

# EMERGING PERSPECTIVES OF GOVERNMENT WITH ADVENT OF FRONTIER TECHNOLOGY: INDIAN CONTEXT

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**Abstract:** The technological advancements happening in the twenty-first century are transforming many aspects of human lives. However, one aspect that is still taking considerable time to transform is how people are governed. The pace at which these technologies are developing, disrupting, transforming and converging to create even more complex technologies has left governance structures with problems like policy decay, maintaining trust etc. Governance hence needs to be agile which can be achieved only by incorporating these technologies in the governance structures. Through various case studies, the methods and tools essential for implementing agility through frontier technologies are elaborated. The paper then attempts describing how a data-driven approach can be helpful in achieving agility through various examples around the world. Lastly, the concerns associated and tools to resolve concerns are discussed.

**Keywords:** Agility, Data-Driven Governance, Frontier Technology, Data Analytics, System Thinking, Design Thinking, Policy Labs, Regulatory Sandbox, Center for Excellence

## Introduction

As we usher the Fourth Industrial Revolution<sup>1</sup> (also Industrial Revolution 4.0) and accept unprecedented advances in technology, we find government and its big, bulky structures feeling the pinch. The traditional, comprehensive methods of the government in comparison to the fast, disruptive methods of Industrial Revolution 4.0 are insufficient to govern the citizens. Government, hence, has to match the technology to prevent policy decay<sup>2</sup>, maintain trust and be more accountable, adaptive and inclusive to shape the societal impacts of industry 4.0 efficiently. A little help from these frontier technologies can be taken to navigate changes proactively and become more agile. Till now, these were successfully applied in private organisations, but with the amount of data that every individual generates on a daily basis<sup>3</sup>, the government can anticipate applying the frontier technologies successfully in Governance as

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<sup>1</sup> The term 'Fourth Industrial Revolution' was coined by Klaus Schwab in his book of the same title, and refers to the current and developing environment in which disruptive technologies and trends such as the Internet of Things (IoT), robotics, virtual reality (VR) and artificial intelligence (AI) are changing the way we live and work.

<sup>2</sup> Policy Decay refers to past policies that no can longer fit the changing present and/or future environment

<sup>3</sup> 2.5 quintillion bytes of data created each day at our current pace

Well. It is important to digitise<sup>4</sup> and digitalise<sup>5</sup> governance processes for efficient Governance and this study aims at elaborating how agility can be implemented through to achieve good Governance. The paper starts with Section-1 that elaborates on why governance systems need to be agile. It specifically answers this question in the context of the Industrial Revolution 4.0. The section-2 and section-3, then, describes the methods to realise agility in Governance as an efficient implementation of agility in Governance can happen through these methods and tools along with case studies of successful implementation of these tools. The next section, section- 4 creates an intersection between data and Governance by describing the concept of data- driven Governance in detail and also exemplifies how agility can be brought through data- driven Governance at the local, national and the global level. The study then discusses the concerns in section-5 for agile Governance amidst the technologies encompassing the Industrial Revolution 4.0. The study attempts to solve some of these concerns in section-6 through methods such as the creation of the Center of Excellence.

## Literature Review

The literature pertaining to three broad areas of immediate relevance viz. Governance and existing issues, agility and agile processes and frontier technologies to achieve agility have been reviewed to understand the overall landscape of Governance and agility.

### Governance And Issues With Older Methods

The term governance refers to a formalised set of meetings and practices whose purpose is to ensure that the right decision are made about what deliverables to produce, and how to produce them effectively. Governance is primarily related with mechanisms and responsibilities through which the authority is exercised, decisions are made, and the strategy is coordinated and steered on the organisations, whether they are a country, an enterprise, a specific sector or a project. Governance in this sense is a bit difficult for developing countries like India that are characterised by a large population, digital divide etc. in comparison to countries that have a small population and are highly advanced in technology. This can be attributed to the fact that these countries can function with some degrees of informality, unlike large countries where the rules and regulations are subjected to several constraints. Such constraints<sup>6</sup> slow down the process with which results are delivered. Added to this, the environment affecting the government is also becoming turbulent with Industrial Revolution 4.0. (OECD, 2018)<sup>7</sup> The changes in the environment are not only occurring more quickly, but it's also increasingly unpredictable and disruptive, and governments are not designed to adapt quickly and intelligently. This brings agility into the picture that emphasises adapting to sudden change and focuses on collaboration.

### The concept of agility and agile enablers

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<sup>4</sup> Digitisation is the process of converting analogue to digital. Earlier, data was stored in papers and files; it is now stored in binary codes and databases

<sup>5</sup> Digitalisation refers to interactions, communications, business functions and business models into digital ones

<sup>6</sup> Constraints such as uneven distribution in income, issues of caste and class, availability and reach of services, poverty, outdated infrastructure etc.

<sup>7</sup> OECD. (2018). *Embracing Innovation in Government: Global Trends 2018*. World Government Summit.

Agile processes constitute a style of Governance that emphasises rapid decision-making, based on processes that are developed with minimum effort (cPrime, 2013). As mentioned earlier, public agencies are slow to adapt, and the consequences are different and more dire in their cases such as loss of reputation, credibility and relationships with key stakeholders and public frustration. Here the main challenge faced is to adopt and evolve organically at a rapid pace with changing technology (CIOReview, n.d.)<sup>8</sup>. This can be possible only if the government introduces agile processes into government systems. These processes involve values and principles that incorporate the use of customer experience and design thinking when developing and delivering programs and services (Government Executive, 2017,)<sup>9</sup>. In government, agility means understanding and meeting the needs of citizens in the short term, adopting structures and services to address medium-term trends, and shaping needs in the long term (Nazar & Vahid, 2009)<sup>10</sup>. In practice, an agile government needs to develop its capacity in responding to the public's day to day needs which is short term responsiveness, strategic adaptation to improve public service systems in the long run and focusing on end results to address cross-cutting issues. (Parker & Barlett, 2008)<sup>11</sup>. It can be achieved by employing actors at various levels to develop a comprehensive governance structure that is inclusive in nature. It can have various attributes but people, process, participation, cooperation and collaboration should remain as unchanged elements at its core. In order to build an agile governance some enablers were given by Nazar and Vahid (2009)<sup>12</sup> who gave 7 such agility enablers namely 'virtual enterprise formation tools/metrics', 'physically distributed teams and manufacturing', 'rapid partnership formation tools/metrics', 'concurrent engineering', 'integrated product/production/business information system', 'rapid prototyping tools' and 'electronic commerce'. Further, they have categorised 60 such enablers under four main heads, viz. strategic planning, product design, virtual enterprise, and information technology (as cited in Eleonora Bottani, 2009)

Besides this Boston Consulting Group (2018) gave eight elements for an agile operating model wherein technological enablers is one. This brings the importance of frontier technologies in making agile processes and has been discussed as follows.

