Actionable Intelligence

Using Integrated Data Systems to Achieve a More Effective, Efficient, and Ethical Government

Edited By

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CHAPTER 1

Introduction to the Actionable Intelligence Model

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In 2013, the Pew Research Center reported that fewer than 30 percent of Americans trust the US government to do the right thing (Pew Research Center for the People and the Press, 2013). Equally troubling, Pew found that more than 70 percent of the people believe that government leaders do not make decisions that represent people's best interests. And this is not a new phenomenon: trust and confidence of the American people in their government has been waning since the Kennedy administration. These statistics prompt us to consider what it is that Americans expect from their government—and what changes are necessary to meet those expectations.

According to Don Kettl, an expert in US public administration, people want a *responsible government*—that is, a government that delivers effective and efficient services to its 316 million citizens and that abides by ethical standards of conduct (Kettl, 2012). They want a government that can account, for example, for the $6 trillion that it spent in 2012 to protect and serve its citizens, including the funds apportioned for education, pensions, health care, defense, and welfare (US Government Spending, 2013). And they want local, state, and federal government agencies to responsibly administer those public services. Meeting these expectations is a complex task, one in which political promises often exceed the capacity of government.

Adding to the complexity of the situation is the increasing diversity in the United States. Racial and ethnic diversity have significantly increased over the last ten years as a result of differential birth rates, whereby nearly one in every two children under the age of two is nonwhite (Reese-Cassal & Spisszak, 2011). According to projections, within the next half century, the United States will become a plurality nation, where the non-Hispanic white population is the

largest group, but no group is in the majority. Estimates also show that the population of those aged 65 and older is expected to more than double between 2012 and 2060, increasing to over 92 million, so that this population will represent more than one in five US residents (US Census Bureau, 2012). Increasing diversity means the government will have to identify and address the distinctive needs and possible vulnerabilities of more subgroups of citizens.

And so the $6 trillion question is this: *How do we establish a more responsible government at all levels to serve an increasingly diverse US population?* In other words, how do we achieve an effective, efficient, and ethical system of public administration across all our bureaucracies—one that can address our complex social problems?

In this chapter, we present a new approach to promoting more effective, efficient, and ethical intergovernmental decision making and problem solving—a system we call *actionable intelligence*. Actionable intelligence (AI) is neither data nor research, although it involves both. It is derived from the combined contributions of executive leaders, practitioners, researchers, and citizens. It requires intergovernmental coordination and collaboration among bureaucracies. It is what is needed to inform disciplined, evidence-based decision making. We developed the AI model to address the major limitations of traditional approaches to American public administration.

Before explaining the AI model in detail, we first describe dysfunctions in public administration. We then describe the core features of the AI model, which are (1) actionable intelligence, (2) a network of bidirectional relationships among key contributors using data across agencies to derive actionable intelligence, and (3) a sustainable integrated data system necessary to provide quality data to generate these evidence-based transactions. Given the pivotal role of integrated data systems in generating actionable intelligence, we conclude this chapter by describing the hierarchy of basic needs that must be met to establish well-developed, sustainable integrated data systems (IDSs).

Major Dysfunctions in American Public Administration

How did we get to this point of low confidence at a time when the challenges of meeting the needs of an increasingly diverse population are reaching new levels of urgency? Major policy analysts have identified outmoded and dysfunctional features of the American public problem-solving process that are not suited to addressing the complexity of our contemporary national problems (Kettl, 2002, 2009, 2012; Lindblom & Cohen, 1979). The following section will consider four major dysfunctions of public problem solving and decision making that thwart effective, efficient, and ethical public services: (1) top-down, one-way, hierarchical leadership; (2) compartmentalized bureaucracies with rigid boundaries;

(3) undisciplined decision making that is purely reactive and politically motivated; and (4) disconnects between "knowing" and "doing" communities.

The First Dysfunction: Top-Down, One-Way, Hierarchical Leadership

The policy process starts with the identification of a national problem and need for services. This comes to the attention of our legislators as a priority and results in a piece of legislation that requires some government policy—in other words, a clear course of action. This policy is then developed into a set of regulations with dictated actions to be taken and with appropriated funds to carry out the actions. Next, executive leadership at the federal, state, or local level is charged and authorized to "do" something about the problem and carry out the mandated actions. They are held fiscally and politically accountable to effect this charge. This sequence of problem > law > appropriation > regulation > charge sets up a hierarchical structure of authority, from the top executive leader who delegates authority to higher and lower levels of management in the hierarchy who oversee the workers (or practitioners) who directly deliver the services as prescribed by the regulations to citizens authorized to receive services.
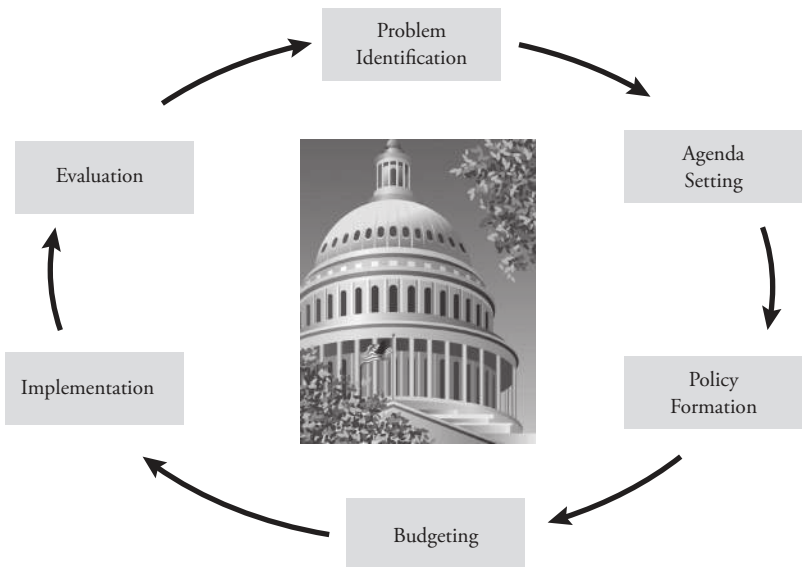

Figure 1.1   Policy process
Center Image Credit: Dynamic Graphics/liquidlibrary/Thinkstock

In a traditional approach to public administration, this chain flows from top to bottom via directives. The dysfunction in this top-down, hierarchical leadership is represented by a *one-way* arrow.

A one-way flow of power, influence, and information down the chain of command is problematic for many reasons. Most importantly, it is based on the false assumption that the executive leader's a priori knowledge and understanding of the problem and of citizens' needs are sufficient to result in effective, efficient, and ethical services. Unfortunately, the executive leader, who authorizes one-way directives to address the problem that groups of citizens are struggling with, is the most distant from people's actual experience of the problem. This one-way, top-down, dysfunctional approach to problem solving does not recognize the value of other sources of information and insights about those being
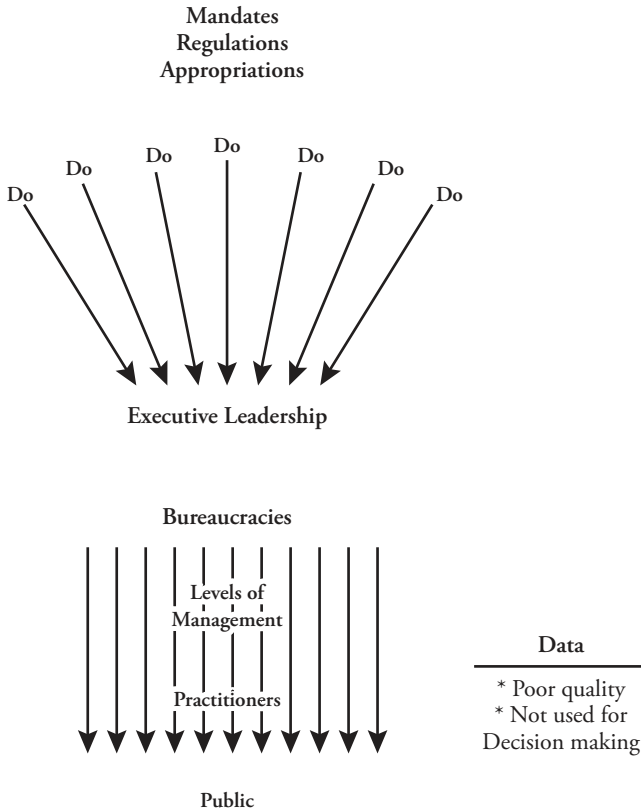

Figure 1.2 Dysfunctional public administration

served, the services they are receiving, or the information flowing up from the clients themselves.

Furthermore, in the context of this one-way, top-down administration, accountability is, in essence, obedience. Those lower down in the hierarchy are expected to carry out the services as prescribed by the top levels of leadership, who are removed from the realities of the clients and of service delivery. If lower-level workers make adjustments or pursue a totally different approach based on intelligence coming from direct experience, they are vulnerable to being identified as "insubordinate" for not doing what they were told to do. This increases the likelihood of what Kettl (2012) called "information pathologies," which occur when there is a distortion or filtering of information from bottom to top and where lower-level workers filter out what is not working or what deviates from the one-way directives and pass along only "good news." Within a single bureaucracy, this filtering increases the likelihood of poor decision making and ineffective services; across bureaucracies, these information pathologies are compounded (discussed in the following sections). Fundamentally, the absence of bottom-up input stifles hope of informing top-down strategies or making changes to the "doing" machinery of government to produce more effective outcomes for the people served. Furthermore, ignorant, insensitive, and presumptive top-down action increases the likelihood of losing thoughtful staff, wasting funds, and perpetuating unethical services.

