



# MASTER DATA MANAGEMENT

A Framework for the Public Sector

BY HARRY BLACK

Data analytics, data management, and master data management are part of an overall imperative for public-sector organizations. They are central to organizational competitiveness and relevancy. The City of Cincinnati, Ohio, has developed a robust master data management process, and any government can use the city's achievements as a best practices model for their own master data management strategy. This article looks at several administrative regulations, touching on reasons why master data management is essential, the benefits it can confer, how Cincinnati got started, the city's framework, and the lessons the city learned along the way.

## AN ESSENTIAL PROCESS

Master data management integrates technologies and processes in a disciplined fashion across the organization, allowing the flow of data from numerous stand-alone systems into one unified process via an enterprise-wide technology tool. This allows an organization to make the transition from a series of non-unified silos to a master data management architecture that integrates the output of multiple systems to a master data management structure that integrates the outputs from all systems, creating an organization-wide management capability.

A “smart” city is data-driven. Increasing the scope, volume, quality, and utility of data can lead to improved performance, better customer service, and greater efficiency through creative problem solving, while also promoting government transparency and accountability.

Governments seek to deliver efficient and effective customer services at the lowest possible cost. One way to identify opportunities for improved delivery of services is by using a strong analytics infrastructure, which provides a framework for storing and using data. Because multiple departments work together to deliver services, a key component of this analytics infrastructure is a clear data governance policy, which outlines the expectations for data access, availability, and management to ensure cross-functional decision making, accountability, data integrity, and data availability.

Optimizing the availability of quality data can be challenging, but it's worth the effort. It forces the organization to ask itself a set of difficult questions, such as:

- What business process does this data represent?
- How are the data structured?
- What information populates these data categories?
- How is this data input?
- Is this data incomplete?

The specific objectives of analytics infrastructure framework are to establish expectations and apply appropriate controls over:

- Data inventory and ownership.
- Data collection.
- Data use and disclosure.
- Data availability, retention, and disposal.

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Governments are stewards of the data it collects from residents, customers, and visitors, so it has a responsibility to protect those data. At the same time, the collected data is a valuable asset for managing the enterprise, and it can be critical for identifying opportunities to improve the quality, effectiveness, and efficiency of service delivery to residents and customers. An organization's capability to achieve these goals relies on a strong analytics infrastructure and direct access to enterprise data in order to perform the following core functions related to this mission:

- Automated data dashboards that are used to consistently monitor and evaluate performance.
- Monitoring of operations in real-time.
- Self-service data discovery, which allows departments to fluidly use data for gaining insight about operations without relying on power users and database administrators for analysis.
- Predictive analytics, which help organizations to develop predictive models that enable proactive and preventative service delivery to enhance operational effectiveness and efficiency.

- Open data to provide transparency and foster innovation.

To use master data management effectively, governments must understand its many nuances and be able to conceptualize the way data should be arranged to respond to questions and clarify the underlying business processes. Benefits fall into four basic categories: cost savings, efficiency, effectiveness, and revenue maximization. The number of datasets created can be unlimited; see Exhibit 1 for an example of some of the ones used in Cincinnati. (More information is available at [data.cincinnati-oh.gov/](http://data.cincinnati-oh.gov/).)

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## GETTING STARTED

There is no one tried-and-true approach to establishing a master data management capability. What's important is to consider various do's and don'ts derived from best practices and the body of knowledge that has evolved over the past decade. It isn't necessary to reinvent the wheel. Governments across the country, including Cincinnati, developed best practices. Like Cincinnati, other governments have developed master data management policies, regulations, and procedures; these public documents can serve as a reference point or template.

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In government, the information technology (IT) function is usually decentralized, which is a problem if your goal is to establish a master data management structure and or open data capability. In these cases, the best operating model allows the central office to lead and maintain policy development, establish standards, and monitor and enforce compliance, while allowing some degree of self-determination on the part of the user community (internal and external). To get started:

- Rationalize, standardize, and optimize the organization's IT delivery model.
- Develop an open data requirements and implementation plan.
- Establish an analytics infrastructure policy.

**Rationalizing the I.T. Function.** The objectives of IT service delivery standardization and optimization include the following:

- Improve IT support and service delivery across the organization.
- Ensure that the total enterprise has equal and adequate access to technology systems and support resources.
- Reduce duplication of systems, contracts, and maintenance agreements.
- Optimize staff expertise and align it with enterprise technology goals and objectives.
- Implement a standardized, enterprise-wide service desk, procurement process, and inventory system.