### **Frontier technologies to achieve agility**

The frontier technologies have the ability to change the status quo and are characterised by radical novelty, relatively fast growth, coherence, prominent impact, and uncertainty and ambiguity. Today's frontier technologies are Artificial Intelligence, Drones, Internet of Things etc. and offer a multitude of opportunities to re-imagine how our economies could serve better social and environmental needs (Gartner, 2018)<sup>13</sup>. They improve and

enhance

<sup>8</sup> CIOReview. (n.d.). Implementing DevOps in Banks as the First Step to Agility by Mrutyunjay Mahapatra, CIO & Dy Managing Director, SBI

<sup>9</sup> Government Executive. (2017). *How Agility Is Driving Government Transformation*. Retrieved From <https://www.govexec.com/excellence/promising-practices/2017/11/how-agility-driving-government-transformation/142752/>

<sup>10</sup> Nazar, D., & Vahid, P. (2009). Agility evaluation in the public sector. *Chinese Business Review*, 8(10), 19.

<sup>11</sup> Simon Parker & Jamie Barlett. (2008). Toward agile government. State service authority.

<sup>12</sup> Nazar, D., & Vahid, P. (2009). Agility evaluation in the public sector. *Chinese Business Review*, 8(10), 19.

<sup>13</sup> Gartner. (2018, August, 20). Gartner Identifies Five Emerging Technology Trends That Will Blur the Lines Between Human and Machine. Gartner. Retrieved from <https://www.gartner.com/en/newsroom/press-releases/2018-08-20-gartner-identifies-five-emerging-technology-trends-that-will-blur-the-lines-between-human-and-machine>

Productivity in delivering goods and services and have the potential to attain sustainable development. For instance, improved application of frontier technologies to transportation and logistics could reduce carbon emissions by an estimated 4.5 billion tons by 2020. Image recognition has allowed researchers to scan more than 50,000 images of plants to identify crop diseases using smartphones with a success rate of over 99 per cent (UNESCAP, n.d.)<sup>14</sup>. In the Republic of Korea, the smart city of Songdo is built around the Internet of Things to reduce traffic pollution, save energy and water, and create a cleaner environment (Neidhart, C., 2018)<sup>15</sup>. Besides these technologies, agile processes also require enhancement of capabilities collaboratively with business to deliver services at scale and at speed required for a country like India.

Improvising the frontier technology into government processes requires collaboration, coordination and cooperation from all stakeholders. For countries like India increased effective collaboration at different levels – between the development sector, entrepreneurs and innovators, business and industry, researchers, local organisations and target communities – will be critical to success. They also require three steps of inculcating frontier technologies in government processes to achieve agility and ensure positive outcomes. The first step includes enhanced development, testing and diffusion of frontier technologies through recognition and understanding of frontier technology needs and opportunities and building skills and capacity in understanding and using frontier technologies. The governments, as the second step, then have to manage quality and risks by establishing sound performance, quality and risk management principles and standards through regulatory authorities. The third and the final step includes focussing on development outcomes and impacts through managing constraints through networks of influencers by designing and financing new development programmes, services and operations that use frontier technologies (Institute of Development Studies, 2016)<sup>16</sup>.

### **Section-1 Agility: Why Should Governance Be Agile**

As mentioned in the introductory note of this paper, the rate at which technology is developing, transforming, disrupting and converging to make more advanced technology is far greater than the rate of advancement in Governance. The institutions of Governance are struggling with questions that these technologies pose<sup>17</sup> and have to develop norms accordingly to ensure a positive impact. However, the policymaking systems being broad, comprehensive and undertaking benefits of all stakeholders, find it difficult to do so. Also, with the growing amount of capital and expertise of companies, power may shift from government to such non- state actors. This makes agility in governance need for an hour as it can proactively help shape and direct how technologies impact people and communities in an

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<sup>14</sup>United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). (n.d.). *Frontier Technologies for sustainable development in Asia and the Pacific*

<sup>15</sup>Neidhart, C. (2018, January 11). Welcome To Songdo, South Korea: The Smartest Of Smart Cities. Worldcrunch. Retrieved from <https://www.worldcrunch.com/smarter-cities-1/welcome-to-songdo-south-korea-the-smartest-of-smart-cities>

<sup>16</sup> Institute of Development Studies. (2016). *Ten Frontier Technologies for International Development*.

<sup>17</sup> (For example, whether AI has racial biases; gender assumptions such as service robots have female characteristics while industrial robots have more male characteristics; or ethical questions of gene editing on humans)



The adaptable way through a repetitive process (World Economic Forum, 2018)<sup>18</sup>. Taking help from the technologies that encompass the Fourth Industrial Revolution can make life easier as these technologies can become the first step in becoming agile. However, proper implementation of technologies requires tools and methods which have been described in the next two sections and exemplified with case studies of countries around the world.

## Section-2: Methods For Agile Governance

As discussed in previous sections, governance systems have the challenge to match with the pace of technology innovation while remaining inclusive, adaptive and sustainable. Systems and Design Thinking are two methods described by World Economic Forum (2018)<sup>19</sup> to have the capacity in tackling the complexity of governance systems while integrating human-centric views and insights.