The Second Dysfunction: Bureaucracies Serving Separate Human Needs with Rigid Boundaries

Bureaucracy is the fundamental organizational structure of American public administration (Amy, 2007). It is a specialized unit of government that is charged by law to carry out a specific set of activities. It is a distinct entity, with its own hierarchical authority and budget to accomplish its charge. As such, bureaucracy is the means by which large governments divide their functions and establish separate authority, appropriations, and accountability to ensure that routine functions are accomplished on behalf of their citizens. The US government has many bureaucracies designed to serve the separate needs of its citizens. For example, we have departments of health, human services, education, housing, agriculture, transportation, commerce, justice, defense, and energy. Each is a bureaucracy with its own subbureaucracies, and they all represent divisions of labor—circumscribed roles and responsibilities—to address various components of human need. Every bureaucracy has its own distinctive boundaries that define the extent of its responsibilities and the justification for its budget.

Bureaucracies are necessary to public administration; they are how government gets things done. But dysfunction arises when threatening problems or

national crises require simultaneously addressing the needs of the whole person, but the boundaries between bureaucracies are too rigid to permit coordination and collaboration (Daniels, Kettl, & Kunreuther, 2006). As we entered the twenty-first century, we have witnessed major failures of American public administration at all levels of government to deal with national crises and growing problems. National crises like 9/11 and Hurricane Katrina, and social problems such as achievement gaps, gun violence, and illegal immigration, have raised serious questions about how our governmental bureaucracies operate in response to national risks. Postmortem analyses of national crises have surfaced the dysfunctions of our traditional operations, as the following quotes illustrate:

> The manifold problems of the Katrina crisis and others of its magnitude "were not due to any one person or organization, but rather were problems of coordination at the interfaces *between* multiple organizations and multiple levels of government." (Bier, 2006, p. 242)

> It is becoming increasingly hard for government to solve problems because the problems themselves confound the boundaries created to solve them. In fact, *it is no longer possible to assign responsibility for any fundamental problem to a single government agency—and no single agency can control or manage any problem that matters.* (Kettl, 2009, p. 34)

Our current bureaucratic model comes out of progressive reforms in the early twentieth century, the goals of which were to have the government step up and provide more services to its citizens (Walker, 1989). This model has been described by Kettl (2009) as the vending-machine model: The government offers an array of services, which are stacked in separate bureaucratic "dispensers." We put our tax dollars in at the top and pull the bureaucratic lever for the service we want (e.g., K-12 education, public housing, or health care). The gears of the government machinery move in some mysterious way, and our one-dimensional service pops out at the bottom of the bureaucracy. This works well for anticipated, routine services, but the model falls apart when the nature of the need involves a simultaneous, coordinated response from multiple "dispensers." In such cases, the proposed solution to the problem becomes the problem itself. Orthogonal bureaucracies with rigid boundaries charged to address separate human functions fail when the crisis or problem affects multiple human functions and requires a rapid response. The failure is the absence of a decisive, *intergovernmental* response to inform critical communications and to direct coordinated action among bureaucracies.

The Third Dysfunction: Undisciplined Decision Making

We imbue our government with the power and authority to act on our behalf, and we expect it to act decisively and effectively—*"to know what it is doing."* It goes without saying that those decisive actions must be preceded by decisions to act. In other words, all government administrative "doing" first requires some type of decision-making process. Kettl rightly concludes that "decision making is the quintessential administrative act" (2012, p. 318). If decision making is the essence of administrative action, then what is essential to decision making? The answer to this question is "knowing" something. Ideally, a *thoughtful* knowing process precedes governmental decision making. Essential to this knowing process is (1) some belief or theory of what decisive actions will lead to beneficial outcomes, (2) information gathered related to that belief, and (3) a process to consider and interpret the relevant information before and after the decision is made and action is taken. Dysfunction results when bureaucracies have *no disciplined process of knowing* that informs decision making—no theory of change, no collecting of information associated with this belief, no process for interpreting the information in light of the theory and the values of the community being served, and no means of evaluating the efficacy of the decision.

Government amplifies this dysfunction by spending billions of dollars collecting and storing mounds of data on citizens' needs, services, and outcomes across its myriad bureaucracies. These data are collected to authorize disbursement of funds to bureaucracies and to meet accountability regulations. These data are more likely used to meet these compliance reporting requirements than for strategic decision making. For all too many government databases, this may actually be a good thing, since the long-term lack of investment in data infrastructures beyond storage and retrieval has resulted in typically poor quality data. In other words, it is not that government leaders do not have data; the problem is they have too much of it, it is not always of high quality, and they do not have a disciplined way to process it cheaply enough and quickly enough for it to inform decision making.

In addition, the Government Performance and Results Act of 1993 (and its newest iteration in 2010) have now, more than ever, required government agencies and officials to focus on strategic performance management through the collection and reporting of data (Office of Management and Budget 1993, 2010). Performance management seeks to make government agencies more accountable for their decisions by requiring evidence of their progress toward ultimate aims. While the mandates requiring proof of government performance seem appropriate toward encouraging the use of data in the decision-making process, government agencies still struggle to utilize data in a disciplined

manner. Agency managers lack the autonomy, discretion, and resources to truly incorporate data into a routine decision-making process (Behn, 2014). Rather, the data collection and reporting requirements become symbolic acts or "technical exercises undertaken out of habit or administrative compliance" (Moynihan, 2008, p. 20). Until data quality can be improved and data can be functionally and realistically incorporated into the decision-making process, government actors will continue to operate under the letter of the law of a performance-management system and not fully actualize the benefits of the data they are mandated to collect.

When there is no disciplined process of *knowing and doing* related to decision making, we are left with reactive or purely political decisions—in other words, government decision making is a function of public opinion, special interest groups, or the popular press putting pressure on leaders to take action. In this context, government leaders do what they perceive will gain support from the public and "spin" the news events rather than paying attention to how such decisions are made and evaluated to best meet the needs of the people (Kettl, 1999). Political action, then, is essentially action based on broad promises believed to be popular or acceptable to those who vote. This leaves us with "functional" politics and *dysfunctional* decision making about service programs.

The Fourth Dysfunction: Disconnects between "Knowing" and "Doing" Communities

Not only are there major disconnects between departments at all levels of government, there are also significant gaps between two major groups of contributors—the university-based research community (the "knowers") and the public-service community (the "doers"). According to Ed Zigler, one of the founders of Head Start, "It is not that we do not know what to do; it's that we do not know how to get people to do it" (personal communication, January 25, 2011). This statement, from a researcher's perspective, calls attention to the gulf that often separates researchers from the other stakeholders in the problem-solving process. The university-based research community laments that it has expended billions of grant dollars to produce a mass of findings and methods, only to see them languish on library shelves, unused by both policy makers and practitioners. Moreover, the disconnect between the large amounts of published research and the relatively low level of its use in public policy and practice calls into question whether the research community's findings are sufficient to promote sustainable change.

As a matter of fact, policy makers and practitioners often refer to *research* as "*the R word*." What makes research "the R word" for these stakeholders is when they experience so much of university-based research as irrelevant to their own understanding of and experience in the settings in which they operate.

Lindblom and Cohen (1979) trace the source of this dysfunction between researchers and other key contributors to the presumptions of authoritativeness and benefit within the social-science community. Researchers, adhering to standards of scientific rigor, often believe that the scientific method is the only valid way of "knowing." They typically believe that their research represents the nearest approximation of "truth" and, as such, should be the sole authority in guiding the decisions and actions of policy makers and practitioners. Furthermore, researchers often believe that adding to the scientific knowledge base is universally beneficial, in and of itself, to all stakeholders. These beliefs, however, exist in stark contrast to the realities in which policy makers, practitioners, and community members operate. Rather than accepting knowledge produced through scientific inquiry as the ultimate authority, these stakeholders typically utilize other more accessible and proximal ways of "knowing" to inform their decisions, such as direct observation, social interactions and shared experiences, or thoughtful conjecture. In addition, many policy makers and practitioners find that research in its decontextualized form is not beneficial toward improving problem solving or enhancing service delivery. The primary focus of these stakeholders is to address and alleviate these pressing public issues; they care less about the cause of advancing the scientific knowledge base or utilizing information gleaned only through the use of the scientific method. Because the research produced is often detached from the practical confines within which these stakeholders operate, it becomes "useless" for those whom it seeks to serve.

