CHAPTER 3

Government Analytics of the Future

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SUMMARY

The investments governments make in measurement today will determine what they know tomorrow. Building an analytics system in government has long-term benefits for our ability to manage scarce public resources and detect unforeseen risks. This chapter provides guidance on what public organizations can do today to become more analytical tomorrow. Government institutions themselves require reshaping: by enhancing structures for planning; by equipping public sector managers with a greater ability to consume and interpret analytics; and by developing new architecture for analytical units. Assisting each public sector organization to develop its own analytics agenda induces cultural change and targets the analytics to the requirements of its specific mission. Rewarding experimentation with novel data sources improves government's capacity to innovate more generally. Each of these changes helps chart a course to the government analytics of the future.

ANALYTICS IN PRACTICE

The guidance that follows aims to facilitate the transition process to build an environment for analytical insights across government:

1. Continuously plan to capitalize on the opportunities afforded by innovations in measurement and analysis of government functioning.
2. Develop units of government analytics at the center of government and within each major organizational unit, and embed them in a community of practice. Centralized units enable economies of scale in both the implementation of analytics and the breadth of comparable data created, as well as network economies from users investing in a common data architecture. Units within organizations can complement central analytics by helping interpret analytics for their organization, and adapting analytics tools to particular organizational needs.

3. Build a public sector management cadre able to undertake and interact with frontier measurement and government analytics. Technological advances in measurement and analysis reinforce the importance of capable public sector managers. A cadre of public managers literate in government analytics is aware of the boundaries and assumptions of government measurement and analysis and adept in using analytical results to complement a broader understanding of public service.
4. Pursue a centralized analytical agenda that harmonizes common variables and conducts joint analysis of them, with specific agencies supporting this "public good." The lack of objective benchmarks in many areas of government work puts a premium on harmonization and benchmarking through common variables across organizations. Similarly, governments should invest in measures that allow international comparisons.
5. Incentivize experimentation and an innovation culture in analytics through institutions that take responsibility for failures. Cultural shifts that reward smart experimentation irrespective of the outcome often come from the explicit support of senior leadership and political actors who endorse the process of innovation—and corresponding success and failure. To reinforce that cultural shift, actors across government—from senior managers through unit supervisors to individual employees—should define analytics agendas for their areas of responsibility.

A GOVERNMENT COMMITMENT TO CONTINUOUSLY SEEK INNOVATION

The choices governments make today on what aspects of their machinery to measure and how to do so will determine what governments know tomorrow. Reviewing the analytical status quo, and planning for its future, should be an integral part of organizational and governmentwide strategies. This chapter provides guidance on how to build a government analytics of the future based on lessons in the chapters of *The Government Analytics Handbook*. Its starting point is recognition that measurement challenges are a defining feature of the public sector.

Outcomes of government intervention in many areas of the economy and society are often hard to observe. Inside government, measurement challenges pervade public management, with managers engaging their staff in tasks that cannot be fully defined in a manual or contract and that can change rapidly in response to a societal or political shock. Management in government is thus anchored in ambiguity and uncertainty, rather than measurement and measurability. This is the environment that public sector managers must make their decisions in every day.

This has always been true. Early governments grappled with measuring the scale of the economy and its taxable component. As governments have scaled up their activities to take on an increasing role in society, they have had to measure an increasingly broad range of activities. As the complexity of society grows, so does the complexity of the organizations government must build to manage its interactions with society, and the corresponding measurement tasks. Conversely, given the centrality of the government budget process, public sector managers have had to collapse much of their measurement and activity back to cash terms that can be put into a centralized budget. Thus, public officials have always faced the tension between the incompleteness of what they know and the practical requirement to make policy decisions.

Take the case of regulation. The performance of public sector regulators will be judged by regulators' capacity to understand and make effective decisions about the sectors that they regulate. As society's economic environment becomes more complex, it naturally yields more complex issues for regulators to comprehend. In response, governments may hire more specialized public sector professionals to undertake required analysis of the complexity—which in turn increases the complexity of the public sector itself. Government must then determine the performance of those professionals, how they should be managed, and what might increase their capacity to undertake their job now and in the future.

Thus, in the future, government will struggle with measurement issues, just as its predecessors have. But there is a qualitative difference: in terms of both its understanding of the world it must govern, and in comprehending its own structures, capabilities, and challenges, the future of government will be far more complex as the world grows more complex.

Fortunately, however, future efforts will also benefit from technical advances in three aspects that facilitate the measurement and management of government, as discussed in chapters 1 and 2. The first is the digitization of many government services, activities, and records. The second is improvements in the analytical technology for understanding government functioning. The third is the increasing redesign of government as an analytical organization. An organization that is not designed for the collection and use of analysis about its functioning will simply not be able to use evidence, however rich. Such a redesign is multifaceted, starting with increased recognition of the need for more and better analytics, continuing through building the mindset and skills of public officials to support an analytical approach, and gaining momentum by setting up institutions that can undertake analytics and embed it in public administration.

