

Predictive and prescriptive governance - improved delivery of government services

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Abstract

Governments all over the world strive hard to ensure a good quality of life to its citizens. Every year, multiple policies and projects are rolled out in the larger interest of their citizens. However, most often, the effectiveness of these projects are seldom tracked or known to the policymakers, nor does one know a priori what works and what does not. This position paper is an attempt in building a framework for predictive and prescriptive governance, aimed at assisting policymakers in making informed and evidence-based decisions by providing them with critical, actionable insights, and in making governance a seamless process. The end beneficiaries of such an exercise in practice will most definitely be the public, as life becomes much easier for them with government services reaching their doorsteps without any explicit efforts from their side, and public amenities being taken care of intelligently

1 Introduction

Governments are responsible for the delivery of a large number of services such as licensing, regulatory services, citizen services and civil works including their maintenance, amounting to large volumes of transactions. At the same time, three major factors invariably govern the working of almost all governments, namely, perpetual scarcity of resources, an ultra-large scale of operations, and unintentional standardization of processes. The massive scale of operations, coupled with scarce resources and lack of evidence (in most cases), make the problem of optimal allocation of resources and creating optimal policies, a challenging task, even for small governments or administrative bodies. The most natural way governments work around this challenge is by standardizing systems and procedures. However, this one-size-fits-all approach, in turn, causes the already bogged down systems to get overloaded due to inefficiencies arising out of standardized rather than custom processes. These challenges make governments the biggest prospective adopters of the artificial intelligence (AI) bandwagon.

AI, with its predictive and prescriptive power, is the way forward for the smooth delivery of services and operations for the governments. Visual tools from the analytics sphere offer great value to decision makers and policymakers alike in analyzing the ground truth and making informed decisions. Predictive services like trouble-free, automated delivery of government services make the life of citizens much more comfortable. Forecasting the demands of the citizens, and infrastructural requirements ahead of time will help with planning projects and associated budgetary overheads. That being said, adoption of AI at the government level brings with it another set of challenges. For the policymakers, one of the key challenges is in staying ahead of the technology curve and in being able to identify new technological disruptions taking shape. For this to happen, governments should encourage innovations. The goal of new public policy should be to allow harnessing the power of AI for social good while keeping it safe and ethically compatible with human values. The AI systems of future being capable of independent decisions - which in areas such as law enforcement or healthcare may interfere with right to life or right to freedom of a human being - should be designed to be compatible with social values, ethics, fairness, equity and the general idea of accountability.

This position paper proposes a framework that will foster evidence-based governance, resulting in equipping the governments with predictive and prescriptive powers. With such a system in place, governments can better allocate resources, be better equipped to incorporate disruptive technologies such as block chains, and significantly improve the citizen experience with governments.

2 PPG Framework

The predictive and prescriptive governance (PPG) framework illustrated in Figure 1 is made of eight components from three groups: data sources, auxiliary systems, and decision support system. These components together enable a data-driven decision support system for the government. We now look into each of these components in detail.

2.1 Data Integration and Exchange

One pressing concern across governments is that various government departments operate in silos, and as a result, the data

