Space Policy and Priorities

Policy and Priorities for Tackling Super Wicked Problems and Avoiding the Tragedy of the Commons (In Space)

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Overview

- **Key question:** Why is it so hard to solve this issue of space debris?
  - *"We went to the Moon…so why can't we do this?"*

- Step back and look at it the issue of space debris (and space sustainability) from a broader ***public policy perspective***

- What can we learn from attempts to deal with the broader class of ***collective action problems*** that is applicable to our problem?

- How does our understanding of collective action problems shape ***policy strategy*** for space debris and sustainability going forward?

What is Public Policy?

- "The principled guide to action taken by the administrative executive branches of the state with regard to a class of issues in a manner consistent with law and institutional customs" (Wikipedia)
- "The public and its problems" (Dewey 1927)
- "How issues and problems come to be defined, and how they are placed in the political and policy agenda" (Parsons, 1995)
- "How, why, and to what effect governments pursue particular courses of action or inaction" (Heidenheimer et al, 1990)

Policy Analysis

- Policy analysis has come to be dominated by economics
  - Definition of several alternative courses of action
  - Weighing the costs and benefits of each alternative
  - Choosing the alternative that best satisfies all the criteria

- Continual push for a more "scientific" (i.e., factual and unbiased) approach to developing, choosing, and implementing a policy option

- In the real world, the process by which policy happens and the people involved in the process play as big (if not a bigger) role than the "science"

Shortcomings of Scientific Policy Analysis

- Rittel and Webber, "Dilemmas in a General Theory of Planning" (1973)
- Scientific tools for problem solving were becoming more widespread after the "success" in government applications
- Professionals in multiple areas of public service coming under increased attack from the public over perceived failings in solving social problems
- Diagnosed it as a function of all the easy problems having been solved, and the only problems left were "wicked" in nature

Wicked vs Tame Problems

- Tame problems (mathematics, chemistry, chess) have ***clear objectives and resolutions,*** and can be resolved through application of scientific methods

- Wicked problems are those for which a ***purely scientific/rational approach cannot be applied (Roberts 2000)***
  - Cannot explicitly define all the variables
  - Stakeholders have radically different worldviews and timeframes
  - Constraints and resources change over time
  - Problem is never resolved definitively

Characteristics of a Wicked Problem

1. Cannot fully describe the problem without knowing what the solution is (the two are intertwined)
2. No “stopping rule” (no explicitly-defined end state when you know you’re done)
3. Solutions are not right or wrong, but better/worse or good/good enough
4. Each wicked problem is unique and novel
5. Every solution is a “one-shot operation”
6. There is no explicitly defined set of all possible solutions from which the “best possible one” can be chosen

It Gets Worse…

"**Super Wicked Problems**" have all of the characteristics of wicked problems, plus:

- Time is running out
- Those who are causing the problem are also seeking to provide a solution
- Central authority to resolve the problem is weak or non-existent
- Policy responses discount the future irrationally

Root Cause: Collective Action Problems

- Problems where the group would benefit from everyone taking a particular action, but the cost of doing so makes it implausible for any one individual to do so

- Categorical example: Prisoner's Dilemma

- Many real world examples
  - Pollution
  - Cyber security
  - Management of natural resources (fisheries, forests)
  - Voting

Strategies for Tackling Wicked Problems

- **Authoritative**
  - Put solving the problem in the hands of a few stakeholders who have authority to define problem & develop solution
  - Makes decisions & action easier, but the "experts" can be wrong
- **Competitive**
  - Many players all compete to solve the problem in their own way
  - Improves odds of finding a good solution, but wasteful & can lead to violence (war is a free market with harsher penalties)
- **Collaborative**
  - Seek "win-win" solution instead of zero-sum
  - Shared costs & pooled resources, but increased transaction costs in developing/implementing solution

Conditions for Employing a Strategy (Roberts 2000)

- Power is ***concentrated and uncontested*** -> Authoritative
- Power is ***distributed and contested*** -> Competitive
- Power is ***distributed and uncontested*** -> Collaborative

- Research shows that people often have to ***fail into collaboration***
  - Only after personal experience with authoritative and competitive strategies can people really understand their shortcomings
  - People have to learn what does not work before they are willing to absorb what are perceived as the "extra costs" of collaboration
  - Goes for interagency process within a government as well as between governments

…Yet There Is Hope

- Significant work by Levin, Cashore, Bernstein, and Auld in dealing with super wicked problems in the context of climate change

- Next few slides summarize their research and findings

Policy Implications of Super Wicked Problems

- One-shot "big bang" solutions rarely work
  - Require behavioral change by all populations immediately
  - Implementation can produce societal "shocks" that hamper compliance
- How to measure progress?
  - Challenges in identifying real "paradigmatic shift" (as opposed to faux)
  - Discounting of incremental, progressive change that could lead to a positive tipping point
- Recognition of different "levels" of a policy regime, and what can be done at each
  - Different levels may have different policy "windows"
  - Implement incremental change at the lowest level possible (bottom-up approach)

