

Systems Engineering Evaluation of Laws Structural Analysis of Pennsylvania Statutes: 2012 Legislative Session

Maria Romero

Aerospace Corporation

maria.c.romero@aero.org

David G. Schrunk, MD

Science of Laws Institute

david.schrunk@scienceoflaws.org

DISCUSSION POINTS

- SCIENCE AND LAWMAKING
- SELAW
- SELAW RESEARCH SUBGROUP # 6
- SUBGROUP #6 EXPERIMENT
- EXPERIMENTAL RESULTS
- CONCLUSION

SCIENCE ~ LAWMAKING

SCIENCE

- Every field of science is a success
 - **Investigative Science** = Ever-increasing knowledge
 - **Creative Science** = Ever-improving problem-solving technologies

LAWMAKING (Laws of Government)

- Not a science, not characterized by success
 - Not based on knowledge
 - Limited problem-solving capability
 - Poor record: poverty, crime, privation, pollution, wars...

SYSTEMS ENGINEERING

An interdisciplinary field of engineering and engineering management that focuses on the design, integration, and management of complex systems over their life cycles

SELAW: Systems Engineering and Lawmaking Working Group

INAUGURATED: May, 2022

PURPOSE: Advance the State of the Art of Lawmaking
using Systems Engineering

(Expand Science to encompass Laws of
Government and the Lawmaking Process)

SELAW

SELAW PROJECTS: Eight Research Subgroups

- #1: Document defects of Traditional Lawmaking
- #2: Adapt IEEE 15288 Standards to Lawmaking
- #3: Modeling of Law Sanctions
- #4: Modeling of Costs of Laws
- #5: Modeling of Risks of Laws
- #6: **Structure and Mechanics of Laws**
- #7: Develop Credentials for Law Creators
- #8: Create SE-based Law Design Manual for Governments

SELAW Subgroup #6

- Focus on legislative statutes of **U.S. State Governments**
- Systems engineering validation of law **structure**
 - What are the essential components of the law?
- Systems engineering validation of law **mechanics**
 - What is the outcome / performance of the law?

Research Project

SELAW Subgroup #6 Research Project

Analyze the structural components of
legislative statutes of Pennsylvania, 2012

Assumption

The goal of legislative statutes is to achieve the efficacious solution, mitigation, or prevention of societal problems within the jurisdiction of the Government of Pennsylvania*

* Purpose of Government: Secure the rights and liberty of the people

PENNSYLVANIA CODE & BULLETIN STYLE MANUAL



Fifth Edition

Parameters

Parameters

Task: Evaluate statutes for ten essential problem-solving elements:

1. **Problem Definition** – the societal problem the law addresses
2. **Analysis** of the societal problem
3. **Priority** assignment of the problem for solution

Parameters

Evaluate problem solving elements:

4. **Purpose of the law (anticipated measure of success)**
5. Statement (analysis) of **selected sanction***
6. **Costs of the law**

Parameters

Evaluate problem solving elements:

7. **Risks** of the law (e.g., side effects)
8. Citation of **references**
9. **Date** and method of follow up evaluation
10. Signature of **law creator(s)**

Materials

Materials

- Subject Matter: Legislative statutes (211) enacted by the State Legislature of Pennsylvania in 2012
- A representative sample (111) of these statutes were reviewed for their content (structure)

Legislation Enacted

Acts on General Legislation approved In 2012

Act	Enact. Date	Bill	Subject
1	Jan 27	HB 1458	Vehicle Code (75 Pa.C.S.) - omnibus amendments (effective IMMEDIATELY WITH EXCEPTIONS)
2	Feb 2	HB 169	Local Option Small Games of Chance Act - omnibus amendments (effective 30 DAYS)
3	Feb 2	HB 170	Vehicle Code (75 Pa.C.S.) - driving on right side of roadway, overtaking vehicle on the left, no-passing zones, required position and method of turning and minimum speed regulation (effective 60 DAYS)
4	Feb 2	HB 398	Appraisal Management Company Registration Act - enactment (effective IMMEDIATELY WITH EXCEPTIONS)
5	Feb 2	HB 1630	Motor Vehicle Sales Finance Act - revocation or suspension of licenses (effective 90 DAYS)
6	Feb 2	SB 159	Interstate Compact on Educational Opportunity for Military Children Act - enactment (effective IMMEDIATELY)
7	Feb 2	SB 726	First Class Township Code - omnibus amendments (effective 60 DAYS)
8	Feb 2	SB 923	Housing Authorities Law - powers of an authority (effective 60 DAYS)
9	Feb 2	SB 995	Health and Safety (35 Pa.C.S.) - requiring operator of each permitted unconventional well in Pennsylvania to post certain 911 response information at entrance to each unconventional well site (effective IMMEDIATELY)
10	Feb 9	SB 1375	Health and Safety (35 Pa.C.S.) - further defining "extended benefit period" (effective IMMEDIATELY)
11	Feb 14	HB 1294	Public Utility Code (66 Pa.C.S.) - omnibus amendments (effective 60 DAYS)
12	Feb 14	HB 1582	General Local Government Code (53 Pa.C.S.) - purposes and powers of municipal authorities (effective 60 DAYS)
13	Feb 14	HB 1950	Oil and Gas (58 Pa.C.S.) - omnibus amendments (effective IMMEDIATELY WITH EXCEPTIONS)
14	Feb 14	SB 894	Second Class Township Code - omnibus amendments (effective 60 DAYS)
15	Feb 14	SB 1043	Trooper Gary Rosenberger Memorial Bridge - designation (effective 60 DAYS)

