Agile Policy Making: How Complexity Theory, Big Data and Data Science Research is Changing the Practice of Policy Making*

By William A. Brantley

Big data and data science has revolutionized how commercial enterprises market and sell products and services. In a widely repeated story, Target was able to predict when customers are pregnant based on changes in their buying habits, according to Kashmir Hill in a 2012 *Forbes* article titled "How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did." The same powerful analytical techniques are being paired with complexity theory to create new methods for public policy analysis and creating public policy. Agile policy making promises to better model the policy stakeholders and their interactions so as to develop more effective and dynamic public policies.

Complexity Theory and Public Policy

Dr. Graham Room, in his book *Complexity, Institutions and Public Policy*, argues that current policy analysis techniques cannot fully capture the dynamic processes between the actors in any given policy area especially when using only longitudinal data. He uses complexity theory to establish his agile policy-making toolkit, which is an eight-step, cyclical process:

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1. Map the landscape – understand the policy arena's issues and current challenges.
2. Identify the protagonists –know the players and stakeholders in the policy arena and their relationships to each other.
3. Model the struggle – create multiple scenarios to understand how the policy landscape may evolve.
4. Watch for tipping points – identify the triggers that could dramatically shift the structure into a new form.
5. Tune the landscape – use analytical tools and discussions to move the policy arena into directions that are more productive.
6. Energize the protagonists – help some of the protagonists build capacity and take other actions to encourage cooperative behavior toward win-win situations.
7. Civilize the struggle – help create win-win situations and limit destructive behaviors by the protagonists.
8. Watch for predators –keep one or more protagonists from unfairly tipping the balance of power and creating a destructive struggle in the landscape.

A vital concept, agile policy making is treating agencies as complex adaptive systems or as entities that anticipate and respond to their environments. That is why modeling the dynamics of internal agency processes and relationships between agencies is necessary to fully understand future policies.

Big Data and Data Science

A great deal of data and computational power is needed to fully model the policy landscape, the protagonists and their struggles. Thanks to the big data revolution, policy informatics is rapidly becoming a growing field. The Center for Policy Informatics at Arizona State University is conducting several research projects that use cutting data analysis techniques to create public policy. A prominent example of using big data in policy making is the various projects on Challenge.gov. The next step is merging the agile policy toolkit with policy informatics to create a new, evidence-based policy analysis: agile predictive policy analysis.

Agile Predictive Policy Analysis (APPA)

Agile predictive policy analysis (APPA) is built upon the concepts behind other data-based policy making functions such as William Bratton's Compstat and the Obama administration's PortfolioStat IT. Data is blended from various sources to create a dashboard that displays key performance indicators where decision makers can create and monitor policies. This gives policy makers near-real-time feedback on the performance of policies and governance decisions.

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The goal of APPA is to not only use data to accurately report on the current state of the agencies and policies but to create accurate models of the landscape, protagonists, and the policy struggle to create the most likely scenarios. This is accomplished by using transactional data sources from agency operations and using data science techniques such as machine learning and predictive analytics to better model agency decisions. The relationships between the agencies and other policy stakeholders are modeled along with any relevant environmental factors in the policy landscape. This all goes toward creating a simulation of the policy landscape which gives both the current status and future scenarios.

SimGovernment

Like the popular computer game *SimCity*, APPA creates a SimGovernment for policy makers to build possible policies and then test the effects of those policies in a realistic environment. As the amount of data grows and the analytic techniques become more sophisticated, it is possible to measure the impact of policies on other issue landscapes. For example, policy makers could model how a new health policy will affect environmental and educational issues, along with health issues.

A major advantage of APPA is that it will also help in identifying the undesired results of policies. With current policy making, it takes time to collect the data and observe the results of a policy. This delay often exacerbates the undesired effects of a policy – sometimes for years. With APPA, policy makers can spot and prevent the undesired effects of their policies before implementation.

Continuing the Cycle of Theory to Practice and Back in APPA

There is nothing new in using research techniques developed in academia to analyze data by public policy practitioners. One can see a cycle where public agencies create the data and analytical challenges that lead to academic research in more effective policy making techniques, which in turn leads to even more data collection and more complex analytical challenges. APPA is the latest iteration in this cycle where complexity theory and data science will lead to more sophisticated policy making, which anticipates policy events rather than just reacts to them.

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Suggested Readings

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