

The Science of Laws: Essential Foundation of Space Governance

By David G. Schrunk

Abstract

This paper discusses the rationale for and the role of the science of laws as the foundation for the rule of law of space governments. The inadequacies of traditional lawmaking are presented and the advantages of scientific lawmaking as a replacement of traditional lawmaking are discussed. Science has proven to be successful in every field of endeavor involving the physical universe, and the science of laws promises to be equally successful. Therefore, to assure that the coming spacefaring age is characterized by prudent, stable, and responsible advances into space for the benefit of the human condition, it is recommended that future space governments adopt science as the foundation of the rule of law.

Keywords: Science, laws, space government, space settlement, rule of law, space exploration, spacefaring age.

Introduction

Before the end of this century, advances in science and engineering will have enabled the establishment of permanent human settlements on the Moon. Since a government is necessary for the security and stability of every organized society of people, a system of governance and rule of law will be required for the people who reside on "Planet Moon." To avoid the poor performance and dysfunction that currently typifies the bodies of laws of Earth governments, a new science, the science of laws, is proposed as the basis for creating and maintaining the bodies of laws of space governments. For the people who become permanent citizens of new worlds in space, the science of laws will produce a consistent and just rule of law that optimally serves their best interests and reflects their highest aspirations.

The Planet Moon Project

The ongoing successes of science have now brought us to the threshold of the largest and most productive endeavor ever undertaken by humankind: the global exploration, development, and human settlement of the Moon.¹ The "Planet Moon Project" holds great promise because it will establish a link between our scientific expertise and the unlimited resources of space.² When that link has been secured, the people of the Earth and the Moon will be supplied with a superabundance of energy and material wealth from space; every region of the solar system will be explored in depth by spacecraft manufactured on and launched from the Moon; Mars will become the third home in space for humankind; and robotic missions will be launched on voyages to the stars. The Planet Moon Project will improve every dimension of the human condition, open

¹ David Schrunk, Bonnie L. Cooper, Burton Sharpe, and Madhu Thangavelu, *The Moon: Resources, Future Development, and Colonization* (New York: Wiley-Praxis, 1999). 2nd ed. published by Praxis-Springer, 2007.

² David Schrunk, Bonnie L. Cooper, Burton Sharpe, and Madhu Thangavelu, "The Planet Moon Project," in *Proceedings of the Seventh International Conference on Space 2000* (Reston, VA: American Society of Civil Engineers, 2000), 768-76.

endless frontiers, and guarantee the survival of humankind as a multi-world species and a spacefaring civilization.

Space Governance

The establishment of permanent settlements on the Moon will require a governing authority for human activities on the Moon and in cis-lunar space.³ The lunar government will secure human rights and liberty, resolve disputes, oversee lunar resource utilization, and facilitate the peaceful and responsible exploration and development of space. To accomplish its purpose, the lunar government will create a body of laws that solve (solve, mitigate, prevent) the problems that degrade or threaten to degrade the rights and liberty of the people or their survival, growth, and flourishing in space. In accordance with this premise, a Lunar Economic Development Authority (LEDA) has been developed by the United Societies in Space and the World Space Bar Association.⁴ If adopted as proposed, LEDA will provide governance for the initial development and immigration phases of Planet Moon, and it will eventually make the transition to a fully sovereign government that serves the permanent residents of the Moon and cis-lunar space.

Problem: The Traditional Method of Lawmaking

Although science has been successful in removing most of the barriers to the planetary development stage of space exploration, one serious problem remains. That problem is the traditional method of lawmaking of government, and it constitutes a serious threat to the permanent human settlement of new worlds in space. Laws are the tools, or means, by which governments solve problems and thereby attain their goals. To meet their problem-solving obligations to the people within their jurisdictions, national, regional, and municipal governments on Earth use the traditional method of lawmaking to create the laws of government.

The traditional method of lawmaking is a relatively simple process.⁵ It begins when someone comes up with an idea for a law of government. The idea is transcribed into a written petition (bill), which is then presented to a legislative assembly. After being evaluated by the legislature and, often, modified through debate and compromise, the final version of the bill is voted upon by the legislature. If the legislature approves the bill it is added to the government's body of enforceable laws. The next bill is presented to

³ Schrunk et al., *The Moon*, Chapter 9. Cis-lunar space is the torus formed by the orbit of the Moon around the Earth, with the inner diameter at the average Earth-Moon L-1 Lagrange Point and the outer diameter at L-2. This volume of space includes Lagrange Points L-4 and L-5.