To complicate these matters further, departments of the federal government, like Education and Health and Human Services, mandate practitioners to use "evidence-based" or "scientifically based" practices. The Department of Education has even created a What Works Clearinghouse of interventions that have been tested by researchers through randomized control trials, typically considered the "gold standard" in research (2003). The studies housed in this database are most often produced by university-based researchers being funded through federal grants. Important to note, in light of the presumptions of the "knowing" community stated earlier, is that what worked for a researcher is different than what *will* work in the context of the daily realities and complexities of public services. We need a What *Will* Work Clearinghouse to address the disconnects between the "knowers" and the "doers" and to ensure that interventions that are effective within the context of university-based studies are also effective for those who must deal with the delivery of public services.

The knowledge generated by university-based researchers, no matter how scientifically rigorous, may not be ready for use. To be useful to government, research must contribute to establishing effective and efficient services. This means that applied research addressing pressing problems must be responsive to both the scientific and moral domains. As Burbules has stated, "Methods

always must be judged by more than merely their *effectiveness*; [methods] that have no tether to what is *realistic or possible* are merely an intellectual exercise" (2003, p. 185).

A closer examination of the traditional modus operandi of conducting applied research will help us gain a better understanding of the significance of both the scientific and moral domains to serve as the basis for beneficial partnerships among researchers, policy makers, practitioners, and community members. Central to the ethical conduct of research to serve human participants are three fundamental principles: beneficence, respect for autonomy, and justice (Department of Health, Education, and Welfare, 1979). *Beneficence* calls for researchers to seek the best interest of the participant community; *respect for autonomy* mandates responsiveness on the part of researchers to the informed choices of the participants; *justice* prohibits any undue burden or hardship as a result of involvement in the research. Institutional review boards (IRBs) at US universities and other research institutions are required to apply federal guidelines and requirements to ensure that these principles are upheld (Department of Health and Human Services, 2001). The traditional process for advancing a major research agenda requires researchers to provide their IRBs with a priori documentation that their research methods comport with these principles. However, we believe that the traditional application of these principles falls short of the spirit of these ethical standards and impedes forming productive relationships with practitioner and participant communities.

From the outset, IRB approval and grant funds awarded to researchers tend to set up lines of authority and power that are more likely to be unilateral and unidirectional. The process is based on the initial motivation, ideas, investments, and resources that are generated by the researchers. University researchers use their credentials and positions to present their ideas for peer review to obtain grants to conduct the research. Funded grants provide researchers with rights, responsibilities, and resources to conduct *their* research. After funds have been obtained, the researchers seek to secure involvement in their research from public-service agencies and potential individual participants. For the research agenda to proceed, a *single* "consent" interaction is required—a "*Yes*, I will participate in your study." After the researcher has secured consent, he or she goes about implementing the research, collecting data, and analyzing it. This data-collection process customarily involves paying participants for the time that they spend completing the data-collection protocol. The researcher submits required reports on the progress of the research to the grant sponsor and the IRB at the conclusion of the project and typically shares the results with the scholarly community and possibly local agencies serving the community of participants. This process can take up to five years for a typical National Institute of Health R01 research grant.

In this series of steps, a single informed-consent transaction is the primary point of contact that defines the nature of the research-participant relationship in the research process. The problem is that this single transaction might represent a number of false assumptions made by the university researchers and the IRB members, who are generally not working or living in the participant community involved in the research (Fantuzzo, McWayne, & Childs, 2006). For example, it is assumed that (1) the investigator's informed-consent statement reflects a comprehensive understanding of the participants' context and anticipates the full range of participant concerns about the investigator and the investigator's research agenda; (2) the residual yeses represent a sufficient vote of confidence in the research agenda and trust that the research will result in genuine benefits for the participants and practitioners serving the larger community to sanction the research in their agency and community; (3) the individuals who have said yes have no remaining reservations or concerns about their involvement—that is, there are no latent unresolved noes in the yes group; and (4) the release of information is dictated by the researcher's grant timeline and not tied to the needs of the yes or no groups. What is missing from this standard sequence—and is essential to forming a true partnership—is a genuine *dialogue*, an ongoing process of shared "knowing" and "doing" that results in effective services. The initial yes responses are not adequate to produce effective services. The no voices must be heard and accounted for to challenge the limitations of the sole researcher perspective to problem solving. An effective and ethical solution requires respectful and responsive transactions.

On the Path to a Solution: Actionable Intelligence

Actionable intelligence (AI) satisfies our need for both effective and ethical processes to produce information that can shape policy and improve practice. In stark contrast to a unilateral and unidirectional approach to public administration and research that is irrelevant and unresponsive to the voice of community partners, actionable intelligence is the result of a dynamic process that uses quality integrated data within a community to foster essential dialogue among relevant contributors. This approach leads to effective and ethical public services. Here data are not intelligence, but they are necessary to *produce* actionable intelligence. Actionable intelligence is derived from relevant contributors working together to make meaning out of the data produced, formulating a theory of change, and taking action to test this formulation (Fantuzzo, 2013). AI is the product of an evolving Data > Dialogue > Do cycle.

We start with quality *Data* from different public-service agencies representing important components of a person's functioning (e.g., health facts, education facts, and facts about the nature of the person's experiences with intense
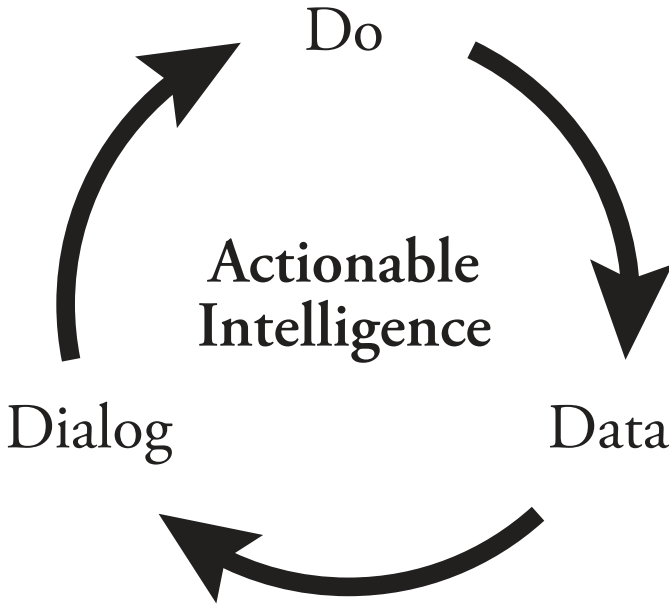
Figure 1.3   Cycle of actionable intelligence

social and familial risks). These data are then integrated to reflect the whole person's experience and relative levels of health and educational and psychological well-being. When integrated, these data can then serve as a common language to facilitate dialogue among partners about citizens' needs and services; communications about the integrated data ground and focus the partnership and keep it person centered (not bureaucracy centered). These data are deemed useful if they lead to productive *Dialogue* and decision making among the key contributors and data-sharing agencies. They can make visible the nature of the problem, the factors influencing it, and the different outcomes associated with the different characteristics of the problem. This dialogue among relevant contributors is useful if it helps partners generate working hypotheses and a theory of change leading to actions (*Do*) that can be taken by one or more agencies to produce improved outcomes for the group targeted for services. Once these actions are taken, the process circles back to the need for more integrated data to evaluate the efficacy of their theory of change and resulting actions, which in turn generates a more focused dialogue and subsequent actions. This is an iterative, evolving process of data-based decision making that produces increasingly more effective and ethical responses to high-priority problems at the local, state, or federal levels.

Essential Dynamic Bidirectional Relationships

The AI process uses quality, integrated data across agencies to generate useful dialogue among essential contributors to address major problems. To gain a better understanding of this process, one needs to identify (1) the key contributors and the nature of their contribution, (2) the inherent dynamic tensions in their relationships, and (3) how integrated data shape productive dialogue among these contributors to produce AI.

Key Contributors

Figure 1.4 depicts the configuration of key relationships in the AI process. This configuration is represented by a diamond, with key contributors—executive leadership, citizens, researchers, and practitioners—at each of its points.

Executive Leadership

At the apex of the diamond is executive leadership, the people charged with the mandate to meet the needs of the citizens they are authorized to serve. Accompanying the legislative charge to address these needs are the appropriations of funds to establish service departments and appoint professional personnel to manage and deliver services.
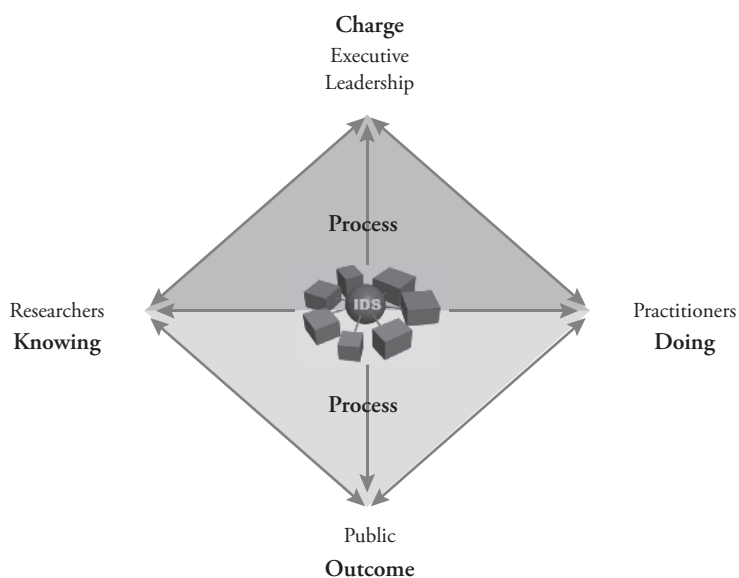

Figure 1.4   Configuration of key contributors to AI

Citizens

The point directly vertical to the executive leadership represents the public—the citizens who are the recipients of the public services and the larger community of citizens and stakeholders. Citizens make important contributions to generating AI. Essentially, when it comes to public services, citizens are not only the recipients of the services; they are the "owners" (governance in a democracy) and "funders" (taxpayers) of the services (Kettl, 2002). They represent the final point of any logical model for effective services—*client outcomes*. They are the major source of data regarding the accessibility of services, assessments of need, engagement in the service delivery process, and the effectiveness of the services to meet their needs. Their input and their outcomes are essential to the AI process. Citizens and other stakeholders who do not currently need services also play an important role as advocates for high-quality service systems in their community and for accountability of executive leaders who are responsible for the efficacy of the public-service systems.