The term systems thinking was first coined by Barry Richmond (1993)<sup>20</sup> and to understand systems thinking, it is important to understand what a system is. Merriam-Webster dictionary defines a system as a regularly interacting group of items forming a unified whole (Merriam-Webster's online dictionary, n.d.). A basic principle of a system is that it is something more than a collection of its parts (Meadows, 2008)<sup>21</sup>. Hence, systems thinking is the study of systems as a system itself. Arnold & Wade (2015)<sup>22</sup> defines Systems Thinking as “*A set of synergistic analytical skills used to improve the capability of understanding systems, predicting their behaviours, and devising modifications to produce desired effects.*” This way, Systems thinking can help policymakers determine the complex and dynamic parameters of the ecosystems, its impact (whether intended or unintended) and test key assumptions and hypotheses to foster rapid learning and iteration.

The next method for implementing agility is Design Thinking, which is a solution-based approach to find what the “would-be” users *really* need. Computer scientist and Nobel Prize laureate Herbert A. Simon was the first to mention design as a science or way of thinking in his book, *Sciences of the Artificial* (1969)<sup>23</sup>. More than an approach, it is a process that entails cognitive, strategic and practical aspects by which design concepts (proposals for new products, buildings, machines, etc.) are developed by designers and/or design teams. Design Thinking has been used to tackle ill-defined or unknown problems (wicked problems) as it reframes these problems in “human-centric” ways, allowing designers to focus on what’s most important for users/customers (Interaction Design Foundation, n.d., para 2)<sup>24</sup>. Design thinking consists of processes such as context analysis, problem framing, ideation and solution generating, creative thinking, sketching and drawing, modelling and prototyping,

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<sup>18</sup> World Economic Forum. (2018). *Agile Governance Reimagining Policy-making in the Fourth Industrial Revolution*.

<sup>19</sup> World Economic Forum. (2018). *Agile Governance Reimagining Policy-making in the Fourth Industrial Revolution*.

<sup>20</sup> Richmond, B. (1993). Systems thinking: critical thinking skills for the 1990s and beyond. *System dynamics review*, 9(2), 113-133.

<sup>21</sup> Meadows, D. H. (2008). *Thinking in Systems: A Primer*. White River Junction, VT: Chelsea Green Publishing

<sup>22</sup> Arnold, R. D., & Wade, J. P. (2015). A definition of systems thinking: a systems approach. *Procedia Computer Science*, 44, 669-678.

<sup>23</sup> Simon, H. A. (1996). *The sciences of the artificial*. MIT press

<sup>24</sup> Interaction Design Foundation. (n.d.). *Design Thinking*.

Testing and evaluating (Niegal, 2011,<sup>25</sup>). Core features of design thinking include (Niegal,1990)<sup>26</sup>:

- Resolve ill-defined or 'wicked' problems
- Adopt solution-focused strategies
- Use abductive/productive reasoning
- Employ non-verbal, graphic/spatial modelling media

Using both system and design thinking makes policymaking more agile as the number of stakeholders consulted to design a particular policy is more. A number of stakeholders are integrated; it helps in identifying the actual problem and saves considerable time and cost by not tackling the assumed problem. It hence creates focussed policymaking taking care of the ones who really need it without creating a one-size-fits-for-all policy. Systems and Design Thinking together have the ability to create a paradigm shift from controlling to implementing policies for rapid and correct feedback. These two processes hence create an iterative process which is efficient, timely and dynamic that is really the determining factor of agility. The opportunity for the citizens to share their concerns and feedback loops to allow policies to be evaluated against the broader ecosystem can make governance system more agile, efficient and trustworthy and hence make citizens contended with it. However, to implement systems thinking and design thinking in an efficient manner, it is necessary that the tools intended for their implementation are properly applied. The following section elaborates on such tools and exemplifies it with numerous case studies around the globe of successful implementation.

### Section-3: Tools For Agile Governance

The efficient implementation of system and design thinking to make Governance more agile requires the use of certain tools. These include:

#### 1. Policy Labs

To assess how a policy will fare once implemented, the governments allot certain areas to the policymakers to experiment with new ways of developing policies called policy labs. These are used to bring new techniques for policy development to government bodies and allow the use of frontier technologies to better design public services (World Economic Forum, 2017)<sup>27</sup>. However, there are certain challenges to policy labs such as governments hesitation to develop actual policies using policy labs poor methodologies for actual policy pilots before passing the testing stage at a smaller scale. Policy labs should have collaborations from multiple stakeholders to develop policies in an agile manner to identify failures quickly and move on quickly.

#### *Case Study for Policy Lab (European Union)*<sup>28</sup>

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<sup>25</sup> Cross, N (2011). *Design thinking: understanding how designers think and work*

<sup>26</sup> Cross, N. (1990). "The Nature and Nurture of Design Ability", *Design Studies*

<sup>27</sup> World Economic Forum. (2018). *Agile Governance, Reimagining Policy Making in the Fourth Industrial Revolution*.

The UK policy lab has introduced a policy lab toolkit, which follows the open policymaking principles, i.e., to be open to new techniques, new experts and new evidence so that better policies can be developed at a faster pace and implemented in an adept manner (Williamson, B. 2015, para 11)<sup>29</sup>. The Govlab Austria is yet another example that works on the principle of developing policies by providing a framework and space to policy makers which is open and transparent to the citizens (GovLabAustria, n.d., para 1)<sup>30</sup>

## **2. Regulatory Sandboxes**

Regulatory Sandboxes allows companies to test new innovative products/ services in a controlled manner and in a safe space without altering their existing regulatory complications (Central Bank of Bahrain, 2017)<sup>31</sup>. Sandboxes allow policymakers to keep track of policies implemented and their consequences, which in turn informs them of the policies that are needed to be developed. A limitation with these is that they are limited to specific industries/ technologies/ time duration to test a product.

