





# DATA ANALYTICS AND FOREIGN POLICY: NICHE TOOL OR GAME CHANGER?

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# **JCSP 46**

# **Solo Flight**

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## SOLO FLIGHT

# DATA ANALYTICS AND FOREIGN POLICY: NICHE TOOL OR GAME CHANGER?

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## DATA ANALYTICS AND FOREIGN POLICY: NICHE TOOL OR GAME CHANGER?

While we may all have our occasional doubts about the advice offered by our traditional public servants, I am certainly not yet ready to trade them in on the strength of this promise!

- Honorable C. M. Drury, 1975

# **INTRODUCTION**

Canada is a nation built on trade. Trade predates confederation and has factored heavily in foreign policy, most notably through international bodies like the General Agreement on Tariffs and Trade (GATT) and later the World Trade Organization (WTO). Canada has the second highest exports as a percentage of GDP in the G7 nations<sup>1</sup> and in 2018 exported 75% of its exports or roughly \$338 billion to the US.<sup>2</sup> Foreign trade is not uniquely a federal issue. Provinces play both an integral and independent part by representing both their citizens and their industry sectors such as manufacturing in Ontario and various natural resources in Quebec and the West. The Government of Canada (GC) must therefore balance the multi-dimensional needs of both provinces and their industries, all of whom need different things while expecting government to be responsive.<sup>3</sup>

Born from the ever growing needs of government and businesses, along with the increasing availability of data, the concept of data analytics emerged. Analytics as a concept gained recognition in the 1960s with the invention of the computer. Analytics has continuously evolved and is quickly making its way into anything and everything that uses or collects data. Imagine collecting enormous amounts of information and having it organized so that it can analyzed to extract highly valuable insight and make timely critical decisions. The notion of data

<sup>&</sup>lt;sup>1</sup> The World Bank, "Exports of goods and services (% of GDP)," last accessed 2 May 2020, https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS.

<sup>&</sup>lt;sup>2</sup> World Integrated Trade Integrated Solution, "Canada Trade Summary 2018 Data," last accessed 2 May 2020. https://wits.worldbank.org/CountryProfile/en/Country/CAN/Year/LTST/Summary.

<sup>&</sup>lt;sup>3</sup> Paul Gecelovsky and Christopher J. Kukucha, "Foreign Policy Reviews and Canada's Trade Policy: 1968–2009," *American Review of Canadian Studies* 48, no. 1 (2011): 39-40.

analytics followed the rise of big data and has become so expansive that it has birthed many subgroups including descriptive, diagnostic, predictive, and prescriptive analytics which will be discussed throughout.<sup>4</sup> It has even evolved field specific areas such as business and policy analytics. Data analytics potentially holds unlimited future possibilities but our understanding of its true capability and application is still in its infancy.

In a data driven world, being able to target this data and effectively manipulate it to make decisions is paramount. Businesses are already doing this and governments are slowly catching up. Given the complexities of Canada's foreign policy and the competitive nature of globalization, Canada needs to find novel analytical tools that would better facilitate future decision making. The use of data analytics, specifically predictive analytics, can help linearize the complex process of decision making in Canadian foreign policy giving it an edge in future trade negotiations.

This paper will be conducted in three parts. The first will discuss how Canada conducts policy decision making and examines specifically how it looks at foreign trade policy loosely centered around the newly negotiated Canada-United States-Mexico Agreement (CUSMA). The second part will look at specific applications of data analytics that apply to policy making in general, focusing on how it is currently being used within governments and business today. The final part will attempt to synthesize data analytics into Canadian foreign trade policy, suggesting areas data analytics could assist in foreign trade policy moving forward. This paper will focus on how decision making is conducted at the strategic and political levels. Centered around the

<sup>&</sup>lt;sup>4</sup> Dataversity, "A Brief History of Analytics," last accessed 3 May 2020, https://www.dataversity.net/briefhistory-analytics/#.

Government of Canada's principles of openness and transparency, it will therefore not delve into more restricted areas such as information operations and intelligence collection.

## CANADA'S FOREIGN POLICY CYCLE AND TRADE

In order to understand how the Government of Canada (GC) carries out foreign policy, it is important to know how the GC is structured to do so. The GC works within the principle of responsible government where ministers are appointed to Cabinet and advise the Prime Minister (PM) on issues within their departments, despite being accountable to a larger parliamentary. Within the government, the PM has several organizations and departments who carry out foreign policy. The Prime Minister's Office (PMO) helps the PM navigate foreign policy with a political view towards re-election, while the Privy Council's Office (PCO) is the central coordinator of all other departments and agencies within the government.<sup>5</sup> The PMs Cabinet operates through and with the PCO and includes several important ministers regarding foreign policy, most notably the Ministers of Foreign Affairs, International Trade, and International Development who collectively make up Global Affairs Canada (GAC).<sup>6</sup> Ultimately though, it is the PM who retains the final word on Canada's foreign policy decisions.