Practitioners

The practitioners—either public agency employees or, more commonly, private contractors—represent one of the horizontal axes of the diamond. They have direct contact with the citizens and therefore have more direct knowledge of the citizens' needs, resources, challenges, perspectives, and cultures. Their primary contribution is that they manage the "Doing" of services in the AI cycle. They carry out all the executive leadership's mandates related to making sure that services are delivered to those who are eligible to receive them. They directly collect all the data from the persons who come to the attention of their department, and they deliver the services that their department is authorized and funded to deliver. This is a complex task that involves making sure that those who are eligible for services in the community have access to them and that the service system engages them so that they can receive appropriate services with respect to what the agency is charged to deliver. Often times, practitioners are aware of client needs that fall outside the jurisdiction of their department and make referrals to other service departments that are beyond their direct control.

Researchers or Data Analysts

Representing the other horizontal axis on the diamond, researchers/data analysts manage the scientific, data-based "knowing" of services. This involves the data or information available about citizens' needs, the departments' services, and the policies that govern the operations of departments. They manage, evaluate, integrate, and analyze data collected by practitioners about the persons served by each department; from these data, they generate findings to address a range of questions regarding the needs of the population for services, the

service delivery process, and the nature and effectiveness of services. An important contribution of researchers is to interpret the findings from their analyses to stimulate dialogue among all the contributors in order to achieve AI. They can operate as an internal member of a department, or they can function as outside researchers who are either working as consultants to an executive leader or practitioner group or conducting their own independent research with the permission of an executive leader or practitioner group.

Each set of relationships in Figure 1.4 is characterized by *two-way arrows*. They represent the bidirectionality of the relationships and how members of the relationship influence each other in a dynamic "give-and-take" manner. The bidirectional nature of these relationships suggests that all participants in the process must be respectful of the perspectives and contexts of others and responsive to those perspectives and contexts in order to avoid dysfunction. Thus the researchers cannot conceive of themselves as the only participant with any authoritative knowledge to contribute and must be responsive to the contextual realities of those administering services, just as the policy maker must be receptive to feedback from practitioners and community members and responsive to their observations and suggestions. *Respectful* and *responsive* relationships must operate in confluence to form a collective understanding of a problem and a unified theory of change to address it, which utilizes the unique contributions of each contributor to the problem-solving process. The knowledge and contextual realities that each contributor brings into the relationship should not be seen as restrictive or detrimental to the bidirectional problem-solving process. Instead, they should be viewed as complementary and necessary pieces of information that better capture the true nature of complex problems. Indeed, a program created without the input of community members regarding their knowledge of how it will function within their unique ecology may prove unusable to that community. Similarly, a research agenda investigating the effectiveness of an expensive intervention that does not consider the financial realities of policy makers and practitioners quickly becomes irrelevant. Bidirectional relationships are the only way to ensure that these processes produce information that is usable and useful for all stakeholders.

Of course, inherent in any dynamic bidirectional relationship are tensions. These tensions result from the differing perspectives and responsibilities of each contributor as they learn to work together and respect each other's distinctive contribution to a genuine collaborative process. Fundamentally, they represent the importance of both a top-down and bottom-up approach to public administration. From a leadership perspective, the recognition and acceptance of these tensions allow for a healthy top-down and bottom-up flow of information, which maximizes the effectiveness of the entire process. In the next section, we

highlight natural tensions in each set of professional interactions (represented in the top half of the diamond in Figure 1.4).

Dynamic Tensions

Executive Leadership–Practitioner Tensions

The primary tension between leaders and the practitioners who serve under them is a function of their different vantage points in the bureaucracy—macro and micro, respectively. Executive leadership has the responsibility of setting priorities and allocating resources on behalf of an entire department or agency, whereas practitioners are responsible for the day-to-day interactions with clients to effect desired outcomes. Each partner approaches the problem from a very different perspective, which challenges the participants to find a common understanding of the problems and goals. To ensure effective leadership, leaders are required to have a big-picture view of their system; they must set priorities as a function of the totality of the department and the pressures exerted on them to respond to the mandates for change. In contrast, to ensure the effective provision of services, the practitioner's viewpoint is on the ground, focused on all the details associated with working directly with clients on a day-to-day basis. The accumulated experiences of practitioners provide them with a unique ability to be closest to understanding the client, whereas the leaders' experiences provide them with the unique perspective of "understanding the system."

The tension between leaders and practitioners is perhaps most evident in the processes of priority setting and resource allocation. While the executive leadership is challenged to allocate resources across multiple departments or initiatives, practitioners focus on their immediate client needs and the resources necessary to meet those needs. Leaders' decisions typically reflect their belief that the relative allocation of resources is sufficient for any particular problem, which is in contrast to practitioners' belief that resources are generally insufficient to get the job done well. Perhaps the most detrimental aspect of this tension is its relationship to client outcomes. Often the big-picture view held by executive leadership does not sufficiently appreciate the complexities of the practitioner-client interactions or represent realistic expectations for services and for outcomes. Unrealistic expectations can put practitioners at risk for failure and cause them to filter information about their clients' needs before passing it up to the executive leadership. Such miscommunications can thwart effective services and unwittingly undermine the production of AI, leading to the kinds of information pathologies we describe earlier in this chapter.

Executive Leadership–Researcher Tensions

The tensions between leaders and researchers reflect another set of contrasting viewpoints and a lack of understanding about the complex realities of the other.

Primary tensions that exist between these contributors relate to time, resources, and decisiveness. A major tension involves the time it takes to produce sufficient evidence. Researchers know that it takes time to generate a researchable question, integrate and manage data, and analyze and interpret the findings to address the question raised. They also have a definition of *quality science* that culminates from experience with academic standards reflected in the peer-review processes for grants and manuscript publications. In other words, they know what it takes to produce quality evidence. A second tension is the level of certainty that researchers indicate when answering the questions. Researchers are trained to take small steps and to qualify their findings by articulating the limits of their research and the need for *more* research to increase confidence in the findings. This tends to produce long, complex answers to questions that fall far short of decisive yes or no responses. Contrast this with the perspective of the executive leadership: They are in decision-making positions that are intense and time sensitive. They must respond quickly and make decisions with certainty, often without much evidence to substantiate their decisions. They know what it takes to get decisions made and keep programs running, and they have little tolerance for traditional research timelines or lengthy qualifications of findings. While researchers voice concern that a hurried process will undermine the rigor of the findings and lead to misinterpretation, leadership expresses impatience with untimely and overly complex findings, which will not be used and are therefore irrelevant.

Further contributing to this tension are issues related to the allocation of resources for the "knowing" process. There is clearly a continuum of capacity needed to conduct useful research, both in terms of technology and expertise. A variety of technical solutions and data-quality improvement procedures affect researchers' ability to respond quickly to the executive leadership's need for evidence. Greater investments in sophisticated computer technology can facilitate quicker preparation of data sets and smarter algorithms for matching and cleaning. But often the level of quality within administrative databases does not meet minimum standards for scientific inquiry, or the databases insufficiently capture information that is necessary to answer the questions being asked. Bringing the relevant data variables to a level of adequate quality requires an investment in the data infrastructure, a critical cost consideration that contributes to tensions between executive leaders and researchers. Additionally, there is the level of expertise necessary to use state-of-the-art data analytics that are appropriate to the questions asked. The field of applied statistics is very dynamic and often requires complex analyses to address substantive questions. Personnel equipped for this job require ongoing professional development or access to expert consultants to help them develop data analytic models for the tasks at hand. The researcher will be advocating adequate technology, an investment

in data-quality infrastructure, analytic expertise, and for more time to produce more definitive findings ("tomorrow"), while the executive leadership wants answers simply stated, quickly ("yesterday"), and at minimal cost and may not understand the necessary time and costs to provide a capacity to answer important questions well.

