directors are expected to act and vote in the best interest of ICANN, not as representatives of the organization that selected them. As of now, each Director serves for a period of 3 years. This focus on diversity in board members illustrates how the mulitstakeholder model functions best, specifically in representing a wide variety of stakeholders in the decision making process, a departure from classical international institutions focused on states.

The Board itself is required to meet annually to conduct business, but also more frequently as required. Any Board member has the right to inspect all books, records and documents of any kind produced by ICANN, and has the right to inspect the physical premises as well. As to the actual responsibilities of the Board, according to the Board Governance Guidelines of ICANN, the Board members are:

> …to exercise their business judgment to act in what they reasonably believe to be the best interests of ICANN and in the global public interest, taking account of the interests of the Internet community as a whole rather than any individual group or interest. Actions of the Board reflect the Board's collective action after taking due reflection.

Specific core values are also established for the Board, such as preserving the operational security and interoperability of the Internet, seeking broad and diverse

cooperation on decision making, and relying on market mechanisms to promote a competitive environment. The Board itself must balance the business nature of the corporate structure with the goals of being an international governance organization, and this tension is highly reflected in the expectations and core values for Board members. This tension between corporate and governmental interests is especially played out in the ultimate core value laid out in the guideline “While remaining rooted in the private sector, recognizing that governments and public authorities are responsible for public policy and duly taking into account governments' or public authorities' recommendations.” The Board functions as the primary decision-making body for ICANN, and as such is perhaps the most important single group of people for the entire Internet. Yet much like normal corporations, the Board of ICANN does not take a heavy hand in the day-to-day operations of the organization. Instead, much discretion is given to the corporate officers.

Corporate Structure – Officers and Members

Continuing on building an institution in the mold of a corporation, ICANN has explicit corporate officers. The three specific corporate officers as laid out in the By-laws are the President, Secretary and Chief Financial Officer (CFO). All corporate officers are elected by the Board of Directors, and hold office until resignation, death, or replacement. To replace an officer, a two-thirds majority vote is required by the Board. Other additional officers may be created and appointed at the discretion of the Board. The President of ICANN also functions as a voting member on the board, the only officer capable of holding both an office within ICANN and a seat on the board. T President of ICANN, also functions as the Chief Executive Officer (CEO) for the

corporation. The President is responsible for the day-to-day functioning of ICANN, is the person to whom all ICANN personnel report, and has the ability to call meetings of the board. In all, this office functions in a manner that is compliant with common corporate governance procedures.

The Secretary is responsible for the keeping of minutes for the Board, as well as maintaining the procedural records books. As is often the case with organizational secretaries, ICANN's Secretary also performs duties as prescribed by the President of the organization. The Chief Financial Officer is responsible for the financial activities of ICANN as dictated by the President and the Board of Directors. ICANN's CFO maintains the books, and keeps receipts of all financial intakes and disbursements. The CFO is also responsible for assisting the President and the Board in drafting the annual budget, as well as forecasting future financial needs for ICANN. Finally, the CFO is responsible for conducting any institutional audits for ICANN and any of the Supporting Organizations. Again, the officers of ICANN operate according to common corporate governance practices.

Corporate Structure- Advisory Committees

Perhaps more important than even the officers of ICANN for the governance of the Internet are the Advisory Committees of ICANN. Established by Article XI of the by-laws, these committees have no legal authority to act in place of ICANN. They do, however, serve as the primary providers of advice and recommendations to the Board and officers on matters that might not be a core competence for the various Directors on the Board. The Board has the ability to create more advisory committees, but four permanent committees were originally established by the By-laws, dealing with a wide

variety of technical and political issues. These committees are as follows: the Government Advisory Committee (GAC), the Security and Stability Advisory Committee (SSAC), the Root Server System Advisory Committee (RSSAC), and the At-Large Advisory Committee (ALAC). Each committee has a distinct area of jurisdiction and a distinct set of restrictions placed upon them.

The first of these committees, the Government Advisory Committee (GAC) has a somewhat different advisory focus than the other committees. Instead of focusing on a technical problem, the GAC deals directly with political issues, a set of issues that lies outside of the core competency of the majority of Directors. The GAC has a membership open to all national governments, Distinct Economies,[40] multinational governmental organizations, and treaty organizations. Members then appoint to the committee one representative, who must be an accredited member of the public administration of the member state or organization. The chief responsibility for the GAC is to make the Board aware of any public policy activities that might affect the operation of ICANN, with an eye towards requesting public comment on political activities. If important political or policy issues emerge, the GAC is capable of taking these issues directly to the Board. Finally, the GAC is supposed to play an important role in the formulation and adoption of policy matters for ICANN. When the Board and the GAC have a difference of opinion regarding policy, there must be a good-faith attempt to reconcile these differences in a timely manner. If the advice that is given by the GAC is not taken, then the Board must state the specific reasons why the advice was not followed.

[40] Distinct Economies i.e. Taiwan, Hong Kong, Macau, etc.

The Security and Stability Advisory Committee is the first of the major technical advisory committees with the distinct goal of advising on matters of the security and stability of the Internet. Their specific focus lies on issues of security and integrity for the name and address allocation systems. Unlike the GAC, SSAC interfaces not with governments and legal bodies, but directly with the Internet technical communities directly. SSAC is responsible for gathering and articulating requirements for technical provisions of the DNS protocols and address allocation. Threat assessment and risk analysis for Internet naming and address allocations services are also a primary concern for SSAC. This committee must also communicate with the organizations directly responsible for the naming and address allocations security,[41] making sure that all security issues are synchronized with the latest security activities being taken by ICANN and other Internet governance bodies. Finally, SSAC provides advice and makes policy recommendation to the Board, with no procedure or guarantee for dispute resolution between the Board and SSAC. Membership of SSAC is not determined by other actors in the system, but are instead appointed to a three-year term by the Board, perhaps explaining the lack of a need for a dispute resolution mechanism between the Board and SSAC.

The Root Server System Advisory Committee is the third permanent advisory committee to the Board of ICANN. RSSAC is very similar in nature to SSAC, but instead of focusing on security and stability issues for the DNS and the name and address allocation system, the primary focus is on maintaining integrity of the Root Server System. Put more clearly, SSAC is responsible for security and stability, whereas

[41] IETC, RSSAC, RIRs, name registries, etc.

RSSAC is responsible for interoperability of the Internet, as well as making sure the Root Server System, a hardware consideration, maintains functionality. This committee does not represent governments or legal bodies, but directly liaises with the Internet technical community. Responsibility is given to RSSAC over matters of the Root Zone, as well as the processes and procedures of the Root Zone file, the fundamental networking system for the Internet. RSSAC must also participate in threat assessment and risk analysis for the Root Server System, as well as provide advice and policy recommendations for the Board. Again, much like SSAC, the membership is appointed by the Board for three-year terms and, thus, no procedure is in place for differences of opinion between the Board and RSSAC.

The final permanent advisory committee for ICANN is the At-Large Advisory Committee. ALAC is meant to be the home within ICANN to represent individual Internet users. The advice provided to the Board by ALAC is meant to advise the interests of the individual who uses the Internet, not for governments and legal bodies, and not for technical advice about Internet architecture. ALAC is meant to be an accountability method for ICANN, and is meant to coordinate outreach to the Internet community. Membership of ALAC is made up of two members from each Regional At-Large Organization (RALO) comprising of five organizations representing the five geographic regions and five members selected by the Nominating Committee as describe in a previous section. The five Nominating Committee seats are to represent each geographic area as well. Each Regional At-Large Organization is responsible for setting its own membership criteria, but should attempt to allow every individual Internet user the ability to participate in the RALO. Overall ALAC is responsible for reporting the

activities of ICANN to the public, as well as participating in policy development for ICANN. There is no method for ALAC to resolve policy disputes with the Board; it appears that the major role for ALAC is more public outreach than true policy crafting. The real avenue for public input for ICANN policy seems to come from the Request for Comment system. ALAC is responsible for the maintenance of the RFC system, as well as other avenues for public input on ICANN policies.

Corporate Goals and Abilities

The primary goal stated by ICANN upon its inception was the preservation of the "self-governing" and "self-regulatory nature" of the Internet. While it might seem on the surface that this is the case, given the At-Large Advisory Committee's input into policy decision, in actuality ICANN has helped to subvert these very characteristics of the Internet. ICANN, being predicated on a non-profit corporate structure and acting as an international governance institution, appears to be an entirely new institutional type in the international system. Yet it has a perhaps unexpected set of governance goals for the Internet that may not be precisely what is expected. Milton Mueller observes in *Ruling the Root*:

> ICANN is not primarily concerned with technical coordination, not is it a standards setting organization. Rather, it is an institution that ties the need for technical coordination to regulation of the industry built around the resources it manages…ICANN is not pioneering a radically new and better form of global policy making. It is simply a resource-based international regulatory regime… its creators have succeeded in building a rough facsimile of an international treaty organization without a treaty.

While ICANN may be in practice a regulatory regime, the major goal as stated in the By-laws is to ensure the stable and secure operation of the Internet's identifier systems: the DNS, IP and protocol port and parameter numbers. In essence and actuality this

situation requires ICANN to maintain control over the operation and evolution of the DNS root name server system (Root), the primary controlling architecture of the Internet.

In order successfully to control the DNS root name server system, ICANN retains the authority to be the sole policy setting organization for the Root. It should be noted that ICANN does not control the actual root servers, but merely sets the policy for the operators of the servers. A large degree of delegation of policy authority to directly affected Internet constituencies is built in to the decision-making process of ICANN, as described in the sections above. The authority to set policy for the Root was given to ICANN in a series of Memoranda of Understanding between ICANN and the United States Commerce Department. Under these MoUs, the Department of Commerce gives ICANN the private sector leadership and coordinating ability to make policy for the development and stability of the Internet. The majority of the focus for this policy-making authority rests in maintaining the Root, as well as setting policy for Top-Level Domains (TLDs). Yet the US Department of Commerce merely allows ICANN to be the regulating body for the Internet, in much the same way the Federal Reserve Bank has been given the private ability to regulate the monetary supply from the United States' Congress. Were the Department of Commerce to decide that they did not agree with ICANN's actions, the DoC could pull ICANN's authority and destroy overnight the system as it stands.

The other important goal for ICANN, the administration of TLDs, has seen a great deal of corporate policy change since TLD authority was vested in ICANN. From its inception, the major policy for ICANN has been to create artificial scarcity for TLDs in

the name space (Milton, 2002 pp255). These TLDs, i.e., *.com, .org, .edu, .uk,* etc., serve as the highest routing level for all addresses on the Internet. In the earliest commercial http configuration of the Internet, these TLDs were very limited, with only a handful of domains being available for use. A constant struggle for the Internet community has been the proliferation of TLDs, so that greater access could be given to the Internet, and scarcity could be reduced. It has been in the best interest of ICANN to keep TLDs limited, as it has the authority to release more domains to their approved oligopoly of domain name registries and registrars. It should be noted that this question of TLD proliferation is not necessarily a technical problem, although it does abut the technical problem of IP address scarcity due to the prevalence of IPv4.[42] Computers and networks have no preference for addressing their information flows. It is almost a purely political and social issue that humans have ownership over certain names.

The proliferation of new TLDs creates massive intellectual property issues for ownership of domain names in these new top-level domains. In order to combat these issues, ICANN had a policy of artificially limiting the number of TLDs that would be available. This policy would not last more than a few years, as domains would be rapidly populated to the point of being essentially "sold out." The eventual expansion of the TLD was carried out in a many phased process, from adding a few new TLDs such as *.biz* and *.law*, to adding country code TLDs (ccTLDs) like *.tv, .uk, and .fr*. The final stage of this process has occurred only recently, allowing for essentially unrestricted TLDs to be used, such as *.search, .live* and *.amazon.* Finally, non-roman character domains are now being allowed, presenting a new host of technical problems for Internet

[42] This technical problem and the political negotiation to switch away from the 48-bit architecture of IPv4 to 128-bit IPv6 will be addressed under the next section, the IETF.

architecture, but alleviating a political problem caused by the forced use of roman characters for domain routing. While this process of domain name proliferation seems to be coming to a close, with the new, nearly unrestricted TLDs being introduce, the political problems still exist.

To solve the political problems with TLD proliferation, ICANN has stepped outside its original charter, establishing a committee to deal with these domain disputes. While this expansion seems to step on the institutional aspirations of the World Intellectual Property Organization (WIPO), the system that has been put into place seems to be highly effective. The Uniform Dispute Resolution Policy as established by ICANN does much good in keeping the disputes over domain names at a fairly low level, shifting authority away from any international institution, towards arbitration or local courts. ICANN, in holding the TLD and Root, is able to force dispute resolution policies on registries and registrars. While ICANN has done a decent job of administering Root Level governance of the Internet as well as TLDs, the still very bureaucratic nature of the corporation derived from the GAC's interactions with the Board has led to a slow-down in the pace of disruption and innovation within the Internet and technology sectors (Mueller, 2002).[43] But the fundamentally privatized nature of Internet governance structures has left it free to adapt more readily to the dynamic realities of technological change than perhaps a true treaty organization would be capable of adapting.

[43] Interestingly, Mueller seems to pre-sage the coming of Web 2.0, with a radical shift of disruption coming from outside the system that had already been created. This in turn prompts institutional change at ICANN, namely in forcing TLD proliferation in both 2006 and 2014.

ISOC, IAB, IRTF and the IETF

Aside from questions of Root governance and TLDs, one other major area of the Internet requires distinct governance, namely Internet Protocol. Internet Protocol, or IP, is the assignment of numbers to machines, as well as the manner in which the various networks and networked machines access each other. The current IP, IPv6, has a long and storied political adoption story that has been driven primarily by the Internet Engineering Task Force, a subdivision and independent work group in conjunction with the Internet Architecture Board. Whereas ICANN is a more political body focused on administering the Root and TLDs, the IETF and IAB are more technical working groups that focus on technical standards adoption for the Internet. And instead of having a distinct corporate structure in the manner of ICANN, or an international treaty institutional structure, the IAB functions as an operational committee of an international professional society, the Internet Society.

The Internet Society, as previously mentioned in sections above, began its life as an institutional working group supporting the activities of the Internet community created at ISI by many of the "Fathers of the Internet" (ISOC, 2015). ISOC is comprised of over 65,000 individual members in 100 chapters, as well as 145 organizational members. Through the system of Request for Comments (RFCs) organized and administered by ISOC, decisions concerning technical issues for the Internet are made collaboratively by the primary users of the Internet. This much more active system of RFCs allows for ISOC to funnel the self-governing nature of the Internet into actual user policies in a way that is much more directly connected to users than ICANN's claims of supporting Internet self-governance. It should be noted that all RFCs are the intellectual property of

ISOC, but are freely available for all, members or non-members to view.[44] While ISOC claims three particular goals, namely standards setting, public policy creation and advising, and education, the most salient goal *vis-a-vis* Internet governance is that of standards setting. ISOC as a whole does not itself set standards, instead delegating this task to three smaller committees that cooperate to set standards. These committees are the Internet Architecture Board (IAB), the Internet Research Task Force (IRTF) and the Internet Engineering Task Force (IETF).

IEFT

The IETF is perhaps the most nebulous, but most important of these groups for the technical governance of the Internet. Unlike the other groups that will be examined for this chapter, the IETF has a very loosely defined membership, and could best be described as an open working group for Internet technical standards. The majority of the working group is made up of freely contributing volunteer engineers. While there are three official meetings each year to coordinate on projects, the vast majority of the work is done within the mailing lists for IETF. Various working groups are generated to deal with specific issue areas, and are overseen by Area Directors, who are members of the Internet Engineering Steering Group. IETF deals directly with the technical problems of the Internet from an engineering perspective, working towards resolving these issues and producing RFCs for eventual adoption as official protocols and standards. It should be noted that the IETF does not function completely independently. The IESG serves to direct the activities of the IETF, acting essentially as project managers, herding the Internet cattle to make accomplish work on pressing issues. IANA interfaces with IETF

[44] This is especially useful for the comedy RFCs that are traditionally submitted on April Fool's Day.

to coordinate assignment parameters for Internet protocols, even though IANA's assignment function has been primarily subsumed by ICANN. Finally, the IETF interfaces with the IAB to be given architectural oversight.

IAB

The Internet Architecture Board is a much more organized committee than the IETF working group, but is in actuality a subcommittee of IETF. The IAB's membership is also much more limited than that of the IETF. A nominating committee from the IETF selects the IAB, and in turn the IAB functions as the oversight board for the IETF, and assigns the area directors for the IESG. IAB is responsible for architectural issues for the protocol and procedures for the Internet, and was a highly instrumental group for the adoption of IPv6's hexadecimal protocol to replace the rapidly filling dot decimal protocols of IPv4. In addition to the standards oversight role, the IAB also serves as the editorial board for the RFC system, giving a great deal of de facto control over the Internet's future to the members of the IAB. Much of the work done by the IAB is conducted in 90-minute phone conferences that are held twice monthly, on the first and third Wednesday of each month. IAB does not have any official role in operational or commercial matters for the Internet, and merely serves as an advisor in policy matters. While the IAB does have oversight authority for technical Internet matters, it do not itself set policy and standards, merely guiding the policy and standards making process. The primary work of both the IAB and the IETF is focused on near-term technical problems and standards setting for the Internet. For more long-term evolutionary concerns, the IAB has the ability to set tasks for the Internet Research Task Force.

IRTF

The structure of the IRTF is very similar, if more limited in numbers, to that of the IETF. These two organizations are generally considered to be parallel organizations with differences in terms of the scope of its activities. While IETF is concerned with the short-term standards adoption for the Internet, the IRTF is concerned with long-term development and evolution for the Internet. Much like IEFT, IRTF's membership is open and composed primarily of individual engineers. These members are then tasked into one of the nine currently chartered research groups, each headed by a research director who sits as a member of the Internet Research Steering Group. These research groups deal with long-term issues like encryptions, global access to the Internet, and Internet congestion mitigations. The IRTF was responsible for anticipating the problems that IPv4 would cause due to eventual scarcity of IP addresses, and for pushing forward research into a new Internet Protocol. Their recommendations and research are coordinated by the IAB and then turned into short-term engineering problems for IETF working groups.

With the collaboration between these various groups, the technical problems of the Internet are addressed in an open and collaborative way. ISOC oversees this work and promotes the results to the outside and lay world. Building on decades of history, ISOC and these various committees promote a particular type of problem-solving and institutional approach that appears thus far to have been unique to the Internet. In what has become a cliché, it appears that these technology groups, through their open collaborative problem solving approach, are attempting to save the world. The actual

humanitarian contribution may be suspect, but the technical advances facilitated by this approach have had a great deal of impact on the way that society functions.

Conclusions

The two major governance problems for the Internet, managing the Root and adopting technical standards have led to the creation of two vastly different regimes. Yet these regimes are connected by an interesting history of evolution driven by a handful of participants who are considered to be the “Fathers of the Internet.” ISOC, the Internet Society and all its constitutive committees were the original institution for the Internet, setting early technical standards and eventually making a claim for the governance of the Root under the guidance of John Postel. While this play for governance authority failed, the same group of participants did lead to the eventual creation of ICANN. Both of these institutions, while significantly different in practice, make a similar claim to furthering the self-governance of the Internet. The Root governance aspect of the Internet appears to have fallen away from self-governance, with a good deal of control being exercised by political players, especially the US Department of Commerce. But on technical standards adoption and Internet Protocol, the Internet, through ISOC, has retained substantial control and self-governance.

What is clear about these institutions is that they are the outcome of attempts at fairly novel approaches to institution creation for governance issues. ICANN chose the route of creating a non-profit corporation to assign names and numbers on the Internet as well as securing governance for the Root. ISOC has attempted to retain the early decision-making institutional nature of the Internet, relying on open participation from volunteers. Both institutions reach back to the Request For Comment method of

decision making that has been adopted heavily by the technology industry and the open-source movement. It is important to note the RFC system was used by the "Fathers of the Internet" from the earliest days of the technical inception of the network of networks that would eventually form the modern Internet. The use of RFCs is a rather important and fitting tribute to the creation of this new industry and medium, and its adoption by the larger community could, be seen above and beyond the creation of the internet, as a very important contribution to the world. These two institutions, ISOC and ICANN, are not, however, the only participants in Internet governance. While they may be the largest and most important, other institutions play important roles as well. These other institutions and their role in governing the functionality of the Internet will be the primary focus of the next chapter.

CHAPTER 7: INTELLECUTAL PROPERTY, TRANSMISSION, AND COMMERCE: THE LESS TECHNICAL GOVERNANCE OF THE INTERNET

"I spend a lot more time than any person should have to talking with lawyers and thinking about intellectual property issues" – Linus Torvald

This chapter serves as the second part of the case study of the governance of the Internet. Much like the chapter 4, this chapter will examine the institutions of internet governance within a horizontal context, operating in conjunction with a series of wider international institutions. This approach should aide in the understanding of the institutional context of Internet governance, extending beyond technical governance to more political questions.

While the Internet Corporation for Assigned Names and Numbers (ICANN) and the Internet Society (ISOC) accomplish much of the technical governance for the Internet, namely governance of the Root and the creation of technical standards for operation, there are still many aspects of the Internet that require a good deal of governance. Most of these questions come not from the technical operation of the Internet, but are more ephemeral in nature, originating from conflicts between people as opposed to technical conflicts. Three of these major problems are (1) the protection and assignment of intellectual property, (2) the maintenance of data transmission worldwide, and (3) the regulation of commercial activity on the Internet. Each of these problems correlates with a particular institution that has sought to ameliorate the issues that could potentially bring the Internet to a screeching halt due to political problems. The problem of intellectual property on the Internet, while dealt with in part by ICANN as described in the previous chapter, is the primary concern for the World Intellectual Property Organization (WIPO), a subdivision of the United Nations Economic and Social Council.

Ensuring the maintenance of data transmission internationally falls under the purview of the International Telecommunications Union (ITU). The United States Department of Commerce, through the National Telecommunications and Information Administration (NTIA), attempts to deal with commercial issues for Internet use, but many other international bodies also attempt to deal with these issues as well, leading to significant political tensions for the international Internet community.