Carleton University's Macodrum Library provides a simplistic model to help understand the GC policy cycle for decision making. The first step, contemplation, aims to understand why the GC should consider an issue. There are many reasons the GC many want to study an issue, including the fulfillment of an election promise, study changes in public opinion, consider recommendations from a parliamentary committee, or to respond to an international

<sup>&</sup>lt;sup>5</sup> Nelson Michaud, "The Prime Minister, PMO, and PCO: Makers of Canadian Foreign Policy?," in *Handbook of Canadian Foreign Policy* (Toronto: Lexington Books, 2006).

<sup>&</sup>lt;sup>6</sup> Global Affairs Canada, "Global Affairs Canada," last accessed 3 May 2020, https://www.international.gc.ca/gac-amc/index.aspx?lang=eng.

commitment's call for policy measures.<sup>7</sup> The second step is to determine what action is required to address the issue. This could involve preliminary work to study or debate the issue. It could also include taking direct policy action in the form of issuing official statements, applying economic instruments (i.e. taxes, expenditures), committing to engaging in capacity building, or imposing new rules and laws.<sup>8</sup> Once implemented, the last step is to evaluate through audits and reports to determine the overall effect of the policy action.

A simple way to study the model is to apply it to an area that is critical to Canada, foreign trade. Canada is heavy committed globally through a series of bilateral free trade agreements, WTO agreements and plurilateral agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Canada-European Union Comprehensive Economic and Trade Agreement (CETA), and CUSMA.<sup>9</sup> There are many stakeholders involved in these agreements including federal departments and agencies, provinces, corporations and international actors; the actions of any one could potentially trigger a requirement for government to consider an issue. This process is further complicated by Canada's geography and regional separation of the various industry sectors, not to mention the court's interpretation of the Constitution, which divides the regulation of federal trade and commerce between the government and the provinces.<sup>10</sup>

Governments will often release white papers to clarify their positions and priorities on issues, however these papers rarely alter foreign policy objectives. They tend to be domestically focused, often failing to consider the needs of the provinces, and tend to have very little within

<sup>&</sup>lt;sup>7</sup> Carleton University, "Canadian Government Policy Cycle," last accessed 5 May 2020,

https://library.carleton.ca/research/subject-guides/canadian-government-policy-cycle-detailed-guide. <sup>8</sup> Ibid.

<sup>&</sup>lt;sup>9</sup> Government of Canada, "Trade and investment agreements," last accessed 3 May 2020. https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/index.aspx?lang=eng.

<sup>&</sup>lt;sup>10</sup> Gecelovsky and Kukucha, "Foreign Policy Reviews...," 46-47.

regarding foreign relations, let alone trade.<sup>11</sup> In conjunction with foreign policy reviews, these papers have systematically contracted in freedom and scope due to the increasing complexity of international trade agreements, which have evolved from their original aims of eliminating trade barriers. They have encroached into domestic markets setting conditions for the production of basic commodities such as softwood lumber and dairy to ensure competitive and fair access globally.<sup>12</sup> Gecelovsky and Kukucha argue that the sheer complexity of these agreements may lend foreign policy to be better resolved using Parliamentary Committees.<sup>13</sup> While any government would prefer the flexibility to choose what issues to study and when, sometimes those decisions are made for them by international state and non-state actors. A recent example is the 2016 US presidential campaign, where the discussions on renegotiating the North American Free Trade Agreement (NAFTA) left Canada with no choice but to contemplate the issue.<sup>14</sup>

Once an issue has been analyzed and discussed, the PM will then have to address it officially. Negotiating trade agreements typically results in new laws or regulations which take into consideration economic instruments which could have effects on living standards, wages, employment, inflation, and taxation or even tariffs and subsidies.<sup>15</sup> These economic instruments can all be studied in depth using evidence-based policy making or what is becoming known as policy analytics, or the merger of policy analysis with data analytics.<sup>16</sup> The GC will then need to announce the new measures through a public statement as was done two days prior to the first

<sup>&</sup>lt;sup>11</sup> Gecelovsky and Kukucha, "Foreign Policy Reviews...," 38.

<sup>&</sup>lt;sup>12</sup> Ibid, 46.

<sup>&</sup>lt;sup>13</sup> Ibid, 37.

<sup>&</sup>lt;sup>14</sup> Open Canada, "NAFTA Negotiations: Your guide to the players and priorities that matters," last accessed 3 May 2020, https://www.opencanada.org/features/nafta-negotiations-your-guide-players-and-priorities-matter/#team-canada-well-prepared-with-firm-priorities.

<sup>&</sup>lt;sup>15</sup> Gecelovsky and Kukucha, "Foreign Policy Reviews...," 48.