Importance of Path Dependent Processes

- Why do certain policies, technologies, or institutions endure despite presence of what seems to be a better alternative?
  - Key actions can set a system on a particular path of a branching tree

- Useful characteristics of a policy intervention:
  - ***Lock-in:*** a policy intervention that contains a logic that gives it immediate durability
  - ***Self-reinforcing:*** the costs of reversing a policy intervention increase over time
  - ***Increasing returns:*** the benefits of a policy intervention increase over time, possibly leading to a tipping point
  - ***Positive feedback:*** expanding the number of actors participating in the policy intervention reinforces the original support

Strategies For Developing Policies

- Increase the stickiness of a solution
  - Take advantage of what is already sticky
  - Minimize short-term political risk by delaying cost imposition
  - Focus policies at the lowest & multiple levels

- Entrench solution and expand participation/support
  - Build coalitions that can convert short-term interests to the long term
  - Create new interests in line with the super wicked problem
  - Foster values and norms that reinforce the policy intervention

FROM SPACE DEBRIS TO SPACE SUSTAINABILITY

The Tragedy of the Commons

- Concept of "Tragedy of the Commons" was popularized by a 1968 *Science* article by Garrett Hardin
  - "Multiple individuals, acting independently and rationally consulting their own self-interest, will ultimately deplete a shared limited resource, even when it is clear that it is not in anyone's long-term interest for this to happen" – Wikipedia

- Hardin suggested only two ways to avoid this tragedy
  - Leviathan (single hegemonic entity to manage the resource)
  - Privatization of the resource

Tragedy is that you can't solve the problem without destroying the commons

Space as a Common Pool Resource (CPR)

- **Excludable:** can prevent others from using the resource
- **Rivalrous:** someone else's use of the resource precludes your own use of it

	Excludable	Non-excludable
Rivalrous	**Private goods** food, clothing, cars, personal electronics	**Common goods** (**Common-pool resources**) fish stocks, timber, coal
Non-rivalrous	**Club goods** cinemas, private parks, satellite television	**Public goods** free-to-air television, air, national defense

Outer space as whole is a public good, but heavily used regions of Earth orbit (LEO, GEO) are Common-Pool Resources (CPRs)

Elinor Ostrom

- Won 2008 Nobel Prize in economics for her work on common-pool resources (CPRs)

- Discovered that there are many cases where the tragedy of the commons is false
  - Resources can be managed sustainably without either Leviathan or privatization
  - Resource appropriators self-organize to develop governance model that is suited to local conditions

- Distilled 8 principles which were common to all cases of successfully managed CPRs

Ostrom's Principles

1. Clearly-defined ***boundaries of the CPR*** (effective exclusion of external unentitled parties)
2. ***Congruence*** between governance structure or rules and the resource context
3. Collective-choice arrangements that ***allow most resource appropriators to participate in the decision-making process***
4. ***Effective monitoring*** by monitors who are part of or accountable to the appropriators
5. ***Graduated sanctions (penalties***) for resource appropriators who violate community rules
6. Low-cost and easy-to-access ***conflict resolution mechanisms***
7. Self-determination of the community is recognized by higher-level authorities
8. In the case of larger common-pool resources: organization in the form of ***multiple layers of nested enterprises***

MOVING FORWARD

General Lessons Going Forward

- Learn from other domains, but don't copy/paste ideas
  - Air Traffic Management ≠ Space Traffic Management, but there are some useful concepts that might help
- Technical definitions/approaches are good places to start, but don't ignore politics
  - Wicked problems by definition cannot be solved through purely scientific/rational means
  - Need to have a cultural/behavioral/political dimension as well
- Push for a collaborative solution, but don't be surprised if it's the last thing that gets tried
- Recognize that not all stakeholders have the same perspective/priorities
  - Developed spacefaring countries have a different perspective from developing countries

General Lessons Going Forward (2)

- Focus on developing policy interventions at multiple levels
  - International, national, and individual actor
- Don't discount value of incremental policies, or starting from coalitions of the willing
  - Start with a core constituency, and increase it over time
- Pay attention to the process & actors involved as much as the actual "solution"

Policy Priorities Moving Forward

- Increased harmony between technical standards and regulations on debris mitigation across all space actors
  - Increases benefits to those actors who adopt them
  - Creates a path dependency that makes it hard to go back

- Develop norms of responsible behavior in space that reinforce debris mitigation guidelines and other policy interventions
  - Reward good behavior, and criticize bad
  - Polite peer pressure (from NGOs?)

- Increased access to SSA data for all space actors (and the public)
  - Increases awareness of the problem, builds common understanding
  - Reinforces norms of behavior and costs of acting outside the norms

Thank You. Questions?

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