In other words, the future of government is characterized by tension. On the one hand, governments can capitalize on the opportunities that innovations in digitization and analytics afford. On the other hand, they face increasing complexity in both society and in the organization of government. Managing the interplay between these two forces will be a central challenge. Government must build its capacity to engage with greater complexity in the world and within its own architecture.

How can this be done? This chapter provides answers. It begins by describing the institutional architecture that has been shown in the cases covered by the *Handbook* to strengthen government analytics. It continues by outlining what an effective agenda might look like to capitalize on the analytics that are available today and what may be available in the future. It concludes with a discussion of how a government's analytical architecture and analytical agenda might prepare for novel data sources that are not yet part of the administration's strategy but could be a useful addition in the future. These transformations require an informed conversation throughout the public service that drives the requisite cultural change. This *Handbook* aims to improve that conversation.

BUILD A GOVERNMENT OF THE FUTURE

A Vision of the Future

Like any forward-planning activity in the public sector, government should continuously plan to capitalize on the opportunities afforded by innovations in measurement and analysis of government functioning. Given the speed at which analytics is evolving, this should be a constant task. Each new innovation in the measurement of government functioning is a new opportunity for improved public sector performance.

The future of government analytics thus begins with an approach by government to continuously support innovation. This should become a strategic goal of politicians in their political agendas; of senior management of the public service in their guidelines for public service action, formulation of appraisals, and circulars to staff; and of middle management in their prioritization of analytical activities and use of corresponding results in their decision-making. Implementing these commitments in planning documents and work plans presents stakeholders with a credible signal of cultural change. These efforts are catalyzed by the formation of coalitions of political and technical officials interested in developing or innovating the analytics agenda. Chapter 26 describes how such coalitions around the Federal Employee Viewpoint Survey have substantively improved the US federal government.

Planning that includes a review of analytical opportunities should capitalize on the best evidence available in public decision-making. For example, in workforce planning, basic analytics would regularly monitor the likely shortfalls in staffing as current employees leave or retire. A higher level of analytics would aim to

predict what new roles might be necessary and which might become redundant. An even higher level would assess trends in the productivity of distinct roles, enabling adjustments to be made for shifting burdens of work. Attaining each of these levels entails strategic choices in bringing empirical evidence to the management of the public service. It also requires resources to be allocated for analytical purposes, and necessitates technical staff to work closely with senior managers to articulate the implications for personnel management. Chapter 10, for instance, zeroes in on how investments in the use of personnel management data have allowed future wage costs to be predicted. The chapter describes a ladder of quality of data, with each higher layer enabling an increase in the depth of analytical insights. The analytics provided a platform for the corresponding governments to head off fiscal shortfalls and avert a major wage bill crisis. But it was the strategic choices key decision-makers made to request the analysis and proactively respond to the results that were the key to success.

Public service cultures often guard against rapid innovation and technological change. To enable cultural change, a multitude of approaches can be taken. For instance, to signal high-level support, senior management can convey a vision of a government managed based on evidence. Senior managers and middle managers can celebrate the implementation of analytical approaches. Publicizing and explaining how government functioning in a specific agency has improved can help shift service norms toward acceptance. Hiring employees trained in data analytics and upskilling existing employees in data analytics can increase the interest in adopting innovations in analytics, and reduce the cost of making those changes. Evidence of how quickly public service culture can accept—and come to expect—novel measurement of administrative functioning can be seen in the rapid adoption of surveys of public servants in many countries in recent years, documented in chapter 18.

Creating or Expanding Management Capabilities

As the task of integrating precision analytics with less measurable aspects of government work becomes more sophisticated, the need will grow for decision-makers capable of interpreting and integrating analytical insights with tacit managerial knowledge. For example, in the case of machine learning (ML), chapter 16 notes that "continuous collaboration between the ML implementation team and policy colleagues who will use its insights ensures that applications are adapted to and stay relevant to public administration's needs."

Ethical considerations are also paramount. For instance, chapter 16 emphasizes the important role public managers must play in assessing the ethics of machine-learning approaches in specific cases. Balancing the need for innovation to collect and analyze more and better data and safeguarding the public good will always be a fundamental aspect of public managers' application and oversight of analytics. This is particularly true when data concern government itself because managers and organizations are the ultimate safeguards of their employees' rights. Yet, as chapter 6 notes, "there is a dearth of discussion and practical guides on the ethics of data collection by government on its own employees." The chapter provides a framework for public sector managers to judge the ethical use of government analytics in particular cases.