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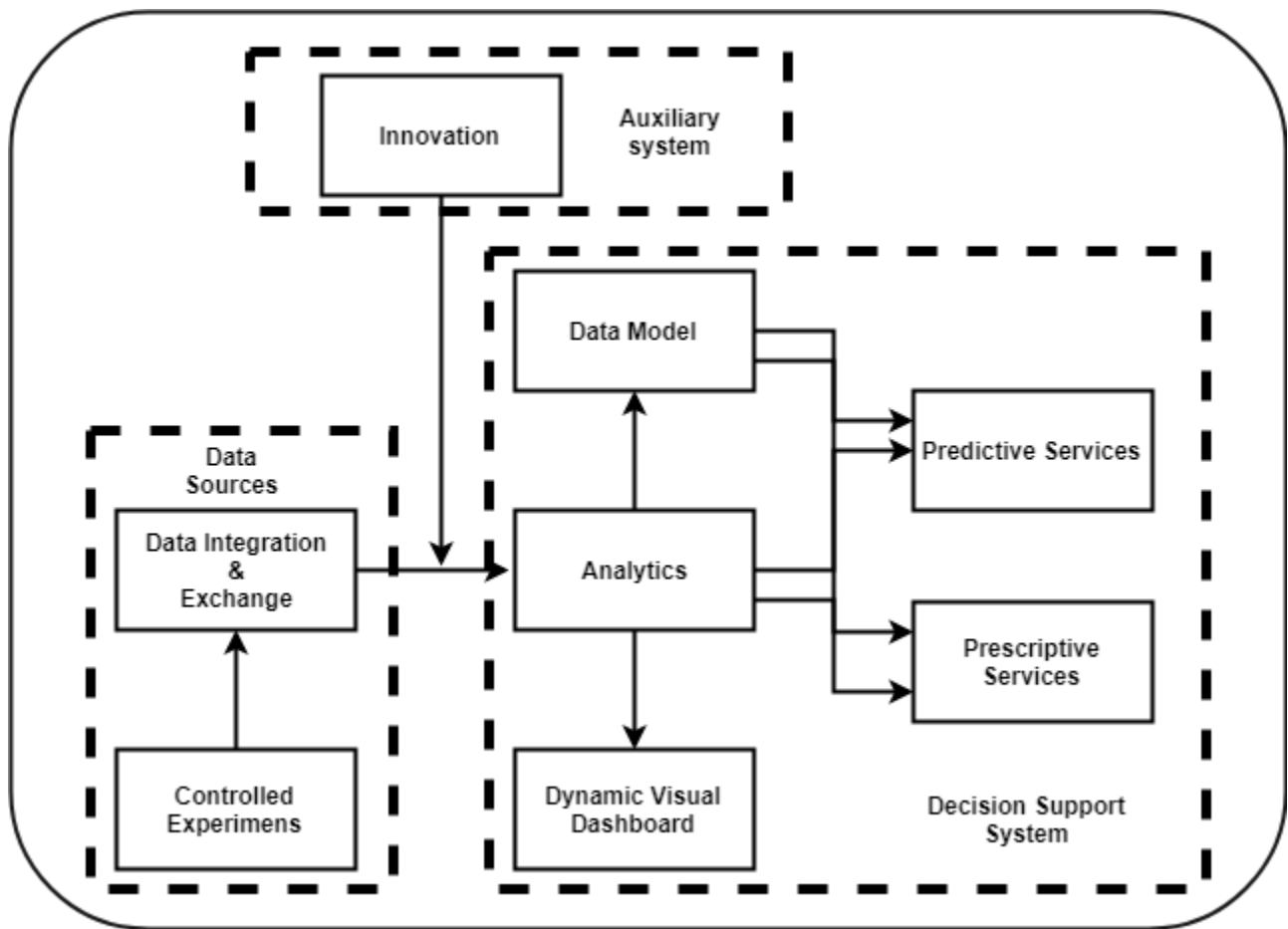


Figure 1: The predictive and prescriptive governance framework - enabling data driven decision system.

that belong to the departments reside within the departments. This inability to have a global picture acts as a significant hindrance in crafting public policies and projects as the policymakers are in the dark when it comes to having a broader view, and are most often driven by narrow insights and anecdotal evidence. A developmental goal that has to be achieved in a specific sector might usually have associated factors that need to be addressed in other areas too. For instance, to lower the percentage of primary school dropouts in developing countries, a lot needs to be done at the household and health segment in addition to improving facilities at schools [Okumu *et al.*, 2008], such as making sure the household finances are set right and children are vaccinated or protected from diseases like malaria [Zuilkowski and Jukes, 2014] and diarrhea. A central data integration and exchange platform will facilitate data exchange between departments of concern thus enabling evidence-driven policymaking, which in turn will result in better outcomes for the citizens. Such an exercise will also make governance more transparent, thus implicitly making the system faster, and putting a curb on corruption.

2.2 Controlled experiments: anecdotal vs. empirical evidence

Government schemes are in most cases targeted at goals that are to be achieved in the future, and the future is vulnerable to all the uncertainties it brings along. If the future had no randomness associated with it, designing a scheme or project would mean selecting that set of factors as building blocks which will deliver the best possible outcome in the future. Unfortunately, more often than not, this is not the case, and that is where adaptive policies play a crucial role [Walker *et al.*, 2001]. Adaptive policies and experimentation equip policymakers with a framework to devise policies that respond to change or randomness in the future. Another flavor of uncertainty is when one does not know what amongst a set of possible interventions or alternatives works in a specific scenario or helps achieve a particular goal. For instance, farmers in the poorer regions of India were shown to follow certain fads or herd mentality when it came to seed selection [Stone *et al.*, 2014]. This trend is attributed to the choice-problem [Presman and Sonin, 1973] faced by farmers on seeing their more affluent counterparts using genetically modified seeds and other technology in farming. This is a perfect example where randomized controlled trials (RCTs) could be

employed to understand which solution works best under a specific set of conditions and which would not [Banerjee and Duflo, 2009]. The Government could employ similar strategies to understand what works and what does not in controlled pilot studies, and then deploy it in a large scale.