### Exhibit 1: Representative Types of Datasets

GPS data to track location and status of vehicle assets.

Computer-aided dispatch data to record public safety responses and in-field activity by first responders.

Records management system case data for police (e.g., geo-coding, cleaning, and joining with computer-aided dispatch incident data).

Emergency management services on-scene response data.

Proactive green space cleaning activity.

Health center clinic data (e.g., geo-coding and cleaning up address data so the health department can identify trends on a neighborhood level).

Performance and workflow data.

Customer service request survey data from surveys received from citizens once departments have closed out service request tickets.

Development data geo-coded for the Community and Economic Development Department to use in tracking development trends and activity.

Police traffic stops and citations.

Police use of force.

Assaults on police officers.

Police officer-involved shootings.

Violent crime.

Shootings and police calls for service.

- Strengthen cybersecurity efforts through policy compliance and proactive security initiatives.
- Ensure management accountability.
- Clearly define enterprise-wide IT and data management leadership roles and responsibilities.

Delivering on these objectives requires a strong chief information officer and data management executives, along with engaged and committed enterprise executive leadership at the highest level. This phase of the process requires engaging and breaking down silos across the organization.

#### **Open Data Requirements and Implementation Plan.**

Citizen access to their government's information is fundamental to transparency and accountability. Therefore, public enterprises have an obligation to make datasets about the operations and finances of government publicly available for review, interpretation, analysis, research, and criticism. Datasets should be complete, accessible, reflective of primary data, available to the public in a timely manner, supplied in a format that can be computer-processed, license-free, and non-proprietary.

**Establishing an Analytics Infrastructure Policy.** Set up an open data executive committee made up of senior-level staff representing the appropriate cross-section of decision makers and influencers throughout the government — individuals who are directly responsible for IT, performance management, and data management. The executive committee should meet regularly, to vet data that are specific to security or privacy concerns and review funding. The committee will also likely be responsible for conducting an annual review of all data management/governance policies and making recommendations for revision. It should also establish a smaller working group to serve as a forum supporting the implementation plan. The working group will work to support the organization's open government goals, including collaborations with researchers, the private sector, and the public. The working group will also identify problems or issues that arise during the course of their work on the implementation plan and develop recommendations for resolution. Each sub-organization within the enterprise needs an open data coordinator, who is responsible for attending meetings of the open data working group, identifying any potential privacy or security concerns with a dataset and informing their

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departmental leadership. The open data coordinators, in cooperation with their department directors, should be expected to identify and recommend datasets for public distribution to the chief data officer.

The chief data officer is responsible for realizing the implementation plan, as established in a related enterprise

policy, by providing technical assistance and guidance to the open data working group, and by identifying needed infrastructure and resources. The chief data officer establishes standards and schedules for the publication of datasets, with the goal of presenting them in an efficient and cost-effective manner, and reviews existing policies to identify impediments to the open data initiative. He or she works with relevant staff, including but not limited to the government's information security officer and law department, to guide and/or propose revisions to existing policies in order to facilitate the organization's open data initiative, promoting greater openness without damaging legal and financial interests. The chief data officer facilitates the sharing of information among departments and is responsible for making recommendations to the executive committee for revisions, with the goal of expanding the open data initiative and increasing the number of open datasets. These recommendations should be submitted at least once a year. The chief data officer also acts as a liaison between the open data working group and the executive





committee, providing department-by-department summary updates once a month to the executive committee and other enterprise leadership.

## MORE ON DATA GOVERNANCE

Data governance policy should outline the government's expectations for data access, availability, and management, to ensure cross-functional decision making, accountability, data integrity, and data availability. The scope of data governance policies and procedures should cover:

- Analytics infrastructure expectations.
- Analytics infrastructure policy.
- Analytics infrastructure procedures.
- Open availability of data.
- Data collection.
- Automatic extraction of data.
- Data use and disclosure.

Public enterprises have an obligation to make datasets about the operations and finances of government publicly available for review, interpretation, analysis, research, and criticism.