This chapter will examine the role played by these various organizations in governing specific political problems that have emerged from the Internet's expansion into a large part of the global society and economy. First, the question of intellectual property will be explored, examining the role of WIPO in dealing with IP[45] disputes, as well as how WIPO interacts with ICANN for IP issues. Second, the question of data transmission and International Telecommunication Regulations (ITRs) will be examined by focusing on the ITU. The particular problem of ITRs, namely their status as the global treaties regulating telecommunication, and their creation prior to the proliferation of the Internet will be examined in greater detail by examining the WCIT-12 process, an attempt to draft new regulations that would function more properly in an Internet world. Finally, regulation of commercial activity on the Internet will be explored through an examination of the US Department of Commerce, with a main focus on NTIA. Other international actors' impact on commercial activity regulation will also be explored. Some brief conclusions about practical Internet governance will be included to complete the chapter.

[45] For this chapter, the acronym IP will stand for Intellectual Property. This is not to be confused with Internet Protocol from the previous chapter. Internet Protocol will be fully written out for this chapter.

Intellectual Property on the Internet and WIPO

With the commercialization of the Internet in the early 1990s, a massive proliferation of users and websites occurred, generating many intellectual property disputes. The structure of the Internet from its inception relied on an essentially free market, but a free market limited by artificial scarcity in Internet real estate. The primary IP issues that emerges from the commercialization is that of domain name ownership, an issue that is controlled by ICANN. Yet the solution of ICANN being responsible for domain name dispute resolution was not the only proposed plan, nor is it complete in its dominance for dispute resolution. The World Intellectual Property Organization also plays an important role in domain name dispute resolution. More important, however, is the role WIPO plays on other IP disputes in relation to the Internet. As Internet traffic speeds have increased, and overall use for the Internet has skyrocketed, WIPO has found itself responsible for dealing with IP issues not about the Internet itself, but those which are caused by the Internet.

WIPO itself is a specialized agency of the United Nations, and is a replacement organization[46] meant to enact the Berne Convention and the Paris Convention, the primary conventions enacting global IP laws. The Convention Establishing the World Intellectual Property Organization was signed in 1967 at Stockholm, and WIPO was brought into full force in 1970. This organization, based in Geneva, is responsible for the administration of 26 treaties, each dealing with various aspects of intellectual property. The majority of these treaties are focused on traditional types of media and works of intellectual property. It is only very recently, within the last 15 years, that WIPO has

[46] The original organization for this role was BIRPI, but was eventually supplanted by WIPO.

begun to be responsible for issues concerning IP on the Internet. Yet from the earliest days of the commercial Internet, WIPO has attempted to play a large role in Internet IP disputes.

Early Play for Domain Name Ownership

Before the creation of ICANN in 1998, the ownership and maintenance of the DNS Root was very much in dispute. While the Root had been created and administered by elements of the Internet Society, namely IANA, and was funded by the United States government, the international community was less certain of the role that the United States should play in further governing the Root. Much of the story of the governance of the Root is covered in the previous chapter, and in much greater detail by Mueller 2002, yet the political maneuvering by WIPO in its attempt to rule the Root is of great importance to questions of administering IP disputes on the Internet to this day. With the issuance of the US government White Paper in 1998, WIPO saw the opportunity to open up the Internet to a much greater degree of international oversight. WIPO's counter to the gTLD-MoU, the 1998 Interim report, proposed a much different approach to Internet governance than was eventually agreed upon. Due to the nature of the institution, WIPO's report was focused very heavily on Intellectual Property concerns, and proposed to give WIPO a very large degree of power.

WIPO's proposal focused on securing complete and accurate information from domain name registrants, with very large penalties levied for false information provision. Along with this information collection, the database of registrants should be cheaply available to determine if an IP violation has occurred. A separate arbitration process overseen by WIPO for IP disputes would be part of the contract for purchasing a domain

name, and exclusion rights could be given to famous people for a one-time fee (WIPO 1998). While WIPO focused on alleviating domain name disputes in a very open format, this proposal was met by much backlash from a broad spectrum of the Internet community (Mueller,2002 pp191). The focus of WIPO remained firmly on IP dispute resolution, even at the expense of privacy concerns and the notion of fostering competition to the DNS. Although the Internet by this point had been commercialized, the US Commerce Department still had authority over the infrastructure of the Internet, without which WIPO could not implement its plan and the Commerce Department found itself aligned with ICANN's goals for IP dispute resolution. In the end, WIPO lost its bid to control the Root to ICANN, and its role in IP on the Internet was greatly reduced. Instead of having overall DNS Root authority, ICANN's Universal Dispute Resolution Policy was put into place and WIPO was reduced to trademark concerns in the resolution process.

Trademark concerns in the DNS registration process were one of the original ways that WIPO interfaced with the Internet community. Under the Madrid Agreement and Protocol, one of the chief treaties administered by WIPO, corporations may register their trademarks internationally. While in 1996 these trademark disputes were limited to entities within the United States, it was already foreseen by Robert Shaw that many international trademark disputes would emerge in the coming years. Alexander Gigante was also quick to point out in that same year that there was an ongoing conflation between domain names and trademarks. It would become clear that some internationally accepted practice for dispute resolution would become necessary. William Foster suggested that WIPO play an important role in this process, as it was

already adept at international IP dispute resolution. The major real-world impact of WIPO on Internet IP rights has not come from dispute resolution however much the early Internet community might have liked it to. Once ICANN implemented the UDRP, WIPO transitioned into another role, that of shepherding Country Code Top Level Domains[47] over into the ICANN system of gTLDs. While it could be interpreted that WIPO lost its bid for the Root, it have since come to have a "symbiotic relationship" with ICANN (Mueller, 2002 pp 227). WIPO undertakes the policy initiative to create new rights in domain names, and ICANN provides the control necessary to actually implement these plans. For the first two decades of the commercial Internet, the scarcity of domain names drove this relationship to be highly successful. But ICANN has since done away with the artificial scarcity of domain names, and has accordingly left WIPO without much of a role to play in IP domain name dispute resolution. WIPO made a valiant bid for control over the Root, but in losing has now found itself without a role to play in domain name intellectual property.

The Internet Treaties

Although WIPO had lost its place in the realm of domain name IP, a much larger role for interaction with the Internet was underway within the international community. Throughout the 1970s and 1980s new technologies came into being that made the idea of intellectual property theft a much more expansive idea. While IP had already been expanded to cover a large variety of intellectual output, technology had begun to make it possible not only to plagiarize, but outright to steal others' works of IP. This new type of theft quickly adopted the piracy moniker, and caused a great deal of new law to become

[47] ccTLDs

necessary (WIPO 2002). As technology began to progress, especially in the realm of information technology, piracy began to become an even more important problem to address. For several decades, the policy followed a principle of “guided development,” but by the middle of the 1990s, it was clear that this policy would no longer function. Accordingly, two new treaties were drafted to update modern IP law for the computer age. These treaties, the WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT), are collectively known as the Internet Treaties.

Both of these treaties were adopted on December 20, 1996, during the period of chaos when the institutions of Internet governance were undergoing a period of reformation. Taken together these two treaties enhance the protections of IP rights as created under the Berne Convention. These treaties deal specifically with what is called the “digital agenda” and seek to expand and clarify the role that intellectual property rights play with regard to the expanding role of computers and networked computing to media proliferation and consumption. The rights of communication with the public and the distribution of intellectual property are two of the major rights at play in the WCT, and are extended under the so-called “Umbrella solution.” This solution reserves IP rights to the authors or creators of the work regardless of transmission method, and the timing of consumption of the work by the individual members of the public. It also allows the transmission to be contractually negotiated out to third parties, while the creator retains the rights. Perhaps more important than simply guaranteeing IP rights for creators, WCT allows for technological solutions to prevent piracy, namely the creation of Digital Rights Management systems. The treaties make breaking the DRM systems a crime, as well as the act of piracy itself.

While WCT built primarily off of the Berne Convention, the WPPT builds primarily off of the Rome Convention, securing rights for phonograms (sound recordings) and performances. The WPPT functions almost as a mirror to the WCT, accomplishing the same goals of expanding IP rights to phonographs and performances that the WCT did for copyright holders in traditional mediums. Under the WPPT, making a digital copy of a phonogram or performance is to be treated the same way as copying these to a cassette tape. To determine if any reproduction is justified, Article 16 of WPPT suggests the "three-step test." Many explicit rights for performers and producers are laid out by the WPPT, and these rights, often called the neighboring rights, are extended under the same "Umbrella solution" as laid out in WCT. These rights deal with certain moral and economic rights to intellectual property that should be reserved to the performers, such as the right to be identified as the performer and the ability to authorize the distribution and communication of the performance. The sole right to copy their performance is also guaranteed, along with the right to distribution of their work.

Current Activity

With the expansion of IP rights to artists through digital mediums, WIPO's Internet treaties have secured WIPO's places as the institution responsible for IP rights on the Internet. This position has created several new opportunities and roles for WIPO as the Internet and information technology have continued to advance. Perhaps the most important position for WIPO is that of spearheading an expansion of IP rights to broadcasters. Currently very little IP protection is afforded to broadcasters, and WIPO has begun to campaign for a new treaty or rights regime to expand the rights and protections of broadcasters. They believe that this expansion would also further benefit

the performers and producers of the material (WIPO, 2013). WIPO has also been highly instrumental in helping various nations enact legal provisions to support the Internet treaties, such as the Digital Millennium Copyright Act and the EU Information Services Directive.

Finally, in roundabout fashion, WIPO has begun to work heavily to help shutter websites that promote digital piracy. While WIPO has little by way of enforcement mechanisms for fighting piracy, it does have one potentially useful tool. WIPO still plays a large role in domain name disputes at the international level. If a well-known piracy website, such as www.ThePirateBay.se, comes into a domain name dispute, WIPO can find against the website and give control of the domain name to another party. Such a case occurred in 2012, when ThePirateBay was forced to relinquish control over fuck.timkuik.com to Tim Kuik, a well-known advocate for anti-piracy activity (Ernesto, 2012). This trademark dispute represents a potential future avenue for WIPO to directly fight digital piracy.

While WIPO's position in the current activity of practical Internet governance appears to be waning, the past contributions to the Internet, from challenging Root governance to the creation and administration of the Internet Treaties, have had a significant impact on the shape of the Internet today. WIPO's symbiotic relationship with ICANN in the promotion of merging ccTLDs with gTLDs was highly instrumental in making the Internet truly international. ICANN may exercise important control over IP disputes for domain names, but WIPO still handles IP disputes through the Internet, a role that is expanding into the future. With an important role in administering the Internet

treaties, and a position to expand IP rights to broadcasters, WIPO continues to play a highly important, if diminished, place in Internet governance.

Data Transmission, the ITU, and WCIT-12

Once again the International Telecommunication Union, the institution created in 1865 to coordinate standards for international telegraphs, finds itself in a position of international importance. In this instance, as opposed to that of space exploration and satellite orbits, the role of the ITU appears to be actually less prominent than it should probably be. The ITU does play an important role in governing the Internet, but instead of actually governing the Internet directly, a position taken up by ICANN and ISOC, ITU serves as an advisory group to both of those other bodies. While ISOC plays a significant part in standards setting for the Internet through ITER and IETF, the ITU's Telecommunication Standardization Sector (ITU-T) serves as the global Information and Communications Technologies (ICT) standards setting body (ITU, 2015).

The way that the ITU-T functions is surprisingly similar to both ITER and ITEF, utilizing a contribution driven and consensus based environment overseen by a particular study group chairman. While this second string standards setting is of passing importance to the ITU's place in governing the Internet, a more important and interesting role comes from the creation and enforcement of International Telecommunication Regulations (ITRs) and their negotiation under the World Conference on International Telecommunication (WCIT-12). It should also be noted that the ITU has expressed the opinion that its own contribution to Internet governance should be larger, and it has also made an attempt to wrest control of the Root from ICANN. The remainder of this section will address these two issues: ITU's attempt to

remove control of the Root from the US and ICANN, and the WCIT-12 process of rewriting the ITRs.

ITU's Power Play for the Root

From the very beginning of the commercialized Internet, it was clear that new institutions would be necessary to govern this rapidly expanding realm of human activity. While the Postel plan was out for comment, and WIPO was making an overreaching play for the root, participants in the process from the ITU were instrumental in pushing through the original gTLD-MoU (Mueller, 2002). Throughout the process of negotiation for the creation of ICANN, as guided by the US Department of Commerce, ITU participants[48] sat on the International Ad Hoc Committee responsible for negotiation. The ITU were even capable of negotiating a position on the Board of ICANN, securing for itself an important say in the governance of the Internet. Yet with the creation of ICANN, many problems emerged that the ITU believed it could leverage to gain more control over the governance of the Internet. The foremost of these problems was the large role played by the United States in overseeing ICANN (Mueller 2010). This privileged position facilitated the ITU in calling a World Summit on the Information Society in 2002-2005. The ITU was the spearhead organization for this summit meant to address the digital divide through worldwide redistribution of technology in the old UN model. This World Summit would end up being dominated by the issues surrounding ICANN, and would evolve into the World Summit on Internet Governance.

[48] Namely Robert Shaw.

The ITU, while playing a role in ICANN as a stakeholder still exists “as a redoubt for supporters of an intergovernmental solution…” to the problem of ICANN’s oversight being solely held by the United States (Mueller, 2010 p 216). There appears to be significant institutional drama caused by the non-traditional structures of ICANN, and ITU is at the forefront of calls to change the system to international oversight for ICANN. The treaty-based institutions of governance cause a great deal of friction with the Organically Developed Internet Institutions (ODii), such as ICANN and ISOC, resulting in attempts to subvert the system that has evolved. These subversion attempts from the international level will be one of the primary foci of the next chapter. For now, attention should shift to the WCIT-12 process and the ITRs.

WCIT-12, ITRs, and conflict with ISOC

One of the primary responsibilities of the ITU is the creation and implementation of International Telecommunications Regulations. These ITRs serve to make communication work at an international level, ensuring technical compatibility of various states’ telecommunications networks. The most recent widely adopted set of ITRs was adopted at the Melbourne World Administrative Telegraphy and Telephone Conference in 1988. At that time, the Internet was still in its infancy and hardly a pressing concern for international regulation. Telephone networks were predominately national monopolies and not a large concern for new regulation. The ITRs that exited from this meeting would serve as a foundation for regulating the modern communication system, but upon the rise of the Internet and the break-up of telecommunications monopolies, a new set of ITRs became a pressing need. Along with changes in technology that had occurred, massive changes had also been undertaken in institution creation. The ODiis

[49]emerged as a multi-stakeholder model for governing the Internet, and privatization became the order of the day. This new world situation would cause fundamental problems with the WCIT-12 process, which was to be driven by ITU in the old world model of a large international treaty making conference.

Convened in Dubai in December of 2012, WCIT-12 is perhaps best viewed as a power struggle between the ODiis and the ITU over what the future of Internet governance should look like. However, as opposed to focusing on the problem of US control of the Internet, the major issue in this instance would be the types of stakeholders who should have a say in Internet governance. The ITU, building on almost 150 years of experience regulating international telecommunications and acting as the organizer of the conference, would support a model very familiar to that of the post-world war period. States as the primary stakeholders for the Internet, the so-called single stakeholder model, would be supported by the ITU as 85 national participants in the conference. The ODiis and the remainder of the states present would push for the new model, the multistakeholder model, that had emerged with the Internet, and which had to that point been the predominate method of Internet governance. This model supports the notion that the Internet is not the sole provenance of nation-states, and that a wider variety of players are stakeholders in the Internet (Wentworth, 2013). These new stakeholders include international institutions, corporations, non-profit organizations, and even individuals bounded together into interest groups (Mueller, 2010).

[49] References to ODiis will be used for ICANN and ISOC.

It is interesting to note that the conference began with an address by the President and CEO of ICANN, Fadi Chehade, in which he called for an era of increased cooperation between ICANN and the ITU. In his address, he also calls for the organization to be "… open and vital; let's remove the walls; open the windows; build organizations that are welcoming and transparent" (Chehade, 2012). This call is rather ironic due to the very opaque process actually put into place by the ITU, resulting in the creation of a new website wcitleaks.com that would attempt to leak as many of the working documents of both WCIT-12 and the ITU as a whole. These leaks began once it became clear that the ITU's openness and transparency extended only to the nation-state members and observer groups of the ITU.

Aside from this issue of transparency, several major proposals for the ITRs were brought forth by the ITU, and opposed by ISOC, the primary participating ODii. While the ITU pushed for the ITRs to apply to Member States, and ISOC generally agree, ISOC recognized that the Internet is fundamentally different, and requires regulations to apply more broadly than to just recognized operating agencies. Accordingly, ISOC proposed operating agencies should be referred to in the ITRs more generally, in an attempt to capture groups that would be otherwise unregulated (ISOC, 2012a). The ITU, as previously discussed, also plays a standards setting role through ITU-T, and does so in a much less open and transparent way. ISOC pushed for ITU-T recommendations to be treated as recommendations and not have the same legal status as Regulations.

One of the largest differences in policy is seen in the realm of regulation of private commercial arrangements. The ITU proposed as a matter of treaty law that the ITRs have the ability to regulate IP interconnections. ISOC vehemently opposed this

change, as private commercial arrangements had thus far allowed for a great deal of growth in the Internet. It argued that creating a one-size-fits-all policy would remove the ability of local market conditions to be reflected by policy (ISOC, 2012b). On top of these considerations, an attempt was put forth by the ITU to deal with unsolicited bulk electronic communications, or spam emails. ISOC recognized that spam is a very large problem for quality of life on the Internet, but did not agree that it should be part of a treaty, representing a much larger push that content not be party of any international treaty effort.

The ITU pushed for certain quality of service requirements to be put into place by the new ITRs, a move opposed by ISOC. While it might seem just from a political and social standpoint to require certain standards of service, this move by the ITU was viewed by ISOC as a fundamental misunderstanding of how the Internet actually works. By putting into play the proposed standards the ITU would be attempting fundamentally to change the way that Internet interconnectivity functions, and would actually increase the cost of Internet traffic (ISOC, 2012b). Along with the push for standards of service, the ITU attempted to pass a motion for Member States to know how traffic is being routed across their territories. Again, ISOC pointed out that this is not how the Internet actually works. Routing does not conform to national boundaries and is dynamic in nature, constantly changing the flows as necessary. The networks upon which this traffic flows often involve more than one country as well, and data packets do not leave a footprint where they have gone.

Finally, the ITU attempted to pass various changes to the ITRs that would enhance cybersecurity. The focus for these cybersecurity issues would be on nation-

state level actions. Accordingly, ISOC was against a host of the changes proposed by the ITU, primarily on grounds of reliance on a single stakeholder model (ISOC, 2012). The specifics of cybersecurity, particularly digital defense, national security, content and cybercrime should be handled by the international Internet community in a mulitstakeholder model. The only area of cybersecurity deemed worthy for the ITRs by ISOC is that of network robustness and the maintenance of the international telecommunications networks. ISOC holds that the ITRs should remain high level regulations and guidelines, and that specific policies should be adopted through the multistakeholder model (ISOC, 2012). ITRs, in the view of ISOC, should function as constitutional rules, the rules for rule making. All other regulations should be arrived at by consensus of all parties involved, not just strictly Member States of the ITU (ISOC, 2012).

The vast difference in policy goals between the ITU and ISOC betrays a fundamental divide in approaches to global regulation. The ITU, a long-standing international treaty organization is fundamentally oriented to produce treaties and regulations in a traditional Member State-centric methodology. ISOC, on the other hand, is representative of the multistakeholder model of the organically derived Internet institutions, where consensus decisions are made from a wide variety of actors, not strictly nation-states. This fundamental divide left the process of revising the ITRs at WCIT-12 as a non-starter. While the conference went off relatively well, the outcome was a set of ITRs that were not acceptable to all parties. While many developing countries did sign on, none of the major players in the Internet, including the United States, Japan, Korea, and many EU countries, did so. The main cause for this defection

can be placed on an abandonment of the mulitstakeholder model of decision making, as well as on an overreach by the ITU in the types of regulations that would be passed. This broken treaty revision process has left the world in a bit of a lurch for international Internet governance of data transmission.

It is clear that the ITU, apart from its position within ICANN as an advisor, has an important role to play in governing the Internet. But the most recent failed ITR revision process has revealed that the ITU must fundamentally alter its understanding of how the Internet actually functions. A revision of the governance model of the Internet must be taken by the ITU, and it must reconcile reality with its own institutional inertia to remain relevant to Internet governance moving forward. Only with these revisions can the future of the Internet and its ability to be interoperable across national boundaries be assured.

The United States Department of Commerce, ICANN, The FTC and Digital Commerce

The question of commercial regulation of the Internet leads to many interesting answers. While the Internet is by its very nature international, with the possibility of data flowing across national boundaries with extreme ease precipitating the flow of goods in a similar manner, the primary regulators of this commerce are national entities. For simplicity's sake, this section will focus on the United States' regulatory entities, the Department of Commerce and the Federal Trade Commission. But this is by no means an exhaustive case study, as the European Union, Russia, China, Singapore, and Brazil among many other examples also have highly important commercial regulatory agencies for the Internet. Yet due to the interesting relationship between the United States Department of Commerce and the ODiis, the primary focus of this section will be placed on US regulatory agencies for Internet commerce.

Due to its essentially anonymous nature the Internet creates many avenues for criminal activity, especially when put into combination with economic activity. Problems with purchasing goods and services through the Internet, identity theft, and security of financial information abound. The Federal Trade Commission has various rules and regulations to combat these problems, and exists as part of the International Consumer Protection Network (ICPEN). But these problems are not the only commercial problems facing Internet governance. Perhaps an even larger issues is that of free and open competition between services on the Internet. The questions of competition and regulation of criminal activity on the Internet have served to create some of the largest regulations and governance moves by the FTC in recent years, including several anti-trust cases against Microsoft and Google. This section will examine the consumer protection regulations of the FTC and their relation to ICPEN, the competition-fostering regulations of the FTC, and the unique relationship between the United States Department of Commerce, the Internet Policy Task Force (IPTF), and ICANN.