<sup>&</sup>lt;sup>16</sup> Giada De Marchi, Giulia Lucertini, and Alexis Tsoukiàs, "From evidence-based policy making to policy analytics," *Annals of Operations Research* 236 (2016): 17.

round of NAFTA talks when the Foreign Affairs Minister formally outlined the GCs position and priorities.<sup>17</sup>

Shortly after, assessments and reports will begin to surface on the effectiveness of the policy action. Under the office of the Chief Economist's website, within GAC, there is access to research and analysis, performance reports and trade statistics on a variety of topics.<sup>18</sup> There is no doubt a plethora of other assessments and reviews done by other departments, industry, news agencies, and think tanks. One such data rich report on CUSMA noted that the outcome preserves the important benefits of NAFTA, modernizes the agreement's disciplines, and makes it easier for Canadian companies to benefit from preferential access to the U.S and Mexican markets.<sup>19</sup> While the final step of evaluation is jam-packed with content primed for data analytics, the area surrounding performance measurement has been widely covered by academics. Though still worthy of additional exploration, it will not be covered further in this paper.

Foreign policy in simplest terms is complex. Towards the end of the 20th century, a massive movement towards globalization was taking place, one that was of immense benefit not only to consumers and producers but, by consequence, governments as well.<sup>20</sup> However, this change that has taken place over the past 30 years may slowly be shifting back towards nationalism and has already resulted in the (re)negotiation of several trade agreements in the past few years. When renegotiating NAFTA, Canada as a globalist nation, was able to hold onto most

 <sup>&</sup>lt;sup>17</sup> Osler, "Canada unveils its top priorities for NAFTA renegotiations," last accessed 3 May 2020,
 https://www.osler.com/en/resources/cross-border/2017/canada-unveils-its-top-priorities-for-nafta-renego.
 <sup>18</sup> Global Affairs Canada, "Office of the Chief Economist," last accessed 3 May 2020,

https://www.international.gc.ca/economist-economiste/index.aspx?lang=eng.

<sup>&</sup>lt;sup>19</sup> Global Affairs Canada, *The Canada-United States-Mexico Agreement: Economic Impact Assessment* (Ottawa: GAC, 2020), 3.

<sup>&</sup>lt;sup>20</sup> Michael Lusztig, "The Evolution of Liberalization in Canada's Trade Policy," in *Handbook of Canadian Foreign Policy* (Toronto: Lexington Books, 2006).

of the old agreement. However, as Globerman rights, the GC squandered an opportunity to push for more free markets and tariff reduction.<sup>21</sup> This push for regression to nationalistic means made three-time Ambassador Randolph Mank argue now would be a good time for Canada to conduct a foreign policy review provided it can "cohere with domestic policy and advance national interests."22 Governments in the past have tried to transition Canadian exports away from US markets in an effort to better diversify, ultimately failing at this simple and unilateral task which is minimal compared to something as complex as a foreign policy review. At the end of the day, despite all the negotiating and agreements, it is ultimately industry who decide on what, how much, and where good and services will go.<sup>23</sup> This should make one question if there is a better way of doing things.

Evidenced-based policy making has been around since the 1990s and has gradually given way to policy analytics. Longo and Dobell define policy analytics as the "use of new sources and forms of policy relevant big data combined with advanced analytics techniques and capacity, taking advantage of ubiquitous communication methods to reduce the time delay amongst stages of the policy cycle, aimed at better addressing public problems."<sup>24</sup> Traditional approaches of government arguably can no longer keep pace and are at risk of being caught unaware. The emergence of big data has accelerated the policy cycle process, suggesting the GC should transition from methodically independent stages into a more continuous loop as real time data about policy problems and system conditions arrive continuously.<sup>25</sup>

<sup>&</sup>lt;sup>21</sup> Fraser Institute, "NAFTA renegotiations – a missed opportunity for Canada," last accessed 3 May 2020, https://www.fraserinstitute.org/article/nafta-renegotiations-a-missed-opportunity-for-canada.

<sup>&</sup>lt;sup>22</sup> Randolph Mank, *Does Canada Need a Foreign Policy Review?*, (Canadian Global Affairs Institute: 2019), 8.

 <sup>&</sup>lt;sup>23</sup> Gecelovsky and Kukucha, "Foreign Policy Reviews...," 47.
 <sup>24</sup> Justin Longo and Rod Dobell, "The Limits of Policy Analytics: Early Examples and the Emerging Boundary of Possibilities," Politics and Governance 6, no. 4 (2018): 8.

<sup>&</sup>lt;sup>25</sup> Ibid, 7.