Practitioner–Researcher Tensions

The primary tension between practitioners and researchers is a classic reflection of the differences between the qualitative and quantitative perspectives. When approaching the description of a problem, practitioners pull from their one-on-one experiences with clients, using anecdotes and case histories; researchers, on the other hand, look for meaning through statistical principles based on large numbers of representative observations. It is primarily a tension between trying to describe a problem based on a mathematically created "average" person (who does not really exist) and describing the "typical" person as seen through experiences with individuals (none of whom look like an "average" person). The tension in these diverse viewpoints can be lessened with the creation of a common understanding that each perspective is necessary, but insufficient, to view the problem as a whole. Researchers need to appreciate practitioners' firsthand knowledge of their clients' context and perspectives in the knowing process, and practitioners must acknowledge that their local accounts need to be considered in context of the more global accumulated research evidence about a "general" population of clients. Researchers need to recognize the fact that while statistics point to averages, the "real-life" meaning of those averages is best understood in context of the clients' practical realities; these can be learned from the practitioners' perspective. The practitioners, on the other hand, need to be capable of incorporating a big-picture understanding of what the scientific evidence reveals into their conception of their clients' experiences. These two perspectives can be combined to generate robust AI and thus shed new light on problems that cannot be fully understood or addressed from one viewpoint alone, although such collaborations are all too rare.

Executive Leadership/Practitioners/Researchers–Public Tensions

At the heart of a democratic government is a means for the *voice* of the people to shape government intervention. The bottom half of the diamond in Figure 1.4 represents the ethical dimension of the AI process. It addresses how the AI process has, as a priority, the beneficence, justice, and autonomy of the citizens being served by the professional collaborators involved in the AI process. This involves making sure that the participants being served and the larger community of citizens and stakeholders have a voice in all the AI process components discussed previously. Here data are essential at all levels. The executive

leadership needs to have in place processes like community-wide surveying and open community forums for soliciting input from the public about priorities for services, access to services, satisfaction with services, and evaluations of services. This may involve greater transparency and the sharing of information and findings related to AI on a community-wide scale to foster productive dialogue. Practitioners need to have in place mechanisms for clients to evaluate practitioners and services received. Also critical are thoughtful considerations about how to improve data-gathering processes to make sure that they are valid and that they do not contain unintentional factors that result in biased or invalid data. Additionally, there is a need to capture clients' experiences with intervention services and to use the data to identify client characteristics associated with access to services or attrition. Although researchers do not have as much direct contact with clients, they can help practitioners consider the validity of their data collection and assessment as well as help them build evaluations of services that capture the clients' perspective.

How an Integrated Data System (IDS) Can Guide These Bidirectional Relationships to Produce AI

At the heart of the AI process is an IDS (Figure 1.4). An IDS integrates individual citizens' data across agencies (distinct bureaucracies) to provide scientifically sound, intergovernmental information to inform AI. The greatest value of a fully developed IDS is that it can provide a comprehensive picture of the whole person and has the potential of bringing everyone from health, education, and human-service agencies together around one table. Through use of an IDS, data-sharing agencies can contribute their clients' data to one collaborative process to achieve a more thorough understanding of a pressing problem and what to do about it (the pioneer of IDS in the United States, Pete Bailey of South Carolina, once described the graphic of the wheel of data available in that state's IDS as "the circle of love"). They bring together relevant data and distinctive perspectives from each data-sharing agency to drive an intergovernmental AI process. The Data > Dialogue > Do of the AI cycle requires integrated data to directly support the entire policy process. Specifically, an IDS serves as the following collaborative foci of the primary contributors: (1) identifying problems and setting priorities, (2) understanding the factors influencing the problem and policy formation, and (3) implementing and evaluating interventions to improve the professional response to the problem in the community. We take up each of these foci in the following sections.

Identifying Problems and Setting Priorities

This charge is primarily the responsibility of the executive leadership. The IDS provides an opportunity for practitioners, researchers, and citizens to contribute to the leader's decision making. The IDS does this by providing a population view of the problem that can indicate its prevalence and incidence. In other words, the population view can help determine how extensive the problem is in the community (prevalence) and whether the problem is increasing or diminishing each year as determined by the number of new incidents. Linking data across systems gives the leadership an opportunity to determine how severe the problem is by determining how the problem affects important indicators of health, education, and social well-being, which are data that can be found in the IDS. The IDS also makes visible the multisystem nature of the problem by providing information about an individual's involvement in multiple service agencies simultaneously or longitudinally. Concurrently, having an understanding of where one problem overlaps with another can inform a more strategic, cross-agency use of resources. The longitudinal nature of the IDS can help leaders better understand when problems cross over from one system to another across time. It also might indicate how a client's involvement with one service agency serves as a precursor to problems (or benefits) that surface in another agency across time, thus informing prevention efforts.

In addition, the IDS can be used to attach a cost to a problem by identifying across systems how much is spent on clients affected by the problem. The extent, severity, and cost of a major problem are important considerations in setting priorities and allocating resources to grapple with it. Without an IDS, this information would not be available, and so it could not be used to guide the deliberations and actions of the AI collaboration. Using an IDS is far superior to a mere political reaction to a problem or a myopic one-agency perspective.

Understanding the Problem and Policy Formation

Identifying the problem is only the beginning. The next important task is obtaining information about the problem in order to generate AI. This requires thoughtful inquiry about the nature of the problem and primarily falls under the "knowing" domain in which the researcher works with the executive leadership, practitioners, and citizens. Here, there are a number of fruitful paths to take. The IDS can be used in the same way that public-health specialists use data to track physical diseases in a population to understand their causes. The data can be used to examine typologies—characteristics and patterns of subgroups affected by the problem. Information on the personal characteristics of the identified clients and their geographic location in the community can be used to identify important patterns of the problem that can stimulate ideas about possible causes. With information across systems, the team can identify

other risk factors that are associated with respective subgroups of the problem and levels of severity. This is particularly important when working in communities that are disproportionately affected by poverty. Instead of being a homogeneous, dichotomous condition (Huston & Bentley, 2010), poverty is a very complex phenomenon comprised of a wide variability of risk experiences with their own distinctive and cumulative effects on human functioning. The IDS uses multiple social-problem surveillance systems to provide a more comprehensive view of co-occurring risk patterns that may suggest different paths to intervention. Finally, the IDS provides an essential, longitudinal view of a problem. An IDS can archive decades of valuable data, meaning that investigators are not handicapped by having information about only the present. They can examine the course of the problem for individuals and communities by studying patterns of data that exist before and after a problem is identified. This is valuable information that can distinguish between factors that appear to contribute to a higher or lower risk of the problem occurring in a population. Investigators can use this information to identify risk and protective factors that occur naturally in the populations and that would be instrumental in constructing a theory of change and informing the development of effective interventions.

Implementing and Evaluating Interventions
The data > dialogue process is validated as useful only when it helps create a theory of change and provides evidence leading to effective intervention—the "do" part of the AI cycle. The "doing" province of the practitioner is enhanced when out of the "dialogue" comes a plan based on evidence used by the whole team of contributors. The intelligence provided by the IDS can serve to evaluate the effectiveness of the existing conception of the problem and the existing professional response to it (theory of change). Stakeholders can assess the logic of the existing theory of change in light of the AI generated by the collaborators using the IDS. The AI can generate data-based hypotheses to modify the conception of the problem and the associated services. The AI can also contribute to the development of a more robust intervention. AI may uncover new areas for practitioners to probe and generate questions and interview processes to improve their collection of more strategic data that would lead to a revised logic model. Most important, contributors can use the IDS to evaluate the effectiveness of a new, AI-guided intervention for the problem and the costs and cost savings associated with implementing this new intervention.

Additional Secondary Benefits of an IDS
In addition to the primary benefits discussed earlier, there are other benefits of having a well-developed IDS in a community. At either the state or local level,

a mature IDS, which enables the creation AI, is a valuable community asset. This capacity provides a community with the opportunity to network with other communities with similar mature systems in operation. This networking affords opportunities for conducting cross-site studies of a problem and/or simply sharing ideas or technology to improve the IDS. Collaborations extend a community's ability to contribute to regional and national AI. With this ability, a community becomes attractive to national foundations and federal agencies that are interested in funding more extensive studies of problems of national significance. This is appealing to funders because they do not have to invest in a lengthy and costly process of collecting and integrating population-level data, and they can be assured of the data's quality. The AI work can be conducted more quickly and more cost efficiently because the IDS is already fully functioning. If the community can use its IDS to make these types of contributions, it can bring both funding and national recognition to the community's data-based decision-making competence.

Hierarchy of Developmental Needs of an IDS

What does it take to establish a well-functioning IDS that can produce AI to promote effective and ethical policy? This section introduces the basic needs of a mature IDS and its hierarchical development. We draw on Maslow's hierarchy of developmental needs to help describe what is needed to grow a fully developed IDS. Maslow's (1943) hierarchy represents the developmental progression of human needs to achieve self-actualization. It is classically depicted by a stratified pyramid in which the need at each layer depends on the foundation of the layers below it. At the base of the pyramid are the most basic human needs. Once these needs are met, they provide the basis for the development of more advanced needs, which are necessary for independent and fully actualized human potential.