Another important foundation is to build what chapter 4 calls a balanced data suite to inform decision-making. As the chapter warns, "an overreliance on quantitative data comes with its own risks, of which public sector managers should be keenly aware." While embracing a role for qualitative data, especially for those aspects that require in-depth, context-specific knowledge, analytics should focus quantitative measures of success on those aspects that are close to the problem. Analytics also needs to protect space for judgment, discretion, and deliberation in those (many) decision-making domains that inherently cannot be quantified. One way to attain a balanced suite is through the use of external assessments, as discussed in part 5, such as anthropological methods (chapter 30). To attain balance in the data suite, public managers need to identify and manage the organizational capacity and power relations that shape data management.

Managers of the public service also need to be able to have an informed discussion about when measurement is of the right nature and accuracy to make a particular claim. For example, chapter 20 shows that public servant surveys frequently do not have a sufficiently large sample to make valid comparisons across organizations about employee attitudes. An informed public official could therefore disregard such comparisons

when there is not a statistical basis to make them. The more profound the understanding of public sector decision-makers as to how measurement should be undertaken and how related analysis should optimally be mapped into decisions, the more useful government analytics will be.

All this implies that along with a commitment to analytical work, building a government of the future requires building a public sector management cadre capable of directing and interacting with frontier measurement and government analytics. This cadre should be aware of the boundaries and assumptions of that measurement and analysis and be capable of using analytical results in the context of their broader tacit understanding of the public service. Such managers should also be continuously aware of what the frontier of good practice looks like in undertaking analytical work. As chapter 5 shows, the range of freely available resources to support achieving this awareness is expanding rapidly.

Managers in individual organizations need to link to a community of practice, where they can combine learning from their own organization—and from their specific set of tasks—with learning from others. Embedding public managers in a community of practice for government analytics across the relevant administration, or across government, bolsters opportunities for learning and motivating officials, rather than leaving them as independent analysts who could be subsumed within the wider institutional environment. The network effects that arise from such a community underlie the rationale for central offices of government analytics. To encourage network effects, for instance, the US federal government holds workshops to build communities and connect with staff (see chapters 9 and 26).

Analytics Architectures

Centralized units of analytics enable economies of scale in both the implementation of analytics and the breadth of comparable data created, as well as facilitating network economies from users investing in a common data architecture. For example, by mainstreaming public servant surveys into an integrated data system, a single entity can brand, market, and implement the survey (chapter 25); the statistical rigor of question design and analysis can be improved (chapters 19 through 23); and all agencies and units can compare their results to similar entities across the service (chapter 24). As more agencies use the survey for personnel management, the cultural norms around acceptability of the usefulness of the survey results shift and favor adoption (chapter 26).

Such benefits might be realized by mainstreaming government analytics into Integrated National Data Systems, typically managed by national statistical agencies. Locating analytics teams in statistical authorities may improve the statistical rigor and country ownership of the corresponding analysis. Such agencies provide a solid foundation for achieving scale and sustainability in the collection of data on public service. They also offer a platform for integrating data on government functioning with broader data on the targets of government action, such as the Sustainable Development Goals.

However, locating analytics teams in national statistical agencies outside of management agencies risks isolating analytics teams from decision-makers. In particular, these teams may not be responsive to the requirements of specific managers. To address that issue, the UK Cabinet Office and the US Office of Personnel Management have created centralized units of government analytics and located them in central management authorities rather than statistical agencies. Centralized delivery approaches have typically housed analytics teams within the heart of government, either in the presidency/prime minister's cabinet office or in a ministry of finance or public administration. The evidence leans toward developing units of government analytics at the center of government and within each major organizational unit, though whether this holds in a given government depends on its institutional context.

There may be ways to share analytical responsibilities across national statistical authorities and implementing agencies, but at this nascent stage in government analytics, few examples of such relationships exist. One example is Colombia's National Statistical Office (DANE), which conducts the country's governmentwide employee survey (chapter 18). Statistical agencies can also use existing data, such as household surveys, to provide insights into the functioning of public administration (see chapters 27 and 28). Chapter 29 provides examples of how some sectors and associated line ministries can use service

delivery assessments as diagnostic tools, particularly when combined with other forms of data on public administration, as discussed in chapter 8.