### *Case Study for Regulatory Sandboxes (Australia)*

Australia's ASIC allows for testing of specific new products or services without acquiring a license for a period of upto 12 months. It provides relief from certain requirements of the law and comprises of three options:

- relying on existing statutory exemptions
- relying on fintech's certain products/services licensing exemptions
- relying on individual relief for other services

## **3. Use of technology to improve agility**

Using frontier technologies to existing governance structures can allow governments to be more agile, distributed and have transparent processes. This fosters better policies being developed based on up-to-date data, which can provide policymakers with a clearer understanding of the views, behaviour and priorities of their citizens.

### *Case Study of Use of Technology To Improve Agility (India)*

The world's largest biometric programme, Aadhar, captures fingerprints and iris scans, so that benefits of services reach the right people by providing a unique identification number to every citizen of the country thereby reducing risks of frauds from happening (OECD, 2018)<sup>32</sup>

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<sup>28</sup> World Economic Forum. (2018). *Agile Governance Reimagining Policy-making in the Fourth Industrial Revolution*

<sup>29</sup> Ben Williamson. (2015). *Testing Government: Policy Labs and Political Experimentation*. Retrieved from: <https://codeactsineducation.wordpress.com/2015/03/30/testing-government/>

<sup>30</sup> GovLabAustria. (n.d.). *About Us*. Retrieved from: <http://www.govlabaustria.gv.at/ueber-uns/>

<sup>31</sup> Central Bank of Bahrain. (2017). *Regulatory Sandbox Framework*. Bahrain. Retrieved from <https://www.cbb.gov.bh/assets/Regulatory%20Sandbox/Regulatory%20Sandbox%20Framework-Amended28Aug2017.pdf>

<sup>32</sup> OECD. (2018). *Embracing Innovation in Government: Global Trends 2018*. Retrieved from: <http://www.oecd.org/gov/innovative-government/embracing-innovation-in-government-2018.pdf>

#### **4. Crowdsourced Policy- Making**

Policies are made with the public's opinions as to how the existing policies are made better, allowing governments to be more agile, accountable, inclusive and transparent.

*Case Study of Crowdsourced Policy-Making (Iceland)*

The Iceland government made use of crowdsourcing in 2010 and 2011 in the constitution reform process. The citizen's ideas, knowledge and expertise were crowdsourced for reform, it also helped the government gain citizen's trust back after a heavy financial crisis that led the country into recession while deteriorating their trust in the government (Aitamurto, T., 2012)<sup>33</sup>

#### **5. Promoting Collaborations Between Innovators And Regulators**

Forming a collaboration between innovators and governments can allow them to use new technologies in a shorter time span by reducing the time taken to alter existing policy structures that may hinder the same from happening.

*Case Study of Promoting Collaborations with innovators and regulators*

The Innovators Deal by the European Commission is an example of a close collaboration whereby the innovations can be made use of soon after they are made thereby avoiding technology from getting outdated which may happen due to delay in conception of idea to bringing the innovation to the market, specifically in the context of governance services, these kinds of collaborations can prove to be efficient in delivering services to the citizens.

#### **6. Public- Private Data Sharing**

Exchange of data between private firms and governments can allow for collaborations that can be beneficial for both the parties, whereby stakeholders from different sectors can come together and provide each other with better real-time data.

*Case Study of Public Private Data Sharing (USA)*

The Waze connected citizens programme (USA) has been made to do the same, where Data is exchanged from private firms to citizens to provide a better traffic monitoring system thereby leading to lesser congested and better-managed roads (Waze, n.d.)<sup>34</sup>

Similarly Uber partnered with New York city, allowing its drivers to run in exchange for real-time geo-localised data on their journeys (The hidden side of innovation, 2017)<sup>35</sup>

With a comprehensive study on agility and use of frontier technologies to make governance processes agile, it is important to look around how governments all around the world have used technologies to make the lives of people simple. The following section shows how data.

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<sup>33</sup> Aitamurto, T. (2012). Crowdsourcing for Democracy: A New Era in Policy Making. *Publication for the committee of the future, Parliament of Finland*. 1-48.

<sup>34</sup> Waze. (n.d.). *Connected Citizen's Program*. Retrieved from <https://www.waze.com/lv/ccp>

<sup>35</sup> Le Lab. (2017). Public Private Partnerships in the age of Data. *The Hidden Side of Data*. 1-18



analytics (one of the frontier technology) has been used at various levels of Governance, making it a driver for change.

#### Section-4: Making Governance Agile Through Data: Data-Driven Governance

Governance has been defined as the process of decision-making and the process by which decisions are implemented and includes formal/informal institutions empowered to enforce compliance and ensure collective action (Commission on Global Governance, 1995)<sup>36</sup>. Governance, hence, is not static but a continuous process of adapting to new opportunities. In the literature, scholars like Pierre and Peters (2000)<sup>37</sup> have identified Governance to be occurring at three levels, namely local, national and global level. Following is a brief description of the three levels:

1. Local Level governance- The local level may be understood as the lowest level of the country's political subdivision. UNDP (n.d.)<sup>38</sup> defines local Governance as "the channel closest to the citizens for accessing basic services, for participating in the public decisions that affect their lives, and for exercising their rights and obligations".
2. National Level governance- The Governance here covers the whole area of a nation state. The World Bank report (1992)<sup>39</sup> of *Governance and Development* defines national Governance as "the manner in which power is exercised in the management of the country's economic and social resources for development.
3. Global Level governance- It is defined as "the attempt to accommodate the conflicting interests, through processes of collective action, in a range of areas operating beyond nation-state borders" (Higgott,2005)<sup>40</sup>.

The pyramid below exemplifies the various levels of Governance along with the related activities.