Internet Consumer Protection Rules in the US and Internationally

With the opening of the Internet to the world, and the accompanying proliferation of websites, came a new avenue for commerce, what would come to be known at e-commerce. E-commerce would precipitate a period of economic growth and increase in trade for much of the world, allowing individuals around the world to connect in marketplaces that would not have ever been possible without the Internet. But with economic growth also came the growth and evolution of new economic problems and crimes. In order to deal with these new developments, the United States Federal Trade Commission created new consumer protection rules that would serve as the foundation

for legal protection for e-commerce. The most important of these rules are the Mail, Internet or Telephone Order Merchandise Rule, the CAN-SPAM rule, the Children's Online Privacy Protection Rule (COPPA), and the Identity Theft and Assumption Deterrence Act. All of these rules are administered by the FTC's Bureau of Consumer Protection for the benefit of securing e-commerce transactions for consumers.

The Mail, Internet or Telephone Order Merchandise Rule is designed to protect transactions for goods that are ordered on-line, allowing for reasonable shipping times to be expected, or for the prompt refund of payment. This rule is built on old rules from 1975 to expand mail and telephone transaction to Internet transaction, solving an old problem in a new media with previously proven rules (FTC, 2015). With the anonymity of transactions that characterize the Internet, even while requiring personal identification documentation, it becomes much easier to steal and assume identities. To combat this problem, and deter criminals, the FTC-administered Identity Theft and Assumption Deterrence Act of 1998 serves to increase the penalties for these crimes in an attempt to deter potential criminals. The CAN-SPAM rule is an attempt to reduce the amount of unsolicited advertising emails received by consumers, a goal originally expressed by the working groups for the WCIT-12 conference.

The old adage about activity on the Internet states that "On the Internet, no one knows you are a dog," betraying the supposedly anonymous nature of Internet users. Yet this anonymity has proven to be more fictitious in the decades since that phrase was coined. This loss of privacy is especially relevant in relation to children's activities on the Internet. To increase the protection of children's privacy online, the FTC has created COPPA. These rules prohibit the collection of information online for persons

under the age of 13. In order for operators of web services to collect information from persons under the age of 13, verifiable parental consent must be obtained. Participation in online activities for persons under the age of 13 may not be made conditional based on the collection of information. Any information obtained by operators may not be disclosed to third parties.

These rules taken together regulate a good deal of consumer-level commercial activity on the Internet, from data collection and dissemination to exchange of goods. But the FTC does not operate alone on these issues. The International Consumer Protection Network (ICPEN) serves as an international coordination body for the sharing of information and best practices in relation to consumer protection activities. Established in 1992, and revised in 2006, many of the world's largest economies, including the Unites States, the European Union, Russia and China, have all signed on to ICPEN. Going beyond simple intelligence sharing and advocacy, ICPEN also works with the OECD to deal with cross-national breaches of consumer protection laws (ICPEN, 2015). This international framework serves to allow for variation in national consumer protection, but also works to extend consumer protections internationally, especially in the face of international consumer activity facilitated by the Internet.

Competitive Commercial Regulation

The other major arm of the FTC, the Bureau of Competition, is concerned with the fostering of the free market economic system. The Bureau of Competition serves to enforce the anti-trust laws in place in the United States. Problems of competition on the Internet create many interesting issues for both regulators and Internet companies. Perhaps the largest example to date of the FTC enforcing anti-trust laws on Internet

corporations is the Microsoft anti-trust case (US v Microsoft, 2000). Microsoft was found to be acting in the role of a trust by bundling the program Internet Explorer as the default browser option in its Windows operating systems. This anti-trust ruling forced Microsoft to break up into several smaller companies, as well as make Internet Explorer a much less prominent program in the operating system. While this might be a rather clear-cut case of monopolistic activity in the technology sector, the rise of Internet commerce makes questions of trusts much more complicated.

The great example of what could possibly be a trust in the Internet today comes from Google. While Google has been previously investigated for trust activity, Peter Thiel raises the question as to Google being a trust in which realm of activity (Thiel, 2010). If one were to consider Google as a mere search engine, then perhaps due to sheer market share the company could be considered as a trust. If Google were to be considered an online advertising company, then the argument could still be made for its status as a trust. While the vast majority of Google's revenues do in fact come from advertising, this is not the full extent of Google's economic activity. Taken in the context of all advertising firms, Google represents a very small portion of the revenues taken in in the United States, much less globally. If Google is considered to be a technology and devices company, then its revenues are very small compared to the rest of the market. So the question becomes: under which economic activity is Google acting as a trust?

A further complication, as also pointed out by Peter Thiel,[50] is the nature of the technology and Internet industry itself. In order to be a successful company in the technology sector, it behooves companies to create new and novel technologies that

[50] An excellent rumination on this subject of innovation and market dominance in the tech sector can be found in Peter Thiel's "Zero to One".

will become the dominant player in an entirely new activity. Google represents one of these successful companies, becoming the dominant player in Internet content searches through the creation of a new algorithm for the sorting and presentation of search results. While other search engines existed prior to Google, and others have since entered the field, Google remains the dominant market player by far through the high quality of their product (Thiel, 2010). This situation has contributed to Google occupying the position of a trust in the search field, resulting in investigations by the European Commission into Google's monopolistic activity. Yet Google did not attain this position either by being granted a government exclusive contract to search results or through collusion with other players. Google has achieved this position through market dominance based on a superior product.

This important distinction in capitalism, between a naturally occurring monopoly and a nefariously produced monopoly, can be rather difficult to discern. It is the job of the Bureau of Competition to determine whether this is trust activity, as it has been by the European Commission, or if it is just a by-product of the capitalist system. Thus far, the Bureau of Competition has been loath to declare these types of monopolies as trusts, but this could change drastically in the future based on changes in the political winds or if an international consensus begins to emerge. It is important to note that the FTC and the Bureau of Competition also collaborate with similar institutions globally, but do not always come to similar conclusions.

US Department of Commerce and ICANN

As has been previously explored, the United States Department of Commerce has a very special and interesting relationship to the ODiis, essentially acting as the

sole oversight body. While the Internet was originally developed by DARPA and the Department of Defense, once it became clear that the potential for the Internet to impact society as a whole becomes clear, financial and oversight responsibilities for the Internet were transferred to the Department of Commerce under the National Telecommunications and Information Administration. These responsibilities ultimately included authority for the Internet Assigned Numbers Authority (IANA). The previous chapter details how IANA came to be under ICANN, but this section will examine the specific relationship between ICANN and the United States Department of commerce, with particular attention paid to the Affirmation of Commitments (AOC) between the two, as signed in 2009.

While a memorandum of understanding was signed between ICANN and the Department of Commerce in 1998, and official recognition of ICANN occurred the next year, these documents did not fully grant authority to ICANN to govern the Root, even if they did establish a great deal of authority for ICANN (Mueller, 2002). It was not until the AoC a decade later that a strong series of affirmations was established between the two entities. In this new document, the Department of Commerce fully affirms the multistakeholder, private sector model for Internet governance, believing that this model can be appropriately used to make quick decisions about the rapidly advancing technology of the Internet. ICANN agrees, under this AoC, to remain a non-profit corporation that will be headquartered in the United States.

The chain of authority for the Department of Commerce and the NTIA in their control over the Internet is a convoluted tale, but authority is ultimately derived from United States Code title 15-1512 and title 47-902. 14 USC 1512 establishes the

Department of Commerce and gives it authority over national and foreign commercial matters, and all subsequently necessary bureaus and agencies. 47 USC 1512 creates the NTIA and grants authority to that agency over telecommunications issues. In part b Sections H and I:

> (H)The authority to provide for the coordination of the telecommunications activities of the executive branch and assist in the formulation of policies and standards for those activities, including (but not limited to) considerations of interoperability, privacy, security, spectrum use, and emergency readiness.
> (I) The authority to develop and set forth telecommunications policies pertaining to the Nation's economic and technological advancement and to the regulation of the telecommunications industry.

Once DARPA released IANA authority based on the United States Code, the natural home for this authority falls to NTIA. With the foundational work for the Internet having been a US military project, the vast majority of early Internet infrastructure was located in the United States, with legacy contracts for governance resting with the Information Sciences Institute at the University of Southern California. Accordingly, the United States has an authoritative claim for ownership of the governmental structures of the Internet. Yet the AoC shows that there is a commitment to a multistakeholder model for Internet governance, taking in a wide variety of international and non-governmental opinions. But the AoC concludes with a statement that the Department of Commerce could terminate the relationship between itself and ICANN given 120 days formal written notice. This situation produces a tenuous authority for ICANN to govern the Internet, an authority which could be easily pulled to the Department of Commerce should political opinions change. It is no wonder that there are attempts both by other nations and by international communities to wrest oversight control from the United States Department

of Commerce to some new Internet governance body. These attempts at subverting the ODiis as they exist currently will be the primary focus of the next chapter.

Conclusions

While the ODiis that serve to govern the technical aspects of the Internet for the most part accomplish their goals in an elegant, if unorthodox, manner the political aspects of Internet governance have been characterized by the older model of governance. This is not to say that these older models are deficient by any means, but, given the mulitstakeholder model that has been generally adopted by Internet users and advisory groups, the traditional treaty law model might be slow to react to particular technological and political issues that emerge from the Internet. Conflict around the political aspects of Internet governance has thus far been relatively minimal, allowing for significant innovation to occur in the realms of commerce and communication facilitated by the Internet.

Intellectual Property issues, especially those revolving around domain name registration, have been predominantly dealt with by ICANN in coordination with WIPO, and those that concern IP theft through the Internet have come under the purview of WIPO in conjunction with law enforcement agencies. Data transmission and standardization issues have fallen to the ITU, with ICANN and ISOC playing important roles. Yet a change in regulations for telecommunications has caused a split in the global community, resulting in the latest set of ITRs negotiated at WCIT-12 to have sparse adoption. Commercial issues are predominantly dealt with by various national agencies, such as the FTC, but there is a great amount of international cooperation between these agencies to resolve any potential issues. While these more political

aspects of Internet governance are from the old single stakeholder model, so far these institutions appear to be functional.

Yet the final issue, that of NTIA's control over the Internet's main infrastructure, and the Department of Commerce's AoC with ICANN create a possibly tenuous relationship between one national government and the mulitstakeholder governance ODiis. This relationship has caused the much consternation in the international Internet community, possibly leading to a reevaluation of the oversight structure of ICANN. The final chapter of this work will examine some policy prescriptions that could ease the tensions surrounding the Department of Commerce's relationship to ICANN as well as bridge the divide between the single stakeholder models of WIPO and ITU and the mulitstakeholder model of ICANN. The next chapter of this work will bring this case study of Internet governance to a close by examining the various national and international attempts at subverting the current governance structure of the Internet.

CHAPTER 8: NATIONAL AND INTERNATIONAL SUBVERSION OF OPEN INTERNET GOVERNANCE: BRICS, PRISMS, AND GREAT FIREWALLS

"That's something that tends to happen with new technologies generally: The most interesting applications turn up on a battlefield, or in a gallery."- William Gibson, Spook Country

This chapter will serve as the final part of the case study on internet governance. It will examine the attempts to subvert the ODiis, both by national and international actors. In this case, the private-oriented international institution is attempted to be subverted by public interests. Unlike the case of subversion in space exploration institutions, the end of these subversion attempts has not been observed, so no conclusion about the resilience of the ODiis can be drawn.

While the Internet has primarily developed an open and organic governance structure, these Organically Developed Internet Institutions (ODiis) do not exist within an institutional vacuum. Outside of the realm of the Internet the traditional actors for governance, nation-states and international organizations, still maintain dominance for other governance structures. These traditional actors have long sought to play a larger role in governing the Internet, openly attempting to subvert the ODiis as the drivers of Internet governance. This chapter will examine these ongoing attempts at subverting the ODiis, at both the national and international levels. Several examples will serve to illustrate the various methods of subversion that have emerged in recent decades.

At the international level, what follows will focus on attempts by the Internet Governance Forum, the World Summit on Information Society and its precursor organizations and summits to centralize control of the Internet in the hands of a United Nations treaty organization. The attempt by the BRICS countries to create an alternative

to the ICANN and US-controlled Internet will also be examined due to interesting intersections with both national subversion and distinct international political problems caused by the impact of the US on the Internet. At the national level, several different subversive approaches have been utilized, and as such several examples will be presented. For attempts to heavily censor Internet content by a national government, the People's Republic of China will serve as the primary case, especially on the so-called Great Firewall of China. Attempts to create separate and parallel networks of networks will be examined with Iran as the primary case. Finally, and perhaps most interestingly, the back door attempts by the United States to use the Internet as an intelligence gathering network, known as PRISM, will be examined. While this final case may not be subversion in the sense of undermining the governance structure of the Internet, the subversion in this case comes from undermining the organically determined norms of the Internet.

While these cases may represent only a small sample of the attempts and methods to subvert the ODiis as well as the more traditional institutions of Internet governance as discussed in the previous chapter, taken together they present a clear picture that the institutional shift represented by the ODiis is not considered to be a universal shift in institutional norms. The traditional, modernity styled norms still exist and have institutional inertia not only to continue operating, but also have and existential mandate to try and expand their governance territory. This tension of institutional interplay between the ODiis and the traditional institutions illustrates the idea that institutions are not set in stone and must be capable of adapting to both technological and political inputs. The future of international institutional norms depends on the

outcome of this institutional conflict, a conflict that is still being played out today. While the theory of institutional subversion, as discussed in chapter 2 does predict subversion, the outcome relies on the international normative and geopolitical context. If the ODiis are being subverted, the true question becomes: is the international community experiencing a shift in norms and geopolitical contexts? Only time and further research will be capable of answering that question. This chapter will attempt to illustrate the institutional conflict theater as represented by Internet institutions.

International Subversions

When attempting to subvert the Internet's ODiis at the international level, there are two major categories of subversion that can be observed. The first category is that of wresting policy-making authority away from the United States. The previous chapters have detailed early attempts at this activity by both WIPO and the ITU. Contemporary cases of this activity are represented in the World Summit on the Information Society and the Internet Governance Forum. It should be noted that NTIA, the ultimate authority on Internet governance, has resolved to give up this authority, so a shift on this front is likely to occur in the future. The second category is that of creating an alternative network apart from the US dominated Internet. The laying of the BRICS cable represents this strategy, creating a network backbone between the BRICS countries outside the US-created system. It is unclear at this time whether the intent of this project is to actually create an alternative Internet, or merely to connect the BRICS countries to the United States in a more direct manner. These different cases will be examined below.

WSIS and IGF

As discussed in the previous chapter, the World Summit on the Information Society meetings in 2003 and 2005, while nominally held to address the digital divide, resulted in calls for the United States to play a less exclusive role in controlling the Internet. From the Tunis phase of the Summit came the call to create a regularly meeting forum, sponsored by the United Nations and following a multistakeholder model. The result of these calls was the creation of the Internet Governance Forum (IGF) in 2006. Building from Article 19 of the UN Charter, the article expounding the freedom of expression and information for all citizens of Earth, the UN put forth a mandate for the IGF to serve as an open forum for the discussion of problems of Internet governance.

While the IGF does exist as perhaps the only truly multistakeholder forum for discussion of Internet governance issues, inasmuch as there is no formal membership of the IGF and the meetings processes are open to any and all comers, the mandate also puts forth a particular agenda for the forum. Much of this mandate focuses on the free exchange of ideas for Internet governance, from dispute resolution to promoting growth in the developing world. One particular element of the mandate is to promote and assess the embodiment of WSIS principles in the Internet governance process. The Declaration of Principles for Building the Information Society presents a series of principles that seems to support the multistakeholder model of the Internet. Several of these principles, especially those found in section B6- Enabling Environment, present interesting questions for the continued ODii system of Internet governance.

Principle 39 promotes the rule of law in creating “a people-centered Information Society”, but in doing so relies on national governments to build “policy and regulatory framework reflecting national realities”. Also, “Governments should intervene, as appropriate… to serve national priorities.” While attempting to foster a multistakeholder model, this principle appears to grant authority for Internet policy to national governments. While in many cases, such as the United States and much of Europe, this policy results internally in multistakeholder models, this policy could also result in national governments heavily subverting the free-flow-of-information nature of the Internet, as will be discussed later in this chapter.

Principle 48 reiterates the multistakeholder model of Internet governance, with particular attention paid to managing the Internet in a “multilateral, transparent and democratic (way), with the full involvement of governments, the private sector, civil society, and international organizations…taking into account multilingualism,” While this language seems rather benign and in accordance with the multistakeholder model properly understood, it is also rather subversive of the extant ODiis. While the ODiis are relatively open and predicated on this very multistakeholder model, ICANN is still under the ultimate control of the United States Department of Commerce. This situation runs counter to the idea of a multilateral governance structure for the Internet as proposed in the Declaration of Principles. Principle 49 also promotes the claim that “policy authority for Internet-related public policy issues is the sovereign right of States,” and that the “private sector has had and should continue to have an important role in the development of the Internet, both in the technical and economic fields.” Civil society should play an important role at “the community level” while IGOs should coordinate on

Internet-related public policy issues. Finally, International Organizations should play a role in developing technical standards and relevant policies.

The roles envisioned in Principle 49 are much better defined than what occurs in the extant ODiis. While much of the practical governance of the Internet actually occurs in a multistakeholder model through ICANN and ISOC, WSIS principles envision a world with clearly defined roles for the various realms of stakeholders. At the top, as intimated by Principle 50, should be the IGF to coordinate all activity between the stakeholders. Individually, none of these principles do much damage to the extant ODiis, but taken together they tend to usurp the authority that has been granted to the ODiis. The world as envisioned by the IGF is still recognizable as a multistakeholder model of Internet institutions, and these institutions can and should remain organically derived. But a greater degree of power should be granted to states to control their own Internet policy and ultimate authority for international Internet governance should be derived from the IGF.

The actual mechanics of this shift in policy authority present much of the difficulty faced by the IGF in establishing itself as a true player in Internet governance. The funding for IGF comes not from the UN, but from contributions from interested parties in the process. Among these contributions, generally from national governments and private sector players, is a sizable contribution from ICANN totaling $330,000 for fiscal year 2015[51] (ICANN, 2014). Secondly, until March 2014 the NTIA had not expressed interest in giving up control over the root DNS, the key component to Internet function and the lynchpin of all Internet governance. As previously discussed, the NTIA, a

[51] This represents a $50,000 increase from FY2014. ICANN views IGF as an important forum for free discussion and dialogue within the multistakeholder model.

division of the US Department of Commerce, had ultimate authority over the root, and merely delegated this authority to ICANN. This shift in NTIA policy, along with its mandate from the US congress to assure that no proposal for authority transition would include a national or inter-governmental agency as the recipient of authority, allows for the IGF to gain more authority for Internet governance. ICANN, and many other stakeholders have proposed that the IGF be used to settle the question of ultimate root authority.[52]

Another major problem faced by IGF is the existence of a 5-year, renewable mandate from the UN. This mandate has been renewed once before, in 2011, leading to the current mandate nearing its natural end. Unlike the previous renewal, there appears to be some concern from certain stakeholders that IGF's mandate should not be renewed. The parallel process of the WSIS as administered by the ITU seems to cover much of the same ground as the IGF, and IGF adopts the principles of WSIS in its operation. But due to the clear actions and administration of WSIS by the ITU, IGF appears to be the truly free multistakeholder forum (Badii, 2014). The notion has been floated that IGF is hindered in its operation by having a 5-year as opposed to permanent mandate, as it could theoretically hurt fundraising. Yet the Internet Governance Project points out several other UN projects, such as the UN Relief and Works Agency and the UN High Commissioner for Refugees, that function on temporary mandates and which have little problem raising funds (Badii, 2014). It is almost certain that IGF will be given a renewed mandate in 2015, and some stakeholders have argued that it could perhaps

[52] The current proposal for IANA transition states that IANA functions would be spun off from ICANN and would be given to a new legal entity. This entity would be a wholly owned subsidiary of ICANN, thus giving full control of the Root DNS to ICANN, leaving out any of the other potential claimants i.e. ITU, IGF, UNESCO etc.

be beneficial to keep the IGF on temporary mandates to keep the process open and effective (Badii, 2014).

The other international process, WSIS, is now entering its plus 10 phase, holding large meetings to continue the work and assessment of the impacts of the original WSIS. These meetings are organized by ITU, UNESCO, UNDP, and UNCTAD in Geneva to continue the multistakeholder model of the implementation of activities derived from the original WSIS process (ITU, 2015). In order to facilitate these activities, networks called action lines have been established to coordinate and collaborate across a wide variety of Internet activities. The action lines are as follows: Stakeholders roles in ICT development, Infrastructure, Access to information, Capacity building, Confidence and Security, Enabling Environment, ICT applications, Cultural Diversity, Media, Ethics, and International and Regional cooperation. While these action lines provide a clearer path for the enacting of policy recommendations from the international Internet community represented by WSIS, there exists little chance that WSIS could on its own actually subvert the system of ODiis.

These two groups, IGF and WSIS, represent a possible shift in the international Internet governance structure. Both seek to create a forum for the multistakeholder model of Internet governance to play out, and have succeeded to varying degrees. But they also seek to move the focus of authority away from the US Department of Commerce to the larger Internet community. Being grounded in the United Nations, they still prefer states and IGOs in the multistakeholder model, though they do attempt to include the other types of stakeholders as well. And with a shift in policy in the NTIA, there remains a possibility that either IGF or WSIS, or possibly some other international

organization, could become the ultimate authority for the Internet. This shift would not represent a fundamental shift in Internet governance, however, but would merely be a relocation of the source of authority away from a single state towards the international community. Other attempts by international groups have begun to subvert the overall makeup of international Internet governance, namely a move by the BRICS countries to establish their own Internet structures.

BRICS Cable- an Internet alternative?

