



# A NEW APPLICATION FOR SYSTEMS ENGINEERING: THE SCIENCE OF LAWS

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# Order of Presentation

- Government and Laws
- Failure of Laws
- Traditional Lawmaking
- Proposed Scientific Lawmaking
- Expected Results
- Role of Systems Engineers
- Future Efforts



# Government

- **Democratic Governments**
  - **Purpose:** Secure rights and liberty of the people (D. of Ind.)
  - **Obligation:** Solve problems that threaten rights and liberty



# Rights and Liberty

- Parameters that define rights and liberty:
  - Human rights
  - Living standards
  - Quality of life



# Laws

- Laws are the problem solving *means* of government
  - Human-made tools
  - **A form of software**
  - Consume resources, produce results, and have side effects



# Serious Problem: Laws Are A Failure

- Millions of laws in effect (globally)
- Problems are **not** solved by laws:
  - War, crime, illiteracy, poverty,  
abuse of human rights, gov't debt,  
lack of potable water, sanitation,  
homelessness, pollution...



# Cause of Failure

- Traditional method of lawmaking  
(the legislative process)
  - Used by all governments
  - NOT** a problem solving process (!)



# Cause of Failure

- Traditional method of lawmaking
  - Only produces laws
  - Incapable of solving problems
    - Therefore, unable to satisfy the purpose of democracy





# Traditional Method Critically Flawed

Lacks or is deficient in:

1. Problem definition
2. Statement of purpose
3. Design expertise



# Traditional Method Critically Flawed

4. Assessment of costs and risks
5. Knowledge (!)
6. Follow up evaluation



# Traditional Method Operation

- Based on opinion / ideology / dogma / anecdotes
- Mechanics of “design” process
  - Rhetoric (speechmaking)
  - Dialectic (debate)



# Traditional Method Operation

- **Begins** with an idea for a law
- **Ends** with enactment of a new law

(Note: It does **not** end  
with problem solution.)



# Traditional Method

- A feed forward control system
  - Input = Ideas for laws
  - Output = More laws
  - No formal feedback mechanism**



# Traditional Method



## Feed Forward Control System



# Result of Traditional Lawmaking

- Continual increase in size, cost, and complexity of bodies of laws  
(Example: U.S. Tax Code)
- Problems **not** solved



# Result

- Governments are “flying blind”
- Outcomes of laws are not measured
  - Unknown number of laws are useless or harmful





# Result

- Overburden of laws
- Gov't's must enforce laws selectively
  - Violates principle of the Rule of Law
- Threat to democracy



# Failure of Laws

- How to solve the problem of failed laws and the threat to democracy?



# Answer: **SCIENCE**

- Expand science to encompass laws and lawmaking
- Create a new Science of Laws



# Rationale for a Science of Laws

- All fields of science are successful
  - Continual growth of knowledge
  - Ongoing advances in technology
- Science of laws promises to be equally successful



# Rationale for a Science of Laws

- Science brings to lawmaking:
  - Knowledge
  - Design expertise
  - Ethics
  - Quality



# Science of Laws

## TWO CO-EQUAL BRANCHES

- Investigative Science of Laws
- Creative Science of Laws  
(engineering discipline)



# Investigative Science of Laws

**Answers the question:**

What is the relationship between the laws of government and the wellbeing of the people?



# Investigative Science of Laws

- Measures and analyzes outcomes of laws
- Defines mechanics (cause and effects) of laws and systems of laws





# Investigative Science of Laws

- Accumulates knowledge (history) of laws and their effects
  - Enables governments to avoid mistakes of past



# Investigative Science of Laws

- Foundation for a Quality Assurance (QA) program for laws
- Identifies less than useful laws
  - Leads to repeal of unnecessary laws and **improves** the Rule of Law



# Creative Science of Laws

- Applies engineering methodologies and design expertise to lawmaking
  - Quality design standards
  - Engineering “Best Practices”
  - Ethical standards



# Creative Science of Laws

- Create individual laws
- Create and optimize systems of laws



# Creative Science of Laws

- Goal: The ideal law
  - Simple, succinct, clear meaning, effective problem solution, cost efficient, user friendly, no adverse side effects, and maximum usefulness to citizenry



# Scientific Lawmaking

- Synergy between **Government** and **Science**
- Goal of both **Government** and **Science** :
  - Satisfy the purpose of democracy



# Scientific Lawmaking

## “Division of Labor”

- **Legislature**
  - Discusses, debates issues
  - Sets policy and priority
  - No longer “makes laws”
- **Creative Science**
  - Designs laws



# Scientific Lawmaking

- **Legislature**
  - Enacts (or vetoes) laws designed by creative science
- **Investigative Science**
  - Measures outcomes of laws
  - Performs QA of laws