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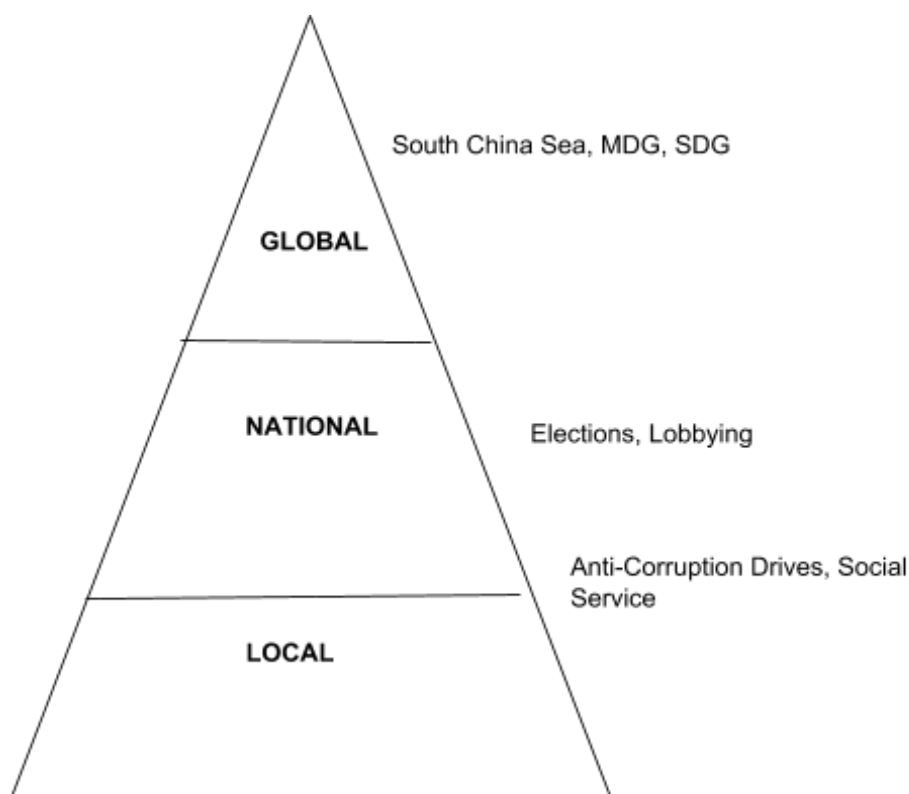
<sup>36</sup> Commission on Global Governance. (1995). *Our Global Neighbourhood*. United States

<sup>37</sup> Pierre, J., & Peters, G. B. (2000). Governance, politics and the state.

<sup>38</sup> United Nations Development Program (n.d.) *Local Governance and Local Development*. Retrieved from <http://www.undp.org/content/undp/en/home/democratic-governance-and-peacebuilding/responsive-and-accountable-institutions/local-governance-and-local-development.html>

<sup>39</sup> World Bank Publication. (1992). *Governance and Development*. Washington D.C

<sup>40</sup> Higgott, R. (2005). 'The Theory and Practice of Global and Regional Governance: Accommodating American Exceptionalism and European Pluralism' Richard Higgott, University of Warwick.



**Figure 1: Pyramid describing levels of Governance**

Source: United Nations Academy of IT Essentials for Government Leaders. (n.d.).The module on Realising Data-Driven Governance

As mentioned in the introductory parts of the paper, we are in the era of digital transformation- an era characterised by the use of data to change the way value fundamentally is created, delivered and achieved. In Governance, this data transformation is called data-driven Governance, which is defined as the intensive and extensive use of data in ways in which societies organise themselves and achieve common goals. In the society driven by data, all critical decisions and actionable information are available when and where needed (Lutes, 2015)<sup>41</sup> and decisions are compelled by data rather than by intuition or personal experience. Similar to the way Governance is exercised at three levels, i.e. local, national and global, data-driven Governance can also be exercised at the same levels as described below.

### **Data Driven Local Governance**

As defined earlier, Governance at the local level is the channel closest to the citizens for accessing basic services, participating in the public decisions that affect the lives of citizens, and for exercising rights and obligations. Extensive use of Data in Local Governance can make the services more targeted and effective, help to distribute scarce resources in an efficient manner, provide insights into the causes and cost-effective solutions to social problems. An example of the way in which data can be used to provide valuable insights and transform

<sup>41</sup> Lutes, T. (2015). Data-Driven Government: Challenges and Path Forward. IBM Analytics White Paper p3

local Governance from simply reacting to proactively anticipating issues can be found from Philadelphia, Pennsylvania, USA.

*Case Study: Eliminating inefficiency at Fire Department with Analytics at Philadelphia, Pennsylvania, USA*<sup>42</sup>

**Aim**

Prevent spending precious man-hours and budget resources of the Philadelphia Fire Department (PFD) from reaching the high- risk buildings

**What was done**

- analytics was used to develop a customised Fire Vulnerability Index (FVI), which scored every household in Philadelphia for fire risk
- The FVI allowed the department to identify quantifiable patterns in resident psychographics (individual lifestyles, life stages, behaviours, attitudes and finances) that correlated with fire incidents

**Result**

- Analytics revealed that nearly 60 per cent of residential fire incidents occurred in two specific household types that accounted for just 26 per cent of the total household mix.
- The fire prevention program then developed one-on-one relationships with those citizens, thereby saving precious man-hours and budget resources.

*Case Study: Increase productivity of the auditors at the finance department, New York, USA*<sup>43</sup>

**Aim**

Increase the productivity of auditors who review companies under the suspicion of underpaying their taxes

**What was done**

- Using sophisticated data analytics, the department to look for patterns—identifying individuals who had businesses similar to others but who stood out as outliers on taxes paid
- Through comparison of reported income and expense data across multiple sources identification of under-reporters as well as non-filers was undertaken

**Result**

- audit cases reduced from 37 per cent to 22 per cent over three years resulting in cost-saving from unnecessarily auditing a company under the suspicion

These case studies from the developed countries show that integrating data analytics for driving local Governance can bring a tremendous positive impact on society. However, the above-mentioned case studies have been from developed nations that already have sophisticated systems in place for data-driven local Governance. However, developing countries like India that are still in the nascent stages can take cues from these examples for a

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<sup>42</sup> International City/Country Management Association. (2015, March 23). *How Local Governments Are Making Data Driven Decisions*. Retrieved from <https://icma.org/articles/article/how-local-governments-are-making-data-driven-decisions>

<sup>43</sup> Data City Smart Solutions. (2014, August 4). *Making Data Matter in Administrative Systems*. Retrieved from <https://datasmart.ash.harvard.edu/news/article/making-data-matter-in-administrative-systems-504>

Transition to data-driven decisions. The aim should be to jump from Nascent (Rich in data but poor in intelligence) to a Datavore (Rich in data and intelligence).