With this acceleration, comes a new threat of strategic surprise, which Ikani, Guttmann, and Meyer describe as "surprise by slower-burning." These threats, which can come from both state and non-state actors, simmer below detection until they emerge onto the scene leaving governments scrambling. Three recent examples were the Arab Spring, the rise of ISIS, and the Annexation of Crimea.<sup>26</sup> In these cases world leaders were unaware of the severity of events playing out before their eyes. Perhaps policy analytics, using essential elements of data analytics like forecasting, could have identified these trends in advance and help mitigate their significance before they erupted into flames.

## NAVIGATING THE WORLD OF DATA ANALYTICS

The first step in data analytics is to consider data as a strategic asset. Data itself comes in two forms: structured and unstructured. Structured data typically comes from automated systems such as resource planning tools and finance information, while unstructured data encompasses contracts, emails, social media, and even imagery from video monitoring systems.<sup>27</sup> Talend, an open source data integration platform company, defines data analytics purely as "the process of collecting and examining raw data in order to draw conclusions about it" and furthers that its true value emerges through discovering patterns that point toward trends, risks, or opportunities.<sup>28</sup> Descriptive analytics focuses therefore on discovering what happened using historical data while diagnostic analytics attempts to look at cause and effect to explain why it happened. Predictive and prescriptive analytics, are forward looking, and will be discussed in detail shortly.

<sup>&</sup>lt;sup>26</sup> Nikki Ikani, Aviva Guttmann and Christoph O. Meyer, "An analytical framework for postmortems of European foreign policy: should decision makers have been surprised?," *Intelligence and National Security*, 35, no. 2 (2020): 198.

<sup>&</sup>lt;sup>27</sup> Analytics Magazine, "An IBM view of the structured data analysis landscape: descriptive, predictive and prescriptive analytics," last accessed 2 May 2020, http://analytics-magazine.org/the-analytics-journey/.

<sup>&</sup>lt;sup>28</sup> Talend, "Business Analytics vs. Data Analytics: Which is Better for Your Business?," last accessed 2 May 2020, https://www.talend.com/resources/business-analytics-vs-data-analytics/.

Why should one care about data analytics? The World Economic Forum estimates that 90% of the world's data has been produced within the last two years at a current rate of 2.95 quintillion bytes of data daily worth an estimated \$3 trillion globally.<sup>29</sup> Commonly accessible data analytic tools are now commercially available and provide services from basic self-serve content, to augmented machine learning, to advance functions that predict future outcomes, but notably not the future itself.<sup>30</sup> The rise of big and open linked data (BOLD) initiatives has increased the presence of non-copyrighted and ready to use structured sources available to governments and businesses alike.<sup>31</sup> By 2013 Open Government Data had amassed over a million searchable datasets from 43 public government (including GC) and international organization sources in 24 languages.<sup>32</sup> There are countless other free and pay services out there and readily available for use.

Data analytics has found many uses within government. Health and medical services are combining medical records, insurance, disaster forecasting, and public safety policies to provide better health care policy and programs.<sup>33</sup> Social media is being used to search for instances of governments being mentioned and tracking how public opinion changes over time, a tool known as "social listening."<sup>34</sup> In the 2018 article "Cracking down on government fraud with data analytics", the authors detail how fraud prevention services helped prevent over \$500 million in losses in the health sector while Australia saw savings of \$12 million running analytics on

<sup>&</sup>lt;sup>29</sup> World Economic Forum, "The value of data," last accessed 2 May 2020, https://www.weforum.org/agenda/2017/09/the-value-of-data/.

 <sup>&</sup>lt;sup>30</sup> Solutions Review, "Five Common Data Analytics Use Case You Need to Know," last accessed 2 May 2020, https://solutionsreview.com/business-intelligence/common-data-analytics-use-cases-you-need-to-know/.
 <sup>31</sup> Sarah Giest, "Big data for policymaking: fad or fasttrack?," *Policy Sciences*, 50 (2017): 377.

<sup>&</sup>lt;sup>32</sup> John S. Erickson, Amar Viswanathan, Joshua Shinavier, Yongmei Shi, and James A. Hendler, "Open

Government Data: A Data Analytics Approach," *IEEE Intelligent Systems*, September/October 2013, 19.

<sup>&</sup>lt;sup>33</sup> E.S. Kim, Y. Choi, and J. Byun, "Big Data Analytics in Government: Improving Decision Making for R&D Investment in Korean SMEs," *Sustainability* 12, no. 202 (2020): 2.

<sup>&</sup>lt;sup>34</sup> Longo and Dobell, "The Limits of Policy Analytics...," 8.

doctors who were over billing.<sup>35</sup> While these systems can be expensive to set up and run, the return on investment can pay for itself many times over. As useful as these tools are, governments use of data analytics tends to limit itself within descriptive analytics.