2.3 Innovation

Innovation within the government requires serious thoughts [Swyngedouw, 2005; Hartley, 2005]. Governments often shy away from innovation and experimentation at the policy level because there is the exchequer money involved, and the tolerance to error is minimal within the system. To work around this, government agencies should devise ways to generate alternate income sources from service offerings and intellectual property rights. Such agencies can invite young and creative minds to work on problems that matter to the Government, and provide them with a sandbox to test their ideas, assist them financially and mentor them to develop low cost solutions to critical problems. Solutions thus developed could be used by the governments on cost basis, and by other agencies on a revenue sharing basis. Reforms should be devised at the policy level that will foster innovations within the Governments.

2.4 Analytics, Data Model, Dynamic Visual Dashboard: what is happening?

An analytics engine built atop the data integration platform can generate meaningful and actionable insights. These trends in data and insights can be formed into a visual dashboard that will aid the policymakers in making informed decisions. This dashboard should have the capability to accept dynamic queries, rather than a pre-determined set of queries. This is important because the kind of questions that need to be asked of the data changes very rapidly, and a static dashboard offers little help in such situations. Such a dynamic visual panel will enable policymakers to visualize the effects of their interventions, and learn what needs to be done and what can be done to improve the quality of people's lives and governance. A data model built from this will result in predictive and prescriptive services that can be offered to the citizens as well as those that can be used to improve governance

2.5 Predictive services: insights into the future

Predictive services can address a broad range of topics ranging from predictive services to the citizens (right services at the right time, without visiting any office), predicting infrastructure needs of the future, to predictive maintenance of existing infrastructure. It could also give valuable insights into potential distress situations within certain communities, financial distress amongst farmers, and propensity to crime.

2.6 Prescriptive services: evidence based advisory

Prescriptive services will significantly enrich the policy-making process and citizen life. The government can now prescribe what exactly has to be done to achieve desired goals at both policy and individual level using insights gathered from the analytics engine, the data model, and evidence from the controlled experiments

3 Policy Implications - improving citizen satisfaction

Governments, democratic ones in particular, need to transparently administer their welfare schemes for a targeted group of citizens. Much of this transparency is achieved through creating a publically visible database of select individuals [Casalino *et al.*, 2013; Shelby, 2000]. Such databases are created and often publically displayed by almost all departments of the government for their respective schemes. These databases are an extremely rich source of information for the policy makers for improving their design of Public Policy. However, most of these databases remain woefully disjoint and rarely are they put to use in conjunction with each other. Disjoint databases also result in poor user experience for the citizen and it makes government processes tedious and cumbersome, keeping the citizen satisfaction-quotient low [Chan *et al.*, 2010].

The paradigm shift advocated in this paper is one that requires governments to use the power of data and make the citizen interaction a smooth and painless process. As illustrated in Figure 1, governments need to create an underlying Data-Driven Decision Support System (D3S2) by:

1. utilizing the information from available data sources;
2. creating an environment which fosters innovation and applying them to improve service efficacy and efficiency;
3. using latest data analytics to generate insights, and
4. applying data visualization to make sense of the insights.

The D3S2, thus designed, would improve the efficiency of delivery of public service to citizens. It would not only cut down on the time required for delivering a service (using previous interaction lookups, removing duplication of data entry work, etc.) but it would go a step further and would start to deliver what we term as "predictive services". Predictive services are defined as the delivery of government services essential for citizens without requiring an explicit application by the citizen. Predictive service delivery is based on a simple consent of the citizen over short message service (SMS) or any other electronic messaging service (including voice). An example of such an offering is the inclusion of a newborn child's name into the public distribution system (PDS - food safety net for poor families) record of the family - data pertaining to the child's birth and her family data is already available with the government - this should enable easy and automatic inclusion of her name into the PDS smart card without making the parents visit a government office multiple times. Other government services such as issue of community certificates and release of scholarships can be delivered in a 'predictive mode'. Such services naturally extend to other domains, such as predictive maintenance of the road and railway networks and predicting the requirement of infrastructure over the next decade based on existing data and insights derived from it.

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