Having distinct analytics teams spread across a public service carries its own risk: fragmentation in analytical approaches, limiting comparability. Such a risk can be mitigated by building servicewide management information systems (MIS) to harmonize and aggregate measurements across government, and by embedding local analytics teams in governmentwide communities of practice. As the case studies in chapter 9 focusing on human resources management information systems (HRMIS) show, integrating different data sources can enhance analytical impacts. Chapter 9 describes the stages in developing harmonized management information systems focused on public administration, and outlines key decision points and trade-offs involved in building public sector data architectures. It warns against constraints in existing legislative institutional environments impeding experimentation with integrating data sources. Such experimentation enables the costs and benefits of integration to be clearly identified, providing important inputs into any scale-up decision. Introducing legislation to allow for small-scale experimentation in measurement and data integration can generate precise inputs and demonstration effects to inform discussions about how to push forward a government's analytical agenda.

Even within existing legislative and institutional constraints, a range of actions can be taken to strengthen analytical integration. A basic activity is the recording of common metadata for all data and existing integration in a centralized repository. This can promote clear communication across government and facilitate public scrutiny. Another action is to monitor what analytics are being used and by whom (see chapter 7). By taking this step, analysts can turn the lens on themselves, and assess how well the architecture of analytics they have developed is holding up, and whether analytics are being used purposefully rather than abused.

BUILD AN ANALYTICS AGENDA OF THE FUTURE

Develop Analytical Agendas Everywhere

Every institution comes with its own staff, tasks, and culture. Thus, the specific analytical requirements of any unit, organization, or public service will vary over a particular task, space, and time. At the same time, for each activity and employee, the questions of what success looks like and how to measure it remain relevant. As such, an agenda for government analytics can be defined at a very granular "micro" level. Every member of the public service can apply an analytical lens of measurement and analysis to their activities, and as such can define an analytical agenda for themselves.

Yet what success looks like and how it can be measured are not central concerns in many government agencies. A first step in resolving this is for actors across government—from senior managers, through unit supervisors, to individual employees—to articulate their commitment to using government analytics where beneficial in their work and to define associated analytics agendas for their areas of responsibility. To institutionalize this approach, performance appraisals could include a compulsory component on the curation of an analytics agenda for an official's areas of responsibility. Organizations could be required to publish an annual update on their analytical agenda. And government could have a central strategy for adopting or expanding government analytics (chapter 26).

None of the discussions in the *Handbook*, or in this chapter, insist that everything in government that can be measured should be measured. Measurement and analysis are costly, and have opportunity costs. Part of an analytics agenda should be to identify an optimal level of analytical investment. Such a level will be iterative, to be updated by the results from previous rounds of analytical investments.

The investment in analytics has potentially high returns. Chapters 12 and 15 show how administrative case data can be used to identify public agencies or individuals who overpay to procure goods for government or take considerably longer than their peers to complete tasks, for instance. Supporting these agencies

or individuals to harmonize their practices with those closer to the average can yield substantial cost savings. Although not all analytics will yield such a return on investment, searching for and prioritizing those that do is a shrewd financial investment. In this vein, evidence from the private sector suggests that data analytics can drive organizational productivity and profitability.

Although the discussion in the *Handbook* has been framed in terms of central government, much of what is discussed applies to any public administrative environment, including subnational public administrations. Subnational entities face some distinct management challenges, such as the management of jurisdictional boundaries. However, subnational analysis can capitalize on the fact that many subnational entities within a country have comparable units with the same functions that can vary considerably in performance and quality. Coordination of analytical agendas across subnational entities has analogous benefits to the centralized analytical units discussed. Institutions that can help coordinate government analytics across subnational entities as part of a community of practice will capitalize on those benefits.

A strength of anchoring analytics agendas in the public administration is that they have a greater chance of continuing beyond any single government administration. By making an analytics agenda a basic part of the administration of government, it can take a longer-term perspective than political agendas can (see chapter 18). This is important because the credibility of measurement and its use for strengthening public service matters for the quality of that measurement. If public servants do not believe that survey results will be used for action and as a management tool, response rates fade, for instance (chapter 26). By clearly signaling that analytics will only be molded but not undermined by political actors, it is likely to be of higher quality. Analytics can build credibility over time, and with stability gain a degree of familiarity.

Similarly, by embedding analytical agendas in public administration, many political leaders are more likely to accept the preexisting analytical architecture as a foundation for their own efforts to strengthen the administration. This may shift political actors toward evidence-based management of the public service.

Build Comparable Measurement

Many elements of government functioning can be usefully measured across sectors and organizational units. For instance, many features of budget, payroll, human resources management, and process quality have commonalities across all of government (chapters 10 to 13). Thus, centralized analytical agendas should push for the harmonization and joint analysis of these features, and agencies should be open to supporting these public goods. Other measures—such as those related to budget utilization and task completion—are more challenging to compare across tasks, but are central to organizational decision-making in areas such as budget allocations (chapter 17). Thus, making explicit the assumptions of such comparisons, and then refining them, is better than skewing measurement toward the most measurable and comparable areas.