The GC is admittedly behind the curve compared to some countries and recognizes that the value of its current data is "sub-optimized". Its new Data Strategy Roadmap hopes to change this by outlining a path to "create more value for Canadians from the data we hold."<sup>36</sup> It is pushing for an "open by default, privacy by design" approach that seeks to be as transparent as possible while protecting the data of its citizens. Further details of the plan can be seen in figure 1, noting that the GC is committed to achieving "world-leading standards governing transparency, archiving, management, usability, interoperability and privacy."<sup>37</sup> The GC has created a single point of contact to manage this ambitious program and requires all departments and agencies to develop a data strategy that is suited to their departmental needs. While this is a great start, it will take significant time and resources to implement. Additionally, while the roadmap mentions analytics throughout, it does not allude to what types, though the narrative would suggest it is unfortunately centered only around descriptive analytics.

<sup>&</sup>lt;sup>35</sup> Susan Cunningham, Mark McMillan, Sara O'Rourke, and Eric Schweikert, "Cracking down on government fraud with data analytics," *McKinsey Insights*, (Oct 15, 2018): 7.

<sup>&</sup>lt;sup>36</sup> Government of Canada, "Report to the Clerk of the Privy Council: A Data Strategy Roadmap for the Federal Public Service," last accessed 6 May 2020, https://www.canada.ca/en/privy-council/corporate/clerk/publications/data-strategy.html.

<sup>&</sup>lt;sup>37</sup> Ibid.

# What will success look like?



Source: Government of Canada, *A Data Strategy Roadmap for the Federal Public Service*.

While governments play catch-up, businesses are pioneering new ways to use data through business analytics, a term that is often interchanged with data analytics. The nuance is that business analytics is the complete package of "skills, tools, and applications" aimed at using specific data sources to improve a business's core functions whereas data analytics centers around the collecting and analysis of raw data to draw conclusions and identify trends.<sup>38</sup> Figure 2 provides additional insight into the subtle differences. The key to a successful business,

<sup>&</sup>lt;sup>38</sup> Talend, "Business Analytics vs. Data Analytics...".

according to Talend, is the proper application of both.<sup>39</sup> Re-examining the Data Strategic

Roadmap, it would appear the GC's focus is positioned to align itself more with the inward focus

of business analytics, which does not bode well for a foreign policy framework that needs to be

outward looking.

	Business Analytics	Data Analytics
Goal	Focuses on identifying trends in the organization that can be optimized to improve overall business planning and performance. Supports continuous improvement in technology and processes.	Benefits come from recognizing patterns in a dataset and making accurate predictions based on events.
	the truth.	
Data	Data sources are defined in advance based on project goals.	Analysis is more ad hoc with data sources added on the fly as correlations are uncovered.
Approach	Involves defining the goals and requirements for programs and projects.	Typically, more predictive and prescriptive.
	More retrospective and descriptive.	and discover new insights for competitive advantage.
Team members	CIO, CDO, analytics manager, business analyst, data warehouse engineer	Data analyst, line of business manager

Figure 2: side-by-side comparison of Business and Data Analytics

Source: Talend, Business Analytics vs. Data Analytics: Which is Better for Your Business?

The real value of data analytics in business comes from its ability to predict potential futuristic outcomes within acceptable margins. This is done using predictive and prescriptive analytics. Predictive analytics builds on descriptive analytics to create forecasts of expected outcomes. It does not attempt to predict whether the outcome will happen but rather attempts to

<sup>&</sup>lt;sup>39</sup> Talend, "Business Analytics vs. Data Analytics...".

identify "trends, correlations, causation, or probability" using qualitative analysis to carry out predictive modeling.<sup>40</sup> Prescriptive analytics then builds on the predictive results and recommends preferred actions based on those outcomes. It uses feedback as a learning mechanism and often incorporates AI and machine learning to help achieve business objectives.<sup>41</sup> To help solidify ones understanding it is best to consider an example from business.

Data analytics is used to moderate the consumption and enhance the efficiency of energy in the global market. For that reason, demand for this use of analytics in the energy market sector is expected to increase roughly 10% per year over the next five years.<sup>42</sup> Using descriptive analytics, significant energy related data would be collected for analysis, including smart metering and the monitoring of high maintenance machinery and equipment. The analysis would recognize from historic data that instability in oil prices increases expenditure costs in energyrelated projects and the need for more quality information. Predictive analytics would take those results and compare them with additional data such as the impact of growing renewable sources of energy with the increasing scarcity of fossil fuels. It would use the smart metering data to forecast high energy consumption times and predict increasing demand in countries such as India and Brazil who are investing heavily in the energy sector. Concurrently, prescriptive analytics would help the utility sector optimize the planning of power generation by matching demand with supply, based on identified distribution and transmission constraints, in a way that minimizes cost and helps mitigate the waste of energy.<sup>43</sup>

<sup>&</sup>lt;sup>40</sup> Michigan State University, "4 Types of Data Analytics and How to Apply Them," last accessed 5 May 2020, https://www.michiganstateuniversityonline.com/resources/business-analytics/types-of-data-analytics-and-how-to-apply-them/.