This is an apt metaphor to describe the progression of needs that lead to a fully functioning IDS—one that is capable of producing AI to address complex problems on a sustainable basis. A mature system is necessary to produce AI; without a well-developed IDS, one cannot maximize the potential of the bidirectional relationships among the executive leadership, practitioners, researchers, and citizens in a community and generate AI.

In this section, we introduce the levels of needs in this hierarchy. Figure 1.5 illustrates the hierarchy of IDS development. At the base of the pyramid is the legal foundation for the IDS. The next basic need is establishing the scientific integrity of the IDS. Both these needs provide the underpinning of the IDS's ethical use. The IDS is fully actualized if it can be sustained economically in the political context that it must operate in to be effective.
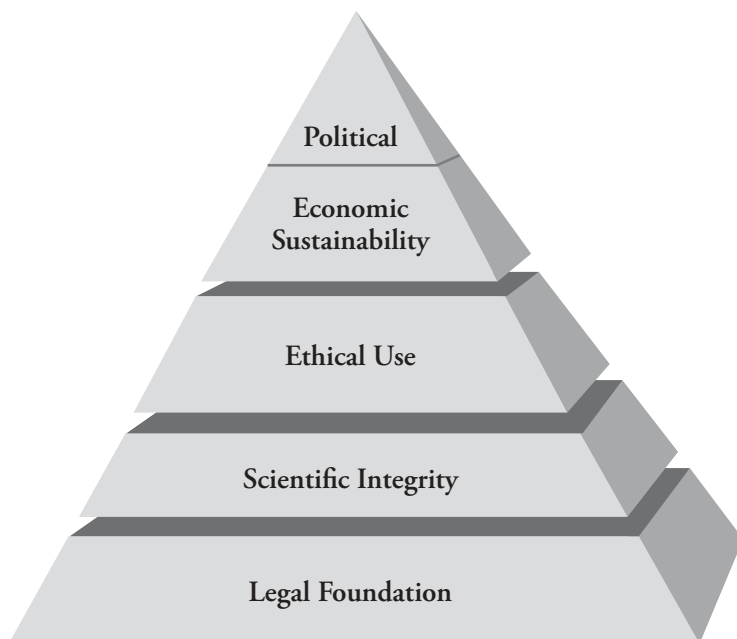
Figure 1.5 Developmental hierarchy of needs for IDS

Legal Foundation

At the foundation of a well-functioning IDS is its lawful capacity to integrate individually identifiable data across health, education, and human-services agencies for the purpose of policy research and planning (again, "human services" here is broadly conceived to include workforce, housing, and justice programs, as well as traditional social-welfare services). It is important to point out that the data are intended to be used for organizational decision making related to policies and practices provided to clients and not for making decisions about particular individuals, which would be a case-management/operational use.

Creating an IDS requires using individuals' identifying information to match their administrative records from across multiple systems (e.g., using first and last names, Social Security numbers, and/or birth dates). Of course, numerous laws and regulations provide broad protections against the use of private information and determine how, when, and for what purpose these data can be integrated and shared between public agencies. Building a system that relies on IDS requires that these legal issues are attended to through the creation of a written memorandum of understanding (MOU) between IDS partners. These MOUs provide the collaborative foundation of the IDS and accomplish

two important objectives. First, they make it the top priority to protect the private information of individuals being served by the respective service agencies. Second, they respect the rights and responsibilities of the agencies that collect the private information to provide services and to use these data to learn how they can improve the quality of the services they provide.

Laws and regulations at all levels of government regulate private information. Federal regulations are the most explicit in providing detailed information about what can and cannot be done with protected health and education data, whereas other policy areas have less explicit regulations that are implemented at the state level (e.g., welfare, juvenile justice, or homelessness). The federal Privacy Act of 1974, 5 U.S.C. § 552a (2000) is the omnibus "code of fair information practices" that regulates the collection, maintenance, use, and dissemination of personal information. The Privacy Act is designed to balance the government's need to maintain information about individuals with the rights of individuals to be protected against unwarranted disclosure of personal information (i.e., any data element that can be used to identify the individual like names, Social Security numbers, and addresses).

Two major extensions of the Privacy Act specifically address federal legislative guidelines for the protection of individual health and education records—the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and the Family Educational Rights and Privacy Act of 1974 (FERPA), respectively. Standards for protecting the privacy of individually identifiable health information address the use and disclosure of such information by public service agencies (45 C.F.R. § 160.102, 160.103). A major goal of this legislation is to ensure that individuals' health information is properly protected while allowing for the flow of health information to promote high-quality health care and protect the public's health and well-being. The Family Educational Rights and Privacy Act of 1974 (FERPA, 20 U.S.C. § 1232g) protects information contained in public-education records about parents and students. Similar to the HIPAA regulations, FERPA prohibits public-education agencies from instituting any policy permitting the release of personally identifiable records without prior written consent from parents.

Many government agencies have written policies that permit disclosure of administrative information for research purposes, often with conditions to be met prior to disclosure and conditions restricting further use (Hotz, Goerge, Balzekas, & Margolin, 1998). In addressing the privacy rights of individuals as subjects of research and statistical studies, the Privacy Protection Study Commission determined in 1977 that information collected and used for administrative purposes could be used for statistical purposes, but it recommended that no record or information contained therein be used in individually identifiable form to make any decision or take any action directly affecting the individual to

whom the record pertains. This principle was labeled "functional separation," which means that individually identifiable information collected or compiled for research or statistical purposes should never be used to affect the individual case and may enter into administrative and policy decision making only in aggregate or anonymous form.

Provisions within the federal privacy legislation permit the disclosure of individual records to external researchers for the purposes of statistical inquiry (5.5 U.S.C. § 552a). These stipulations permit the sharing of records to a third party who has provided the agency with advance adequate written assurance that the record will be used solely as statistical research; in such cases, the record is to be transferred in a form that is not individually identifiable. According to HIPAA, such research is considered one of the allowable categories of "public interest and benefit activities," so long it is designed to develop or contribute to generalizable knowledge (45 C.F.R. § 164.501). FERPA has similar provisions, indicating that such studies must serve an administrative need of the educational agency, including for the purposes of developing, validating, or administering predictive tests, administering student aid programs, and improving instruction. Regulations also require the research to be conducted in such a manner as will not permit the personal identification of students and their parents, and researchers must agree that the information will be destroyed when no longer needed for the purpose for which it is conducted (20 U.S.C. § 1232g(b)(1)(D)).

Scientific Integrity
Cooperative agreements providing for legal access to integrated data serve as the necessary foundation for agencies, organizations, and researchers to handle the integrated data with scientific integrity. The capacity of an IDS to provide accurate AI for policy depends on the scientific integrity of the knowing process. This fundamentally involves everything associated with the knowing process, including the quality of the data used within the system, the level of precision involved in integrating data at the individual level across different service agencies, and the scientific validity of the methods used to address the research questions.

Data Quality
Standards for data quality include both the accuracy of the information and the reliability with which it is collected (Iwig, Berning, Marck, & Prell, 2013). Methods for assessing the reliability and validity of data systems can be incorporated into IDS to maximize the utility of the information they contain. Procedures to evaluate reliability can include variable-level auditing to look for out-of-range codes or codes that may have changed over time. Variables can

be scored with a reliability measure such that external requestors are aware of the reliability of a given variable. Common audit routines can measure the completeness of a given variable (degree of missing data), the accuracy (the proportion of valid codes), and the coverage (gaps in time periods reported, or providers reporting, etc.).

Reliability and validity testing are important data-auditing tasks for evaluating the scientific capacity of data to be included in the IDS. It ensures that data collected on a variable actually represent the phenomenon in question. In some cases, this testing may involve manual record abstraction from paper files, which are checked against the electronic data. Due to its time-consuming nature, this task may only be done on an annual or semiannual basis. Since most agencies are not equipped to conduct such validity testing on a routine basis, IDS leadership may have to partner with data-sharing agencies to periodically seek funding to accomplish these important audits. When two data sources are available for a given measure (i.e., diagnosis associated with a hospitalization), the redundant data sources can be compared to assess the degree of agreement between them. Discordances may raise the issue of which source is considered more reliable and may require further investigation.

Data Integration
The critical methodology for creating integrated data systems is the process of *record linkage*, which refers to the joining or merging of data on the basis of common data fields, usually personal identifiers. Common personal identifiers are a name, birth date, and Social Security number, but they may also include system-generated client tracking numbers or a "unique ID" that has been encrypted. Addresses may be used as a linkage field in some cases, particularly for projects in which geographic location is the basis of the intended analysis.

A variety of tools are available to facilitate record linkage, and many organizations may have already created their own methods for linking administrative data. The key issue is creating decision rules that provide parameters for determining what constitutes a matched (i.e., successfully linked) record. Keystroke errors, misspelled names, and the transposition of characters represent just a few of the potential data problems that would reduce the likelihood of a match. To reduce these "false negatives," database administrators may perform the matching process using unique identifiers created from components of fields (e.g., the first two letters of last name and first name, month and year of birth). They may also use a phonetic-spelling translation algorithm such as Soundex as an alternative to exact name matches.