- Data retention and disposal.
- Responses to public records requests.
- Third-party IT solutions and IT procurement (evaluating accessibility, who owns the data, services and assistance provided, and security).
- Analytics infrastructure roles and responsibilities.
- Analytics infrastructure procedure (comprising four main phases: identify and authorize; develop; approve; and implement).

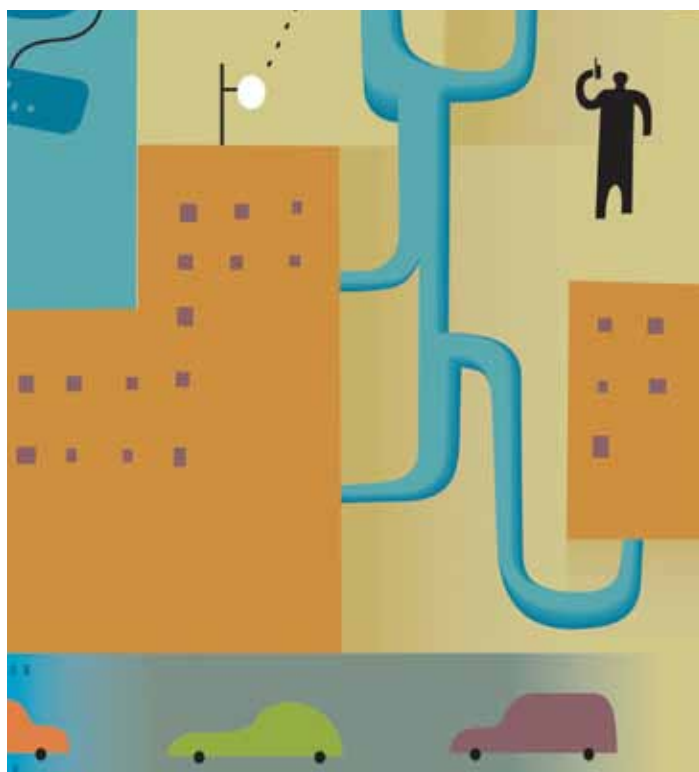
**Operating Framework.** Exhibit 2 shows the basic structure of a data management model. This is Cincinnati's model, and it probably resembles that of other governments with a mature master data management function. Hardware and software requirements vary, depending on the organization and its appetite for investment. Typical cost items associated with creating the infrastructure include staff resources, software, open data portal hosting, data visualization software, and the direct costs associated with establishing a data warehouse.