<sup>&</sup>lt;sup>41</sup> Ibid.

<sup>&</sup>lt;sup>42</sup> Market Watch, "Global Big Data Analytics in Energy Sector Market 2020-2025," last accessed 2 May 2020, https://www.marketwatch.com/press-release/global-big-data-analytics-in-energy-sector-market-2020-2025segmentation-by-types-regions-key-players-applications-2020-03-12.

<sup>&</sup>lt;sup>43</sup> Ibid.

Data analytics is not without its limitations. Longo and Dobell caution that policy analytics is far more encompassing than simply analyzing the data, countering the notion of positivism or belief that everything can be verified though science.<sup>44</sup> Just like security systems, there are digital blind spots, which if unrecognized, could lead to flawed results. Data acquisition is not guaranteed, and much of it often resides with large private companies who may not want to share their data without reasonable compensation. Even with access, some data may not be interoperable with other forms. Another issue that can arise when analyzing the data, is the effects of correlation and causation. The latter represents a desired cause and effect whereas the former merely demonstrates a relation that holds no future value.<sup>45</sup> Lastly, data analytics is linear in nature, and therefore may not easily align with the complex nature of foreign policy making.

## **PUTTING IT ALL TOGETHER**

Data analytics can help linearize complex problems such as foreign trade policy. Using predictive analytics, the effects of small changes can be forecasted and repeated with slight variations, providing significantly more insight than what is being provided by evidence-based policy making models.<sup>46</sup> Similar analysis could also be done on a larger scale if appropriate policy objectives have already been agreed on, thus removing the political aspect from the equation, such as in existing trade agreements. In these cases, machine learning tools can collect and analyze data to study the effects of typical market and economic fluctuations. This would greatly assist during times of crisis such as a stock market crash, major disruptions to trade, and even boycotts. In time, the ability to better forecast issues as they are arise and predict potential

<sup>&</sup>lt;sup>44</sup> Longo and Dobell, "The Limits of Policy Analytics...," 6.

<sup>&</sup>lt;sup>45</sup> Ibid, 11.

<sup>&</sup>lt;sup>46</sup> De Marchi, Lucertini, and Tsoukiàs, "From evidence-based policy...," 17.

outcomes will provide necessary insight to take swift and informed political action.<sup>47</sup> It would have been interesting to test this idea during the recent COVID-19 crisis.

The key irony when using data analytics to solve foreign trade policy is that the politics behind the policy making should initially be removed. Specific policies can still be simulated, and the subsequent results of the data analysis would then feed back into the policy analytics to enable decision making. If we look at figure 3, it depicts a series of areas where data analytics could potentially be used by government. There are many varying opinions regarding the usefulness of data analytics and while the authors of the diagram have proposed possible areas of use, they remain wary of the limitations of data to shape policy analytics. They offer that only local scale with low uncertainty (lower left) items should even be considered for political analytics at this time. However, they acknowledge its use during high uncertainty and global scale events (top right), as mentioned in the previous paragraph, when there is agreement on the "appropriate policy objectives and instruments."<sup>48</sup>

<sup>&</sup>lt;sup>47</sup> Longo and Dobell, "The Limits of Policy Analytics...," 11.
<sup>48</sup> Ibid.



Figure 3. The applicability of policy analytics across scale and complexity.

Source: Longo and Dobell, The Limits of Policy Analytics, 12.

It is probably worth discussion here the logic behind separating policy decision making from data analytics, which is the opposite of what seems logic to do. Caution should be taken when attempting to apply data analytics to all situations. By its name, data implies a quantitative nature based on facts and figures. While there are many applications for this in foreign policy and other areas, data analytics does not incorporate qualitative analysis and the subtleness that comes with policy decision making. This is why many suggest is better suited for fields like science and health care and less so for areas like human rights. With the growth of AI this may change in the not too distant future. However, for now data analytics cannot determine if providing humanitarian aid to a destabilized country in Africa is more important than improving living conditions within Indigenous communities in Northern Ontario. What it can determine is where surplus resources may be forecasted that could enable you to solve one or both problems while potentially even assisting a regional industry in the process.

Predictive analytics provide qualitative statements about direction of predicted change, allowing for better insight into deciding which policy action to take. This is what is missing in government and certainly within the GC Data Strategy Roadmap. The benefits to successful forecasting can take a good foreign policy and make it a great one. Before the new US president was even sworn in, the GC had begun looking into NAFTA. Part of this analysis involved examining the implications of resorting back to previous Canada United State Free Trade Agreement (CUSFTA), which would have come back into effect by default in the event it was decided to terminate NAFTA.<sup>49</sup> Predictive analytics could have allowed detailed simulations to be run based on previous data that existed under both agreements to analyze the effects on different sectors within Canada and potential implications to the US. As Longo and Dobell pointed out, forecasting can be "good in uncertain environments where unlikely events may still yield catastrophic outcomes."<sup>50</sup> This arguably would have better informed the GC on a fuller spectrum of outcomes and potentially given them other key areas to pursue.