## Data Driven National Governance

Policymaking at the national level entails controlling the manner in which power is exercised in the management of the country's economic and social resources for development. Data in this aspect can be used through Evidence- Based Policy making. Before these developments, economists would make largely a draw conclusions from anecdotal observations and introspection. Evidence Based Policy Making combines deductive logic with statistical analysis to inform policy decision making (Heckman, 2000)<sup>44</sup>. The good evidence-based policy allows the decision-maker to select a suitable program making a correct evaluation of pursuing one course over the other. It also arms the policy makers with the evidence to convince others. Four principles that are distinctive of EBP are as follows

- Rigorous evidence of the cost and benefits
- Impact evaluation for program effectiveness
- Rigorous evidence to improve programs and what works and redirect funds away from consistently ineffective programs
- Encourage innovation and test new approaches

No matter how painstaking Evidence Based Policy Making may sound, with the changing data landscape, evidence-based policy decision making is now feasible, cost effective and has the potential to produce reliable findings. Not only it analyses the positive and negative externalities of the policy, but it also questions habits and existing ways of doing things by enabling policymakers to learn and refine existing programs (The University of Melbourne,n.d.)<sup>45</sup>. How much a data-driven approach can help design efficient policies at the national level, can be appreciated by following case studies.

*Case Study: Using data to set healthcare priorities for Health Benefit Schemes in Chile, South America*<sup>46</sup>

### Aim

Prioritisation of health services for health benefits program (HBP) based on various population characteristics

### What was done

- Chile considered socio-economic and gender inequities in the creation of Health Benefit Plan (Universal Access with Explicit Guarantees) by including variables

<sup>44</sup> Heckman, J. (2000). 'Microdata, Heterogeneity and The Evaluation of Public Policy', Bank of Sweden Nobel Memorial Lecture in Economic Sciences December 8, 2000, Stockholm, Sweden.

<sup>45</sup> The University of Melbourne. (n.d.).Evidence-Based Policy: Data Needed for Robust Evaluation of Industry Policies (A Report for the Australian Department of Industry, Innovation, Science, Research and Tertiary Education). Melbourne, Australia

<sup>46</sup> United States Agency for International Development. (2015).*Using Evidence To Design Health Benefit Plans For Stronger Health Systems: Lessons From 25 Countries*. (The Health Finance and Governance Project). United States



measured by differences in disease burden across populations, and ranking diseases with higher levels of inequality

## Result

- Analysis of the original 56 conditions included in the HBP indicates that 25 conditions have significant differences in mortality and prevalence across socio-economic groups, with another seven between men and women
- This enabled creating specific HBP for these conditions without having the HBP unnecessarily for other conditions

Despite the increased availability of data and evidence in many countries, the use of information and analysis to inform policy and improve the welfare of populations remains limited. Some reasons pertaining especially to developing countries include the shortage of resources, lack of commitment from political leadership, gaps in technical skills, and an absence of clearly defined strategies and mechanisms to support sharing and use of data and evidence (Results for All,2017)<sup>47</sup>. However, four key conditions that enable the use of data and evidence at the national level given by Results for All (2017)<sup>48</sup> are (1) commitment, (2) allocation of resources, (3) incentives, and (4) a culture that supports learning and improving. For implementing Evidence-Based Policy Making, governments are using a mix of data to promote the use of data and evidence such as big data analytics, performance management systems, citizen engagement platforms, information clearinghouses, and training programs. However, these initiatives are in but the nascent movement to improve the use of data and evidence in policy. Developing countries will have to build more capacity to ensure a dedicated use of data in policymaking at the national level.

## Data Driven Global Governance

As we find data driving Governance at the local and the national level, it is also enhancing global Governance- the international process of consensus forming, which generates guidelines and agreements. It entails the intervention of international organisations such as the United Nations in setting principles and standards to guide collective action around the safe use of big data for development and humanitarian action within a global community and according to common norms (United Nations,n.d.para 6)<sup>49</sup>. The Agenda for Sustainable Development, which includes the Sustainable Development Goals (SDGs) is the most recent global governance effort that underlines the importance of data. SDG underscores the importance of monitoring development results and of data and statistics for sustainable development. In regard to the importance of data, the UN member countries have agreed to be rigorous, evidence-based and informed by high-quality data which is accessible and reliable and disaggregated by income, sex, race, ethnicity, migration status, disability,

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<sup>47</sup> Results for All. (2017). *100+ Government Mechanisms to Advance the Use of Data and Evidence in Policymaking: A Landscape Review*. United States

<sup>48</sup> Results for All. (2017). *100+ Government Mechanisms to Advance the Use of Data and Evidence in Policymaking: A Landscape Review*. United States

<sup>49</sup> United Nations. (n.d.). *Big Data For Sustainable Development*. Retrieved From <http://www.un.org/en/sections/issues-depth/big-data-sustainable-development/index.html>

geographic location etc. (United Nations, 2017,pp3)<sup>50</sup> in accordance with the SDG Target 17.18, i.e. "increase significantly the availability of high quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts." To ensure effective implementation of SDGs Indicators were adopted to monitor progress, inform policy and ensure accountability of all stakeholders and comprised of 232 criteria to indicate progress. The United Nations has developed certain use cases as to how data and its analytics can be useful in the implementation of various SDGs, which is given as follows.