⁴ See the website for United Societies in Space/World Space Bar Association: www.angelfire.com/space/usis/; Declan J. O'Donnell, "Metaspace: A Design for Governance in Outer Space," *Space Governance* 1, no. 1 (1994): 8-27; Declan J. O'Donnell and Phillip R. Harris, "Legal Strategies for a Lunar Economic Development Authority," *Annals of Air and Space Law* 21 (1996): 121-30; Declan J. O'Donnell, Buzz Aldrin, Brad Blair, and David Schrunk, "The Lunar Economic Development Authority: A Municipal Governance Tool," in *Proceedings of the International Astronomical Congress*, Session IAC-06-A5.1.7, Valencia, Spain, 2006; Declan J. O'Donnell and Phillip R. Harris, "Facilitating Space Commerce Through a Lunar Economic Development Authority," Appendix F in Schrunk et al., *The Moon*, 2nd ed., 355-70.

⁵ An overview of the legislative process of the United States Congress is at thomas.loc.gov/home/lawmade.toc.html; an overview of the legislative process of the State of California is at www.leginfo.ca.gov/guide.html#Appendix_A.

the legislature, and the lawmaking process is then repeated. The traditional method operates as a feed forward control system whose output is new laws as depicted in Figure 1.

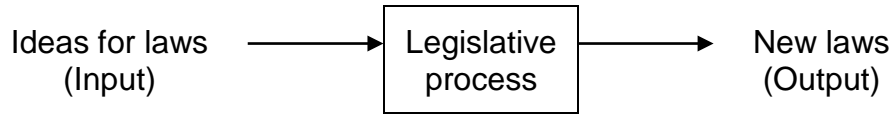


Figure 1: Traditional lawmaking. The traditional method of lawmaking is a simple feed forward control system whose output is a continuously growing body of laws. Note that this process can operate indefinitely without reference to societal problems.

Although the governments of the Earth annually create millions of laws, the problems of war, crime, poverty, abuses of human rights, economic crises, pollution, and illiteracy (etc., etc.) continue to plague the people of the Earth. In other words, as a means for enabling governments to satisfy their public-benefit obligations by means of laws, the traditional method of lawmaking is a failure.

To determine the cause of the failure of the traditional method to solve societal problems, an investigation of its structure and function was performed.⁶ That investigation disclosed that the traditional method has the following serious flaws and omissions:

- It does not require societal problems to be defined.⁷
- It does not assign priorities to problems for solution.
- It does not require laws to have a statement of purpose in terms of a measurable outcome.
- It does not require law designers to have design expertise.
- It does not require the creation of a model for each law-design.
- It does not require a full accounting of the costs of laws.
- It does not require a full accounting of the risks and side effects of laws.
- It tolerates design defects and intentional vagueness in laws.
- It tolerates the inclusion of “pork barrel” and other special interest provisions in laws.
- It does not require law designers to have knowledge of the subject matter; it is based upon opinions, or ideology, not knowledge.
- It does not require a citation of references and databases.
- It does not require a competent and thorough quality assurance (QA) program that periodically evaluates the outcome of laws, or a regular mechanism for the repeal of laws that have been found to be less than useful to the citizenry.

⁶ David Schrank, *The End of Chaos: Quality Laws and the Ascendancy of Democracy* (Powey, CA: QL Press, 2005).

⁷ It is impossible to solve a problem that has not been defined.

- It incorporates no regular, competent mechanism for improvement of the performance of laws.

The above defects of the traditional method render it completely unacceptable as a problem-solving process. In fact, it is not a problem-solving process; its purpose is to make laws, not to solve problems.⁸ It is lacking or deficient in knowledge, expertise, ethics, and quality, and the laws it creates are frequently defective, vague, unnecessary, ineffective, or harmful. On the occasions when it produces laws that are effective (e.g., tax laws that raise revenue), those laws are, as a generalization, unnecessarily costly and complicated. Also, since the traditional method does not evaluate the outcomes of laws, it fails to identify and repeal outmoded, ineffective, redundant, and purposeless laws whose continued enforcement wastes government resources to the detriment of the people. As legislatures enact more laws with each legislative session, the size, cost, and complexity of the bodies of laws increase, and governments are compelled to enforce laws selectively in violation of the rule of law.