Similarly, individual governments should invest in measures that allow international comparisons, such as internationally standardized modules in public servant surveys. Within suitable comparison groups, such harmonization does not substitute for, but powerfully complements, internal measurement. Concerns regarding comparisons of officialdom across sectors or tasks within a single public service can be balanced against concerns regarding comparisons across countries. Having access to measurement from multiple ministries of health around the world will support a health minister's understanding of their own organization's particular strengths and weaknesses in a way that is complementary to their comparison to ministries of agriculture and education in their own countries (chapter 24). To this end, the Global Survey of Public Servants (Fukuyama et al. 2022) aims to increase the volume, quality, and coherence of survey data on public administration over time (see chapter 18). It presents both harmonized data from existing surveys and a suggested common set of questions to be included in surveys of public servants to aid comparability of data from any specific setting. It also recognizes the boundaries of such comparisons and provides access to data (chapter 24).

Comparisons across and within governments can also be made based on administrative data. When such comparisons are made, a frequent challenge is that different organizations in government complete different tasks. One approach the analyst can take is to focus on homogeneous units that do very similar work, such as procurement units across agencies. This is particularly useful for analysts focusing on a specific sector, such

as those described in chapters 14 and 15. As a more general principle, however, such an approach is liable to skew the analytics of government toward areas that are easier to measure (chapter 4). An analyst will gain a more comprehensive picture by defining a holistic agenda for understanding public administration and defining areas where comparability is useful. This relates back to the capacity for public servants to discriminate between when analytics rests on assumptions that fit their setting and when they do not.

With this in mind, when comparing organizations based on administrative data, the analyst should address three questions: (1) Is such a comparison being made implicitly somewhere in government, such as the ministry of finance (for example, when it compares task completion or budget execution rates across organizations)? (2) Can adjustments be made that will make the comparisons more valid (such as by measuring the complexity of the underlying task)? (3) Are there subgroups of comparators for which comparison is more reasonable? As these questions suggest, taking an analytical lens to the issue of comparability itself sometimes allows unspoken assumptions to be surfaced and discussed. Much comparison occurs in public administration without proper care being taken that the underlying issues surrounding comparability are understood and factored into decision-making based on the comparison.

Use Experimentation Broadly

Faced with uncertainty or ambiguity, how should decision-makers proceed? As tech firms have realized, the optimal choice is to experiment with multiple sensible choices and measure which one works in what environments. For example, according to the company's "rigorous testing" blog, Google "ran over 700,000 experiments that resulted in more than 4,000 improvements to Search" in 2021.[1]

Experimentation in the field of government analytics allows the analyst to trial distinct approaches to measurement of public administration, or the design of government itself, and assess, through proper measurement, the advantages of each. The use of experimentation in the design of public administration is growing in policy circles, and a complementary academic literature is burgeoning in public administration, economics, political science, and beyond. Within this *Handbook*, chapters use experimentation to shed light on methodological questions, such as how the mode of a public servants survey affects responses (chapter 19) and how responses change when questions focus on organizational-level or individual-level referents (chapter 23).

The overlap in work programs across the public sector, and across public sector organizations around the world, presents an opportunity for the repeated testing of successful approaches from other settings, both in measurement and policy. This *Handbook* has illustrated key ideas in government analytics from specific governments. The lessons provide a starting point for undertaking methodological experiments (akin to the A-B testing of large technology firms) in the use of government analytics in a particular setting. In their specific analytics agenda, one question an analyst should aim to answer is: "Does what worked elsewhere work here?" In addition, there is a global benefit to repeated replication of any approach to measurement. Repeated testing of measurement approaches in different settings allows extensions of the findings in this *Handbook* and advances global knowledge toward "stylized facts" about what works where. This will also enhance the quality of conversation on how government functions, grounded in the empirical realities of the service, rather than only perceptions and tacit knowledge.

PREPARE FOR NOVEL DATA SOURCES

Search and Testing

The speed at which analytics is evolving requires a constant perspective on novel data sources. A new way of measuring and assessing government functioning could appear at any time. Thus, governments should set

themselves up to capitalize on novel data sources. This requires an approach to analytics that experiments with new approaches to measurement and analysis without the need for wholesale change. Analytics agendas should include an approach to searching for and testing innovations. Individual analysts can assist the search process by publicizing their experiments, by collaborating with others on testing, and by being open to the insights presented by others in the public and private sectors. Centralized analytics units are perhaps the most common way for an organization to engage with new approaches to government analytics.