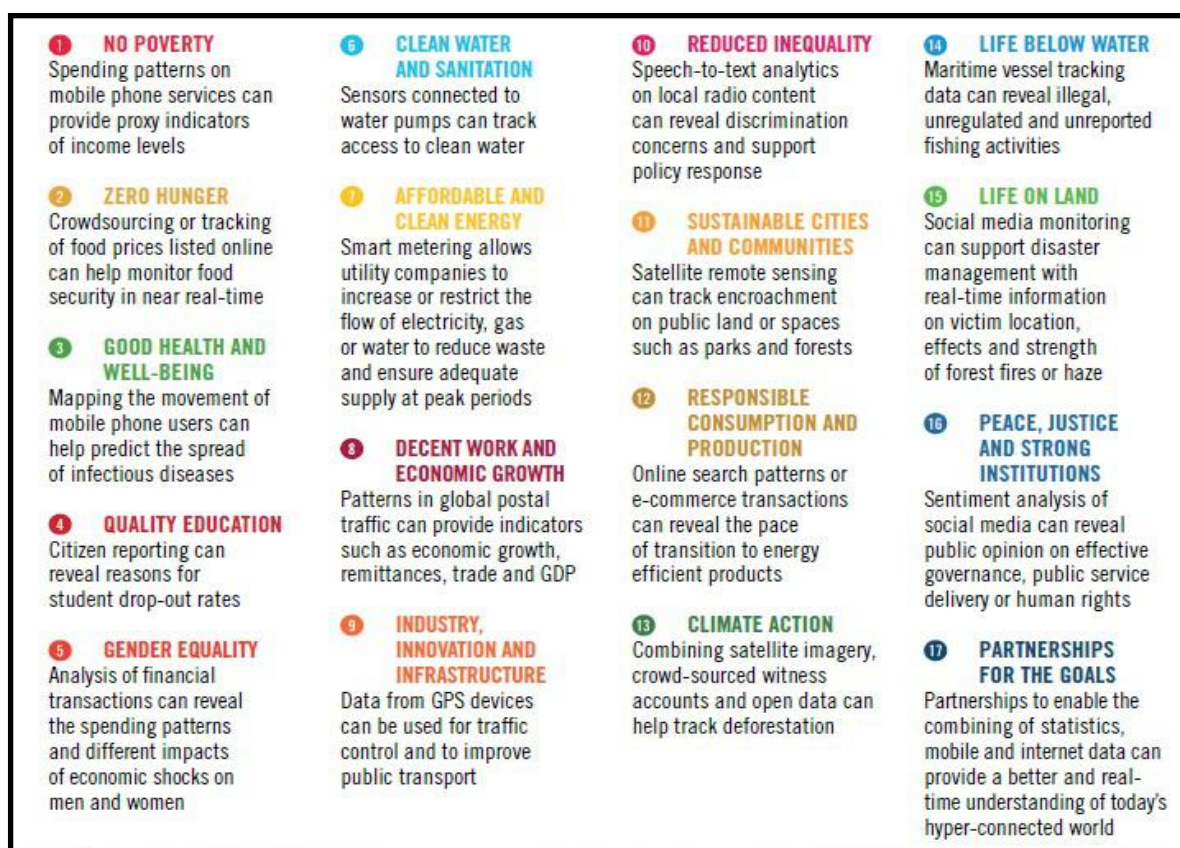


Fig: Use of Data to achieve agility (Source: Retrieved from [http://www.undp.org/content/dam/undp/library/Sustainable%20Development/Guidance\\_Note\\_Data%20for%20SDGs.pdf](http://www.undp.org/content/dam/undp/library/Sustainable%20Development/Guidance_Note_Data%20for%20SDGs.pdf))

Despite the indicators and criteria for effective implementation of SDGs, as of 2017, two-thirds of the indicators have no available data that can be used for the monitoring of the SDGs, almost one-fourth have a methodology but no data and thirty-eight per cent do not have agreed-upon methodology and data (OECD, 2017, p24)<sup>51</sup>. This slow adoption of data can be attributed to technical and political reasons. The technical issues include lack of data

50 United Nations. (2017). *Data for Implementation and Monitoring of the 2030 Agenda for Sustainable Development*.

Retrieved from

[http://www.undp.org/content/dam/undp/library/Sustainable%20Development/Guidance\\_Note\\_Data%20for%20SDGs.pdf](http://www.undp.org/content/dam/undp/library/Sustainable%20Development/Guidance_Note_Data%20for%20SDGs.pdf)

51 Organisation for Economic Co-operation and Development. (2017). *Development Cooperation Report: Data for Development*. <https://read.oecd-ilibrary.org/development/development>

Standards, poor data quality, absence of interoperability framework, poor information governance (GCN,2016)<sup>52</sup>. However, it also suggests that bureaucratic politics is among the biggest obstacle with officials still unwilling to modernise data collection/production and afraid of sharing or releasing data. The new way forward is to implement agile approaches to incorporate technologies of the Industrial Revolution 4.0 in Governance effectively. The following section tells about the two approaches that can help enable agility in Governance.

### Section-5: Anticipated Concerns For Agility Amidst Industrial Revolution 4.0

Clearly, in the last few years, a gradual transition has been taking place weaning traditional forms of Governance to a transparent, efficient and citizen-centric format. This digital change has been supported by applications of these technologies in varied domains. However, technology-led development might hide the realities of the complex governance structures or might go unquestioned, especially in the context of developing countries. Broadly the headwinds to successful e-governance may be broadly categorised as *Technological challenges*, *Human Resource challenges* and *Governance challenges*.

#### Technological Challenges

The specific concerns comprising technological challenges range from e-Waste damages, last mile-connectivity, cybersecurity concerns and ‘digital divide’<sup>53</sup>. Lack of national technology standards causes distorted user-experiences (Satyanarayan and Malhotra, 2018,)<sup>54</sup>. Lack of robust cyber security mechanisms while keeping privacy intact is also a challenge. Fast obsolescence of devices with the use of ever-changing digital technologies is another challenge leading to ‘e-Waste’. According to Global e-Waste Monitor Report (2017) by ITU, around 44.7 million metric tonnes of e-Waste was generated in the year 2016. In developing countries like India, e-Waste is a bigger challenge because of unplanned discarding that makes disposal difficult as well as costly (Dasgupta, Debsarkar, Chatterjee, Gangopadhyay & Chatterjee, 2015)<sup>55</sup>. Unauthorised access to personally sensitive information also poses a challenge, especially in a country like India, with a population of almost 132 crores. In the present context, the implementation of frontier technologies requires a constant and a strong internet connection bringing in the possibility of Internet blackout (Kathuria, Kedia, Varma, Bagchi, & Sekhani, 2018)<sup>56</sup>. Programmers, too, should not end up ‘creating’ AI-driven machines that may start ruling us instead of being our slave. Therefore, a very strong emotional and

<sup>52</sup>GCN.(2016). *What's really needed for the data-driven government*. Retrieved from <https://gcn.com/articles/2016/12/22/data-governance-challenges-solutions.aspx>

<sup>53</sup> Digital divide refers to the inability of the citizens to access digital technologies, primarily due to economic constraints.