To really understand predictive and prescriptive analytics, it is important to understand the nuts and bolts of how they work. Predictive analysis relies on hard data, which is essentially

<sup>&</sup>lt;sup>49</sup> CBC, "Canada's NAFTA fears began before Trump became president," last accessed 6 May 2020, https://www.cbc.ca/news/politics/canada-us-trump-nafta-trade-cusma-1.5022592

<sup>&</sup>lt;sup>50</sup> Longo and Dobell, "The Limits of Policy Analytics...," 10-11.

free of interpretation, emotion and language. Using various form of quantitative analysis such as machine learning and regression models, surprisingly small amounts of hard data can be used to predict large outcomes.<sup>51</sup> The hypothetical possibilities seem endless: impacts on local businesses run by foreigners due to increased tariffs on their main imports, effects on farming exports to the US should subsidies to Quebec dairy farmers be increased, or change in the number of imported foreign made automobiles sold in key automotive election ridings in Ontario due to a 5% change in the value of the Canadian dollar compared to the Mexican peso. The more data that is provided the more accurate the outcomes will be and the better the chance of identifying unforeseen events. Businesses are already doing this internally so it could be as simple as applying similar models to an entire sector vice an individual company.

Prescriptive analytics further build on predictive models to make recommendations to the identified outcomes. It learns through a specialize feedback loop using AI, machine learning, and neural network algorithms to analyze the relationships between actions and events to determine optimal solutions.<sup>52</sup> Unfortunately, few foreign policy decisions have a quick enough feedback loop from the time a change is introduced until a change is manifested.<sup>53</sup> Like predictive analytics, it is also not responsive to the qualitative analysis that comes with policy decision making. For these two reasons, it is unlikely that this method would be worth pursuing within the context of foreign trade policy in the foreseeable future.

Unfortunately, analytical tools to support these methods are not readily available, nor can they quickly be built by anyone with a software engineering degree. The complex math and

<sup>&</sup>lt;sup>51</sup> Michigan State University, "4 Types of Data Analytics and How to Apply Them," last accessed 5 May 2020, https://www.michiganstateuniversityonline.com/resources/business-analytics/types-of-data-analytics-and-how-to-apply-them/.

<sup>&</sup>lt;sup>52</sup> Ibid.

<sup>&</sup>lt;sup>53</sup> Longo and Dobell, "The Limits of Policy Analytics...," 11.

analysis involved requires the expertise of data scientists, machine learning experts, and data analytics specialists. If we assume that the increased demand for these specialists, as observed in the energy market, is similar across all industries, then it is highly unlikely the GC will be able to recruit sufficient numbers anytime soon. That being said, there are always opportunities to partner with business and academia to either contract services out or help ensure that this highly specialized field is established effectively and efficiently in the interest of its people.

Risk is one of the biggest considerations when transitioning to a data centric culture. There are common risks such as time, cost, and people that need to be considered. Some cost can be offset by seeking partnerships with other governments, academics, and business provided the information, and in this case data sharing, is mutually beneficial. Time and people savings could come from offsets through the use of industry to assist in various areas including access to, combining, analyzing and collaboration of data between departments.<sup>54</sup> There are several other risks worthy of exploration as well.

Another key risk is privacy. The GC has pledged to be open and transparent but there are risks to any data that can be shared. The Data Strategy Roadmap outlined GC efforts in this area which would equally apply to foreign policy. However, there are regulatory and legislative considerations as any agreements at a minimum would require consensus between departments at the federal level and in concert with provincial and territorial governments. There is also the consideration of data aggregation as well as the risks of storing data on partners and allies. Fortunately most of these regulations already exist, however they will still need to be considered as indicated in the roadmaps "open by default, privacy by design" strategy.<sup>55</sup>

<sup>&</sup>lt;sup>54</sup> Sarah Giest, "Big data for policymaking..." 373.

<sup>&</sup>lt;sup>55</sup> Government of Canada, "...A Data Strategy Roadmap..."

One of the major limitations of data analytics, specific to foreign policy and trade, is that it is essentially impossible to predict the outcomes of any policy. Policy decision making is advanced beyond the capabilities of current analytics tools. There are too many individual and system variables to consider, which could generate an exponential number of outcomes. While more data and accuracy will eventually improve its understanding and basis for policy, it is important to remember that the volume of data alone does not equate to completeness.<sup>56</sup> Thus policy making at its core will remain outside of data analytics which risks the analysis being outright dismissed or ignored.