Setting up an analytics agenda that has a component of search and testing requires a legislative environment that allows public officials a space for experimentation (chapters 9 and 26). Thus, how a government is built will affect its ability to experiment (chapter 16). Institutions that can take the responsibility for the failures that naturally come from testing innovations increase the incentives to experiment. Complementary cultural shifts that reward smart experimentation irrespective of the outcome often require support from senior leadership and political actors. Political actors who can articulate the case for experimentation to their peers and the public buy senior administrative officials space to improve the quality of government administration.

The Limits of the *Handbook*

There are areas that this *Handbook* has not covered where some governments are starting to make inroads in their analytical efforts. In the area of recruitment, sentiment analysis toward public sector jobs and a wide range of recruitment analytics—for instance, on the diversity of the application pool or the extent of competition for different public sector jobs—can be drawn on by government to improve its quality of personnel. Analysis of communications between government employees, enabled by off-the-shelf solutions from large technology firms, is being experimented with; properly managed and with due care for employee privacy, it promises an understanding of how organizational structure affects team dynamics. Connecting tax records with procurement and customs data can enable an understanding of how government procurement policy affects private businesses and international trade. Machine-learning approaches to images can allow governments to automatically cross-check progress records in infrastructure projects with photos of those infrastructure projects to detect anomalies. And so on.

The *Handbook* has limited the data sources it presents to those of widest use to the largest number of public service organizations. All such entities must deal with payroll and budget, processes, and measures of task completion. Yet this focus on the most standard data sources in government has meant that the *Handbook* has not included some innovative approaches to assessing government functioning.

For example, substantial efforts have been made in geospatial analysis of the impacts of public policy, but there is little evidence that this has been applied to the public administration of the state beyond simple geographic comparisons. Matching personnel with geolocated project data will allow analytics to shed light on whether managers are better or worse at managing projects closer to their homes, or whether there are strong links between characteristics of local labor markets and the quality of recruitment into the public administration in that area. As the world shifts further toward remote work, the utility of tracking exactly where a public official is working and how this affects their productivity may allow for more sophisticated telework policies.

The potential for applying machine learning to text analysis of the vast quantities of documents produced by the public sector is in its infancy (chapter 16). Given that much public service communication is now online, such text analysis and machine learning might be applied to the communications of public officials in real time, and provide automated interventions when there is evidence of a personnel, management, or public policy issue arising.

As governments becomes more capable of integrating their electronic data systems, the capacity to build maps of the networks of government officials and firms will increase, and it will be easier to assess how personnel who move across different tasks (such as from managing procurement to budget) prosper in different environments and with different colleagues. Overall, gaining a greater sense of what the informal coalitions

in public administration are that facilitate strengthening of government may require triangulation between different data sources.

All these examples underscore the point that a comprehensive analytical agenda is forward-looking, capitalizing on what is available today and readying itself for what might be useful tomorrow.

The Continuing Validity of the *Handbook*

A number of the foundational themes highlighted in the *Handbook* will continue to be of relevance to any innovations in the field. These include a robust discussion of the ethical implications of government analytics, the boundaries of measurement, and the rigor of analysis.

In terms of ethical issues, the use of data by governments on their own employees has received very little attention, as chapter 6 notes. Although checks and balances exist in public service, these will not always be well-equipped to deal with the pivot to government analytics. Where governments have begun to undertake government analytics, efforts have often not been complemented by a corresponding discussion of the ethical issues involved. For instance, it is important to have robust, servicewide debates about questions such as the extent to which analytics on public officials' remote work communications be undertaken at the level of anonymized individual email or message exchanges, and the ways in which this influences officials' behavior and the capacity to have wide-ranging and honest discussions about public policy.

It is key that such debates are undertaken both sectorwide and within specific organizations because what is considered as ethical and morally right can be very dependent on context (chapter 6). For example, what obligations of transparency around individual activities come with seniority in public service, and how much should officials be actively involved in this debate as they rise up the ranks? Chapter 6 presents a framework for evaluating the ethics of measuring and tracking public sector workers that will continue to be useful to evaluate the impact of innovations in measurement and analysis.

Similarly, the framework presented in chapter 4 will facilitate discussions around the relationship new measurements have to a holistic investigation of the environment being examined. Every new measurement or piece of analysis should come with a "health warning" regarding the boundaries of what it measures, and what it is likely missing. The principles outlined in chapter 5 serve as benchmarks by which new methods can be assessed for their credibility and transparency. Chapter 7 reminds us to turn the analytical lens on analytics themselves and continuously monitor what and how analytics are being (mis)used. And the principles of holistic measurement illustrated in chapter 14 push us to question the extent to which we have "triangulated" any specific measurement with others as a means of capturing distinct dimensions of a variable.