## LESSONS LEARNED

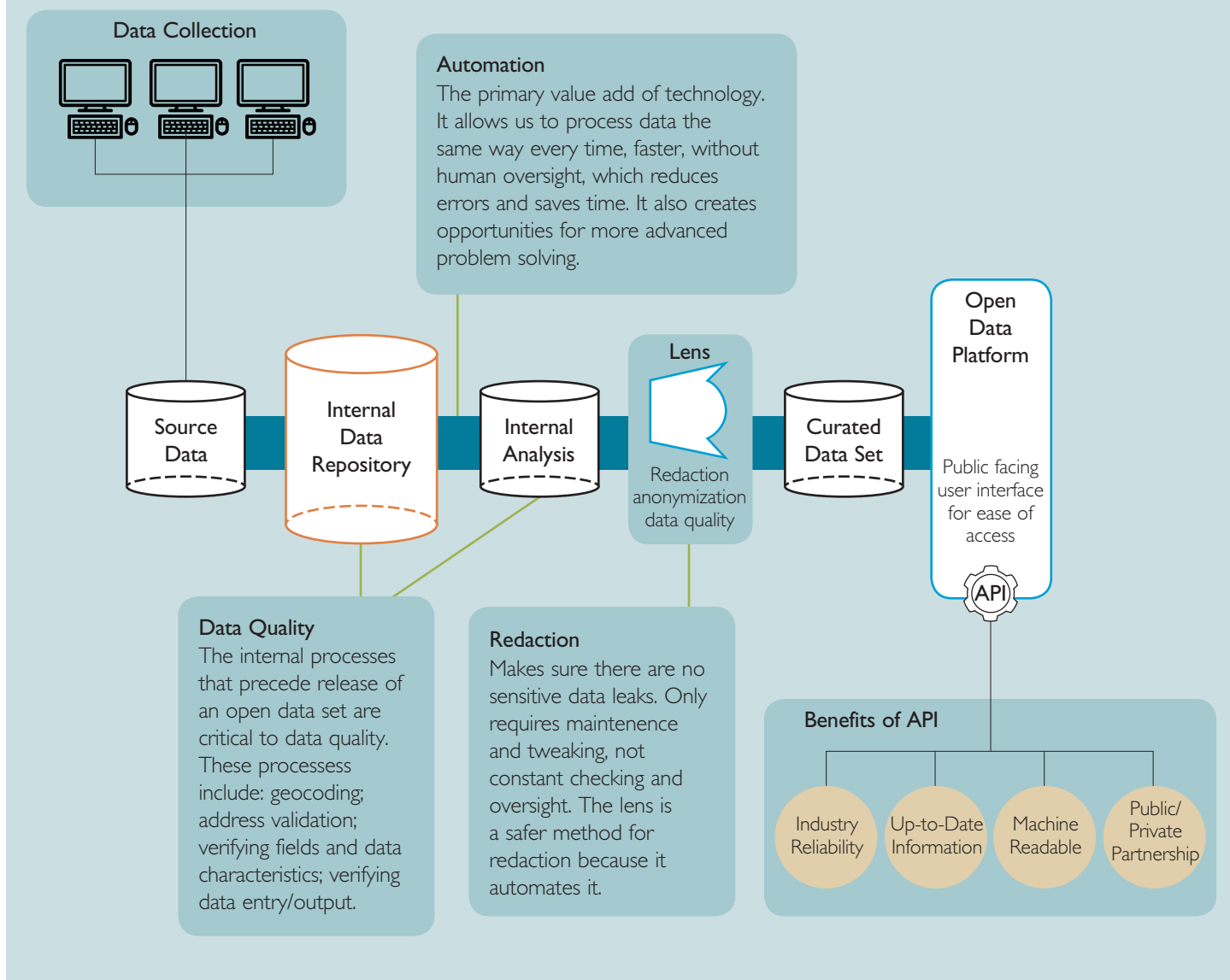
All the components of the master data management capability need to be aligned with the mission, vision, and priority goals of the enterprise. Then, data management can help drive the organization's performance management efforts and innovation initiatives to optimize transparency and community engagement while generating operating and service delivery efficiencies. Alignment can be achieved through a strategic planning exercise that yields no more than five priority goals. Strategy should be laser focused.

Every enterprise-wide initiative needs an executive sponsor, someone who is from the highest level of the organization and who believes in the power of data. The executive sponsor will need to fight for sufficient funding and resources, help break through silos, and keep the effort going until it's complete — and then ensure sustainability.

This effort will require the government to do things differently, including working more seamlessly across all departments, so change management is critical. Effective change management strategy and tactics help in maintaining



## Exhibit 2: Cincinnati's Data Management Model



calm, trust, and communications. The strategy and plan should be flexible and responsive to situational dynamics. Start planning for change before starting the master data management initiative to ensure readiness and preparedness. The executive sponsor will be helpful here.

Don't underestimate the relevance of data governance, a process that reflects discipline and alignment with the government's priority goals.

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Data governance makes it possible to consistently produce timely and reliable data. Master data management is a dynamic process that requires constant tracking, monitoring, and measuring to keep up with the data requirements of its employees and its external stakeholders. Data governance allows the government to identify, capture, manage, and disseminate data, and to establish data management business rules.

Establish a means of measuring the program's success and impact. A list of some things that can be tracked includes:

- How master data management allows for the optimization of collaboration across the organization.
- Cost avoidance and savings.
- Customer satisfaction ratings.
- Insights that have led to innovation.
- Service delivery breakthroughs.
- Community engagement breakthroughs.
- Staffing and resources management impacts.
- Impact as a crime prevention and crime-fighting tool.
- Impact as a tool for creating healthy communities.

## CONCLUSIONS

Master data management is the foundation that makes data analytics and predictive analytics possible. If implemented correctly, it can be a powerful tool that helps governments work smarter, faster, and with greater transparency. Establishing a master data management capability does not have to take forever — with commitment, it can be done within a window

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of six to ten months. As a tool, master data management makes it possible for an organization to hone in on what matters most instead of wasting time on things that aren't important. Master data management can help organizations innovate and solve service delivery and operational problems that might have been intractable before; it also optimizes an organization's collaborative capabilities and allows for greater connectivity between governments and the people they serve. ■

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