The BRICS countries of Brazil, Russia, India, China, and South Africa represent a rising economic and political bloc that could potentially disrupt the global power dynamic. Currently, they also represent one of the major threats to the institutional governance of the Internet through their creation of the BRICS Cable. First proposed in April 2012, this project would run submarine cable between the five countries going outside the current infrastructure network as created by the so-called “American Internet” (Bloomberg, 2012). The cable would connect Miami, USA to Brazil and would then carry on towards Vladivostok connecting together information linkages between the BRICS nations. Originally proposed to further link these growing economies to the United States in a much more direct fashion, since the revelations by Edward Snowden of massive data collection and spying by the United States this project has taken on a different context.

Instead of fostering trade between the BRICS and the United States, the BRICS Cable now allows for data transmission between BRICS countries outside of the infrastructure where the United States could enact its spying and data collection programs (Falkvinge, 2013). While this new network would be free from the possibility of

spying programs such as PRISM that will be discussed at a later point in this chapter, the BRICS Cable also brings with it fears that the Internet could become fragmented, with a separate Internet emerging for the BRICS countries (Clark, 2013). Perhaps even greater than circumventing US spying efforts, the BRICS Cable also begins to break the stranglehold the United States has on Internet infrastructure. As early as 2011, the BRICS countries had begun to call for the US to lessen its control on Internet policy and for a greater role in policy-making for themselves (Prodhan, 2011). In her opening address to the United Nations General Assembly in 2013, President of Brazil Dilma Rouseff referred to both reasons of surveillance and institutional domination by the United States for the establishment of an alternative network of networks.

While the creation of an alternative Internet by the BRICS might seem as if it could be detrimental to the overall Internet structure and the BRICS specifically, it should be noted that approximately 45 percent of the world's population and 25 percent of global GDP rests in these countries, and this share will only continue to rise in the future (Gibbs, 2013). The BRICS-net would suffer somewhat from balkanization from the main Internet, but not nearly as much as the world would suffer from the BRICS departing the main Internet. Along with a physical separation of networks, these countries, led by Brazil, are attempting to strong-arm important tech companies like Google and Facebook to store their data locally, removing the need to communicate outside the BRICS system (AP, 2013). Apart from the direct assault on the infrastructure of the Internet represented by the BRICS Cable and the attempt to change policies for tech companies, questions of the free and open nature of the Internet also emerge from this new system.

Several of the BRICS countries have authoritarian leanings, which could be used to control informational access on the new network of networks. China's relationship to the open Internet will be examined later in this chapter, but could only be buttressed by the creation of a separate Internet. A new agreement between China and Russia also precludes these two states from attempting cyber espionage and cyber-attacks on each other (Razumovskaya, 2015). This agreement also promotes these two countries to work together to counteract technology that might "destabilize the internal political and socio-economic atmosphere," "disturb public order" or "interfere with the internal affairs of the state", essentially agreeing to help each other censor the Internet to prevent internal unrest that might challenge the regimes.

It should be clear that the BRICS countries view the Internet as it currently stands as an American affair, an interpretation not entirely divorced from reality. However, as should also be apparent by now, the Internet is primarily governed in an organically developed, multistakeholder model that is dramatically different from traditional international institutions. The BRICS do believe that they should have a greater say in the governance of the Internet, for various reasons, much like the majority of non-ODii cases examined thus far. Yet as opposed to merely agitating for change, the BRICS have begun the process of laying cable for a direct connection outside of the US-Internet infrastructure.

This process will be completed during 2015, setting up a possible confrontation over Internet governance at the same time as the NTIA is attempting to divest its control over the Internet (Vorster, 2013). It should be noted that the BRICS Cable does not, on its own, establish a separate Internet, but merely represents a new pipeline through

which data can flow. Yet the BRICS Cable does form a backbone of a network for the establishment of a new network, one that goes outside the structures of the so-called US-Internet. The coming few years should be highly important for questions over the future of the Internet, and global politics as a whole, as this example of a possible new Internet being formed could represent an outside challenge to the hegemonic system as operated by the United States and the United Kingdom for the last century or more.

National Subversions

While the attempts at subverting the ODiis at the international level fit into two fairly neat categories, authority subversion and creating alternative networks, attempts at the national level to subvert ODiis fit into other categories altogether. Three major categories can be identified: (1) creating alternative networks to censor Internet content, (2) sever content censorship while connected to the main Internet, and (3) surveillance and massive data collection. The first two of these categories attempt to subvert the institutions as they stand, either by splitting off from the established institutions, or very selectively filtering and censoring content (effectively creating a side branch of the main Internet). These attempts at subversion will be represented by examining the cases of Iran's halal Internet and the Great Firewall of China, respectively. The third category, surveillance and data collection, represents an assault not on the institutions of the Internet, per se, but on the principles of a free and open Internet. Representing this category is the United States and its PRISM program sponsored by the National Security Agency. This final example has already had an impact on Internet governance in its spurring on of the previously explored BRICS Cable. The PRISM program will be

explored, examining how its system of data collection has undermined the way the Internet functions, while also creating new avenues of behavior on the Internet.

Iran- the Halal Internet

Since its inception, the Islamic Republic of Iran has sought to control the morality of its people through coercion and censorship. The Internet has allowed for a much freer flow of information across the world, Iran included. As it became clear that the Internet was no passing fad, and that the Internet could potentially be used to destabilize authoritarian regimes in the wake of the Tahrir Square uprising in Egypt, Iran has sought to censor the information available to its people on the Internet. While some states like China have shown that it is possible, given enough political will and capital, to restrict data flows, Iran has taken steps in creating a clean or Halal Internet (RSF, 2011). This network, also known as a National Intranet, would separate Iran from the US-dominated Internet, creating a new network with content approved and curated by the Iranian Revolutionary Regime. The Halal Internet would represent one of the major assaults at the national level on the free and open Internet, both by causing the fragmentation or balkanization of the Internet and by subverting the international Internet norms of free and open informational flows.

While the idea of a national intranet is not a new one, as North Korea, Cuba, and Myanmar have all established walled-garden type networks, the notion that Iran would like to disconnect from the main Internet leads to some interesting considerations for the future of the Internet as it currently exist (Rhoads and Fassihi, 2011). It should be noted at this point that Iran has not successfully created its Halal Internet, but has taken marked step in that direction over the first half of the 2010s. The first of these steps

occurred in 2011 in the run up to parliamentary elections, a signal that more than religious purity and moralizing was at play in the decision to clamp down on Internet users (Dehghan, 2011). These measures included the collection of detailed personal information on patrons of Internet cafes, logging the websites visited, the storing of this information for at minimum 6 months. Along with these data collection mandates, at the same time major slowdowns in service speed occurred. While the official explanation for these slowdowns was placed at the feet of early efforts to establish the new national intranet, there still remains the possibility that service disruption could have been intended to halt anti-election activities. Attempts to organize boycotts against those elections were criminalized, and bloggers posting satirical content was prohibited (Dehghan, 2011). This period also marked the beginning of the official push to establish the national intranet to provide "appropriate" services for the population (Rhoads and Fassihi, 2011).

The initial plans for the intranet[53] would see it operating in initially parallel to the main Internet, with access to the main Internet maintained for banks, the government and large companies. Citizens would be forced off the main Internet and onto the national intranet in a very short period of time, disrupting the already well-developed and vibrant, if rather small at 10 percent population usage, Internet culture that existed in Iran. This change would be the culmination of over a decade's worth of attempts to stifle Internet usage in Iran, usage that often served to attack the regime. While initial work began on this national intranet in 2005, it was not until 2012 that great strides began to be taken to finalize the construction of the network, which while functioning on

[53] Intranets function similarly to the Internet, but are instead a network of networks that is isolated from the Internet at large.

internet protocols, would operate under a different Root structure altogether (Rhoads and Fassihi, 2011). Although some outside connections will be allowed, these connections will be heavily censored, and Iran-produced alternatives to major providers such as Google would be implemented (Paul, 2012). The primary censorship and curating of this national intranet would be carried out by the Supreme Council of Cyberspace as created by Ayatollah Ali Khamenei, a body of religious and political leaders loyal to the goals of the revolution.

By 2013, the censorship efforts of the Iranian regime had become strong and sophisticated, with sites like Google not only being effectively blocked, but the tools that had often been used by Internet participants in Iran being “effectively squashed” as well (Carrington, 2013). National websites were still made readily available, but service speeds were also drastically slowed. As national elections approached, once again efforts to restrict access not to the main Internet, but internal network activity, were heavily underway, indicating a pattern of information suppression that runs with large political events. In what appears to be remarkably similar to attempts to guide consumers to better choices, the slowdown in service speed on the main Internet in Iran seems to be designed to push Internet users to the national intranet with higher speeds, lower prices and a greater ability for the regime to control access to information. This strategy of not pulling the plug on users’ access to the main Internet, but instead making the choice to switch to the intranet much more appealing to users has been underway since at the very least 2011’s elections and has continued in the face of other large political events to this day (Bernard, 2015). A final step taken in 2013 was for the Iranian public to be registered for government email accounts using their real identities,

ostensibly to allow citizens better communication with their leader (Rafizadeh, 2013). This move would perhaps begin to shunt even more people onto the national intranet.

While much as been made of these attempts to create a national intranet, as of 2015 Iranians are still capable of accessing the main Internet, albeit with severe censorship that finds its roots in the 2011 Internet crackdown (Bernard, 2015). Alternative services to main Internet staples such as Google and Bing have begun to come online. Most recently, the Iranian-born search engine “Yooz” or Cheetah has been offered up to the public. These tools are, at face value, meant to provide greater access to Persian language material to Iranian users at faster speeds and in a more secure way (Sridharan, 2015). It is also stated by state officials that Yooz will allow Iranians to circumvent many of the sanctions that had been placed on Iran by the West. This new push for domestically sourced software solutions represents a slight shift in the attempt to create a Halal Internet for Iran, away from a wall-garden style national intranet and towards a vastly filtered version of the internet or “filternet” (Bernard, 2015). By creating a seemingly quicker and more secure connection to the Internet, as seen by the populace of Iran, it should be theoretically possible for Iran to censor and filter the content that is available to the population. With the transition within the regime from the more hardliner Ahmadinejad to the more liberal Rouhani, perhaps the approach of abandoning the creation of a national intranet in favor of a filternet represents a shift to a less heavy handed method of censorship (Small Media, 2015).

One final element of the push towards a national intranet comes from fears of Western intervention in Iranian networks. Much like a moat around a prison serves to keep people in; it also has the effect of keeping people out as well. Such is the idea

behind the national intranet, as it would allow the regime to better control the access and activities of its population; it would also serve to harden Iranian security networks from outside attacks (Rhoads and Fassihi, 2011). This fear of outside intervention into Iranian networks is not entirely unfounded, as the 2010 Stuxnet virus attack on Iranian nuclear plants shows (Zetter, 2014). Stuxnet, an insidious computer virus originating from somewhere in the West[54] has been called the world's first digital weapon, a weapon aimed squarely at disrupting the Iranian nuclear program. The infiltration of this virus into Iranian systems has been a source of great frustration for the Iranian regime, and has served to foster calls for Iran to remove its networks from the overall main Internet (Dehghan, 2012). Calls by the United States to foster the free Internet in Iran have reinforced the view that the West intends to infiltrate Iran through electronic means (Rhoads and Fessihi, 2011). Separating Iran's security networks, and the rest of the country's networks as well, would allow defenses from these infiltrations to be enacted in more efficient manner.

Iran views itself as the recipient of constant attack and animosity from the West, from highly restrictive sanctions to deliberate cyber-attacks such as Stuxnet being a part of everyday life. In order to push back against the digital infiltration of their society, the plans to subvert both the institutions and intentions of the main Internet have become official policy. By creating a balkanized and fractured portion of the Internet, Iran could to a much higher degree filter and censor content available to the citizenry. The ability of Iran to monitor the networked communications of its people would also be increased by enacting the Halal Internet. This network would also allow Iran to fight the influence of

[54] Most likely the United States or Israel.

the West within its own country, reducing information flows and going a long way to prevent malicious software attack from penetrating vital systems. Even if Iran is unable to divest fully from the main Internet, the creation of a filternet appears to be well underway and causing similar outcomes as a national intranet. The case of Iran's subversion of Internet institutions and norms represents perhaps the most extreme case seen, especially in the context of a state that had previously heavily embraced the main Internet.[55]

China- The Great Firewall

The People's Republic of China has long been the world standard for official censorship of the Internet for its citizens, spurring the idea of the Great Firewall of China, first termed in a Wired article in 1997(Barne and Ye, 1997). While this language brings to mind images of an iron-clad defensive structure that might be more in tune with the idea of a national intranet, the reality is more complex and more intertwined with the main Internet than the name might suggest. In practice, as opposed to a heavy filtering mechanism as might be seen in Iran, China relies more on a series of traps and key word filters to use a gentler, but no less effective hand to censor information flows on the Internet. The most important element of this censorship effort is known as the Golden Shield Project, running from 1998 through 2003. The Golden Shield Project, now a part of offensive cyber capabilities for China, will be discussed below, along with other important elements of the Chinese Internet censorship program. Along with the

[55] Iran presents an interesting case, as it officially adopted the Internet in the early 1990s. The hope was that it could be a medium of spreading Islamic propaganda to the West. Instead it has had almost the opposite effect, with Western ideas flowing in steadily, and the younger generation in Iran has adopted Internet culture consistent with the rest of the world.

creation of the “biggest prison for netizens,” China’s censorship program also has the benefit of protecting Chinese Internet businesses like Baidu, Alibaba, and Tencent (Gracie, 2014). It should be noted that without the cooperation of foreign Internet companies such as Microsoft and Yahoo, China’s censorship policies would not be nearly as effective, a phenomenon that will also be examined below.

The collective censorship and surveillance programs that are known as the Great Firewall of China find their roots in the latter part of the 1990s. The Internet itself did not find its way to China until 1994, and over the next three years a period of lawless activities on the Internet heralded the spread of the Internet. In 1997, the National People’s Congress passed CL97 the only law pertaining to the Internet in China. These laws criminalized cybercrimes, a set of very broadly defined crimes fitting into two categories: (1) crimes committed against computers and networks, and (2) crimes committed on computers and networks (Keith and Lin, 2006). While some judges within China felt the law was too vague, making it unenforceable, the regime stated that the law was left “flexible” to allow for future interpretation and development. The second category of cybercrimes, crimes through the computer, is the primary justification given by the regime for the Great Firewall, requiring severe censorship and surveillance to prevent cybercrime and to catch cyber criminals.

The early stages of enforcement of the provisions of CL97, and the subsequent subversion of the institutions and norms of the Internet, began with the inception of the Golden Shield Program (GSP). In 1998, beside fears that the Internet could embolden and organize a renewed push for democracy in China, the Golden Shield Program was initiated with the goal of monitoring Internet traffic within the country and censoring the

information that would flow in from the West. The Golden Shield Project established a series of network firewalls preventing IP addresses from routing through to the Internet at large, capturing and rerouting through six proxy servers (Hoffman, 2013). The actual hardware used to support GSP originated in the United States, provided by Cisco Systems as well as other technology companies, and was operated by a large cadre of technology officers (August, 2007). While the censorship and monitoring of network traffic on the Internet are conducted by GSP, perhaps more important are the cultural elements that have been derived from such a program.

With the widespread knowledge that for at least a decade (from 1998-2008) GSP was actively monitoring Internet activity in China, the population adjusted to the panopticon nature of Internet monitoring (ScienceDaily, 2007). The public knowledge that Internet activities were being monitored had the effect of causing the population to self-censor their activities online. Widespread self-censorship has led to China and GSP having only to selectively censor the Internet, a process less resembling a firewall and more similar to a series of ever smaller sieves. This less intrusive censorship has left Internet users with a fairly wide range of freedom, but with certain topics being immediately censored by the state, leaving most censorship up to the individual Internet user (ScienceDaily, 2007). After completing its two phases (for a total of 10 years of operation), GSP officially came to an end, and the majority of hardware and personnel have since transitioned to carrying out probing offensive cyber-attack on the West, as witnessed in the Man-on-the-Side DDos attack on GitHub (Netresec, 2015). The introduction of GSP has led to a successful transformation in the Internet activities

within China, causing a great deal of self-censorship leading to a reduced need for actual censorship and surveillance.

A crackdown on usage of Internet cafes, similar to that seen in Iran after 2011, began in 2008 under the banner of Operation for Tomorrow (Yu, 2008). The major purpose of this crackdown was to prevent minors from utilizing Internet cafes to play online games. But the crackdown expanded to include a wide variety of Internet behaviors and the playing of online video games more broadly. Registration requirements were made for users of Internet cafes, including the provision of full identification to the proprietor. The cafes themselves were not only forced to keep this information, but were also limited in the type of software that could be loaded onto their computers. While nominally successful, this operation caused a proliferation of black market Internet cafes to cater to the displaced youths and their gaming predilections (Cody, 2007). Over 130,000 Internet cafes were shut down over a 6-year period ending in 2011, demonstrating the success of this program (Kan, 2011). In a similar move, while it remains legal to post using anonymous Internet handles, the service provider must know the real identification of the end user before allowing the provision of an anonymous handle (Bradsher, 2012). Attempts to disguise Internet activities, through Virtual Private Networks (VPNs) or by utilizing the Tor network, have been severely limited by China, and the method of throttling Internet speeds to users also has a desired outcome of destabilizing attempts to circumvent the various censorship methods employed by the regime. This technology has recently become more sophisticated and automated, subsequently making life more difficult both for private

Internet users and businesses, leading to a preference, at least among Chinese citizens, for homegrown software solutions (Dou, 2015).

The success of the Chinese Internet giants such as Alibaba, Baidu and Tencent could perhaps be directly attributed to the existence of the Great Firewall (Gracie, 2014). These companies have not had to compete on a direct playing field with their similar services offered from abroad, (e.g., eBay, Twitter, and essentially late 1990s era America Online, respectively). With great limitations placed on international Internet companies by the Chinese government as well as by the difficulties of operating a business that straddles the Great Firewall, the Chinese Internet companies have found a great deal of success. China has a locked-in and growing user base of over 600 million users, one with growing economic power, and this user base leans heavily on domestic websites to conduct their commerce due to reasons of both official and self-censorship (Gracie, 2104).

At the same time, extreme restrictions are placed on foreign technology companies such as Microsoft, Yahoo, and formerly Google. In order to operate in China, Western companies must agree to strict conditions and assist in the Chinese program of censorship (Phys.org, 2005). While many companies agree to these terms in order subsequently to access the largest single Internet market in the world, there have been notable cases of companies withdrawing their agreements with the regime. The most prominent example of this is seen in Google, which formerly existed as a major player in the Chinese Internet, agreeing to strict censorship terms. In 2010, Google stopped self-censoring, and as a result was heavily censored by the Chinese government. This change in situation resulted in Google's Chinese market-share dropping from 37

percent of all searches in early 2010 to approximately 10 percent today (Incitez China, 2014). Alongside strict software censorship agreements, it should also be noted that hardware inspection of technology entering the country is also required, making business deals all the more onerous for international technology firms.

The Great Firewall of China has earned its reputation as one of the most severe and restrictive Internet censorship regimes at the national level in relation to the Internet. This program has been successful by openly spying on and curtailing Internet users activities and content availability, as well as acculturating the population into a condition of self-censorship. By forcing foreign Internet companies to become complicit in order to access the growing Chinese market, the regime has been successful in preventing possible subversive activity from occurring as well as protecting the homegrown Internet industry in China. All of these actions combine to create a massive subversion of both the institutions and norms of the main Internet. While the Chinese public can theoretically access the main Internet, the levels of restrictions placed on this activity have essentially served to create a filternet, where censorship and surveillance reign supreme, only tangentially connected to the main Internet. By creating these restrictions from the beginning while growing their Internet usage, China has been quite successful in maintaining control over its citizens' Internet behaviors and the information available on the network. And with the creation of the BRICS cable, the possibility of China further subverting the main Internet will only continue to increase in the future. Yet it is not only authoritarian regimes that participate in the surveillance and censorship of their citizen's Internet activity. The next section will detail how the United States has, through large and insidious spying programs as well as manipulations in

telecommunications law, subverted the norms and institutions of the very Internet that it had created and helped to grow.

United States- Patriot Act Section 215, PRISM, and Net Neutrality?

In the days immediately following the terrorist attacks of 9/11, many steps were taken immediately by the US government to increase its ability to combat terrorism. The largest legal steps taken by the US Congress fell under the umbrella of the PATRIOT Act of 2001. This act began many programs utilized over the next decade to combat terrorism, but one particular section of the PATRIOT Act, section 215 had a distinct impact on the institution of the Internet. Section 215, the so called “library records” provision of the PATRIOT Act, modified the Foreign Intelligence Surveillance Act or FISA to allow for a much wider scope of surveillance than had been previously allowed (PATRIOT Act, 2001). A further modification of FISA occurred under the Protect America Act of 2007; it led directly to the creation of a new power of surveillance of disposable cellular telephones and Internet communications. From the expansion of surveillance came a distinct program of systematic spying on Internet users under what has been revealed as the PRISM program of the NSA by Edward Snowden in the summer of 2013 (Hopkins, 2013). While Section 215 of the PATRIOT Act was allowed to expire in June 2015, significant damage and alterations of Internet institutions had already occurred. This section will examine the functioning of the PRISM program, as well as other programs of surveillance in the post-9/11 world, and how they impact and subvert the institutions and norms of the Internet. In parallel, the impact of so-called Net Neutrality legislation will also be examined, inasmuch as US net neutrality impacts the overall functioning of the Internet globally and within the United States itself. While both

of these strands appears to be primarily domestic programs within the United States, due to the degree of control over the Internet as a whole exercised by the US, there are certainly implications and consequences for the Internet as a whole.