In general, two types of record linkage are possible: deterministic and probabilistic. *Deterministic* record linkage involves matching on the basis of an agreed on set of data characters or strings of characters with some allowance for missing

data. Deterministic matching procedures are typically employed when users are most interested in reducing false positives or the matching of records that don't belong together. *Probabilistic* matching procedures involve the use of algorithms that permit flexibility by weighing fields differently when assigning a match. This procedure is often used in large studies where false-negative matches (the failure to match records that belong together) may be more of a concern or when deterministic matching isn't possible given gaps in common identifiers. Probabilistic methods can also identify *potential* matches prior to a deterministic matching procedure. The science of record linkage continues to be advanced by statisticians and computer scientists (for a bibliography, see http://www.cs.utexas.edu/users/ml/riddle). Different users will have different purposes that warrant more or less sensitivity to false-negative or false-positive errors. As communities develop these procedures and share their approaches, the field can establish consistent procedures for communicating matching protocols and the standards for assessing the quality of record-linkage results.

Scientific Validity

Core to scientific integrity is scientific validity. This is keenly expressed in the context of the bidirectional relationships between the researcher and the executive leadership and the researcher and the practitioner. Of primary concern is not how interesting the results are but how *useful* they are to the leaders and practitioners who will use the findings to benefit the citizens they serve. As Emanuel, Wendler, Killen, and Grady (2004) highlight, for research to be useful, it must adhere to rigorous scientific standards and inform a process of change that has clear social value for the population served. Boruch (1997) nicely laid out the basic standards of rigorous applied research addressing problems. First and foremost, researchers must work closely with their community collaborators to help identify the most important questions that need to be addressed and determine which questions are *researchable*. Researchable questions are those that are capable of being answered given the specifics of the research context and the current scientific capabilities. This has a lot to do with what Boruch calls "population, power, and pipelines." Here it is important that the researcher ensure that the sample is of sufficient size to provide sufficient statistical power to answer the questions. Also, the researcher must determine if the sample is adequately representative of the target population so that the information derived from the sample will be generalizable (thus useful) to the population of concern. The particular "pipelines," or ways in which participants come to be involved in the sample, must be considered to guard against biases that would limit the utility of the findings. One of the great values of an IDS is that, to the extent that they can capture data on entire populations, they lessen this problem.

Next, the research process, as stated previously, must ensure that the data-collection process and the data collected are of sufficient quality to support the findings. Many elements of data collection and the measurement process can introduce unwanted errors and render the data inadequate for use (e.g., invalid measures or poorly trained data collectors). Ensuring the scientific validity of the research process requires knowledge of the data being drawn from the relevant data-sharing agencies. This knowledge would include how the data were collected, how the data are entered into the computer, and the level of data quality; this must be understood before proceeding with data analyses. Many researchers do not trust administrative data due to the lack of adequate safeguards for data quality (e.g., auditing processes). The researchers and the executive leadership must carefully consider the quality of data used in an IDS to ensure the quality of the AI derived from this process. Next, researchers must select their core analyses, which are the analyses most appropriate for the questions being posed. Here scientific rigor is reflected in the researcher adhering to all the disciplines associated with each core analysis used. Each statistical method has its own science of use, which involves adherence to basic assumptions and tests of significance and fit of models. The analyses are more likely to have a high level of integrity if the researcher has the appropriate credentials and has experience addressing the research questions using the appropriate statistical techniques.

Finally, research findings must be translated and appropriately qualified so that they can be respectfully presented to all key contributors (executive leadership, practitioners, and citizens). It is important that researchers expend the effort to make their findings clear and easily comprehensible to all involved nonresearchers. Clear communication of the findings is necessary to foster valuable dialogue to promote the AI process. The social value of the research is reflected in a design that is useful in identifying research that is feasible to be carried out in the community served and is appropriate given the social, political, and cultural context of the community (Emanuel et al., 2004).

Ethical Use

Legal access to data and scientific rigor are necessary but not sufficient to cover the full range of concerns related to the potential harm that can result from unethical conduct in the use of protected data. For an IDS, consideration of potential harm includes both harm to the individuals whose data are used by the IDS and the public agencies that are providing services for these individuals. In a review of ethical codes, Emanuel et al. (2004) have distilled a set of eight overarching ethical principles to guide the ethical use of an AI process that are applicable to a mature IDS. These standards include a broad range of responsibilities that are shared by all but that are particularly relevant to each set of

key collaborators as they negotiate the tensions of their relationships in the best interests of the communities they serve. In a fully developed IDS, these essential considerations of ethical use are formally expressed by establishing a governance process that spells out the ethical conduct of each contributing member, as described in the following sections.

Executive Leadership

Executive leaders are, first and foremost, accountable for the well-being of the population that appointed them to leadership. As such, these leaders should pay particular attention to three primary ethical concerns related to the use of integrated administrative records. First, the executive leader is responsible for bringing the key contributors together in a collaborative partnership. This partnership should be marked by respect—respect for the community's values and culture and respect for the unique contributions of each of the partners. Second, the information gained through such use of an IDS should be of considerable *social value* so as to "yield fruitful results for the good of society" (Nuremberg Code, 1946, Principle 2; US National Institute of Health, 1949). For a public-service IDS, this means that the research proposing to use administrative records should be designed to answer specific questions about the etiology, treatment, and prevention of health, education, and social problems that affect individuals' well-being. Third, executive leadership must determine that there is a *favorable benefit-cost ratio* associated with the work, such that potential policy decisions made as a result of findings have the capacity to provide a net gain for the municipality and its citizens (see the section "Economic and Political Sustainability" later in this article for further discussion of benefit-cost). In this case, leaders must weigh the potential benefits with the risk of violating the privacy of their citizens. Leaders must be convinced that adequate provisions are in place to protect the privacy of individuals.

Furthermore, the research is likely to be evaluated by the executive leadership to determine whether it is in its own best interest to undertake it, relative to the potential political costs of identifying problems with poorly delivered or coordinated services or with unserved and underserved populations. Clearly, it is the ethical responsibility of executive leadership and public agencies to identify shortfalls in programs and policy. But the real world is rife with political considerations that discourage this kind of transparency. Therefore, it is in the best interests of a mature AI process to provide leaders and agency staff the opportunity to participate in framing their activity so as to demonstrate that they are engaging in intentional problem solving with their community and research partners. They may also require opportunities to review research results and work products to ensure that findings are framed in a way that respects

their positions and are not depicted in a "gotcha" manner; failing to do so will reduce their willingness to engage further in the AI change process.

Practitioners

The ethical considerations that are most appropriately identified with the practitioner/stakeholder community are those that arise when systems begin to test out new interventions with clients. When an IDS is working effectively, the information gleaned from systematic program evaluations will inform decisions to bring in new programs or make changes to existing programs to improve their effectiveness. Because these changes, or interventions, necessarily involve alterations in how people receive public support, they call attention to the need to consider the rights of the potential participants. At the individual participant level, ethical concerns about the fair selection of subjects, respect for subjects, and informed consent are essential. Concerns about the fair selection of subjects typically focus on groups considered vulnerable, such as those from minority or low-income families or those with mental or physical disabilities (Fisher et al., 2002; Fisher & Vacanti-Shova, 2012). Plans for establishing interventions and evaluating their effectiveness must balance the need for representation of vulnerable groups with the concern for avoiding discrimination or exploitation. This work must also be conducted with adequate safeguards to protect the rights of participants throughout the course of research. From beginning to end, the intervention and research process must demonstrate respect for participants, in terms of both the protection of their private information and regard for their safety and well-being. The two-way arrows in Figure 1.4 connecting with the public underscore citizens' right to know what is happening and what is being learned about them and for them as a result of the AI process.

Once participants are selected for new intervention trials, procedures for obtaining informed consent must also be considered. Participants have the right to know whether or not they are receiving traditional services or are part of a trial testing the effectiveness of new services. Practitioners can be extremely helpful in this arena because they are the front-line sentinels who have daily contact with the community members who are the intended target audience. As such, they are at the appropriate place to facilitate the consent process with potential clients. Creating a priori, structured communication strategies for case workers or health-care providers will help them explain to clients the potential risks and benefits of their participation in new intervention trials.

The importance of community involvement in research activities is another significant ethical concern (Emanuel et al., 2004). It is particularly relevant when research is being conducted with underrepresented groups, such as minorities, low-income families, or immigrants (Fantuzzo et al., 2006). The concerns include those related to the exploitation of culture or traditions. Considerations

should be made to include representatives of relevant communities throughout the process, including the development of research questions and the interpretation of findings.

Researchers

The primary ethical considerations for researchers working with an IDS, as stated earlier, are related to the scientific integrity of the proposed research design and statistical evaluations (Buchanan, Fisher, & Gable, 2009). Here there are two major foci: protecting the rights of human subjects through IRB processes and ensuring the scientific integrity of the research.

