# REFLECTION:
# DECISION MAKING DURING PANDEMICS

**EPA 1361: Model-Based Decision Making**

**30 June 2017**


Erin Bartholomew – 4627237

Patrick Steinmann – 4623991

Stefan Wigman – 4016246

Practical politics consists in ignoring facts. — Henry Brooks Adams

*(Autobiography, 1908)*

I know few significant questions of public policy which can safely be confided to computers. In the end, the hard decisions inescapably involve imponderables of intuition, prudence, and judgment.

— John F. Kennedy

*From Address to the Centennial Convocation of the National Academy of Sciences (22 Oct 1963), 'A Century of Scientific Conquest.' Online at The American Presidency Project.*

## Introduction

The relationship between science and politics is a fraught one. To the scientist, the world of politics is a murky world of constantly changing and evolving agendas and issues, where entire governments are replaced overnight and there never seems to be much focus on what truly matters, only what the voters want to hear about. To the politician, on the other hand, science is usually an impenetrable bubble of academic elitism, where white-haired scholars sit in ivory towers and pore over books, without a care at all for what's happening outside their office windows. These diametrically opposed positions are nothing new, and they are well recognized. Addressing the gap between science and policy however is far more difficult (von Winterfeldt, 2012). Even more difficult is finding ways to integrate scientific methods and advice into the political process.

In this essay, we will review an adaptive policy, designed according to scientific principles to combat an infectious disease epidemic, from a politics perspective - in order to exemplify the science-politics gap, but also to show how the gap could be bridged. We will discuss the science-policy gap and its causes. Additionally, we will propose a strategy to ensure that, if an epidemic breaks out, scientists are involved in the policy process. Finally, we will show potential risks and threats, but also benefits to such an involvement.

## The Relationship of Science and Politics

While the reasons for the dissonance between science and politics can be connected to any number of causes and factors, we believe two main points, related yet independent, can be identified.

Science and politics have a very different understanding of what truth and facts are, and what they can be used for (Hoppe, 1999). While scientists see facts as both the foundation and pinnacle of their profession, they are generally not worth much on their own in the political arena. Without a cause or proponent, facts will be washed away by rhetoric. Similarly, while the scientific community uses facts as the basis and method of argumentation, political actors will generally use facts more as supporting elements to emphasize a principal or moral argument.

The reason for this different understanding about the usefulness of facts is the problem structures encountered in science and politics. This is the key difference between science and politics. Broadly speaking, all problems can be grouped into structured and unstructured problems. While structured problems are defined by objective facts and well-defined norms, unstructured problems suffer from disputable or unclear facts, and dissent about relevant norms. It is immediately obvious that scientists are confronted mainly by structured problems, while politics deals almost exclusively in unstructured problems involving multiple actors. The two problem structures require vastly different resolution approaches - which may not be immediately apparent to an inexperienced outsider.

These two differences demonstrate well why the average scientist, thrust into the world of politics, will struggle to make his point heard - not only will other actors in the arena not accept his hallowed facts, they will also object to his problem-solving methods and principles.

## Dynamic Policy for Infectious Disease Response

Crisis situations and operations research do not go well together. As time pressure and stress levels increase, and as the risks increase, brain capacity decreases, and the initial instinct is to simplify decision-making routines in response. To purposefully add complexity by introducing scientists, data tables, computer models and simulation runs entails a high risk for both parties. By extension, the potential payoff must be worth the added effort, putting high pressure on the scientists to deliver useful contributions.

This risk is compounded by the fact that our recommendations outline a dynamic policy, which adapts to the disease's course over time and even tries to predict the disease's behavior in advance. While this holds great potential in terms of policy effectiveness, we believe it would be even more difficult to convince stakeholders and policymakers of its value and applicability. We expect there would be significant resistance from the policy side towards pre-specifying actions to combat a completely unknown disease which may or may not occur at any time. This is understandable - if the action decisions were instead made in "real time", there would be more complete information available. Developing policies in advance, even adaptive ones, imposes a voluntary restriction on the knowable data, thus probably making the actions less specific and effective. We believe this would be more than compensated by the fact that pre-specification means preparatory actions can already be undertaken - acquiring stockpiles of face masks or vaccines, or creating contingency plans for rapidly expanding medical capacity in a crisis situation.

The four policies presented in our strategy paper can be grouped into low- and high-infectivity pairs, with very similar action sets for the two policies in each pair. In every case, the action sets address multiple aspects of daily life - we expect this would lend the policies legitimacy, as they are perceived as an integrated effort. For high-infectivity policies, two very aggressive actions are implemented - involuntary vaccination and curfews/quarantining. These actions would likely be politically extremely unwelcome, as they would likely spark public resentment.

It should definitely be noted that the key performance indicators that were used in the analysis cannot sufficiently represent these political difficulties. Most policies are subject to ethical and legal constraints, as well as other undesired effects that weren't taken into account. These "soft" criteria are very hard to implement in an explicit model, but definitely influence decision-makers in their judgment. In addition, the effect of some policies is very dependent on the way a policy is implemented, and it can be detrimental if it fails to be executed properly. For instance, a public education campaign should focus on risk communication, as this helps the community to accept other, more serious health measures. If the campaign is too sensationalistic or alarmist instead of reassuring, it might cause a panic and damage the situation (Gostin and Berkman, 2007).

In the case of vaccinations, one might think of intellectual property concerns, regulatory hurdles, limited production capacity, and fear of liability. Also, depending on the country, there might be severe moral objections against vaccination. This might make the timely implementation of a vaccination policy quite hard.