PRISM, ECHELON, and NSA Surveillance Programs In the 1960s, at the height of the Cold War, the United States National Security Agency (NSA) established a program to intercept diplomatic telecommunications of Eastern Bloc countries. Over the subsequent decades this program, known as ECHELON, expanded beyond simple diplomatic telecommunication interception to become a monolithic program in cooperation with the five signatory countries of the UKUSA Security Agreement for the capturing of all global communications (NSA, 2010). [56] Occupying an almost mythical role in the global surveillance system of the West, ECHELON provided the backbone for the collection of data globally, with listening stations placed in at least twelve countries. These stations have the capability to intercept telephone, email, radio, and satellite communications (Bamford, 2008). While this early and highly capable system of data collection remained in the realm of conspiracy theorists, the actual collection of data was much more directed than subsequent surveillance programs employed by the NSA. In a somewhat ironic turn of events, upon being publicly disclosed in the late 1990s this precursor to contemporary (Post-9/11) mass surveillance systems was viewed as degenerate by US lawmakers due to ECHELON's ability to monitor US citizens. Later programs, namely PRISM, would set out in a much more overt manner to collect data and metadata on US citizens' communications in an attempt to combat terrorism.

[56] Signatories include the United States, United Kingdom, Australia, Canada, and New Zealand. Each country agreed to collect data for the others, so that none could be considered to be spying domestically.

While the United States still refuses publicly to admit that ECHELON exists, the Snowden revelations of 2013 show that not only was ECHELON real, but also was only the tip of the surveillance iceberg (Greenwald, 2013). Questions were raised by the Bush administration in 2007 about the ability of the United States to monitor communications on newer technologies that had come to exist since the creation of FISA in the 1970s. In late 2007, the Protect America Act modified the contents of FISA to allow for surveillance of disposable cell phones known as burners, as well as Internet communications. While ECHELON had been capable of collecting information from these communication mediums, a new program was created specifically to collect information from these new types of communication. This new program, as revealed in 2013, was known as PRISM (Hopkins, 2013). While the US was the primary beneficiary of this new program, the other four members of UKUSA also greatly benefitted and participated in PRISM. Unlike the national programs of surveillance and censorship as undertaken by Iran and China, PRISM does not attempt directly to subvert the free and open Internet and its multistakeholder institutions. PRISM instead relies on the open character of the Internet to function, gobbling up the metadata[57] of communications on the Internet. The more that people communicate openly on the Internet, the more information PRISM is able to collect.

The subtle surveillance from PRISM, ECHELON, and other NSA/UKUSA surveillance programs represents a different but no less subversive assault on the

[57] Metadata is not the actual contents of communications on the Internet, but rather the routing information. While this data may not give actual content, it does allow the NSA to create information about communication networks, i.e. who is talking to whom. From this metadata, a large deal of information can be collected, and more targeted surveillance can be made possible.

norms and institutions of the Internet. Whereas China and Iran boldly censor and monitor their citizens' activities on the Internet, UKUSA attempts to use the open character of communications on the Internet to build models of communication networks to further target subsequent surveillance efforts. More than simple metadata collection, however, programs such as MUSCULAR and STORMBREW collected actual message content from service providers (ISPs) and tapped into the private clouds of Google and Yahoo to obtain data (S. Gallagher, 2013, Bamford, 2013). The interplay between government agencies and the primary providers of Internet services for the collection of data extends far beyond the monitoring efforts of more directly subversive nations like China and Iran.

These programs subvert the multistakeholder institutional model of Internet governance not by creating a balkanized portion of the Internet, but instead by utilizing the control over the Root network held by the US, as well as the relationship between Internet service companies primarily based in the United States, to intercept the informational flows on the Internet. While FISA and the Protect America Act require the use of warrants for domestic surveillance activities, due to the global nature of the Internet and the ability to penetrate the network from outside the United States (with the help of other UKUSA signatories), these laws become easily subverted. China and Iran may justify their own surveillance programs and censorship with the principle of protecting both their populations and their regimes, but the United States and UKUSA justify their programs with the banner of national security and anti-terrorism efforts. The end results, however, remains the same: the collection of information about citizens' activities on the Internet. But in the case of UKUSA, the subversion of Internet

institutions and norms has the effect of possibly facilitating the fracturing of the Internet creating national networks to withdraw from UKUSA surveillance activities as potentially observed with the laying of the BRICS cable. While the surveillance law in the United States regarding is currently under review, the potential outcomes and consequences of a shift in surveillance law vis-a-vis the Internet remain to be seen. The only sure outcome is that UKUSA will have much work to do to repair its relationships to the other stakeholder in the Internet.

Net Neutrality in the United States One of the foundational norms of the Internet is that all data should be treated equally. As data reduces down to a series of 1s and 0s, the machinery does not differentiate between the delivery of a webpage about peregrine falcons, a video documentary about the horrors of living in North Korea, and a song praising the glorious existence of Vladimir Putin. The only care exhibited by the machines and the network is the amount of bandwidth and data that is to be transferred, and from which server to which client. The original File Transfer Protocol nature of the Internet is essentially agnostic to what data goes where, relying on inputs from users and operators to deal with the order and priority of data routing. For the first several decades of its existence, the Internet has treated all data equally, allowing for direct competition between established providers and disruptive start-ups. This characteristic of the Internet has been greatly lauded, but now that the Internet has become crucial for daily commerce, many established players believe that the neutral characteristic of the Internet can or should be changed. Other stakeholders believe that the neutral nature of the networks should be maintained. This conflict has lead to the push in the United States for net neutrality legislation, which both supports the norms of

the Internet, but subverts the multistakeholder institutional model of Internet governance.

The early days of the Internet saw thinkers and stakeholders become concerned with open competition and the freedom to access content on the Internet, leading to Timothy Wu coining the term “Net Neutrality” in 2003 (Wu, 2003). From this point until early 2015, lobbying battles within the United States both for and against Net Neutrality played out. The Federal Communications Commission (FCC) ultimately rendered a new ruling in April 2015 reclassifying broadband Internet services as common carriers similar to telephone and telegraphs. Common carrier classification strictly governs the way that data should flow on the Internet, restricting ISPs from blocking lawful content, slowing down services, and accepting fees for favored treatment (Reisinger, 2015, FCC, 2015). This shift in treatment forces all data to be treated the same, securing a fairly strict definition of net neutrality for the United States. Of course, this ruling spurred many lawsuits about the overreach of the FCC, and has drawn some criticism from sitting FCC board members[58] that the nearly century-old rules now governing the Internet are inappropriate and will have unintended consequences for the functioning of the Internet (Gillespie, 2015, Reisinger, 2015).

While this work will remain agnostic with respect to the outcome of the policy shift around Net Neutrality and Common Carrier status, the subversion of the multistakeholder model of Internet governance represented by the actions of the FCC are highly important for the overall subversion attempts on the ODiis. While ultimate authority for the Internet rests with the US Department of Commerce, the majority of

[58] Ajit Pai, speaking with Nick Gillespie

decisions have been made through the multistakeholder model, allowing other actors involved with Internet to have a say in Internet policies. On the issue of net neutrality however, the FCC had claimed jurisdiction, to the exclusion of the multistakeholder model. While this issue of net neutrality is one of commercial policy, perhaps lending itself to regulation by a United State agency, the authority and ownership exercised by the Commerce Department would seem the natural fit for this type of regulation outside of the multistakeholder model. Yet the FCC has given itself the authority to render decisions about net neutrality in the United States, having far reaching consequences for network access across the world. With the outcome of reclassification of Internet services as a common carrier, the FCC has given to itself a great policymaking authority in relation to the Internet, authority far beyond the Department of Commerce for the regulation of Internet service and content. It is quite possible that this new authority could have far reaching effects on the overall network.

The decision-making process by the FCC is itself rather secretive and is considered by some to be lacking in transparency (Suderman, 2015). Public comment on policy proposals is allowed and encouraged, but the ramifications of these comments remains suspect. According to norms for an Open Internet, themselves created by the FCC in the early 2000s, one of the major norms for operation and governance of the Internet is transparency (FCC, 2010). Yet the process employed by the FCC in crafting Internet regulations in relation to net neutrality appears to lack that transparency characteristic of the Internet. A series of several meetings between the head of the FCC, Tom Wheeler, and members of the Obama administration occurred in the run up to the release of new Internet regulations in early 2015 (Suderman, 2015.2). As a result

of these meetings the eventual outcome of FCC policy, one that supported the creation of so-called fast lanes for the Internet, appears to have changed from previous rulings, (Gillespie, 2015).

Regardless of the eventual outcomes from this policy shift, transparency in policy creation has clearly been undermined by the FCC in the rulings to reclassify the Internet as a common carrier. The norms of transparency in policymaking, along with the multistakeholder model of decision-making about the Internet, have been undermined by the actions of the FCC. The ODiis themselves have also been subverted, inasmuch as they were not the primary decision-making bodies for this important policy issue. While these changes only impact the laws and functioning on the Internet in the United States, the location of Internet service companies operating in the US as well as the rest of the world could potentially impact their corporate policies and subsequently cause a shift in the overall character of the Internet, an institutional arrangement that has to this point functioned quite well. The decision to push for net neutrality rules, while generally well accepted by members of the Internet community, still resulted in a subversion of the norms and institutions of the Internet. The process undertaken, driven by the FCC, functioned contrary to the well-established methods of Internet policymaking, both nationally and internationally.

Conclusions

The Organically Developed Internet Institutions, along with the multistakeholder model of Internet governance, find themselves under attack in a multitude of ways, from a multitude of sources for a multitude of reasons. The majority of these attempts at subversion stem from national entities attempting to assert their dominance over the

Internet policymaking system, seeking to play the dominant role in policymaking that traditional treaty organization have given to states. The Internet, however, is governed under the multistakeholder model where states must participate in policymaking in conjunction with other Internet users such as Internet corporations and individuals. Even the United States, ostensibly the only nation-state with a direct claim for authority over the Internet through the Department of Commerce's ownership of the Root DNS system, has sought to undermine the institutions as they exist through the push by the FCC for net neutrality. As a result of national subversions, several "walled garden" Internets (e.g., in China and Iran) have been created to filter out unwanted content, typically in the name of protecting citizens or regimes as seen in China and Iran. These national intranets, nascent as they may be, also allow the states to monitor the Internet activities of their citizens. As revealed by Edward Snowden, even the developed world has attempted to monitor the activities of their citizens.

At a higher level, direct attacks on the ODiis have occurred at the international level. The United Nations and the ITU have each attempted to wrest ultimate authority for the Root DNS from its current location. Yet this perhaps is a good thing, as the US Department of Commerce has attempted to spin off its authority for Root DNS onto a new organization. This attempt at subversion may be resolved within the multistakeholder model, noting that not all subversions are necessarily a bad thing, merely representing institutional change. On the other hand, the BRICS nations, in the laying of their BRICS cable, have begun the process of potentially creating a separate Internet, apart from the Internet governed by the ODiis through the multistakeholder model. This new system can also be viewed as a reaction to the subversions put forth

by the UKUSA surveillance system by the developing economies. What is clear, apart from these attempts at subversion, is that the multistakeholder model of ODiis represents a distinct change in the norms of international institution creation. The previous system of nation-state centric organizations is under assault and, accordingly, states and treaty-based international organizations will attempt to exert their authority in this new system in any way possible. Yet the possibility remains that the multistakeholder model will not only survive the attempts at subversion, but also may actually continue and expand as distributed technologies like the Internet become more important for daily life in a global context.

The next chapter will attempt to examine the various institutional types that have come to govern technology: nation-state centric treaty-based organizations and organically developed multistakeholder organizations. Similarities from both institutional types will be explored to find common ground for all international institutions governing technology. The difference in these institutional types will also be highlighted, in an attempt to find best fits for institutional governance of future technology. It should be clear at this point that the institutions for governing technology are diverse, but seem to be driven not by the needs of the technology itself, but by the dominant norms of the international system where the institutions are created. The technologies and institutions begin to mature, attempts at outside subversion of the institutions can have a great deal of impact on institutional change. It remains clear, however, that attempts to subvert and change institutions will always occur, as long as the international system remains in flux.

CHAPTER 9: ANALYSIS AND CONCLUSIONS- INSTITUTIONAL COMPARISONS, LESSONS LEARNED, AND POLICY PERSCRIPTIONS

"It is change, continuing change, inevitable change, that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be." Isaac Asimov

The two case studies of institutional technological governance examined in the work, that of space exploration technologies and the Internet, provide an interesting contrast for the varying approaches utilized for the governance of technology at an international level. While the institutions themselves have many fundamental differences, when considering the larger technological and historical contexts for the institutions, many interesting intersections occur. Up to this point, the comparison of these institutions has been strictly implicit, if following a parallel structure. This final chapter seeks to deal directly with the comparison of these systems of governance, looking for some particular divergences in institutional structures that could possibly explain the different levels of success for the technologies being governed. While much work in comparative politics has been previously focused on the governance of people and places, with the increasing role of technology in human society it will become important to develop a new set of institutional best practices for the governance of technology. This chapter will seek to draw some lessons from the comparison of the two case studies to begin to gather the information necessary to create these new best practices. Some preliminary policy prescriptions can also be derived from these lessons learned.

This chapter will be structured as follows: first, the institutional structures from the case studies will be compared. Distinct differences in regime structure and their

consequences for policy and physical outcomes will be examined. The interesting intersections between the two technology governance structures will also be discussed. An examination of overall trends in institutional formation and change will also be held. Secondly, the various lessons learned from these two case studies, focused on practical outcomes for technological governance will be teased out for further exploration. Interesting dynamics of institutional protection and attempts at subversion will be explored, along with questions of institutional inertia. Distinct conclusions about effective governance structures will be drawn from the two case studies. Finally, this chapter will conclude with some policy prescriptions for future attempts at crafting governance structures for nascent technologies of global importance. While international norms of institutional creation may be constantly in flux, as illustrated by the case studies, some practices and structures as well as general approaches to institutional engineering seem to bear out as superior to others. Hopefully, these prescriptions can assist in the successful crafting of governance structures for future technologies moving forward, as it appears that these issues of technology will only continue to gain importance in the next several decades.

Analysis of Governance Structures for Technologies

The two case studies covered in this work, the international governance structures for space exploration and the Internet, provide an interesting contrast for the study of technological governance institutions. On the one hand, with space exploration exists a set of institutions that to the trained political science eye would seem highly familiar. On the other hand, the governance structures for the Internet seem almost anarchic, relying heavily on business and information technology-based institutional

structures. Yet in their divergences from each other, as well as the intriguing intersection of institutional structure, many interesting observations about both the creation and change of international institutions, as well as attempts to govern technology can be made. The following section will address a series of these fundamental divergences as well as a series of intersections derived from the two case studies at hand.

Divergence

The two case studies have revealed distinctly different institutional approaches for the governance of technology. Examining where these institutional structures have diverged can reveal important principles for the governance of technology. By understanding how these governance structures approach their technologies in different way, examples and lessons for good governance of technology can be derived. The following areas of divergence can give us important information for crafting best practices of institutional creation, expanding beyond the realm of the governance of technology.

Foundational Principles

Space exploration and the Internet have many distinct points of divergence that have a great deal of importance on how their particular governance institutions are structured. Perhaps the most fundamental of these points of divergence stems from the very foundational principle from which the institutional structures are derived. For space exploration, the institutions set out from the point of the scientific commons. No individual, corporation, or state can make a claim of ownership of any celestial body, as outer space and the celestial bodies are, according to the Outer Space Treaty of 1967,

to be held “in common” for all mankind. While this is a truly noble and high-minded ideal, in practice many difficulties emerge, leading to legal and institutional struggles that have hampered the ability for mankind to explore further reached of outer space. The idea that space exploration should be limited and state-centric appears to be the actual intent of using the commons approach (Oganbanwo, 1975). The Internet’s governing institutions are not predicated on notions of scientific commons, instead relying on principles of private property and ownership to guide the creation of institutions, rules and norms (Kahin and Keller, 1997). While there are clear differences in the technical requirements for the proliferation of these two vastly different technologies, the ownership model perhaps creates incentive structures beneficial for expansion of the Internet, leading to the rapid expansion of networked computing in both society and commerce (Mueller, 2012, Murmann, 2003). This divergence in foundational principles, while derived from the logic of proliferation, owes a great deal to the historical background for the development of each technology.

Historical Background

The historical period during which both these technologies were developed, and, accordingly, the period under which the institutions were created play a important role in the eventual type of institution created. The fundamental technologies for space exploration were created and refined during World War II under the Nazi regime. While the Nazis were ultimately defeated, the scientists and engineers responsible for these technologies were split between the powers that would eventually become the major players in the Cold War. Against the backdrop of nuclear conflict and mutually assured destruction, the creation of rockets capable of placing a man into outer space would run

in parallel to the creation of missiles capable of delivering large nuclear payloads to targets on the other side of the Earth. This context of the Cold War and possible global annihilation would make states wary of new technologies capable of aiding such large-scale destruction, and would have a large impact on the types of institutions crafted during this era. Along with the consequences of the Cold War, this era was also one of decolonization. Western states were loathe politically and economically to hold onto distant colonies after several protracted struggles (e.g, France in Algeria and Vietnam), instead valuing national self-determination. This context too would have important impacts on institutional creation norms.

On the other hand, the Internet, while developed during the waning days of the Cold War, is predominantly a product of the 1990s, a period of relative peace and optimism. Economic activity and capitalism were the order of the day, and this period has been interpreted by some as “the End of History” (Fukuyama, 1992). The great ideological conflicts appeared to be over, and an era of collective security seemed to reign in international politics. States had begun to take the back seat to corporations, and individuals were beginning to become major players in the world system independent of political bodies. This historical context would lead to vastly different international norms for creating institutions than the context of the height of the Cold War.

Institutional Norms and Primary Actors

The historical context for each of the case study technologies leads to a certain understanding of the international norms for institution building during each period. During the early phases of the Cold War, the era under which institutions governing

space exploration were created, the dominant norms of institution creating could be best categorized as the early Cold War. The norms of modernity lead to a state-centric view of institutions, as states were the primary actors in the global system. The initial instinct for any new international institution at this time would be to create a series of treaties building on the work of the United Nations General Assembly. These international institutions would seek to limit any unforeseen consequences by calling for consensus-building discussions between states party to the treaty. The background of decolonization would also see states act more reluctantly in the extension of colonial claims. This reluctance is perhaps responsible for the proliferation of the notion of commons based institutions during this era, as observed in the creation of UNESCO, and the Antarctic treaty (Christol, 1982). All of these norms taken together lead to the early Cold War style of institution: international, treaty-based, UN organized, commons oriented, and predicated on a state-centric single stakeholder model.

Alternatively, the institutional norms surrounding the creation of Internet institutions are derived from a much more focused ideology of institutions, “neoliberalism”. Under neoliberalism, states and politics take a much more diminished role in institutions. Instead market mechanisms are allowed to play out, leading to much more organically derived institutions. While neoliberalism is often associated large corporations and globalization, individuals are also capable of playing an increased role in both institutions and the international society (Steger, 2007). All of these come together to shift the primary actor in the governance structure away from the single stakeholder model as observed during the early Cold War towards a much more inclusive multistakeholder model of governance. While neoliberalism often has negative

connotation, in the realm of norms for institutional creation neoliberalism leads to organically created of institutions inclusive of a wider variety of voices and participants in decision-making.

Institutional Type and Authority Center

The results of the norms surrounding the institution creation process varying widely are vastly different institutional structures. Space exploration's governing institutions take the form of a United Nations-supported treaty organization. Building on a UN mandate, a series of treaties were created to establish norms for behavior in outer space. While at the time of institutional creation only two states were capable of actually operating in outer space, the vast majority of states chose to sign on to the treaties. By the end of the 1970s, with the final treaty governing outer space, most of the states in the world signed, except those actually capable of operating in outer space (Ogunbanwo, 1976). Ultimately, the institutions for governing outer space rely on the status of their treaties to grant authority for action against those who violate the treaties. In principle, the United Nations theoretically acts as the arbiter and administrator of the institutions, though in practice those capable of reaching space must coordinate their actions independent of the UN.

For the Internet, and its organically developed institutions, the primary institutions that were created took the form of private not-for-profit corporations. ICANN and ISOC allow a wide variety of actors to participate in decision making, through the mulitstakeholder model. Unlike space exploration, no treaty has ever been drafted, much less ratified, to govern the institutions of the Internet. Corporate governance documents have been drafted, but states themselves are not the parties to any treaty.

Yet the results of the ODiis are essentially treaty organizations without treaties (Mueller, 2002). And while the multistakeholder model allows for a wider degree of participation, the ultimate authority for Internet governance, at least for the time being, rests with the United States Department of Commerce. While there is currently a push to make Root DNS, the lynchpin system of the entire Internet, an entirely privately held authority, current Internet governance institutions rely on the US Department of Commerce to continue operation. Internet governance institutions appear and operate as an open and relatively inclusive system but rely on one national organization to function, a situation that has lead to tension with other participants in the system.

Institutional Change

One thing that should remain clear to all students of institutions is that despite attempts to remain the same, institutions inevitably undergo some change. The governance institutions of space exploration have been forced to change in interesting ways over the course of the last few decades. While subject to subversions, as will be discussed in the following section, several important concessions to institutional change have been necessary. Primarily, a new openness to non-state actors has occurred. With the processes of privatization and subversion, new actors in space exploration have emerged and the role of the state has accordingly been revised. States remain the primary actors, yet their relationship to those capable of accessing outer space has shifted. While the legal documents creating the foundations for space institutions have remained unchanged, this represents a potential for myriad legal problems in the future. The institutions of the Internet have also undergone some small changes. While the legal structure of Internet governance remains relatively un-codified, this has left room

for national actors to attempt to balkanize the Internet through the creation of national intranets. The lack of national and international-level treaties dictating national behaviors on the Internet has also left the door open for massive surveillance programs, perhaps precipitating the creation of said national intranets. While both the institutional structures for space exploration and the Internet have undergone drastically different types of change, the intersection between the two cases will show in a later section the similar role played by institutional momentum in each case.

Intersections + Divergences= Convergences

Two particular realms of activity have seen the institutions of space exploration and the Internet simultaneously have a convergence of issues, while at the same time experiencing them in vastly different way. This section will address these areas of convergence, examining how similar processes can differ so greatly in outcome across the two case studies. These areas of convergence should provide great insight into the particular problems faced in attempting to govern technologies, an entirely different endeavor than attempting to govern a population.