The pioneers who become the first permanent inhabitants of the Moon will need a government that solves problems in an efficacious and just manner and that enables the continuing responsible and peaceful exploration and settlement of space; they will not tolerate a failure of government. For the people who are now planning the development of Planet Moon, the concern is that the traditional method of lawmaking will be adopted by the lunar governmental authority as the means for creating the new government's body of laws. The resulting dysfunctional and ever-growing body of laws (created without reference to societal problems, without the benefit of design expertise or knowledge, and without consideration of adverse outcomes) would, by consuming and diverting resources for non-productive purposes, constitute a serious threat to the viability of the new space settlements. Fortunately, this threat can be avoided by substituting scientific lawmaking for the traditional method of lawmaking.

Solution: The Science of Laws

The need to create an entirely new government for the first permanent settlements in space offers the opportunity for space planners to adopt the science of laws for the design, evaluation, and improvement of the government's body of laws.⁹ Laws have a significant impact upon the physical universe, which is the domain of science, and they are eminently suited for inclusion within the purview of science. The science of laws will bring the strengths of science, of knowledge, expertise, integrity, and quality – all of which are deficient or lacking in the traditional method of lawmaking – to bear upon the solution of societal problems. It has two coequal branches: the creative science, or engineering discipline, of laws and the investigative science of laws.¹⁰

⁸ The simple explanation for the poor performance of laws is that governments attempt to solve problems with a process (traditional lawmaking) that does not have problem solution as its purpose.

⁹ David Schruck, "The Science of Laws: Application to Lunar Governance," paper presented at the Joint Annual Meeting of LEAG-ICEUM-SRR, Cape Canaveral, Florida, October 2008.

¹⁰ Schruck, *End of Chaos*; Schruck, "Science of Laws"; David Schruck, "The Science and Engineering of Laws," in *Proceedings of the Seventh International Conference on Space 2000* (Reston, VA: American Society of Civil Engineers, 2000), 133-40; Science of Laws Institute website: www.scienceoflaws.org.

Creative Science of Laws

The creative science of laws develops, accumulates knowledge of, and applies engineering design methodologies and best practices to the solution of societal problems by means of laws. The engineering design process requires inputs from a wide range of fields such as sociology, law, statistics, business, and economics; it is the ultimate example of multidisciplinary engineering.¹¹ By creating just and efficacious laws, the creative science of laws will enable the space government to satisfy its public benefit obligations to the people it represents.¹² The first step for the engineering discipline of laws of the space government will be to establish quality design (QD) standards¹³ that require law designers to observe knowledge-based, problem-solving best practices for the creation of each new law, such as:

- Identify/analyze a societal problem that needs to be solved.
- State the priority of the problem and the goal of the law.
- Create a model of the law based on relevant data and ethical codes.
- Test and refine the model for maximum efficacy.
- Document all sources, methodologies, and observations.

When the final design of the prototype law (bill) has been completed, it will be submitted to the legislature for a vote of acceptance (enactment) or rejection. If the bill is enacted into law, it will be added to the government's enforceable body of laws and will then be subjected to periodic reviews of its performance by a QA program (see below). In addition to creating new laws, the engineering discipline of laws will conduct a quality improvement (QI) program to enhance the structure and performance of existing laws after they have undergone their periodic QA evaluation. The standards of the QI program will be the same as the QD standards for the design of new laws. By this means, the laws of government will be constantly upgraded in their ability to satisfy the problem-solving purpose of government.

Investigative Science of Laws

The purpose of the investigative branch of the science of laws is to derive reliable knowledge of the mechanics (cause and effect mechanisms) of laws and of methodologies for the measurement and analysis of laws. It regards every law of government as an incomplete experiment in human behavior.¹⁴ Each law has a hypothesis (that it will produce a desired societal outcome) and that hypothesis is tested (i.e., the experiment is carried out) when the law is enforced.

¹¹ To meet the future need for law design engineers, new college curricula to the PhD level will need to be developed; the engineering design of laws is not currently taught in any school.