The insights offered in the *Handbook* can strengthen some innovations in measurement and analytics. Better measures of budget or task completion will still rely on the principles outlined in chapters 11 and 17. Innovations focused on improving data quality, availability, regularity, and connectedness will all need to implement the basics outlined in this *Handbook*. Chapters 10, 11, and 12 explicitly discuss layers of data quality that innovations in local settings will help achieve. Similarly, some innovations will build infrastructures that enable more regular, secure, and timely data collection (chapter 9).

GOVERNMENT ANALYTICS IN AN INCREASINGLY COMPLEX WORLD

As measurement, data, and analysis become the central mediators of decision-making, government must build its capacity to engage with greater complexity in the world and in its own architecture. The question is whether public organizations will reform themselves sufficiently fast so that they can keep up. A solid machinery for government analytics can help empower government organizations to do so.

This chapter lays out the key components of a strategic review process for government actors to think through how they are building a government analytics system that responds not only to today's demands,

but also those of the future. Such thinking is useful at every level of government, from a project manager assessing how they are using administrative diagnostics in their project to the most senior management of the public service thinking through how they might optimally manage service staff.

The lessons presented in this chapter are drawn from across the chapters of the *Handbook*. The *Handbook*'s inability to cover all potential sources of government analytics mirrors the fact that governments will have to prioritize their investments in measurement and analysis. To make those choices strategically, a governmentwide vision of the future, linked to diverse analytical agendas of officials across government, will define the objectives of analytics. Managers who are aware of the trade-offs involved, and supported by specialized offices, will balance investments in basic measurement and the testing of innovations.

As the world gets more complex, the demands on public managers and decision-makers will increase as they manage a more complex government in response. Making the public administration fit-for-purpose will require an informed conversation throughout public service that drives the requisite cultural change. This *Handbook* hopes to inform that conversation. Important public sector conversations regarding reform may occur in a department of local government, a ministry of civil service, or even span countries and the international community. It is therefore important for all government actors to make an informed choice today about how they are setting up a system of analytics that will define what they will know tomorrow.

HOW TO USE THE *HANDBOOK*

The chapters in the *Handbook* aim to be freestanding overviews of a particular topic in government analytics and can be read independently. The book is accompanied by a website with annexes and tools for analytics that enable readers to immediately apply insights from the *Handbook* in their own work (www.worldbank.org/governmentanalytics).

To make the best use of the *Handbook*, readers are encouraged to choose the chapters that provide guidance on the data sources most relevant to the management challenges they are facing. For instance, if fiscal sustainability is the core challenge, consider focusing on chapters related to data sources that can yield solutions, such as chapter 10 on the payroll and chapter 11 on budget data. Table 2A.1 at the end of chapter 2 provides a tool to map areas of interest and data sources to the content of the chapters.

The *Handbook* aims at three main external audiences: government analytics practitioners (in governments, international development organizations, and elsewhere); educators; and researchers.

GOVERNMENT ANALYTICS PRACTITIONERS

The *Handbook* has been designed to make use of the most widespread sources of data on public administration and to address some of the most pressing problems in managing government. As such, our hope is that government analytics practitioners will be able to find inspiration and useful advice in each of the chapters. We also hope that they will see the connections between their immediate interest and other data sources that might enrich the analysis they originally envisaged.

For readers interested in building the analytical capabilities of their organization, this chapter provides a vision of how government might move itself toward being more able to undertake analytics. Chapter 9 describes how to generate an integrated management information system for government. Chapter 26 provides a case study of the US government that presents the complementary management infrastructure that catalyzes any physical data system to become a platform for action.

For readers interested in making the most of their analytics, consider chapter 7 on how to measure whether government analytics are being used and chapter 25 on how to use results from surveys of public servants to strengthen public administration.

For those interested in how different data sources fit together, consider chapter 4 on holistic measurement, and chapter 8, showcasing how analytics can be combined to understand corruption holistically.

Readers looking for practical general statistics tools should go to chapter 5.

For those seeking guidance to think through the underlying ethical considerations of any government analytics effort, turn to chapter 6.

EDUCATORS

Instructors in a school of public administration or public service training center, or in an academic institution, for instance, should pick and choose areas of particular interest and adapt lessons to the time available.

A single session could provide a useful overview of government analytics. Beginning with the motivation for government analytics (chapter 1), the class could then review a summary of approaches available outlined in chapter 2, and then focus on one particular data source of interest to the use (such as how to use procurement analytics).

A potential module on government analytics could proceed as follows. After an introductory session discussing chapters 1 and 2, consider a class summarizing chapters 4 to 6, to give students a sense of foundational considerations in government analytics. Students could be asked to consider the right ways to apply and manage statistical tools, the ethical considerations particular to studying public administration, and ways to measure holistically in public administration. Perhaps, students could design their own analytics study of public administration that has a pre-analysis and ethics plan that accords to the messages in these chapters.