Subversion- Who and How

Both case studies have revealed attempts to subvert the technology governance institutions of both space exploration and in the Internet. Yet the manner and source of subversion diverge widely due to the nature of the initial institutions. Borrowing and adapting the Stolper-Samuelson Theory concerning factor distribution and favor for trade, when dealing with institutional subversion, those actors who seek to subvert institutions are the actors who lose out from current institutional structures (Stolper and Samuelson, 1941). For institutions, these factors fall into the categories of public sector

and private sector. For the public sector, these actors are nation-states and international organizations. For the private sector, these actors are individuals, corporations, and non-governmental organizations.

In the case of the institutions governing space exploration the institutional structure benefits the public sector, leaving the private sector in a non-dominant position. Under the initial distribution of capabilities for space exploration, this institutional structure was very appropriate, as the very notion of a private corporation or individual being capable of space exploration in the 1960s rested squarely in the realm of science fiction. As time progressed, however, technology advanced and individuals and private corporations began to gain influence and increased capabilities for accessing outer space. By the 1980s and 1990s, major attempts at subversion had begun, falling into the two categories of privatization and commercialization, as discussed in chapter 6. The non-dominant factor, the private sector, upon gaining capability began attempts at subversion that continue to this day, resulting in an institutional overhaul affecting not just the institutions of space exploration governance, but the overall legal structure for mankind's activities in outer space.

The case of subversion for the Internet is much less straightforward, as discussed in chapter 8. For Internet governance institutions, the dominant factor is essentially the private sector. While the public sector does exert influence through the US Department of Commerce's authority over the Root DNS and IANA, the ODiis are given an extremely free hand to set policy on their own. Moreover, attempts are underway by the Department of Commerce to relinquish this authority in the near future. While that particular subversion would serve to strengthen the position held by the

private sector over the Internet, it is not overly illustrative of the general attempts at subversion underway on Internet governance institutions. The non-dominant factor, the public sector, attempts to subvert Internet institutions in several important ways. International Organizations attempt to wrest IANA and Root DNS authority from ICANN. States use their relationship to Internet institutions to put into place massive surveillance and censorship programs. And perhaps most importantly, states and groups of states attempt to balkanize the Internet by breaking away from the technical and governance institutions of the Internet, sometimes in response to the surveillance activities as they occur in the West.

Subversion attempts are important factors in both solidifying and causing change for technology governance institutions. These attempts typically originate from the non-dominant factor, as they have the most to win by changing the system. And these attempts at subversion change as the norms of international institutional creation change, as witnessed by the shift towards the private sector in space exploration upon the shift to the neoliberal world. It is possible that a new era of institutional norms is in the offing, as witnessed by national and international attacks on the institutions of the Internet.

Adoption of Technology- Institutional Impacts and Success?

Many authors such as Murmann (2003), Ruttan (1974), and Ruttan et al. (2002) have noted the relationship between institutional structures around a technology and the eventual success or failure in adoption of the technology by a wide audience. While the Internet and space exploration have a wide gulf between their mutual ready utilization by the public and are not directly comparable technologies, there is still an interesting

interaction between the types of institutions created for each technology and their adoption by society up to this point. For space exploration, the institutions are created, at least implicitly, to limit the ability of new actors to join into the system. The reward structures for new applications for space exploration and possible exploitation are limited. The ability for profit in space exploitation is limited to essentially nothing based on the space treaties as they currently exist. While there is some room for possible exploitation of celestial bodies, the institutions to fairly distribute any profits do not exist. To this point, regardless of actual technical capability, exploitation of outer space has been limited to data collection and transmission (telecommunication) activities within the bounds of primarily private satellites launched on public launch vehicles. This appears to fit the design and original intent of the space treaties (Oganbanwo, 1976).

The Internet provides a marked contrast for the effects of institutional design on adoption of a technology by society. Whereas the space treaties attempt to lock out as best they can any new actors in the field of space exploration, the Internet has evolved very open institutions meant to ease the entry of new actors. Property rights exist on the Internet, and barring some distinct limits on behavior, allow users to attempt new and interesting things upon joining the Internet. From the early commercial open period of the Internet, it has rapidly spread not only taking on new users to foster wider communication networks, but it has also expanded into new commercial frontiers. Massive amounts of trade and commerce have been made possible by new entrants into the Internet Communication Technologies field (Denardis, 2007). By allowing actors to collect financial rewards for creating novel uses for the Internet, over the course of the last two decades it has grown from a small network of academics and hobbyists to

one of the major driving forces of the global economy. It would be fair to say that the institutions of the Internet have allowed for a great deal of success in adoption by society.

Intersections

These two case studies have a surprising amount of intersection in relation to the institutions that have been created for such vastly differing technologies during vastly different eras of modern history with vastly different norms for creating institutions. These intersections could lead to some interesting insights about the creation of institutions for the governance of technology. Perhaps these similarities can lead to some best practices for future institutional creation, or can illustrate some of pitfalls that have been experienced in the creation of technology governance institutions thus far. Taken together with the divergences and the convergences we can begin to draw some interesting lessons learned from these cases about the institutional governance of technology.

Auxiliary Institutions

While both technologies that served as case studies develop their own distinct institutional and governance structures, these institutions do not exist on their own. Both technologies have a group of auxiliary institutions that aid in the governance of the technologies. Space exploration, with it reliance on treaties, requires several other institutions to ensure the laws and treaties are appropriately enforced. The Internet relies on the various auxiliary institutions to participate in the multistakeholder model of governance. While in both cases these institutions vary widely, of particular interest is the fact that both technologies rely heavily on the International Telecommunications

Union for effective governance. Originally tasked with coordinating international telegrams, the ITU has since grown to coordinate and govern a wide variety of international telecommunication technologies. The ITU has an important role to play in the governance of the Internet, assisting in the coordination of international Internet standards. And in a strange series of events detailed in chapter 4, the ITU has grown to be the largest and most important player in the practical governance of space exploration, coordinating the allocation of orbits and communications frequencies for manmade satellites. Aside from the role played by the ITU, intriguing as it may be, it is important to realize that the primary governance institutions examined in these case studies rely on other auxiliary institutions to effectively govern the technologies.

Institutional Norm Guidance (Contextuality)

As noted in previous sections, the context of history and international norms heavily influences the types of institutions that are created. This influence, while different for each technology examined, still greatly affects the resultant institutional arrangement. Space exploration may rely heavily on the norms of modernity and the context of the Cold War, and the Internet may rely heavily on the norms of neoliberalism and the context of the “end of history,” but both are still products of their own context. Without paying attention to the historical context of institutions and attempting to understand the norms of institutional creation within the international system during the era of creation, a more complete picture of institutional functions will remain out of reach.

Institutional Inertia

Both sets of technology governance institutions examined in the case studies underwent or are currently undergoing attempts at institutional subversion. But both institutions have maintained a large degree of their institutional autonomy. This continuity is most likely the result of significant institutional inertia (Bentham, 1880). Once institutions are created and are adopted by their communities, these institutions will gain momentum and continue to function in their current configurations. This inertia is the result of institutional norms of operation, with those who participate in the institutions becoming accustomed and acculturated to behaving in certain prescribed manners (Valderrama-Ferrando, 2006, Bentham, 1880, etc.). It becomes more difficult to overcome the risks for change than simply to keep functioning within the system as it exists. The institutions governing space exploration and the Internet at this point both have a large degree of institutional inertia, allowing the institutions to overcome attempts at subversion.

Possibilities for Change

On the other hand, the institutions governing space exploration and the Internet, while experiencing a large degree of institutional inertia, also have potential to undergo changes in the future. The institutions governing space exploration are based on the treaty model, which while exerting a large degree of institutional inertia is also open to a great deal of change and modification. More importantly, as space exploration is becoming more democratized from a technical standpoint and states' roles in space exploration becomes less relevant, the possibility of exit from the space treaties becomes viable in order to create a new institutional arrangement.

The institutions governing the Internet are even more susceptible to the possibility of change. The Internet is not currently beholden to treaties, or any truly codified laws for that matter. The institutions have been organically derived from the actual community of Internet users within the bonds of the multistakeholder model, as noted in chapter 6, and due to this organic nature could be changed to fit the needs of the community. There also exists the possibility of the creation of actual Internet treaties to govern states and international organizations roles vis-a-vis the Internet, should a consensus for state level behavior in relation to the Internet ever be solidified. Even ultimate authority over the Internet is up for possible change that is already in the exploratory stages.

Clearly, potential for institutional change exists for the cases that have been studied in this work, and with institutional change comes a different set of outcomes for the technologies. Shifts in the governance structure for space exploration could allow greater rewards for activities in space, leading to increased levels of commercial activity in space, possibly changing the relationship of humanity to outer space. Similar potential for change and shifts in human society could result from changes in the governance of the Internet, although potential for further growth in an already free and open Internet is possibly limited, resulting in change leading to negative outcomes for society's relationship to the Internet.

Cultural Impact

One final intersection between the two cases studies is less an observation about the institutions of governance and more an observation on the overall cultural impact these two technologies have had in the last century. Of all the various achievements

that mankind can hold up during this time period, these two technologies stand out as two of the most impactful and greatest achievements. Tremendous amounts of information about our universe have been gained from space exploration, as well as the social impact of actual human activities in space over the last 60 years. And with recent developments in the private space sector, it has become apparent that barring catastrophe of a massive scale humanity will continue in the coming decades to reach out towards.

The Internet has allowed for globalization to come to true fruition, permitting peoples separated by continents to form new communities. Information has become greatly democratized and new spaces for expression have been created due to the expansion of the Internet. The role of a networked society has increased human productivity, massive economic growth, and possibly assisted in the removal from poverty of a billion people (Economist, 2013). The Internet has held a massive place in human life for the last two decades, and this role appears to be increasing as attempts by the Internet's governing institutions to decrease the digital divide begin to mature. Both of these technologies loom large in humanity's collective consciousness and have exerted a powerful influence on the shape society has take in the last 60 years, and appear to have a major role to play in dealing with the challenges humanity will face in the decades to come.

Lessons Learned

Examining the divergences, intersections, and convergences of these two case studies some important lessons can be derived about technology, governance institutions, and the potential future of institutions. This section will examine several of

these trends and lessons, with the ultimate goal of crafting some discrete policy prescriptions for those who would create new institutions to govern the technologies that will emerge as important to humanity in the coming years. Some observations for further research will also be highlighted, as this work has uncovered some large holes in the literature that need to be addressed, as well as avenues that have not be examined to date.

Technology Does Not Exist In A Vacuum

While this lesson may seem obvious to anyone in the social sciences, those of a more technical nature and background can become very enmeshed in capabilities to the exclusion of a wider context. To quote Dr. Ian Malcolm, “You spent so much time thinking about what you can do, that you forgot to think about if you should do it.” Taken further, technology is embedded within society and culture. Institutional and social structures will influence the impact of a technology, from development to adoption. The rules and reward structures crafted around a technology have a large and discernable impact on the course a technology takes within a society (Murmann, 2003). This is by no means a new observation, especially among the business and economics communities, but the two case studies examined in this work clearly bear out that technologies exist within a contextual social and political economic environment, and that political elements play an important role in influencing this environment.

Institutions Matter

Another lesson born out from these case studies is also no new observation in the world of political science, and more specifically political economics. The role of institutions in outcomes is highly important, as seen previously in various political

economic works such as Mahoney (2010, and Chibber (2003) . Yet these previous works have focused on political, economic and social outcomes. The two case studies show that a similar process of institutional influence is born out for technologies. Technology, typically viewed as a social or economic process, has yet to become fully disembedded from the rest of human society, if it even may ever do so. The institutions of politics exert influence on the path of technology, sometimes deciding winners and losers from the beginning, other times allowing the market to play its role. We have seen the institutions of space exploration limit rather successfully new entrants into that realm of activity for fifty years due in part to limiting the rewards for attempting commercial activity in outer space. On the other hand, the Internet has been fostered and grown in an open and competitive fashion, with a much larger group of participants capable of directing policy. Institutions are highly important for technologies because they create the context in which technologies operate, essentially filling the vacuum around technologies.

Subversions Occur

Institutional rules create winners and losers. Once institutions are established, there will be beneficiaries from the system and those who are negatively impacted by the institutional arrangement. This observation is not without previous exploration, and is responsible for a Nobel Prize in economics (Stolper and Samuelson). Yet the primary factors for this observation have traditionally been capital and labor. At a national and international level, capital and labor have warred with each other over the types of institutions that affect trade. But for the institutions that affect the use of technology, which admittedly is a subset of economic and social activity itself, the primary factors

appear to be the public sector and the private sector (states/international institutions and corporations/individuals, respectively).

Once an institution governing a technology is created, dominant and non-dominant factors will emerge. As in most areas of human activity, the factor that is non-dominant will attempt to subvert the existing institutions hoping to create a more beneficial distribution of outcomes and power. This situation remains the case for the two case studies at hand, revealing a further lesson about institutional creation for technological governance and institutional creation more broadly. It appears to be a part of human nature that institutions will suffer subversion attempts, as any institutional arrangement will benefit some actors, but not others. \

Institutions are Contextual

Much like technology, institutions themselves are not developed in a vacuum. Institutional creation occurs within a social, political, and economic context. This context could result in a series of global norms about institutional creation. The two case studies have identified two particular sets of norms for institutional creation, identified as modernity and neoliberalism. More work should be conducted in the future to both further flesh out the norms of modernity and neoliberalism as well as attempting to identify other sets of institutional creation norms. It is entirely possible that due to recent levels of global interconnection that these two sets of norms might be the only sets of norms in human history, but smaller international institutions throughout history should reveal norms for institution creation.

States are not the Only Game in Town Anymore

The final two lessons derived from the two case studies reveals a rather frightening outcome for students of political science, but one that allows for a large degree of future study. States are no longer the exclusive primary force in international society. While liberal theories have allowed for individuals and organizations to play a role in international society for many decades, there has always remained a rather strong focus on the activities of states. Primarily as a result of the expansion of the Internet, individuals and corporations have gained a massive amount of wealth, enabling them to utilize this wealth in ways previously held in the exclusive hands of state, (for example creating a private space program or funding massive research in genetics or artificial intelligence). Alongside these economic changes that push in the distribution of power downward, the Internet has also expanded the ability of individuals to be heard by a larger part of the human diaspora. This expansion of the agency has precipitated a need for further evaluation of the role of the individual in the international political system. It is unclear what effects this shift in technology will continue to have on the global political system, but the time has come for the academic community to reevaluate the relationship of individual and states, as well as the prominence of states in the international system.

The Multistakeholder Model is Interesting, but Needs Further Study

The final lesson taken from these two case studies involves the novel governance structure observed for the Internet: the multistakeholder model. The multistakeholder model of governance provides some interesting implications for the future of governance and the structure of institutions. Emerging from the information

technology field, the Internet and its multistakeholder model present a possibly viable alternative for governance in the near future. While traditionally governance structures have required individuals to participate through their state of citizenship, with the growth of communication technology precipitated by the Internet individuals can now directly participate in the decision-making processes as they so choose. The multistakeholder model of governance may not be directly applicable in all spheres of human action, but it does provide an interesting alternative to traditional state-centric treaty based institutions. As such, further research on the multistakeholder model should be conducted from a political science perspective. If this field is truly the study of governance, then the multistakeholder model presents a new and interesting field for future research and possibly policy making.

Policy Prescriptions

From these two cases studies and the lessons that have been extracted from them, a series of discrete policy prescriptions can be derived. Some of these policy prescriptions reflect wider knowledge that has been gathered from other sources and cases, but most emerge strictly from the examples at hand. It is the hope of the author that at least some of these policy prescriptions be investigated by a larger audience, hopefully causing a shift in policy and leading to more effective governance of technology and better outcomes for humanity.

1) Generally speaking, Institutions should be contextual, not one-size-fits-all

The most general and widely accepted of these policy prescriptions is very simple and has been reflected by much of the work in political science and economics. Institutions, as seen in the previous section about lessons learned, are contextual,

relying on the social, economic, and historical circumstances of the day when they are being created. This situation is admirable, but there is also a tendency in policymaking to create universal solutions and institutions, as has been observed in much of the literature about the Washington Consensus (Williamson, 2002). Following the advice of Johann Peter Murmann (2003), institutions should fit the situation observed on the ground. As opposed to universalist policy, institutions governing technologies should be contextual, relying on the actual needs of the community of technology users to dictate the shape of the institutions. Space exploration provides a good example for this, as the users (states) created an institution that fit their needs, as well as the overall context of the time. The story remains true for the Internet as well, but with a focus on individual users. This situation is, generally speaking, a good thing, and should continue in the future. Policymakers should reject attempts to create a universal institutional type to govern technology, focusing instead on the particular needs and demands of the technology and its community of users.

2) The Multistakeholder Model has a future, deserves more examination

Building on the first policy prescription as well as some of the lessons learned from these case studies, the mulitstakeholder model of governance appears to have an important role to play in the future of institutional creation and governance. That is not to say that the multistakeholder model is a panacea and universal model for governance in direct contradiction of the previous policy prescription. But in allowing the community to have a stake in policymaking, the multistakeholder model allows various levels of the international system, from individuals to states and international organizations, to play an important role in policymaking. The multistakeholder model can allow for a more

organic institutional process to emerge, crafting the institutions as needed and allowing for a much larger freedom of change if desired.

Policymakers should keep the multistakeholder model in mind as they continue to craft institutions to govern technology, as generally speaking policymakers are not experts on the particular needs of the technology. Academics and political scientists more specifically should give further examination to the viability of the multistakeholder model, both for the governance of technology and governance as a whole. The multistakeholder model is a rather novel innovation in governance structures and accordingly deserves further study and consideration for wider applications.

3) OST 1967 and the other Space Treaties need a revision

More specifically as a policy prescription, it should be clear given real world changes that have occurred in relation to both space exploration technologies and the potential commercial activities that could occur in outer space that the treaties governing space exploration are fundamentally flawed. Several particular elements need to be addressed with either a revised treaty or a new set of institutions altogether. First, international norms have shifted, as states are no longer necessarily the primary actor. The technology of spaceflight has proliferated, not only to new national actors but also to private corporations. While ad hoc solutions to deal with this trend have been developed, as discussed in chapters 3 through 5, more permanent solutions are necessary to deal with the real world allocation of capabilities.

Secondly, the question of resource allocation and compensation in outer space need to be addressed and clarified. The notion of mining and industry in outer space was purely in the realm of fiction at the time of institutional creation, and even the most

recent space treaty, the Moon Treaty, states that technical capabilities for the exploitation of space are not present, so institutions are not required yet. However, the Moon Treaty, a failed treaty itself, is over 30 years old. In the intervening decades the capabilities for private actors to exploit outer space have begun to come online. With the start of a new age of private spaceflight, it is now time to rethink how resources will be allocated when extracted from outer space.

Third, it must be acknowledged that in relation to space exploration, the idea of a scientific commons is still an important one. There is still much to be learned about the universe and how to live in it that requires the freedom to conduct scientific activities. Holding the precious resources of the universe in common for all mankind is still a noble idea, but it is much easier to hold to those principles when there are no resources present and accessible. Science has now shown that there is much to be gained by exploiting outer space, and commercial activities will increasingly matter in decisions about outer space. The institutions that currently exist do not adequately reflect this reality, leaving the potential for massive disruption and unrest in the future. Now is the time to address these concerns and rethink mankind's approach to governing activities in outer space.

Accordingly, the author suggests that the multistakeholder model of governance be explored for governing space exploration and future exploitations. While states are still and probably should remain primary actors in space policymaking, new participants such as private space corporations should have a voice as well. Perhaps a model with states protecting scientific matters and private corporations lobbying for and deciding technical and commercial matters, with both sets of actors consulting on either set of

issues would be beneficial. While it is clear that the current institutional structure is not sustainable in the coming years, a better structure is not currently apparent. The multistakeholder model could perhaps be a guide, but more study and careful consideration is necessary.

Finally, it is the belief and suggestion of this author that the role of the UN Office of Outer Space Affairs should be increased and the organization strengthened to prepare it for a role as a global coordinator for diverse space activities. UNOOSA was initially created to deal with international outer space issues, but has evolved into a role of fostering space activities to aid developing nations in their growth. While this is a fine role, with a potential boom in space activities, some institution is required to coordinate and arbitrate these activities. The best-fit institution is UNOOSA, which represents not only the states of the UN, but also non-state actors who have an interest in outer space (UNOOSA, 2015). UNOOSA could serve as the coordinating body for a multistakeholder model of governance for outer space activities in the future. But the office would require a much-expanded capacity in order to fill this role. UNOOSA could also serve as the coordinating body for any effort to revise the current institutions governing outer space.

The institutions governing space exploration have served mankind well to this point, but have severely limited outer space activities by limiting rewards attainable from spaceflight. With the birth of a new space race driven by private actors, who while desiring greater rewards from space activities, have neither the same oversight structures as states and the ability to fund space activities on their own, a revision of the current institutions governing space exploration is past due. The future of mankind lies

at least in part in outer space, and as such new rules and institutions will be required to make this future as smooth as possible.

4) ICANN Works, but needs Better Supervision

ICANN, the primary governing body for the Internet, has overseen in the last several decades a massive transformation in the way the world communicates. For the most part, ICANN and the other institutions governing the Internet, have been successful in their roles, yet this has been predicated on the mostly reasonable actions of participants in the multistakeholder model. Once the United States Department of Commerce relinquishes its overall Root authority, the Internet and its governing institutions will be essentially self-regulating. History has already borne out the notion that self-regulation does not always result in beneficial outcomes.[59] The author recommends that ultimate authority and the oversight that comes with that authority should perhaps not be vested in ICANN, but in another organization.

To this point, the Internet has relied on its organically derived institutions to successfully govern, leading to unwritten norms dictating how users and actors interact with the technology. As the Internet and its communication technologies begin to mature, it would be best to codify these norms into rules and perhaps create a treaty to govern behavior patterns on the Internet. While this might have been seen as an assault on freedom, free societies generally require the rule of law. This treaty could also dictate the behaviors of states, limiting their invasions of privacy, an outcome desired by the other participants in the multistakeholder model. A treaty emanating from the multistakeholder model of governance would be novel in global society, perhaps putting

[59] This has been the case particularly with the banking and automotive industry over the last several decades.

individuals and states in a directly accountable relationship in ways that have not been previously seen.