¹² David Schrunk, "Multidisciplinary Engineering Approach to the Design of Laws," paper presented at the American Association for the Advancement of Science Pacific Division, 92nd Annual Meeting, University of San Diego, San Diego, CA, June 14, 2011; David Schrunk, "The Systems Engineering Approach to the Design of Laws," in *Proceedings of the Conference on Systems Engineering Research (CSER)*, St. Louis, MO, 2012 (Amsterdam: Elsevier, 2012), 327-32.

¹³ David Schrunk, "The Quality Approach to the Science of Laws," paper presented at the 16th Annual International Deming Research Seminar, New York, February 2010; David Schrunk, "Lawmaking Standards for Space Governance," *Space Governance* 4, no. 1 (January 1997).

¹⁴ Traditional lawmaking is an incomplete experiment in human behavior, because it does not measure, analyze, and record the results of the experiment, i.e., of law enforcement.

By measuring the results of law enforcement, the investigative science of laws derives knowledge of the mechanics of each law, and the store of scientific knowledge of the structure and function of laws thus grows over time. With this knowledge, governments can avoid the mistakes of the failed laws of the past, and law design engineers can create more effective and just laws in the future. Significantly, the investigative science of laws will be the basis of a rigorous and comprehensive QA program of laws.

Quality Assurance of Laws

Unless a government measures the outcomes of its laws, it is “flying blind.” That is, a government cannot know if it has accomplished anything of value for the public unless it utilizes a reliable process for assessing the outcomes of laws. Therefore, each law must undergo a periodic (e.g., every ten years) QA evaluation to confirm that it is necessary and proper for the well-being of the public.

A major contribution of the investigative science of laws is that it will be the basis of a QA program for laws. The QA program will employ empirical (i.e., scientific) methodologies to measure, analyze, and document the problem-solving outcome of each law, including its costs, burdens, and impact upon the human rights, living standards, and quality of life of the public.¹⁵

A determination of the net benefit of each law will then be made (the net benefit of a law is the difference between the problem-solving benefit of the law and the sum of its costs, risks, restrictions, and other burdens). If the QA program determines that the net benefit of a law is positive, the law will be referred to the legislature for affirmation and continued enforcement. All other laws will be recommended for repeal by the legislature. By leading to the repeal of non-productive laws (e.g., outmoded, ineffective, conflicting, duplicative, harmful, and unenforced laws) the QA program will more than pay for itself,¹⁶ and the bodies of laws of government will consist of the minimum number of laws that efficaciously satisfy the purpose of government, i.e., that are useful to the well-being of the public.

Policy Making versus Lawmaking

The use of science for lawmaking will lead to a separation between “policy making” and “lawmaking.” The legislature of the new government will consist of legislators who are chosen by the people as representative *trustees* of the people. The purpose of the individuals thus elected (e.g., by popular and competitive elections based on universal suffrage and secret ballots) to the legislature will be to secure the rights and liberties of the people by discussing the great issues of the day and formulating, through debate and deliberation, their recommended priorities and goals for government action in the best interests of the people. However, in their roles as trustees of the people, legislators will not be expected to design laws, for two reasons. First, the position of trustee will be a full-time position, and trustees will not have the time to design laws. Second, the requirements for being a qualified designer of laws (e.g., PhD in law design

¹⁵ See the discussion of human rights, living standards, and quality of life standards in Appendix A of Schrank, *The End of Chaos*.

¹⁶ Philip Crosby, *Quality is Free* (New York: McGraw-Hill, 1979).

engineering) are far beyond the typical general-knowledge background of popularly elected legislators. Thus, legislators will set policy, but they will assign, by competitive bidding or other responsible method, the design of laws that carry out their policies to qualified law design engineers (creative scientists).

The Scientific Control System of Laws

The creative and investigative sciences of laws will act synergistically with the legislature to create a science-based feedback control system for the government's body of laws. By its incorporation of quality standards (QD, QA, and QI) for the creation, evaluation, and optimization of laws, the lawmaking process will be self-correcting in the direction of optimum outcomes, both in terms of the rights and liberties of the people and in the peaceful and responsible exploration and development of space (Figure 2).