Public health countermeasures (i.e. hygienic measures, social distancing, travel restrictions, quarantine, and case isolation), and especially the more severe ones are accompanied by significant ethical and human right concerns. Governments must collect sensitive health information from the public, while this surveillance also poses privacy risks. Decision-makers must operate within the borders of the law, and this might affect the effectiveness of these policies. In addition, this might decrease data availability, which would make it harder to actually determine the correct strategy. A model is not able to take these factors into account, and both scientists and policy-makers should realize this.

Another thing to be taken into account is the societal effect of the social distancing policies. Fear, caused by an awareness campaign, might already cause people to avoid public gatherings, and the additional effect of a social distancing policy might be lower than initially assumed. Further, this might lead to individual rights infringement, disrupt social and economic life, and eventually cause loneliness when the policy-duration is long. Such restrictions might lead to heavy protests regarding the right of the government's right to interfere. It also leads to other undesirable side-effects like compensation for lost profit and penalties for non-compliance. These should definitely be taken into account, but a model cannot provide sufficient insights regarding these issues.

## Ensuring Advice is Heard, Risks

Crisis situations are characterized by both significant time pressure and high stakes (Boin & Lagadec, 2000). Analogies can be drawn to wicked problems (Rittel & Webber, 1972), where there is also significant pressure to solve the problem, but the cost of a wrong solution is catastrophic and there is no possibility for re-doing the solution.

In such situations, decision-making mechanisms are often simplified and reduced to known and trusted elements (Boin & Lagadec, 2000). Clearly, this is the worst possible situation for a scientist, regardless how noble their intentions are, to enter the political arena and attempt to advise decision makers regarding policies. Instead of taking on this outsider expert role, the scientific community must instead position itself as a full participant and stakeholder in the policy process. Rather than joining the political arena when a crisis breaks out, scientists must already be inside the arena - listening to the rhythm and blues of the policy streams, maintaining trusting relationships with stakeholders and regularly demonstrating the value and benefit of scientific advice.

There is no template for achieving this transition. However, we can identify two primary components to this: building science-politics dialogue, and building trust and buy-in in the contributions of science to policy making.

Firstly, scientists need to learn the language and habits of policy making and the political process. Academics and scientists should venture forth and join parliament committees, investigative groups and think tanks - first as external subject matter experts, later transitioning to a more participatory (and stakeholder) role. Of special value here are multidisciplinary study courses designed to educate scientists and engineers about the policy making world, as they allow for early exposure and integration into to the political sphere.

Secondly, the value of scientific advice in policy making needs to be reliably demonstrated. One approach for this would be to use tools like data analytics, modelling and simulation methods to support everyday policy decisions, gradually building trust and increasing the scope and impact of scientific methods on the policy making process until one day even the most significant decisions are made under consideration of scientific models.

There are risks to integrating science more into the policy making process. For example, if a policy decision makes significant usage of modelling, but the policy outcome is not as expected, the scientific modelling contribution could become a very easy target for criticism and blame - “the model was completely wrong, those scientists can’t be trusted to get it right!”. This is not completely false - if science is to be used in the policy process, the scientists have a duty to ensure their advice is sound and reliable. Alternatively, there could be pressure from the political arena on the scientists to consider “alternative facts” in order to make model outcomes more palatable and agreeable. Here, science must stick to its guns - while politicians may consider facts disputable, scientific truth is usually stricter (although especially operations research is now cottoning onto the fact that the truth may be objectively framed in multiple ways). Finally, there may be a push to over-rely on modelling and data analytics techniques when making policy decisions - “policy by algorithm”. As we saw in the JFK quote earlier, however, very few policy decisions can be made by computers alone. There are always unquantifiable moral, ethical and principal dimensions to a policy decision, which, at least today, cannot be expressed through a computer model.

## Conclusion

In crisis situations such as infectious disease epidemics, scientists can provide significant contributions to the tackling of the crisis. However, it is generally difficult for scientists and politicians to communicate effectively, and for scientists to join the political arena, as the two fields have very different perspectives and methods.

Therefore, scientists would find it very difficult to effectively support a policy process if they join the political arena on the onset of a crisis. Instead, the scientific community needs to join this arena before a crisis arises, in order to build trust and understanding in advance. This can be achieved through pro-active contribution and education of scientists about the rhythm and blues of politics, and by using modern scientific methods to demonstrate the value of science for policy making.

Once scientists have successfully integrated into the political arena, they can make useful contributions to the policy making process. In the presented case, a dynamic or adaptive policy for an infectious disease was designed through advanced modelling and simulation techniques. While this policy shows great potential for combating the infectious disease, it is by no means a complete package - ethical and moral concerns are very difficult to algorithmically capture, and must be assessed in a multi-actor policy setting. Additionally, there are various risks to making policy recommendations based on models - including the transfer in responsibility and the exposure to politician re-framing in order accommodate other political desires and goals.

Overall, science could provide useful contributions to the policy making process. In order to facilitate this, the scientific community should actively transition from an outside subject matter expert to an integrated stakeholder role, thus securing a seat at the policy table when crises arise. Only then can scientists actively support decision makers.

## References

Boin, A., Lagadec, P.. (2000). Preparing for the Future: Critical Challenges in Crisis Management. *Journal of Contingencies and Crisis Management, Volume 25.*

Gostin, L.O., Berkman B.E.. (2007). Preparing for Pandemic Influenza: Legal and Ethical Challenges. *Administrative Law Review*.

Hoppe, R.. (1999). Policy analysis, science and politics: from 'speaking truth to power' to 'making sense together', *Science and Public Policy, Volume 26.*

Rittel, H.W.J., Webber, M.M.. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, *Volume 4.*

Winterfeldt von, D.. (2012). Bridging the gap between science and decision making. *PNAS, Volume 110.*