Public Policy Challenges: An RE Perspective

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Overview

- Research aim. Parallels between public policy and IT projects from the perspective of traditional RE practice.

- Method. Explorative case study where we categorized the motivating problem, goals and solutions for eight topics in North American mainstream media.

- Results. Evidence of
  - policy failures parallel project failures traceable to requirements engineering problems.
  - bias across all stakeholder groups, similar to the rise of the "beliefs over facts" phenomenon often associated with "fake news".
  - unintended consequences due to inadequate problem scoping, terminology definition, domain knowledge, and stakeholder identification and engagement.
  - ideological motivations that affected constraint definitions resulting in solution spaces that may approach locally optimal but may not be globally optimal.

- Conclusion. Public policy addresses societal issues; RE techniques could be utilized to support policy creation and implementation.

Research questions

Our initial investigations led to the following research questions:

1. Can we identify challenges associated with defining, formulating and realizing public policies?

    1. Do the challenges have analogs in RE for software intensive systems?

2. How could RE techniques help mitigate the identified public policy challenges?

    1. Can RE techniques be used to proactively identify possible public policy challenges during formulation and before enactment?

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Research Method

- MSM was monitored using news feeds such as Google News.
- **If** article related in some way to announced public policy *and* the author's commentary identified unintended consequences, **then** capture that article to the document repository for later analysis.
- Dataset. 152 articles on government policies, policy topics or policy initiatives, government procurement and policy implementation strategies.
Sustainability was primary focus of 37 of the articles or documents.

Topics

- **Algorithms**, e.g. big data analysis, artificial intelligence
- **IT projects**, e.g. large-scale publicly funded projects
- **Social**, e.g. free speech, critical thinking, gender issues, fake news, radicalism
- **Privacy**, e.g. location data, social media, children's self-determination
- **Policy**, e.g. cybersecurity, copyright, taxes, housing
- **Climate change**, e.g. resilience, carbon emissions, energy, electric vehicles, pipelines
- **Controlled substances**, e.g. state versus federal law, avoiding crime, licensing, taxes
- **Equalization**, e.g. income, taxes, resources, cost of living

Analysis samples.

ID	Category	Goal	Solution	Unintended Consequences	Keywords	Problems
Reuters AI	Algorithms	Make news faster, more accurate, and more resilient against fake news attempts.	Use 13 AI algorithms that mine Twitter and cluster and extract news	Potential to eliminate the jobs of 2500 highly educated and skilled reporters	News, media, AI, algorithm	Stakeholders not considered
Amazon sales algorithm	Algorithms	Make customers want to buy more and feel well taken care of	Sales algorithm that works well in selling things that are useful because frequently bought together	(1) Suggesting composites that are potentially useful to build explosive devices, (2) could potentially serve to detect potential terrorists	Sales, online, algorithm	Unintended consequences, incorrect interferences
Passport Canada	IT projects / New passport processing system	Make passports safe and secure with physical robustness	Electronic system to produce the new passports	At least $75 million over budget and well behind schedule. The project "did not include a plan for security requirements."	Passport, IT	Failed to consider specific quality requirements

Sight of personal privacy, Google, Facebook	Privacy	Software company needs to make money	Software can be given away for free if we collect the users' data instead	Loss of privacy, complete-unintended by the user. Unintended consequence by the companies is regulatory pushback of various jurisdictions. No understanding of consequences (e.g. why I didn't get the job/loan/etc)	Privacy	EU has data privacy policies that would make a lot of US startups illegal
Controlled substances summary	Controlled substances	Get people to relax and not be anxious.	Pot legalized.	Potentially reversing policy. You smoke pot in Cali, leave to EU, return, if you deny to have smoked upon return to the US you can be charged, perhaps jailed.	Controlled substances	A federal marshal could walk across the US and throw anyone in jail that has smoked pot.
Equalization summary	Equalization	Ensure that all political regions in the country are able to provide approximately equivalent public services to the citizens	A formula. It is criticized as being far too complex. From a mathematician's perspective the model is grossly inadequate, inaccurate, and simplistic. First year	People don't have trust that equalization is fair. Some regions experience greater levels of taxation than others. The people who receive the money say everyone gets taxed the same, but the federal	Equalization	People don't bother to learn – what it costs to deliver a public policy initiative. Stakeholders can't

Sample. California Sustainability Policies.

- California Sustainability Policies summary

- California aspires to be a thought-leader and puts into action a lot of what we have learned on mitigating sustainability challenges over the past years.

- How many things are being considered at CSULB and the Port of LA as examples - shows you can make substantial differences but at high costs

- Millions of dollars are being spent on these initiatives. What could have been achieved if that money would have been spent somewhere else, e.g. in India or another developing country where it can help far more people with the same resources?

- Sustaina-bility policy

- Prioritization

Observations. (And potential future research)

- Legislative contradictions
- Same old problem
- Holistic perspectives
- Identifying the **right** problem
- Side effects
- Magnitude of unintended consequences
- Affected domains
- Privacy
- Biases in AI and data mining
- Social perspectives
- Emotional content
- Time

Future research farther from RE.

- Do opinion article writers become thought leaders? Are they good barometers of the populous and their emotions?

- Can we use machine learning across the "wisdom of the crowd" as a means to validate what the pundits and politicians are saying?

- Can we extract the core content of each document and perform formal semantic analysis to identify the biases in the presentation and to quantify the intensity of the bias?

- Are things really "as bad" as the MSM would seem to want to have us believe? Is it possible to know the relative scale of the negative elements – were the reported negatives only a small proportion of the overall initiatives? Were the reported negatives only relatively rare occurrences in the greater context of society?

Questions?

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We are the trees of Kananaskis.