Finally, as previously mentioned, Root DNS authority should not be given to ICANN, even if split off into a separate, but wholly owned, entity. Instead, this author recommends that Root DNS and IANA authority be given to an international organization that has a strong track record of coordinating telecommunication issues. The ITU would be a natural home for IANA and Root DNS authority, so long as the actual administration remains with ICANN. A similar contract of service as the one with the US Department of Commerce should serve as the basis of the relationship between ICANN and a IANA holding ITU.

5) Better Attempts to Prevent Network Balkanization Are Necessary

The final policy prescription is that the global Internet community should take better actions to prevent network balkanization. National intranets should be discouraged. The balkanization that has been seen in recent years is bad for both the network as a whole and society, reversing the gains in communication and expression that have been made since the proliferation of the Internet in the 1990s. It must be acknowledged that behaviors by the West, such as the UKUSA surveillance programs, might have a role to play in the balkanization process. In order to achieve this goal, the multistakeholder process must be strengthened, giving voice in policymaking to those states and actors who have felt under-represented in Internet policy. This change could perhaps discourage further network balkanization. While the author does not recommend full Internet democracy, as its policy is still of a technical nature beyond the understanding of the average user, a larger role for the Government Advisory

Committee of ICANN would be a step in the proper direction, as long as it does not come at the expense of the pluralistic nature of the multistakeholder model.

Avenues for Future Research

Several interesting questions have arisen that will deserve further exploration for the future. The multistakeholder model deserves study from an institutional perspective. While this work has gone down the road of examining the multistakeholder model in the context of the Internet, further work should seek to look at the model in other contexts. Perhaps a comparison of outcomes from the multistakeholder model could be compared to more traditional governance models. This might require comparison between governmental institutions and business institutions.

Further research should be continued on institutional creation and evolution. A renewed focus on the study of international institutions as entities unto themselves should be part of this continued study. A more empirical approach to the study of international institutions should be conducted, especially focusing on how the international system affects institutional types. More research into the context of the international system, with a focus on how power and history interact to create international norms of rulemaking (constitutional creation), is also called for.

On the side of the study of technology and governance, additional technology governance scenarios should be searched for and case studies conducted. While past technologies seem the obvious first step in this research area, more contemporary cases could also be illuminating. Exploring national-level governance of technologies, especially in the biological, nanotechnological, and robotics areas should bear fruit. These national level regimes could be compared to each other, looking for both best

practices and best outcomes. The future of the governance of technology will rely on the study of institutions today, and more research into this question is required. Hopefully as technology progresses, more attention will be paid both the benefits and drawbacks of certain governance structures, and the impact on the technologies themselves can be better understood.

Conclusions and Final Thoughts

The two case studies undertaken in this work provide interesting and diverse examples of institutional creation. While most institutional approaches focus on the governance of people, or in the most abstract cases, businesses, by focusing on the governance of technology we have learned new things about how to govern. Reliance on laws and structures is not the only focus of institutions as the dynamics of organically developed institutions may now play a role. Also, barring a massive shift in the global system or some catastrophe, technology appears on the verge of becoming a major political issue for the next century. Technology presents at the same time a more abstract and more concrete case for studying the governance of things[60]. With the possibility that states are losing at least some of their importance in the world system, it will be necessary to think of new ways of governing and creating order in the system. And as technology continues to proliferate and become more advanced, creating new and more powerful things that change society in unexpected ways, structures to mitigate the possible negative outcomes of new technology will be necessary. By looking at how two of the more disruptive and influential technologies of the last hundred years have been governed, it is the hope of this author that we can learn the

[60] Insofar as things can be governed. The main thing being governed is people's interactions with things.

lessons necessary to adjust our governance structures and institutions as this century progresses.

These different institutional structures for the governance of technology have presented many important lessons that can be learned. From these lessons, the policy prescriptions for technological governance generally, and the governance of space exploration and the Internet specifically present some interesting directions for the future. These lessons should be well learned by policymakers and academics, and that the potential policy prescriptions be explored. Technology has played an important role in the creation and development of civilization, and it appears that this role will only increase in the future. It is the role of institutions to harness these changes and allow society to continue to develop. To borrow from Elon Musk institutions "… could either watch it happen or be a part of it" (Musk, 2010). Hopefully, we as a society will choose to participate as a whole, rather than watching it happen for a select.

BIBLIOGRAPHY

Abbot, Kenneth and Duncan Snidal 1998."Why States Act through Formal International Organizations" *Journal of Conflict Resolution* 42(1) pp3-32.

Acemoglu, D, and James Robinson. 2012. *Why Nations Fail.* Crown Business. New York.

Acemoglu, D., J.A. Robinson and S. Johnson. 2000. 'The Colonial Origins of Comparative Development: An Empirical Investigation.' NBER Working Paper 7771.

Acemoglu, D., Johnson, S., Robinson, J. A., & Yared, P. (2009). Reevaluating the modernization hypothesis. *Journal of Monetary Economics*, *56*.8, pp 1043-1058.

Acemoglu, D., S. Johnson and J.A. Robinson. 2005. 'Institutions as the Fundamental Cause of Long- Run Growth', in Philippe Aghion and Steve Durlauf, eds., *Handbook of Economic Growth*. North-Holland. Amsterdam.

Acemoglu, D., S. Johnson and J.A. Robinson. 2006. 'De Facto Power and Institutional Persistence.' Paper prepared for American Economic Association Papers and proceedings, May 2006.

AP. 17 September, 2013. *Brazil Plans to go offline from US-Centric Internet.* Accesed 10 July, 2015. Available at http://www.thehindu.com/news/international/world/brazil-plans-to-go-offline-from-uscentric-internet/article5137689.ece.

Apter, D. 1966. *The Politics of Modernisation.* University of Chicago Press. Chicago.

Aron, J. (2000) 'Growth and Institutions: A Review of the Evidence.' *World Bank Research Observer*, 15(1), pp. 99–135.

August, Oliver. 23 October, 2007. "The Great Firewall: China's Misguided –and Futile- Attempt to Control what happens Online". *Wired Magazine.* Available at http://www.wired.com/politics/security/magazine/15-11/ff_chinafirewall.

Badii, 28 September, 2014. *The UN and the Future of the Internet Governance Forum*. Available at http://www.internetgovernance.org/2014/09/28/the-un-and-the-future-of-the-internet-governance-forum/.

Baldwin, David. 1992. *Neorealism and Neoliberalism.* Columbia University Press. New York.

Bamford, James. 2008. *The Shadow Factory*. Anchor Press. New York.

Bamford, James. 2013. “They Know Much More Than You Think” *New York Review of Books.* Available at http://www.nybooks.com/articles/archives/2013/aug/15/nsa-they-know-much-more-you-think/.

Barne, Geremie, and Sang Ye. 1997. “The Great Firewall of China” *Wired Magazine* available at http://archive.wired.com/wired/archive/5.06/china_pr.html.

Bates, R.H. 2001. *Prosperity and Violence. The Political Economy of Development.* W.W. Norton and Company. New York.

Becker, Gary .1986. ‘The Economic Approach to Human Behaviour’ in Jon Elster ed., *Rational Choice.* Oxford: Basil Blackwell, pp. 108–122.

Bel, Germa. 2006. “Retrospectives: The Coining of Privatization and Germany’s National Socialist Party” *Journal Of Economic Perspectives.* 20.3 pp 187-194.

Benko, Marietta. 1985. S*pace Law in the United Nations.* Martinus Nijlhoff. The Hague.

Bernard, Doug. 9 March, 2015. *Iran’s Next Step in Building a Halal Internet.* Accessed 14 July, 2015. Available at http://www.voanews.com/content/irans-next-step-in-building-a-halal-internet/2672948.html .

Binswanger, Hans. 1978. *Induced Innovation* John Hopkins University Press. Baltimore.

Binzel, Richard. 2014. *ASTEROIDS in the context of Human Exploration: A Sustainable Path.* Presentation available at http://www.lpi.usra.edu/sbag/meetings/jul2014/presentations/0200_Wed_Binzel_Asteroids.pdf.

Bloomberg. 10 April, 2012. *BRICS Cable Unveiled for Direct and Cohesive Communication Services* accessed 10 July, 2015. Available at http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aDLKQqIM.ZZ0.

Bradsher, Keith. 28 December, 2012. “China Toughens Its Restrictions on Use of the Internet *New York Times* available at http://www.nytimes.com/2012/12/29/world/asia/china-toughens-restrictions-on-internet-use.html?_r=0 .

Brooker, Paul. 2000. *Non-Democratic Regimes.* Palgrave Macmillian. New York.

Bueno De Mesquita, Bruce. 2005. *The Logic of Political Survival.* MIT Press. Boston.

Carpenter, Brian. 1996. *About the IAB*. Available at https://www.iab.org/about/description/.

Carrington, Daisy. 3 June, 2013. *Iran tightens grip on cyberspace with Halal Internet.* Accessed 14 July, 2015. Available at http://www.cnn.com/2013/06/03/world/meast/iran-internet-restrictions-halal-internet/.

Catapano, Joe. 28 July, 2014. *IGF-USA Shines on Internet Governance Stage*. Available at https://www.icann.org/news/blog/igf-usa-shines-on-internet-governance-stage.

Cerf, Vint, Bob Kahn, and Lyman Chapin. 1990. *Announcing ISoc.* Available at http://www.internetsociety.org/internet/what-internet/history-internet/announcing-internet-society.

Chandrasekharan, M. 1967. "The Space Treaty" *Indian Journal of International Law.* Vol 7. P 61- 67.

Chang Ha-Joon and Evans, Peter .2005. 'The role of institutions in economic change', in Silvana de Paula and Gary A. Dymski, eds., *Re-imagining Growth. Towards a Renewal of Development Theory.* London: Zed Books, pp. 99-140.

Chehade, Fadi. 3 December 2012. *WCIT-12 Opening* presented at WCIT-12 Dubai, UAE available at http://www.itu.int/en/wcit-12/Pages/speech-chehade.aspx .

Cheng, Roger. 1 November, 2014. "Branson on Virgin Galactic crash 'Space flight is hard—but worth it" available at http://www.cnet.com/news/branson-on-virgin-galactic-crash-space-is-hard-but-worth-it/ .

Chibber, Vivek. 2003. *Locked In Place.* Princeton University Press. Princeton.

Christol, Carl. 1982. *The Modern International Law of Outer Space.* Pergamon Press. Elmsford, NY.

Clark, Darren. 25 September, 2013. *BRICS Cable: An Alternative Internet* accessed 10 July, 2015. Available at http://www.caribbean-events.com/content/brics-cable-alternative-internet.

Clarke, Arthur C. 1945. "Extra Terrestrial Relays" *Wireless World*. October issue. pp 305-308.

Cocker, Steve. 1993. *RFC 1396 : The Process for Organization of Internet Standards Working Group* available https://tools.ietf.org/html/rfc1396.

Cody, Edward. 9 February, 2007. "Despite Ban, Chinese Youth Navigate Internet Cafes*". The Washington Post* available at http://www.washingtonpost.com/wp-dyn/content/article/2007/02/08/AR2007020802389_pf.html.

Collins, Harry and Trevor Pinch. 1998. *The Golem at Large*. Cambridge University Press. Cambridge.

Dahl-Østergaard, T., S. Unsworth and M. Robinson (2005) 'Lessons learned in the Use of Power and Drivers of Change Analyses in development co-operation'. Review Commissioned by the OECD DAC Network on Governance (GOVNET), Final Report (Paris, OECD).http://www.grc-exchange.org/docs/doc82.pdf .

DalBello, Richard. Testimony before Science and Space Subcommittee of the US Senate Committee on Commerce, Science, and Transportation. "Assessing the Risks, Impacts and Solutions for Space Threats". 20 March, 2013. Available at http://www.hq.nasa.gov/legislative/hearings/2013%20hearings/3-20-2013%20DELBELLO.pdf.

Dehghan, Saeed. 5 January, 2012. *Iran Clamps down on Internet use*. Accessed 15 July, 2012. Available at http://www.theguardian.com/world/2012/jan/05/iran-clamps-down-internet-use.

DeNardis, Laura. 2009. *Protocol Politics*. MIT Press. Boston.

DFID (Department for International Development) (September, 2001) *Making government work for poor people. Building State Capacity.* London: DFID.

Diamond, Jared. 1997. *Guns, Germs, and Steel.* WW Norton. New York.

Doner, Richard F., Bryan K. Ritchie and Dan Slater (2005) 'Systemic Vulnerability and the Origins of developmental States: Northeast and Southeast Asia in Comparative Perspective.' *International Organisation*, 59 (2), pp. 327–361.

Dou, Eva. 30 January, 2015. "China's Great Firewall Gets Taller" *The Wall Street Journal* Available at http://www.wsj.com/articles/chinas-great-firewall-gets-taller-1422607143.

Durkheim, E. (1895/1938) *The Rules of Sociological Method*: The Free Press. New York.

Ellul, Jacques. 1964. *The Technological Society.* Vintage Books. New York.

Email. Aiken to ISOC Board. 17 March, 1995. Available at http://www.wia.org/pub/postel-iana-draft5.htm.

Ernesto. 7 December, 2012. *Pirate Bay Proxy Loses Domain Name To Anti-Piracy Boss* available at https://torrentfreak.com/pirate-bay-proxy-loses-domain-name-to-anti-piracy-boss-121207/.

Esping-Andersen, Gosta. 1990. *The Three Worlds of Welfare Capitalism.* Princeton University Press. Princeton.

Evans, Peter, D. Rueschemeyer and T. Skocpol. Eds. 1985. *Bringing the State Back In.* Cambridge University Press. Cambridge.

Ezell, Edward and Linda Ezell. 2010. *The Partnership*. NASA Press. Washington DC

Falkvinge,Rick. 18 September, 2013. *Logical for BRICS Countries to Build Their Own Internet Infrastructure, Circumventing US Surveillance.* Accessed 5 July, 2015Available at https://www.privateinternetaccess.com/blog/2013/09/logical-for-brics-countries-to-build-their-own-internet-infrastructure-circumventing-u-s-surveillance/.

Federal Communications Commission. Rule submitted 13 April, 2015. *Protecting and Promoting the Open Internet.* Available at https://www.federalregister.gov/articles/2015/04/13/2015-07841/protecting-and-promoting-the-open-internet.

Federal Trade Commission Rules and Guides. Available at https://www.ftc.gov/enforcement/rules/rules-and-guides.

Forkosh, Morris. 1982. *Outer Space and Legal Liability.* Martinus Nijlhoff. The Hague.

Fortna, Virginia. 2004."Does Peacekeeping Keep Peace?" *International Studies Quarterly.* 48: pp269-292.

FTC. *About the Bureau of Competition*. Available at https://www.ftc.gov/about-ftc/bureaus-offices/bureau-competition/about-bureau-competition.

Fukuyama, Francis. 1992. *The End of History and the Last Man.* Free Press. New York.

Gallagher, Sean. 11 June 2013. *What the NSA can do with 'big data'.* Accessed 17 July, 2015. Available at http://arstechnica.com/information-technology/2013/06/what-the-nsa-can-do-with-big-data/.

Gandhi, Jennifer. 2010. *Political Institutions Under Dictatorships.* Cambridge University Press. Cambridge.

Gibbs, Mark. 24 September, 2013. *Goodbye US Internet, Hello World Internet.* Accessed 11 July, 2015. Available at http://www.networkworld.com/article/2225442/lan-wan/goodbye-us-internet--hello-world-internet.html.

Gillespie, Nick. 2015. A Solution that won't work to a problem that doesn't exist" *Reason Magazine,* May 2015 issue. Available at http://reason.com/archives/2015/04/09/a-solution-that-wont-work-to-a.

Gilpin, Robert. 1981. *War and Change in World Politics.* Cambridge University Press. Cambridge.

Goedhuis, Daniel. 1970. "Legal Aspects of Utilization of Outer Space" *Netherlands International Law Review* 17.1 pp 25-50.

Grace, Carrie. 8 September, 2014. *Alibaba IPO: Chairman Ma's China*. Accessed 13 July, 2015. Available at http://www.bbc.com/news/world-asia-china-29119121.

Greenwald, Glenn and Ewan MacAskill. 7 June, 2013. "NSA PRISM program taps in to user data of Apple, Google, and others" *The Guardian* available http://www.theguardian.com/world/2013/jun/06/us-tech-giants-nsa-data.

Grief, Avner. 1993. "Contract Enforceability and Economic Instituions in Early Trade: The Maghribi Trader's Coalition" *American Economic Review* 83: 3 pp 525-548.

Haggard, S. (2004) 'Institutions and Growth in East Asia.' *Studies in Comparative International Development*, 38(4) pp. 53–81.

Hall, P. and D. Soskice (2001) *Varieties of Capitalism. The Institutional Foundations of Comparative Advantage.* Oxford University Press.

Harvey, Brian. 2007. *The Rebirth of the Russian Space Program*. Springer Praxis. New York.

Harvey, David. 1989. *The Condition of Post Modernity.* Blackwell Press. Oxford.

Heiddeger, Martin. 1954. *The Question Concerning Technology* Garland Publishing. New York.

Helmke, G. and S. Levitsky, eds., (2006) *Informal Institutions and Democracy. Lessons from Latin America*. Johns Hopkins University Press. Baltimore.

Henry, Caleb. 23 January, 2015. "Russia Merges United Rocket and Space Corporation with Roscosmos" accessed 22 June, 2015. Available at http://www.satellitetoday.com/launch/2015/01/23/russia-merges-united-rocket-and-space-corporation-with-roscosmos/.

Hinson, Diane. 1999. "A new INTELSAT for a new Millenium" *International Organizations and Space Law, Proceedings of the Third ECSL Colloquim, Perugia, Italy. 6-7 May, 1999* Ed. RA Harris. pp 247-252.

Hodgson, Geoffrey M. 2001. *How Economics Forgot History : The Problem of Historical Specificity in Social Science.* Routledge. London.

Hoffman, Bruce. 1998. *Inside Terrorism.* Columbia University Press. New York.

Hoffman, Chris. 2 May, 2013. *HTG Explains How the Great Firewall of China works* accessed 7 July, 2015. Available at http://www.howtogeek.com/162092/htg-explains-how-the-great-firewall-of-china-works/.

Hopkins, Nick. 7 June, 2013. "UK gathering secret intelligence via covert NSA operation" *The Guardian.* Available at http://www.theguardian.com/technology/2013/jun/07/uk-gathering-secret-intelligence-nsa-prism.

Huntington, Samuel .P. 1968. *Political Order In Changing Societies.* Yale University Press. New Haven.

Hurwitz, Bruce. 1986. *The Legality of Space Militarization.* Elseiver Science Press. New York.

ICANN Article of Incorporation for Internet Corporation for Assigned Names and Numbers available at https://www.icann.org/resources/pages/governance/articles-en.

ICANN Bylaws for Internet Corporation for Assigned Names and Numbers. Available at https://www.icann.org/resources/pages/governance/bylaws-en.

ICANN. 18 December, 2014. *ICANN Donates $50k to Internet Governance Forum Support Association* available at https://www.icann.org/resources/press-material/release-2014-12-18-en.

ICPEN. 28 March, 2006. *Memorandum on the Establishment and Operation of the International Consumer Protection and Enforcement Network.* Available at http://icpen.org/files/icpenDownloads/Memorandum_on_the_Establishment_and_Oparation_of_the_International_Consumer_Protection_and_Enforcement_Network_ICPEN_agreed_to_at_the_Conference_in_Jeju_26_28_March_2006.pdf.

ICPEN. *What we do?* Available at http://icpen.org/for-consumer-experts/what-we-do.

ICSU 1998. *COSPAR Charter*. Available https://cosparhq.cnes.fr/about/charter.

IETF. *About the IETF.* Available at https://www.ietf.org/about/.

Incitez China. 17 November, 2014. *China Search Engine Market Share in Q3 2014*. Accessed 7 July, 2015. Available at http://www.chinainternetwatch.com/10594/search-engine-market-q3-2014/.

Interfax Report. 1 October, 2012. “Roscosmos: Space Agency should be turned into state corporation, then into joint stock company” accessed 22 June, 2015. Available at http://rbth.com/articles/2012/10/01/space_agency_should_be_turned_into_state_corp_then_into_joint-stock_18707.html.

International Monetary Fund (IMF) (2005) *World Economic Outlook.* Washington: IMF, Ch. II ‘Building Institutions’.

IRTF. *About the IRTF.* Available at https://irtf.org.

ISoc. 2012. *What are the ITRs?* Available at http://www.internetsociety.org/itr.

ISoc. 31 October, 2012. *Internet Society Submission for the ITU WCIT-12* available at http://www.internetsociety.org/doc/WCITSubmissionOctober2012.

ISOC. *Support the IGF.* Available at http://www.internetsociety.org/igf.

ISoc. *Who We Are.* Available at http://www.internetsociety.org/who-we-are.

ITU-T. 2015. *ITU-T In Brief*. Available at http://www.itu.int/en/ITU-T/about/Pages/default.aspx.

ITU-T. 2015. *Study Group 11 at a glance.* Available at http://www.itu.int/en/ITU-T/about/groups/Pages/sg11.aspx.

Jakhu, Ram. 2013. “Regulatory Process for Communications Satellite Frequency Allocations” in J.N. Pelton, S. Madry, S. Camacho-Lara (eds.), *Handbook of Satellite Applications*, Springer Science+Business Media New York.

Jolly, Vijay. 1997. *Commercializing New Technologies*. Harvard Business School Press. Boston.

Kahin, Brian and James Keller. 1997. *Coordinating the Internet*. MIT Press. Boston.

Kan, 2011. 18 March, 2011. *China closes 130,000 Internet cafes as it seeks more control.* Accessed 7 July, 2015. Available at http://www.computerworld.com/article/2506860/technology-law-regulation/china-closes-130-000-internet-cafes-as-it-seeks-more-control.html.