The third session could focus on chapters 18 and 27, to give students a sense of comparative public administration around the world, and how to diagnose them. The discussion of these chapters could act as an introduction to what data sources are available for government analytics.

Chapter 27 introduces methods for using household surveys to understand public administration, which are the foundations of the World Bank's Worldwide Bureaucracy Indicators. Using the indicators in conjunction with the reading in chapter 27 allows students to understand the global footprint of the public administration, and its relationship to the private sector.[2]

Similarly, chapter 18 outlines the surveys of public administrators undertaken on a regular basis around the world. This chapter complements the data provided by the Global Survey of Public Servants initiative so as to provide the most comprehensive window into the public administration available to date based on surveys of public servants (Fukuyama et al. 2022).

For those students interested in undertaking their own surveys of public officials, the methodological lessons in chapters 19 to 25 provide useful inputs to their design process. These methodological considerations could be covered in a further teaching session on how to do surveys of public servants.

In subsequent sessions, instructors could cover different data sources introduced in parts 3 and 5, focused on the data sources of greatest interest to students. For instance, sessions could cover how to use payroll data, procurement data, and citizen survey data. These sessions should make use of publicly available data sources for students to practice analyzing these data sources.[3]

A teaching module could conclude with a discussion of how to build the analytical capability for government analytics (chapter 3), and how to integrate different analytics sources to assess management challenges holistically (chapter 8).

RESEARCHERS

Overall, the *Handbook* discusses how to repurpose or construct a range of data sources that are rarely used by scholars, yet provide a fascinating window into public administration and government productivity. For many of the data sources discussed, the *Handbook* is the first consolidated attempt at discussing appropriate measurement. It is one of the goals of the *Handbook* to encourage researchers to expand and improve on the measurement of data sources for government analytics through their work. These researchers—in the fields of public administration, economics, management, political science, or elsewhere—may be in traditional research centers, or from inside government itself, perhaps in an analytics unit focused on improving their part of the public service.

A key early consideration of any research project is what the ethical framework is in which research questions and designs are produced. Chapter 6 provides a useful lens for a researcher to evaluate the ethical implications of their research approach.

Given the weight placed on the rigor and reproducibility of any data analysis, chapter 5 provides a reminder of the principles of good data analysis, and links to a set of resources to make those good practices straightforward to apply. Similarly, given the importance of understanding the limits of interpretation of any single data source or study, chapter 4 provides important reminders as to the validity of any single empirical study or approach.

Part 3 on administrative data can help researchers gain insights into how to construct a broader range of data to better understand the state. Some data sources have featured centrally in recent scholarly work, such as procurement data (chapter 12).[4] Other data sources explored in the *Handbook*—such as payroll data (chapter 10), task completion data (chapter 17), or process data (chapter 13)—have been seldom studied.[5]

Part 4 on survey data presents a range of methodological work related to investigations by the editors and others into how to undertake public servant surveys. Although, as outlined in chapter 18, surveys play an increasingly important part in managing the public sector in a number of countries, rigorous research on how to navigate the decision points that arise in designing, implementing, and interpreting surveys of public servants is limited. Chapter 2 presents a decision tree (figure 2.4) that might be useful to arrange thoughts on factors to be addressed in the survey approach chosen.

Research on the public service is not contingent on having access to proprietary government data. Though some public institutions are making their administrative data publicly available in one form or another, this is the exception rather than the rule. Part 5 presents four approaches that researchers have undertaken to understand features of the public administration using assessments that can be undertaken "external" to the public administration. Each of these data sources can be analyzed by researchers independent of government partnership.

We hope future research on public administration, whether in the fields of public administration, economics, management, political science, or elsewhere, will further capitalize on the data sources outlined in the *Handbook*. With the intention of the *Handbook* evolving in response to new methodological insights in government analytics, we look forward to reading your work or hearing from you.

NOTES

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1. See https://www.google.com/search/howsearchworks/how-search-works/rigorous-testing/.
2. All of the code associated with chapter 27 is available online. Thus, students can extend the methods presented in the chapter to a country and corresponding household survey of their choice. Such an extension provides an opportunity to work directly with household survey data and learn about what underlies the comparisons made in the indicators, as well as get to study a particular public administration in detail.

3. Payroll data, for instance, are made public by governments such as Brazil (https://portaldatransparencia.gov.br/servidores/orgao?). Similarly, citizen survey data are available on topics such as satisfaction with public services (see, for example, https://www.gu.se/en/quality-government/qog-data/data-downloads/european-quality-of-government-index).
4. See, for example, Bandiera et al. (2020); Dahlström, Fazekas, and Lewis (2021).
5. There are exceptions. See, for example, Rasul, Rogger, and Williams (2021).

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