Data Collection

Structural Analysis Pennsylvania Legislative Statutes 2012											
Documentation Content											
Statute #	Subject	Problem	Problem	Priority for	Goal of	Sanction	Costs of the	Risks of the Law	Citation of	Follow up	Signatures of
		Definition	Analysis	Solution	the Law		Law (8)	to the Public	References	Validation	Law Designers
100	Electronic Documents for R. Estate	0	0	0	0	Regulation fine?	"minimal fiscal impact"	0	0	4 yr sunset	0
101	Vital Statistics	0	0	0	Disposition Remains	0	"no adverse fiscal impact"	0	0	0	0
102	Professional Employer Provisions	0	0	0	refer to existing law?	Licensure	"no adverse fiscal impact"	0	0	0	0
103	Special License Plates	0	0	0	Special Plates	0	"minimal fiscal impact"	0	Previous Act	0	0
104	Education Modernization	0	0	0	Less Confusion?	0	"minimal fiscal impact"	0	0	0	0
105	Prohibition of School Strikes	Disruption Schools?	0	0	Zero Strikes	Public Hearing	"revenue neutral"	0	Previous Act	0	0
106	Health Club Employee CPR Qualified	0	0	0	Reduced M & M?	Certification	"salary & travel costs"	0	Previous Act	0	0
107	Employee Training Program	Unemployment?	0	0	Reduce Poverty?	Incentive Payment	\$2.5 M general fund	0	Previous Act	Expires 2017	0
108	Guardianship of Estates	Fraud?	0	0	Reduced fraud?	Jurisdiction Def.	"no fiscal impact"	0	Previous Act	0	0
109	Minimum Wage	0	0	0	Reduce Poverty?	Raise Min Wage	"no adverse fiscal impact"	0	0	0	0
110	Towing and Towing Storage	Overcharge Consumer	0	0	Consumer Protection	Standards (?)	"no fiscal impact"	0	0	0	0
111	Pediatric Care	Insufficient Care	0	0	Reduced M & M?	Change Age Req's	"indeterminate"	0	Previous Act	0	0
112	Electronics Insurance	0	0	0	Reduced fraud?	0	"no fiscal impact"	0	0	0	0
113	Vintage Snowmobile Registration	0	0	0	Reduced M & M?	Special Permits	(+) \$400,000 / year	0	Previous Act	0	0
114	Traffic Violation Point Schedule	M / M?	0	0	Reduced M & M?	Fine? Lose License?	"no adverse fiscal impact"	0	Previous Act	0	0
115	Name of Highway Interchange	0 (Lack of Name)	0	0	Name for Interchange	0	\$500.00	0	0	0	0
116	Amend Liquor Code	0	0	0	Reduce Crime?	Regulations	"no fiscal impact"	0	Previous Act	0	0
117	Name of Bridge	0 (Lack of Name)	0	0	Name for Bridge	0	\$500.00	0	0	0	0
118	Name of Bridge	0 (Lack of Name)	0	0	Name for Bridge	0	\$500.00	0	Previous Act	0	0
119	Car for hire Certification	Risk?	0	0	Improved Safety?	0	"no adverse fiscal impact"	0	Previous Act	0	0

Findings

Statute Parameter	Incidence (111 Statutes Evaluated)
Problem Definition	55
Problem Analysis	4
Priority	0
Purpose / End Goal	6
Sanction	52
Costs	111 (81/111 no change)
Risks	0
Reference Citation	0
Follow Up Validation	3
Signature	0
Amendments	160/211
Name of Bridges	22/211