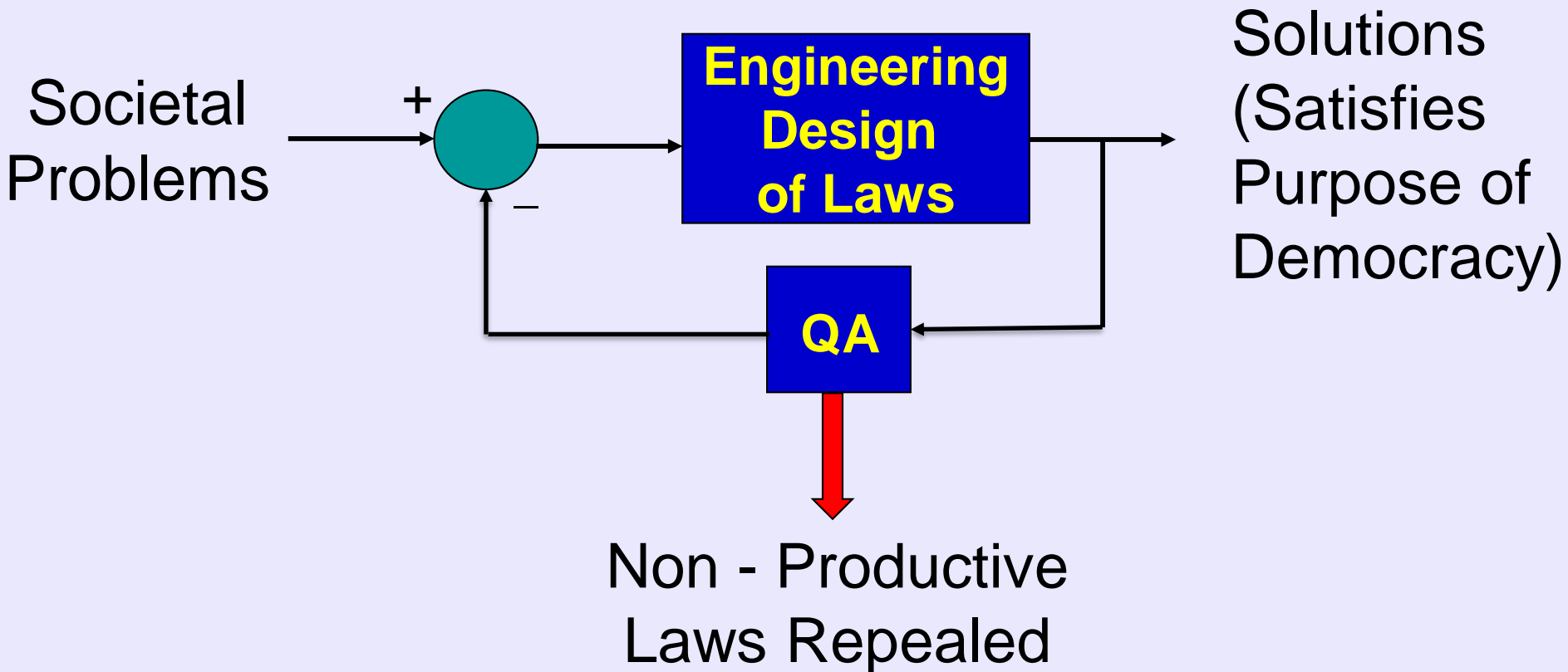
# Scientific Lawmaking

- Investigative Science
  - Identifies less than useful laws
- Legislature
  - Repeals less than useful laws
- Creative Science
  - Optimizes remaining useful laws



# SCIENTIFIC LAWMAKING

## FEEDBACK CONTROL SYSTEM





# Favorable Scenario for Scientific Lawmaking

- Quality standards for laws and lawmaking are observed
- Lawmaking becomes a knowledge industry
- Knowledge of laws and lawmaking increases



# Favorable Scenario for Science of Laws

- Governments become effective in problem solution
- Problems are solved by ever-improving means



# Favorable Scenario for Science of Laws

- The next higher order of problems is in the process of being solved
- Governments are able to satisfy the purpose of democracy



# Why Systems Engineers?

- Lawmaking presents ultimate multi-disciplinary challenge
  - Economics, business, sociology, statistics, human factors, political science, modeling & simulation, civil engineering, etc.



# Why Systems Engineers?

- Lawmaking requires knowledge of systems & system behaviors
  - Inter-related societal systems affected by laws
  - Inter-related system of laws



# Why Systems Engineers?

- Systems Engineers have:
  - Formal training in design
  - Experience with resolving conflicting stakeholder requirements/desires
  - Growing set of tools & techniques





# Science of Laws: Current Status

- [www.scienceoflaws.org](http://www.scienceoflaws.org)
  - Open-source accumulated index of abstracts of the science of laws
  - On-line access to peer-reviewed *Science of Laws Journal*



# Science of Laws: Current Status

- Annual conferences held
  - In conjunction with INCOSE (San Diego Chapter)
  - Peer-reviewed papers presented



# Future Work

- Expand index of scientific abstracts of laws and related methodologies
- Expand participation in annual meetings & journal contributions



# Future Work

- Create society of peers of the Science of Laws
- Establish INCOSE Working Group



# Future Work

- Work with universities
  - Develop college curricula
    - PhD, Investigative Science of Laws
    - PhD, Engineering Discipline of Laws



# Future Work

- Requires help from volunteers
  - Peer-reviewers
  - Technical editors
  - Outreach/communications
  - Grant writers



# Summary

- The traditional method of lawmaking
  - A success at producing laws
  - A failure at solving problems
  - A failure at satisfying the purpose of democracy



# Summary

The Science of Laws will correct the defects of the traditional method of lawmaking.





# Summary

The Science of Laws will enable governments to satisfy the purpose of democracy.



# Summary

*And...*

**Systems Engineers are well-prepared  
to address the ultimate  
multi-disciplinary design challenge!**



# THANK YOU!