Kapor, Mitchell. 2000. Second Paragraph Available at http://cyber.law.harvard.edu/archived_content/people/reagle/inet-quotations-19990709.html.

Keith, Ronald, and Zhiqiu Lin. 2006. *New Crime in China.* Routledge. New York.

Keohane, Robert and Joseph Nye. 2012. *Power and Interdependence.* Pearson Press. New York.

Knight, Jack (1999) *Institutions and Social Conflict.* Cambridge University Press. New York.

Koremenos, Barbara, Charles Lipson, and Duncan Snidal. 2001a. “The Rational Design of International Institutions” *International Organization* 55(4). pp761-799.

Koremenos, Barbara, Charles Lipson, and Duncan Snidal. 2001b. “Rational Design: Looking Back to Move Forward:” *International Organization* 55(4). pp1051-1082.

Krasner, Stephen A. 1991. “Global Communications and National Power: Life on the Pareto Frontier”. *World Politics* 43. pp336-366.

Landis, Robert. 1999. *Lessons Learned about IGOS Through the World Weather Watch* Presented at IGOS Partnership Forum, 21 July, 1999. Vienna, Austria. Available at http://www.un.org/earthwatch/about/docs/igusland.htm.

Lauth, Hans-Joachim. 2000.”Informal Institutions and Democracy” Democratization. 7: 4, pp 21-50.

Leftwich, A. (2000) *States of Development.* Polity Press. New York.

Leftwich, A., ed. (2004) *What is politics? The activity and its study.* Cambridge: Polity Press.

Leftwich, Adrian. 2007. “The Political Approach to Institutional Formation and Change” Discussion Paper 14, IPPG. Accessible at http://www.ippg.org.uk/PDF/Lit%20Review%2014.pdf.

Leighton, Paula. 2014. Developing Nations seek share of Anartica’s Spoils. SciDevNet. Accessed 10 September, 2015 http://www.scidev.net/global/bioprospecting/feature/developing-nations-seek-a-share-of-antarctica-s-spoils.html.

Lem, Stanislaw. 2013. *Summa Technologiae.* University of Minnesota Press. Minneapoli.

Levistky, Steven and Lucan Way. 2010. *Competitive Authoritarianism*. Cambridge University Press. Cambridge.

Levy, Brian and Manning, Nick (n.d.) ‘Institutional and Governance Reviews – an Evolving Type of Economic and Sector Work.’ Washington: The World Bank, accessed on 12 June 2015 at: http://info. worldbank.org/etools/docs/library/92650/assessing/pdf/premnote_igrs.pdf.

Lindner, J. and B. Rittenberger, B. (2003) ‘The Creation, Interpretation and Contestation of Institutions – Revisiting Historical Institutionalism.’ *Journal of Common Market Studies*, 41 (3), pp. 445–73.

Lukes, Steven (1974) *Power. A radical view.* London: Macmillan.

Markov, Marko. 1968. "Against the So-Called 'Broader' Interpretation of the Term 'Peaceful' in International Space Law," *Proceedings of the Eleventh Colloquium on the Law of Outer Space.*

Mahoney, James. 2010. *Colonialism and Postcolonial Development* CambridgeUniversity Press. Cambridge.

McNeill, William. 1982. *The Pursuit of Power.* University of Chicago Press. Chicago.

Menon. PK. 1988. *The United Nations efforts to outlaw the arms race in outer space.* Cambridge University Press. Cambridge.

Messier, Doug. “Rogozin: Russia to Consolidate Space Sector into Open Joint Stock Company” available at http://www.parabolicarc.com/2013/08/30/rogozin-interview-kommersant/.

Miles, Edward. 1980. *International Administration of Space Exploration and Exploitation.* Monograph Series in World Affairs. 8: 4. Graduate School of International Studies, University of Denver.

Moe, Terry. 1989. “The Politics of Bureaucratic Structure.” *Can the Government Govern?*, edited by John E. Chubb and Paul E. Peterson. The Brookings Institute, Washington, D.C. pp 267–329.

Moe, Terry. 1990.“Political Institutions: The Neglected Side of the Story." *Journal of Law, Economics, and Organization* 6: 213–54.

Moore, Barrington Jr. 1966. *The Social origins of Dictatorship and Democracy.* Beacon Press. Boston.

Mueller, Milton. 2003. *Ruling the Root*. MIT Press. Boston.

Mueller, Milton. 2010. *Networks and States*. MIT Press. Boston.

Mumann, Johann. 2003. *Knowledge and Competitive Advantage*. Cambridge University Press. Cambridge.

Narula, Ranjesh. 2003. *Globalization and Technology*. Polity. London.

NETRESEC. 31 March, 2015. *China's Man on the Side Attack on GitHub.* Accessed 5 July 2015. Available at http://www.netresec.com/?page=Blog&month=2015-03&post=China%27s-Man-on-the-Side-Attack-on-GitHub.

Newman, Edward. 2007. *A Crisis of International Institutions: Multilateralism and International Security*. Taylor and Francis. London.

North, Douglass C. 1990. *Institutions, Institutional Change, and Economic Performance.* Cambridge University Press. Cambridge.

NSA Press release. 24 June, 2010. *Declassified UKUSA Signals Intelligence Agreement Documents Available.* Available at https://www.nsa.gov/public_info/press_room/2010/ukusa.shtml.

NTIA. 14 March, 2014. *NTIA Announces Intent to Transitions Key Internet Domain Name Functions*. Available at http://www.ntia.doc.gov/press-release/2014/ntia-announces-intent-transition-key-internet-domain-name-functions.

NTIA. *About the Domain Name System*. Available at http://www.ntia.doc.gov/category/domain-name-system.

Nye, Joseph. 2004. *Soft Power: The Means to Success in the Political World.* PublicAffairs. New York.

Ogunbanwo, Ogunsola. 1975. *International Law and Outer Space Activities* Martinus Nijhoff. The Hauge.

Oruci, Valentina. 2012. *Peacekeeping in Kosovo- A Hard Nut to Crack. (*Thesis) Retrieved from http://diggy.ruc.dk/bitstream/1800/8684/1/Peacekeeping%20in%20Kosovo.pdf.

Pacey, Arnold. 1990. *Technology in World Civilization.* MIT Press. Boston.

Paul, Ryan. 9 April, 2012. *Iran moving ahead with plans for national intranet*. Accessed 14 July, 2015. Available at http://arstechnica.com/tech-policy/2012/04/iran-plans-to-unplug-the-internet-launch-its-own-clean-alternative/.

Peters, B. Guy. 1999 *Institutional Theory in Political Science. The 'New Institutionalism'.*: Continuum Press. London and New York.

Phys.org. 9 September, 2005. *The China Yahoo! Welcome: You've got Jail!* Accessed 7 July, 2015. Available at http://phys.org/news/2005-09-china-yahoo-youve.html.

Pierson, P. and T. Skocpol. 2002. 'Historical Institutionalism in Contemporary Political Science', in Ira Katznelson and Helen Milner, eds., *The State of the Discipline.* WW Norton. New York. pp. 693–721.

Pierson, Paul (2000) 'Increasing Returns, path dependence, and the Study of Politics.' *American Political Science Review*, 94 (2), pp. 251–267.

Pierson, Paul (2000b) 'Increasing Returns, path dependence, and the Study of Politics.' *American Political Science Review*, 94 (2), pp. 251–267.

Poggi, G. (2001) *Forms of Power.* Cambridge: Polity Press.

Polanyi, Karl. 1944. *The Great Transformation* Beacon Press. Boston.

Prodhan, Georgina. 3 October, 2011. *BRICs Push for bigger say in running of Internet*. Accessed 10 July, 2015. Available at http://realcleartechnology.com/news/reuters/technology/2011/Oct/03/brics_push_for_bigger_say_in_running_of_internet.html.

Putnam, R. D. (1988). Diplomacy and domestic politics: the logic of two-level games. *International organization*, *42*(03), 427-460.

Putnam, Robert. 1993. *Making Democracy Work.* Princeton University Press. Princeton.

Rafizadeh, Majid. 12 July, 2013. *Iran's Halal version of the Internet.* Accessed 14, July, 2015. Available at http://english.alarabiya.net/en/views/business/media/2013/07/12/Iran-s-Halal-version-of-the-Internet-.html.

Rawls, John. 1971. *A Theory of Justice*. Harvard University Press. Boston.

Razumovskaya, Olga. 8 May, 2015. *Russian and China Pledge not to Hack Each Other.* Accessed 11 July, 2015. Available at http://blogs.wsj.com/digits/2015/05/08/russia-china-pledge-to-not-hack-each-other/?mod=rss_Technology.

Reisinger, Don. 13 April, 2015. *Net Neutrality rules get published: let the lawsuits begin.* Accessed 10 July, 2015. Available at http://www.cnet.com/news/fccs-net-neutrality-rules-hit-federal-register-lawsuit-underway/.

RFC 2026. available at https://www.ietf.org/rfc/rfc2026.txt.

RFC 4677. *The Tao of the IETF* available at https://www.ietf.org/rfc/rfc4677.txt.

Rhoads, Christopher and Farnaz Fassihi. 28 May, 2011. *Iran vows to Unplug Internet*. Accessed 15 July, 2015. Available at http://www.wsj.com/articles/SB10001424052748704889404576277391449002016.

Rhodes, R.A.W. 2006 ."Old Institutionalisms" in *The Oxford Handbook of Political Institutions.* R.A.W. Rhodes, S.A. Binder and Bert A. Rockman, eds. Oxford University Press. Oxford pp 90–110.

RIA Novisti. 10 September, 2013. "Russian Space Agency faces Major Reform" accessed 22 June 2015. Available at http://sputniknews.com/russia/20131009/184031100/Russian-Space-Agency-Faces-Major-Reform.html.

Roberts, Lawrence. 2000. "A Lost Connection: Geostationary Satellite Networks and the International Telecommunications Union" *Berkeley Technology Law Journal* 15.3 pp1096-144.

Robinson, James. 2002. "States and Power in Africa by Jeffery I Herbst: A review essay" *Journal of Economic Literature* 40: pp 510-519.

Rodrik, D. (2004a) 'Growth Strategies', mimeo, and in Philippe Aghion and Steve Durlauf, eds., *Handbook of Economic Growth*. North-Holland, Amsterdam.

Rodrik, Dani (2003) 'Introduction: What Do We Learn from Country Narratives', in Dani Rodrik, ed., *In Search of Prosperity. Analyrtic Narratives on Economic Growth.* Princeton: Princeton University Press, pp. 1–22.

Rodrik, Dani (2004) 'Getting Institutions Right.' Mimeo.

Rothstein, Bo. 1996. 'Political Institutions: An Overview', in R.E. Goodin and H-D Klingemann, eds., *A New Handbook of Political Science.* Oxford University Press. Oxford pp. 133–166.

RSF. 3 August, 2011. *Woman Blogger Freed on Bail.* Accessed 17 July, 2015 Available at http://en.rsf.org/iran-government-develops-national-03-08-2011,40738.html.

Russett, Bruce, and John O'Neal. 2001. *Triangulating Peace*. WW Norton : New York.

Ruttan, Vernon. 2001. *Technology, Growth and Development*. Oxford University Press. Oxford

Sanders, Elizabeth. 2005. "Historical Institutionalism" In *Oxford Handbook of Political Institutions* Ed. Binder S, Rhodes R, Rockman B. Oxford University Press. Oxford p 39-55.

Sartori, Giovanni. 1994. *Comparative Constitutional Engineering.* NYU Press. New York.

Schattschneider, E.E. (1960) *The Semi-sovereign People.* Holt, Rhinehart and Winston. New York.

Schumpeter, Joseph. 1942. *Capitalism, Socialism, and Democracy.* Harper Collins. New York.

Science Daily. 12 September, 2007. *China's Eye on the Internet*. Accessed 7 July, 2015. Available at http://www.sciencedaily.com/releases/2007/09/070911202441.htm.

Scott, James. 1997. *Seeing Like a State*. Yale University Press. New Haven.

Scott, James. 2009. *The Art of Not Being Governed.* Yale University Press. New Haven.

Scott, James. 2012. *Two Cheers for Anarchism.* Yale University Press. New Haven.

Shepsle, Kenneth A. 2005. "Rational Choice Institutionalism" *In Oxford Handbook of Political Institutions* Ed. Binder S, Rhodes R, Rockman B. Oxford University Press. Oxford p 22-38.

Skocpol, Theda. 1979. *States and Social Revolutions.* Cambridge University Press. Cambridge.

Small Media report. 2015. *Iranian Internet Infrastructure and Policy Report.* Available at http://smallmedia.org.uk/sites/default/files/u8/200215_InternetInfrastructure%20%281%29.pdf.

Smith, Charles and Heather Smith. 2010. "Human Trafficking: The Unintended Effects of United Nations Intervention". *International Political Science Review*. 20 (10) pp1-21.

Sokoloff, K.L. and L. Engerman (2000) 'History Lessons: Institutions, Factor Endowments, and Paths of Development in he New World.' *The Journal of Economic Perspectives*, 14(3) pp. 217–232.

Solomon, Lewis. 2011. *The Privatization of Space Exploration.* Transaction Publishers. Piscataway.

Space Exploration Technologies "About the Company" accessed 12 June, 2015. Available at http://www.spacex.com/about.

Spaceflightnow.com Accessed 23 June 2015. http://spaceflightnow.com.

Sridharan, Vasudevan. 16 February, 2015. *Iran launches own search engine Yooz to beat Internet-related sanctions*. Accessed. 15 July, 2015. Available at http://www.ibtimes.co.uk/iran-launches-own-search-engine-yooz-beat-internet-related-sanctions-1488112.

Steger, Manfred. 2007. *Globalization: A Very Brief Introduction*. Oxford University Press. New York.

Steinmo, S., K. Thelen and F. Longstreth, eds. 1992. *Structuring Politics: Historical Institutionalism in Comparative Analysis.* Cambridge University Press. Cambridge.

Stolper, W. F. & Samuelson, Paul A. 1941., "Protection and Real Wages", *Review of Economic Studies* 9 (1). pp 58–73.

Suderman, Peter. 12 March, 2015. *The FCC's New Internet Rules put the FCC in Charge of the Internet*. Accessed 14 March, 2015. Available at http://reason.com/blog/2015/03/12/the-fccs-new-internet-rules-put-the-fcc.

Summers, Adam. 2013. *Space Privatization Update*. Reason Foundation. Available at http://reason.org/news/show/apr-2013-space-privatization.

Tatsuzawa, Kunihiko. 1988. *The Regulation of Commercial Space Activities by the Non-governmental Entities in Space Law* Monograph available at http://www.spacefuture.com/archive/the_regulation_of_commercial_space_activities_by_the_non_governmental_entities_in_space_law.shtml.

Thelen, K. (2004) *How Institutions Evolve. The Political Economy of Skills in Germany, Britain, the United States and Japan.* Cambridge University Press.

Thelen, K. 1999. 'Historical Institutionalism in Comparative Politics.' *Annual Review of Political Science*, 1999. 2. pp.369–404.

Thomson, Iain. 16 June, 2014. "Elon Musk: I'll put HUMAN BOOTS on Mars by 2035" available at http://www.theregister.co.uk/2014/06/18/spacex_can_get_mankind_on_mars_in_10_or_12_years_claims_elon_musk/.

Tilly, C., ed. (1975) *The Formation of National States in Western Europe.* Princeton University Press. Princeton.

Tilly, Charles (1984) *Big structures, large processes, huge comparisons.* Russell Sage Foundation. New York.

Tilly, Charles (1992) *Coercion, capital and European States, AD 990–1992.* Basil Blackwell. Oxford.

UN General Assembly Resolution 1348 "Question of the peaceful use of outer space" available http://www.unoosa.org/pdf/gares/ARES_13_1348E.pdf.

UN General Assembly Resolution 1472 *International Co-Operation in the Peaceful Uses of Outer Space* available http://daccess-dds-ny.un.org/doc/RESOLUTION/GEN/NR0/142/95/IMG/NR014295.pdf?OpenElement.

UN General Assembly Resolution 1721 *International Co-Operation in the Peaceful Uses of Outer Space* available http://daccess-dds-ny.un.org/doc/RESOLUTION/GEN/NR0/167/74/IMG/NR016774.pdf?OpenElement.

United Nations Treaty *The Convention on Registration of Objects Launched into Outer Space of 1975* available at http://www.unoosa.org/oosa/oosadoc/data/resolutions/1967/general_assembly_22nd_session/res_2345_xxii.html.

United Nations Treaty *Convention on International Liability for Damage Caused by Space Objects of 1972* available at http://www.unoosa.org/oosa/oosadoc/data/resolutions/1971/general_assembly_26th_session/res_2777_xxvi.html.

United Nations Treaty *The Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Space of 1968* available at http://www.unoosa.org/oosa/oosadoc/data/resolutions/1967/general_assembly_22nd_session/res_2345_xxii.html.

United Nations Treaty *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies* available at http://www.unoosa.org/oosa/oosadoc/data/resolutions/1966/general_assembly_21st_session/res_2222_xxi.html.

United Nations Treaty. *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1979* available at http://www.unoosa.org/oosa/oosadoc/data/resolutions/1979/general_assembly_34th_session/res_3468.html.

Universal Postal Union. 2015. “The UPU” http://www.upu.int/en/the-upu/the-upu.html accessed 15 June, 2015.

US Code Title 15, Chapter 40, 1512 .

US Code Title 47, Chapter 8, Subchapter 902.

US Department of Commerce. *Affirmation of Commitments by the United States Department of Commerce and the Internet Corporation for Assigned Names and Numbers* . Available at http://www.ntia.doc.gov/files/ntia/publications/affirmation_of_commitments_2009.pdf.

US Government Accountability Office. 2005. *Telecommunications: Intelsat Privatization and the Implementation of the ORBIT Act* available http://www.gao.gov/products/GAO-04-891.

US Patriot Act of 2001. Available at http://webcache.googleusercontent.com/search?q=cache:9ad6e2QXmakJ:https://www.congress.gov/bill/107th-congress/house-bill/3162+&cd=9&hl=en&ct=clnk&gl=us&client=safari.

US v Microsoft. 253 F.3d 34. 2001.

Utting, Peter. 2002. "Regulating Business via Multistakeholder Initiatives: A Preliminary Assessment." *Voluntary Approaches to Corporate Responsibility: Readings and a Resource Guide.* UNRISD and UNNGLS. Geneva.

Vorster, Gareth. 21 March, 2013. *BRICS Cable eyes 2015 Completion.* Accessed on 12 July 2015. Available at http://businesstech.co.za/news/general/34064/brics-cable-eyes-2015-completion/.

Watson, Adam. 1992. *The Evolution of the International Society.* Routledge. New York.

Weber, Max. (1964). *The Theory of Social and Economic Organization*. edited by Talcott Parsons. New York, NY: The Free Press.

Weber, Max. 1922. *Economy and Society.* University of California Press. Berkeley.

Weingast, Barry. 2002. "Rational Choice Institutionalism" *In Political Science: The State of the Disciplince.* Ed. Ira Katznelson and Helen V Milner. W.W. Norton. New York.

Wendt, Alexander. 1992. "Anarchy is What States Make of It" *International Organization* 46(2) pp 391-435.

Wendt, Alexander, 1999. *Social Theory of International Politics* Cambridge University Press. Cambridge.

Wendt, Alexander. 2001. "Driving with the Rearview Mirror: On the Rational Study of Institional Design" *International Organizations* 55(4). pp 1019-1049.

Wentworth, Sally. 2013. *Testimony to the US House of Representative on WCIT-12 Dubai Meeting* available at http://www.internetsociety.org/sites/default/files/Sally%20Wentworth%20-%20Testimony%20to%20House%20of%20Representatives.pdf.

West, William. 1997."Searching for a Theory of Bureaucratic Structure" *Journal of Public Administration Research and Theory* 7(4). pp591-613.

WIPO 20 December, 1996 *WIPO Copyright Treaty* Available at http://www.wipo.int/treaties/en/text.jsp?file_id=295166.

WIPO 20 December, 1996 *WIPO Performances and Phonograms Treaty* Available at http://www.wipo.int/treaties/en/text.jsp?file_id=295578#P133_18440.

WIPO. 23 December, 1998. *WIPO Internet Domain Name Process.* Available at http://www.wipo.int/amc/en/processes/process1/rfc/3/interim2_ch1.html.

WIPO. April, 2013. *Protecting broadcasters in the digital era.* Available at http://www.wipo.int/wipo_magazine/en/2013/02/article_0001.html.

WIPO. *WIPO Internet Treaties* Available at http://www.wipo.int/amc/en/processes/process1/rfc/3/interim2_ch1.html.

Woo Cumings, M., ed. (1999) *The Developmental State.* Cornell University Press. New York.

World Bank 1997. *World Development Report. The State in a Changing World.* Oxford University Press. New York.

WSIS. 12 December, 2003. *Declaration of Principles*. Available at http://www.itu.int/wsis/docs/geneva/official/dop.html.

Wu, Timothy. 2003. "Network Neutrality, Broadband Discrimination" *Journal of Telecommunication and High Technology Law* 2. pp 141-179.

York, Dan. 7 April, 2015. *46 Years of RFCs*. Available at http://www.internetsociety.org/blog/tech-matters/2015/04/46-years-rfcs-celebrating-anniversary-rfc-1.

Yu, Frank. 28 February, 2008. *The China Angle: "Operation for Tomorrow' Means more Plugins Today.* Accessed 7 July, 2015. Available at http://www.gamasutra.com/view/news/108580/The_China_Angle_Operation_For_Tomorrow_Means_More_Plugins_Today.php.

Zetter, Kim. 3 November, 2014. *An Unprecedented look at Stuxnet, the World's First Digital Weapon.* Accessed 10 July, 2015. Available at http://www.wired.com/2014/11/countdown-to-zero-day-stuxnet/.

Zysman, J. (1994) 'How Institutions Create Historically Rooted Trajectories of Growth.' *Industrial and Corporate Change*, 3(1), pp. 243–283.

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