To properly examine foreign trade, access to data from a variety of sources including industry is required. It is necessary to ensure both the accuracy and completeness of any data. This will necessitate trust relationships with business, multinational organizations and interdepartmentally within the GC. Businesses will have to be incentivized to provide access to their data and the GC will have to ensure the security of its own. Another risk is the accuracy of the data, especially from international sources where you may not have the ability to verify its accuracy or completeness.<sup>57</sup> There is the risk of analyzing incomplete data which could lead to making decisions that are worse than not using the data in the first place.<sup>58</sup> Similar to conducting a survey, if you ask the wrong questions, you will get the wrong answers.

Under the current system, new governments typically take between 12 and 18 months to release a white paper or foreign policy review if they chose to do so at all. The use of data analytics is inherently nonpartisan and could potentially speed up the process by having

<sup>&</sup>lt;sup>56</sup> Longo and Dobell, "The Limits of Policy Analytics...," 10-11.

<sup>&</sup>lt;sup>57</sup> Hannah Durrant, Julie Barnett, and Emily Suzanne Rempel, "Realising the Benefits of Integrated Data for Local Policymaking: Rhetoric versus Reality," *Politics and Governance*, 6, no. 4 (2018): 18.

<sup>&</sup>lt;sup>58</sup> Sarah Giest and Reuben Ng, "Big Data Applications in Governance and Policy," *Politics and Governance*, 6, no. 4 (2018): 3.

predesigned analytical tools ready to be utilized on day one. Another option is to place these tools at the disposal of special parliamentary committees or royal commissions. Their nonpartisan nature is likely to lend them more credibility as well.<sup>59</sup>

The new GC Data Strategy Roadmap has several challenges to overcome regarding the managing, using, and sharing of data. By its own admission, it is "not set up to treat data as a strategic asset for policy-making, program design or service delivery, or to create value for the public, private, not-for-profit, and research sectors."<sup>60</sup> However it appears willing to create opportunities to invest and develop this novel capability. Its "Be-bold – innovate and take risks" section offers innovative ideas such as crowd-sourcing, consultation with academics, and several pilot projects aimed at using Artificial Intelligence (AI) and new technology solutions to reduce administrative burden and more easily share data.<sup>61</sup> One thing absent throughout is any reference on how it will employ its data strategy towards foreign policy.

One solution is to offer several pilot projects geared towards foreign policy. The introduction of data analytics to feed decision support systems for crisis management would also be helpful in develop the predictive tools required for trend analysis. This should include looking into smaller scale areas where you can then test policy analytics and apply the tools.<sup>62</sup> The GC already participates heavily in Open Government and several other open data sharing sites. Leveraging the use of these sites along with predictive analytics could provide a wealth of information regarding how trade and economics are working both with other nations and at home. There is unfortunately little mentioned regarding partnering with industry other than to collaborate on the latest technology. While the storage of public data on private industry servers

<sup>&</sup>lt;sup>59</sup> Gecelovsky and Kukucha, "Foreign Policy Reviews..." 48-49.

<sup>&</sup>lt;sup>60</sup> Government of Canada, "...A Data Strategy Roadmap..."

<sup>&</sup>lt;sup>61</sup> Ibid.

<sup>&</sup>lt;sup>62</sup> Longo and Dobell, "The Limits of Policy Analytics...," 11.

is unlikely, the possibility of leveraging their analytic tools should be examined. Finally, as alluded to in the roadmap, finding ways to partner with industry such as research projects should be explored to the benefit of all.

#### CONCLUSION

Hopefully by now it clear that it is no longer a question of whether or not data analytics is beneficial to governments, but more one of how beneficial and at what costs. Several areas such as healthcare, education, climate change, and crisis management are well on their way. The complex nature of foreign policy and trade could clearly benefit from data analytics and is well suited to make use of predictive analytics for forecasting and trends analysis.

The best way forward for the GC is to continue to implement its current Data Strategy Roadmap and build on its understanding of data as a strategic asset. It should build a repository of tools around the use of descriptive analytics while also considering the use of pilot projects to explore areas where predictive analytics could be of use. The examples of fraud prevention have already demonstrated potential for this technology to pay itself many times over.

The use of data analytics is an important process, notwithstanding the cost in time, money, and people to set up. The GC will require expertise that it currently does not have. Engagement with industry is highly recommended to help fill this gap. The clear hurdle for the GC perspective will be to maintain transparency throughout while protecting the data, especially if it is of value to its citizens. Businesses have already made leaps and bounds and many governments beginning to catch up; the window to get ahead and be a leader in this field is fading, and along with it the competitive advantage. While data analytics will shape how we analyze our future and predictive analytics may one day be front and center of foreign policy, human judgement will remain a vital point of the decision making process. For now, while data analytics has proven itself more than a niche tool, it has not quite reached the level of game changer...yet.

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