Findings

1. Every reviewed statute had multiple critical structural defects or omissions
2. The design of the statutes precluded accurate performance evaluation (benefit / cost-risk analyses)

Findings

3. The present lawmaking process characterized by near-total lack of accessible data (lack of “Big Data”)
4. The large percentage of amendments in this study represents an informal, unstructured system of feedback
 - a. Prima-facie evidence of the failure of existing laws
 - b. This informal system can be expanded as a facet of SE Validation

Conclusion

Conclusion

The examined statutes are structurally incapable of consistent, competent solutions of societal problems

Conclusion

There is potential for a significant improvement in the performance of government through the adoption of SE protocols for the creation, validation, and maintenance of legislative statutes

Recommendations

RECOMMENDATIONS

1. Conduct similar Subgroup # 6 research studies of the statutes of other State Governments to determine if the findings of this research are unique or widespread
2. Continue SELAW efforts to develop Systems Engineering creation and validation standards for legislative statutes
3. Continue SELAW goal of developing a Systems Engineering Law Design Manual for Governments

RECOMMENDATION

4. Anticipate the coming expansion of science / engineering to encompass laws of government and the lawmaking process

End Notes

END NOTES (NOTIONS)

1. Artifacts
2. Consumer Labeling
3. Bureaucracy

NOTION (1): ARTIFACTS (Human Creations)

Esthetic (Art) ----- ALL CREATIONS ----- Useful (Tools)

“Mona Lisa” ----- CAT Scanners

Poetry ----- Laws

(Artists ----- Engineers)

NOTION (2)

Consumer products, e.g., processed food, pharmaceuticals, automobiles, insecticides, ... are required to have a label that describes contents, other useful information

(Laws are consumer products)

Nutrition Facts

About 29 servings per container

Serving size **1 Cup (55g)**

	Cereal	with 3/4 cup skim milk
Calories	190	250
	% DV*	% DV*
Total Fat	1g 1%	1g 1%
Saturated Fat	0g 0%	0g 0%
Trans Fat	0g	0g
Polyunsat. Fat	0g	0g
Monounsat. Fat	0g	0g
Cholesterol	0mg 0%	<5mg 1%
Sodium	200mg 9%	280mg 12%
Total Carb.	46g 17%	56g 20%
Dietary Fiber	4g 16%	4g 16%
Total Sugars	19g	28g
Incl. Added Sugars	13g 26%	13g 26%
Protein	4g	10g
Vitamin D	0mcg 0%	2.2mcg 10%
Calcium	20mg 2%	250mg 15%
Iron	1mg 6%	1.1mg 6%
Potassium	280mg 6%	560mg 10%
Niacin	15%	20%
Phosphorus	10%	25%
Magnesium	10%	15%
Zinc	10%	15%
Copper	20%	20%
Manganese	60%	60%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Ingredients: Whole grain wheat, sugar, rice, raisins, wheat bran, whole grain oats, brown sugar syrup, vegetable glycerin.

Contains 2% or less of corn syrup, salt, natural flavor, modified corn starch, molasses, palm oil, cinnamon, honey, mixed tocopherols (vitamin E) for freshness.

CONTAINS WHEAT INGREDIENTS.

Distributed by Kellogg Sales Co.
Battle Creek, MI 49016
®, TM, © 2021 Kellogg NA Co.

Contains a bioengineered food ingredient

\$ 7.99

NOTION (2)

Require every legislative statute to include, on its opening page, a description of the contents and goal of the law for the consuming public:

Problem definition

Purpose

Sanction

Costs (or Benefit / Cost)

Risk level

Designer name(s)

NOTION (3)

Governments establish a new bureaucracy:

Federal Quality of Laws Administration

- FDA (Protect Public) Assure high quality of pharmaceuticals*
- USDA (Protect Public) Assure high quality of food / food production*
- FAA (Protect Public) Assure high quality of aircraft / operations*
- FQLA (Protect Public) Assure high quality of laws / operations*

* Requires basis in science

THANK YOU

Pennsylvania Style Manual

-- PURPOSE --

On Purpose Statements, the Pennsylvania Style Manual
advises designers of laws:

Page 14, “(a) A purpose section should be included
only when necessary.”

REFERENCES

1.

2.

3... <https://www.ncleg.gov/EnactedLegislation/SessionLaws/PDF/1985-1986/SL1985-222.pdf>