An IRB, which is mandated for any organization conducting research (45 C.F.R. § 46.102(a)), consists of a group of peers (i.e., researchers) who provide independent review of research projects. The level of review varies depending on the nature of the research project and the safeguards that are needed to minimize the risk associated with participation in the study. The Privacy Act defines three levels of review: full, expedited, and exempt. Full IRB reviews are required for any research in which the investigator will be collecting information directly from human subjects (e.g., research testing the effectiveness of a given intervention and research involving vulnerable populations, like prisoners and persons with limitations in capacity to make informed decisions). This research presents the greatest level of potential risk and therefore requires the most consideration of ethical conduct. An expedited review is considered in cases where the research proposal presents minimal risk to the participants, such as during observational studies of students in educational settings or analyses of administrative records that are potentially identifiable (such as "limited" data sets, which while lacking personally identifiable information, may contain enough information, such as dates and types of service, so as to be potentially identifiable). The third category of IRB review is called "exempt" and is considered for research studies that propose to use existing sources of information, such as integrated administrative data systems. Federal regulations state that research involving the collection of existing data is exempt as long as the sources of information are publicly available or the information is deidentified (45 C.F.R. § 46.101(b)). Research or demonstration projects that are conducted or approved by agency leaders and that are designed to examine the public benefit of service programs, procedures for obtaining services, possible changes in or alternatives to programs, or changes in methods of payment for services under those programs are also exempt (they are often broadly referred to as "program evaluation" activities, as distinguished from analytic activities otherwise intended to contribute to generalizable knowledge or research).

While IRB approval is necessary to safeguard the rights of human subjects, the IRB does not review the scientific credibility of the research in the

same way, for example, that a grant-funding agency or peer-reviewed journal does. The IDS needs to have a scientific peer-review process to ensure that the research is scientifically sound, especially since the findings will be used for decision making a long time before they are subject to typical peer review for journal articles. Within each high-functioning IDS there is, either internal to the IDS or through consultation, a connection to the scientific community that can help certify that the proposed research has scientific integrity.

In sum, ethical use requires dynamic bidirectional relationships between all the key contributors. These relationships are marked by a fundamental respect for the contributors and participants and a high level of commitment to effective and ethical service disciplined by AI.

Economic and Political Sustainability

At the top of the IDS hierarchy is the ability of an IDS to demonstrate its value in the face of major economic and political pressures on the executive leadership to provide effective services with allocated resources. The consideration of the cost saving of effective policy is essential to today's leaders: "Social policy seeks to help people make greater investments in their own human capital—health, skills, knowledge, and experience—so that they have attractive legitimate economic opportunities and are less likely to impose costs on the rest of society" (Vining & Weimer, 2009, p. 1).

At the risk of oversimplification, the value of an IDS to provide actionable intelligence for policy is a function of the system's ability to demonstrate the benefit of policy decisions relative to their cost to taxpayers. This is an exercise in efficiency as well as effective and persuasive communication with the public. Building on the development of ethical use, a mature IDS must attend to sustainability in its political and economic environment, or it will cease to function.

As such, the sustainability of an IDS hinges on its capacity to conduct benefit-cost analyses (BCA) of its uses in real time to provide executive leaders with information to justify its existence. Because the system also depends on support from the community, it needs to communicate to the public the proposed benefit of resulting policies and interventions. This requires consideration of the value of the intervention both to the government (in terms of reducing the need for expensive interventions later) and to society at large (in terms of broader social goods that can also have economic value, such as increases in the literacy level of a population; Beatty, 2009).

Many of the limitations of current BCA for policy are a function of the need for clear and measurable definitions of program costs and impacts. The difficulty in measuring such things in policy is that the impacts are often broad, long term, and variable over time. Policies also may have impacts that spread

across multiple service systems such that an investment by one system may not return a direct benefit to its own system but may, in fact, benefit another related system. For example, the benefits of investing in education for single mothers could influence employability (workforce capacity), improved access to and use of early childhood education programs for their children (education), reduce obesity (health), and reduce the need for public assistance (public welfare). These diffusions of benefits and costs may alternatively reduce or increase the incentive for officials from any one particular agency to engage in this important cross-agency research to demonstrate the true benefit-cost of multidisciplinary programs.

Other impacts of policy changes may not be fully observable until many years later, such as the long-term impact of energy-conservation regulations on global warming or the reduction in later adult crime rates for low-income children who participate in early childhood programs such as Head Start (Belfield, Nores, Barnett, & Schweinhart, 2006). Further, some benefits of social programs extend beyond those experienced by the individual participants. Accounts of the return on investment to the Perry Preschool Project, for example, reveal that about 75 percent of the total benefits of the program were actually accrued by the public—not the individual children who participated in the program (Vining & Weimer, 2009).

In an era in which elected officials need to convince the public that their tax dollars are being well invested, the ability of the AI process to concretely demonstrate the benefit cost of services provided will be foundational to the success and sustainability of the system. Unfortunately, many of the relevant impacts of policy interventions are not well monetized with readily available market values. The per-unit cost to society or the government of a reduced score on standardized reading tests, for example, is extremely difficult to calculate. When market values are not readily available, analysts must use shadow prices or estimates of benefit, such as the nonmarket benefits of education or the nonmonetary cost of crime. The problem is that for many policy issues, there are no solid estimates of shadow prices. More research is needed to document these costs in order to then demonstrate the relationship between cost and benefit. But it is certain that a well-developed IDS driving an AI process will make substantial contributions to benefit-cost research at all levels of government.

Conclusion

As we have painfully discovered from recent national crises, the dispensers of antiquated "vending machine" models of public administration do not have the solutions. As Albert Einstein wisely asserted, "The problems that exist in the

world today cannot be solved by the thinking that created them." What, then, do we need?

Do our bureaucracies need more data? As we pointed out earlier, our bureaucracies are deluged with data. The cost of collecting it, storing it, and reporting it (despite its unchecked and questionable quality) *far exceeds* the degree to which it is used to guide decision making. We have plenty of data that remains, for the most part, undisciplined and relatively useless with respect to informing decisive action.

Do we need integrated data? Since 2006, the US Department of Education has spent over half a billion dollars integrating data in state departments of education across the country (State Longitudinal Data Systems [SLDS], US Department of Education, 2010). Unfortunately, expending funds on hardware, software, and computer-science technicians to put data together does not in and of itself generate effective, efficient, and ethical use. Moreover, this integration expenditure involves a single major bureaucracy (education) and does not include information on the whole child or youth. To truly capture the whole person, these SLDS need to include integrated data from other relevant bureaucracies, such as health and human services.

Do we need more research? Despite these increasing mandates for "evidence-based" policies and practices, there is an enormous discrepancy between the amount of research produced related to public problem solving and the extent to which that research is actually used by stakeholders involved in the problem-solving process. Research that is not respectful of the contextual realities of policy makers and practitioners will continue to remain irrelevant in crafting usable policies and programs to address pressing public issues. We do not need more decontextualized, presumptive research; we need disciplined research agendas that are crafted in dialogue with those who will actually utilize and benefit from the research.

Do we need performance management over our government agencies? The seemingly unending mandates requiring data collection, reporting, and strategic planning have not changed the fact that government agencies and officials do not habitually utilize data as a source of information in guiding their decisions. Until agency-level actors have the managerial autonomy and capacity to incorporate data into the decision-making process, public-policy decisions will fail to be responsive to the needs of public-service practitioners and clients.

What do we need? We need government systems that can sustainably generate and use actionable intelligence effectively and efficiently for policy and practice. We developed the AI model in response to the major dysfunctions of outmoded approaches to public problem solving that have shown themselves to be too expensive, too slow, and too inflexible to respond to public problems in a respectful and responsive manner. We need *actionable intelligence* reflecting

an upward spiral of Data > Dialogue > Do *with* those who will actually use and see the benefits derived from this dynamic and collaborative process. We need mature IDSs that can establish the legal foundation and the scientific integrity of a sound "knowing" process to produce AI. Moreover, we need IDSs that establish a governance process that fosters the ethical use of integrated data to improve program effectiveness and efficiency; and finally, we need a quality IDS that is consciously positioned in government to be sensitive to the economic and political realities that will enable it to be a sustainable and reliable resource for AI.

In a recent memorandum to the heads of federal agencies and departments, the Executive Office of the President (2013) emphasized the importance of using administrative data and data-sharing to advance innovation in an increasingly tough fiscal climate:

> The President recently asked his Cabinet to carry out an aggressive management agenda for his second term that delivers a smarter, more innovative, and more accountable government for citizens. An important component of that effort is strengthening agencies' abilities to continually improve program performance by applying existing evidence about what works, generating new knowledge, and using experimentation and innovation to test new approaches to program delivery. This is especially important given current fiscal challenges, as our nation recovers from a deep recession and agencies face tough choices about how to meet increased demand for services in a constrained resource environment . . . [Future agency budget] proposals should enable agencies and/or researchers to access and utilize relevant data to answer important questions about program outcomes while fully protecting privacy. For example, by linking data on program participants to administrative data on earnings, college-going, health, or other outcomes, agencies may be able to improve their understanding of program performance and ultimately improve results. (pp. 1–3)

Now more than ever, we need actionable intelligence for policy produced by mature IDSs to secure a more effective, efficient, and ethical government—one that makes respectful and responsible, evidence-based decisions across bureaucracies at every level of government.

Note

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