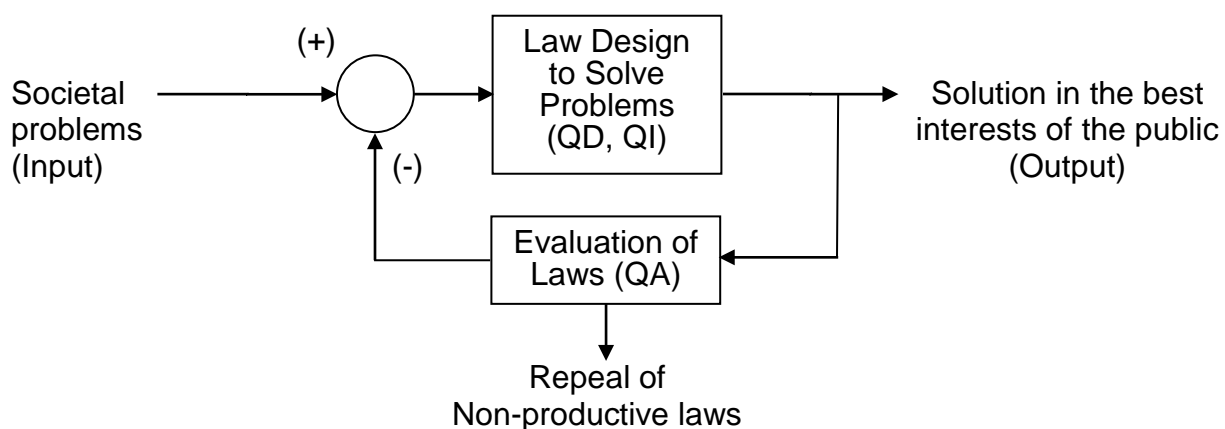


Figure 2: Scientific Lawmaking for Space Governance. Science-derived quality programs for laws (QD, QA, and QI) will transform the lawmaking process into a problem-solving feedback control system that is self-correcting in the direction of optimum outcomes for the citizens of space governments (compare with Figure 1).

With each cycle of the scientific lawmaking process, the sophistication of design and evaluation methods will improve, knowledge of the mechanics of laws will increase, the size and complexity of the bodies of laws (and of the government) will be kept to a minimum, and the performance of laws will improve in terms of effective and just problem solution, cost-efficiency, and safety. In other words, the success of the science of laws, as determined by the levels of human rights, living standards, and quality of life standards of the people, and by the advancement of peaceful and responsible space exploration and development activities will, predictably, come to match the patterns of success that now characterize every other field of science such as electronics, aeronautics, and pharmacology.

Conclusion

The coming exploration, development, and settlement of new worlds in space holds the promise of improving every facet of the human condition. For the governments that are formed to serve the people who live on the new worlds in space, the science of laws is

therefore recommended as the essential foundation for the creation and improvement of their bodies of laws. The science of laws will not only avoid the defects and threat of the traditional method of lawmaking, but it will also produce a rule of law that optimally serves the best interests of the people and facilitates the continued exploration and development of space.

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About the Author: David G. Schrunk is the President of the Science of Laws Institute. He is an aerospace engineer and a medical doctor with board certifications in the medical specialties of nuclear medicine and diagnostic radiology. Dr. Schrunk retired from the practice of medicine and now dedicates his time to his two passions: the future exploration and human development of the Moon and the science of laws. He has authored many scientific papers on lunar development issues and is a co-author of the book, *The Moon: Resources, Future Development, and Colonization*, published by Wiley-Praxis in 1999. The second edition of the “*Moonbook*” was released by Springer-Praxis in 2007. Dr. Schrunk founded the Quality of Laws Institute in 1995 and authored the book, *The End of Chaos: Quality Laws and the Ascendancy of Democracy*, published in 2005 by the Quality of Laws Press. Dr. Schrunk lives in Poway, California with his wife, Sijja, son, Erik, and daughter, Brigitte.



Editor’s Notes: Dr. Schrunk has been contributing to the *Journal of Space Philosophy* and collaborating with us in the Kepler Space Institute for years. Articles #7, by Dr. Schrunk and #8, by Dr. Krone in this issue are further results of their professional sharing. This 2018 year marks the 6th year of the *Journal of Space Philosophy* and the 5th year of annual meetings and online Journal publications of the Science of Laws Institute. **Gordon Arthur.**