According to the International Telecom Union (ITU)ICT Facts and Figures, 20% of households in developed countries and as many as 66% of households in developing countries do not have internet access, leaving almost 4 billion people from developing countries offline.

<sup>54</sup> J. Satyanaraya & Charru Malhotra (2018) “*Universalisation and Replication:-Towards a consistent service experience-*

*The role of a Digital Service Standard (DSS) in Citizen-Centric Governance*”. In ‘Technology for Accelerating Development’, DARPG and NASSCOM Publication, Government of India: New Delhi. URL: <https://community.nasscom.in/docs/DOC-1696>.

<sup>55</sup> Dasgupta, D., Debsarkar, A., Chatterjee, D., Gangopadhyay, A., & Chatterjee, D. (2015). Present E-waste Handling and Disposal Scenario in India: Planning for Future Management

<sup>56</sup> Kathuria, R., Kedia, M., Varma, G., Bagchi, K., & Sekhani, R. (2018). The Anatomy of an Internet Blackout: Measuring the Economic Impact of Internet Shutdowns in India



spiritual IQ must be incorporated in AI programmers to create digital systems, especially in the context of Governance (Malhotra, Kotwal & Dalal, 2018)<sup>57</sup>.

### **Human Resource Challenges**

Human resource challenges are created by lack of exposure, lack of easy availability or/and lack of skills. Further, lack of trust, privacy challenges, and fear of inadequate security in the mind of masses make the uptake of technology either because of unaware citizens, and reluctant employees is another critical aspect that can create hindrance to data-driven Governance. In a diverse country like India digital divide too can be an issue to agility in Governance.

### **Governance Challenges**

Issues of information management and electronic records preservation constitute one part of governance challenges (Palanisamy, 2004)<sup>58</sup>. Sponsor dictates, outdated institutional frameworks, and inefficient partnership models further aggravate Governance challenges. Digital surveillance by establishments and e-hegemony / data autocracy by the developed nations impede the uptake of digital technologies by the developing nations. Lack of robust regulatory mechanisms may further end up creating a national psyche of insecurity against the uptake of digital technologies in Governance.

## **SECTION -6: RESOLVING CONCERNS FOR AGILE GOVERNANCE**

It is no surprise that we live in an era that is awashed with data that finds application in a multitude of technologies encompassing the Fourth Industrial Revolution. This is affecting us irrespective of culture, geographic or economic differences and is changing the way we live, work and interact. Governance structures have a huge onus to responsibly shape the impacts of these technologies through collective and collaborative action, responsible and responsive leadership. More than that, it is important first to accept that we are amidst the Fourth Industrial Revolution that will be affecting our lives in some form or the other in coming times. Agile Governance is a tool to help citizens, companies and policymakers join hands and build a new public governance model through adaptive, human-centred, inclusive and sustainable ideas. A collaboration with startups who are innovators and are involved in early-stage innovation can help policymakers move closer towards agile Governance.

Through a centre for excellence<sup>59</sup> for the Fourth Industrial Revolution's Agile Governance, co-designing and piloting of new projects for societal benefits can be undertaken. Such a policymaking endeavour will involve a multi-stakeholder approach to make sure that it integrates and build on research done by leading academics and practitioners, on the conceptual approaches and principles for agile Governance. The Center will also explore the roadblocks to agile Governance and the relevant metrics to aid decision-making processes. It

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57 Charru Malhotra., Kotwal, V., & Dalal, S. (2018). Ethical Framework for Machine Learning, Submitted for publication

58 Palanisamy, R. (2004). Issues and Challenges in e-Governance Planning. *Electronic Government, an International Journal*, 1(3). DOI: 10.1504/EG.2004.005551

59 World Economic Forum. (2018). *Agile Governance Reimagining Policy-making in the Fourth Industrial Revolution*.



Shall prepare and adapt governance systems to make sure that it follows the pace of change of frontier technologies. The centre shall also provide testing grounds and provide "real-life" environments to understand the consequences of the use of emerging technologies and act as an efficient regulatory sandbox.

### **Conclusive Remarks**

Technologies like Artificial Intelligence, Robots, drones, AR, VR are changing the way we live our lives like never before. These changes are such that it is difficult to remain untouched by them. The need for the hour is to change along with them rather than remaining oblivious to the changes they bring, especially in the area of Governance. The need for the hour becomes agility, i.e. quick and efficient reaction to the changes brought upon by these technologies. The agility in Governance can be brought about by methods of system thinking and design thinking and can be implemented through tools such as policy labs, regulatory sandboxes etc. However, these can be implemented only when there is proper coordination, collaboration and cooperation of governance players, innovators, startups etc. This is required as Close collaboration with innovators and communities involved in early-stage innovation allows policymakers to move closer towards agile Governance. The procedure entails a more public-private collaborative governance, setting ethical standards to ensure consumption and Composition across multiple systems, newer sources of authority to govern new technologies and proper monitoring and control. Such proactive consideration would help the government in successful uptake of data-driven projects.

Summing up, the contemporary governance players have to be agile, receptive to digital technologies, and visionary so that they may serve as 'partners in the growth' and contribute substantially to organic evolution.

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Gartner Identifies Five Emerging Technology Trends That....  
<https://www.gartner.com/en/newsroom/press-releases/2018-08-20-gartner-identifies-five-emerging-technology-trends-that-will-blur-the-lines-between-human-and-machine>