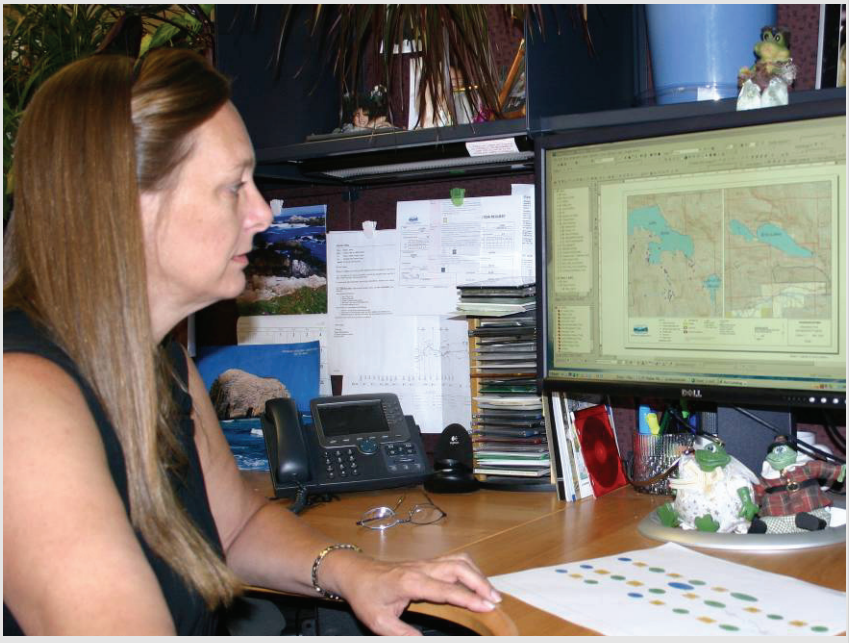
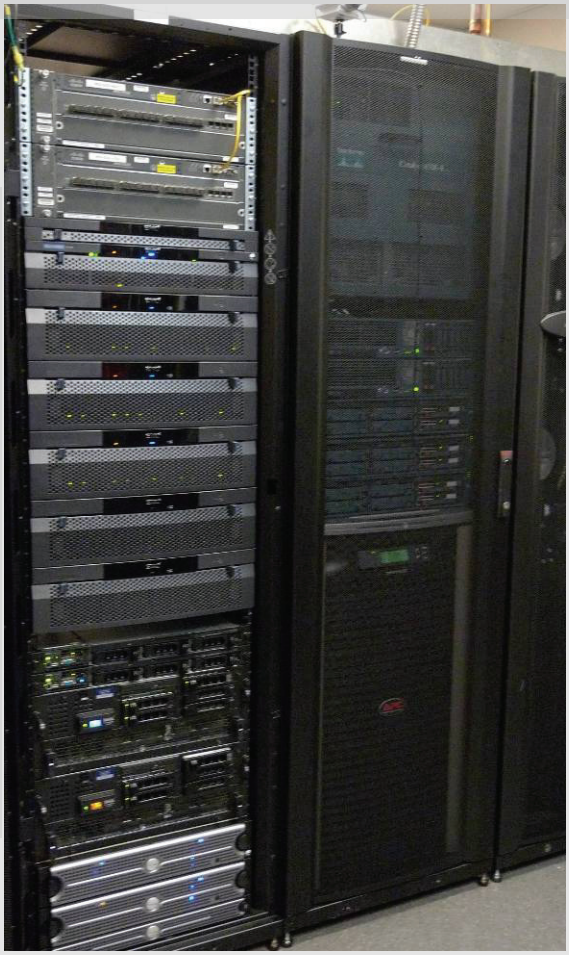
Information Technology Master Plan

Building the base for continued reliable service and products





El Dorado Irrigation District

Serving people, agriculture, businesses and the environment since 1925

Information Technology Master Plan

Building the base for continued reliable service and products

June 2009

El Dorado Irrigation District
2890 Mosquito Road
Placerville, California 95667

Tel. 530-622-4513 or 916-965-0930
www.eid.org

CONTENTS

Executive Summary

The Information Technology (IT) Master Plan is the guide for solidifying the District's existing, sound investments in information technology and moving ahead with improvements that will ensure continued delivery of reliable services and products.

The plan recognizes strengths in the District's commitment to the important role of information technology in relation to improved business practices.

- Creation in late 2008 of an IT department and department head-level position.
- Acquisition of a number of appropriate technical solutions through investments in major information technologies.
- Hiring and development of competent and certified IT staff to administer and maintain the IT infrastructure.
- Extremely efficient and flexible IT infrastructure of virtualized servers, networks, storage, and telecommunications that many agencies are still aspiring to attain.

The plan also identifies a series of strategic business challenges facing the District that are familiar to many water and wastewater agencies.

- Higher customer expectations.
- Continued improvements required by regulatory agencies.
- An aging water and wastewater system infrastructure.
- A changing and aging workforce.
- Budget constraints.

And the plan addresses findings related to information technology from the 2008 Westin report, "The Comprehensive Management and Organizational Assessment."

- Lack of sufficient staffing to perform key functional roles
- A need to integrate information technology with business practices
- IT projects with a departmental versus District-wide focus not clearly linked to overall District business objectives
- Inadequate funding for IT projects

Strategies and programs

The District's IT Master Plan creates the bridge between business strategies and the information systems that support them. It highlights the business priorities for information technology and the strategies and initiatives that will be required in future years to execute the plan.

The following strategies listed in the plan are intended to address the District's business challenges.

1. Adopt a District-wide approach to business process improvement.
2. Establish a District-wide performance management program.
3. Implement District-wide work and asset management systems.
4. Adopt District-wide project management processes.
5. Implement a District-wide business intelligence system.

6. Implement a District-wide content management system.
7. Implement a District-wide, enterprise-class geodatabase.
8. Expand the use of mobile computing solutions.
9. Maximize the use of the District's IT infrastructure technologies.

To put the strategies into action, the plan defines the following nine programs, or business focus areas, and describes the commitment to program "owners" that is required for success.

1. Standards and Governance
2. District Wide Asset Management
3. Maintenance Management
4. Regulatory Compliance Management
5. Records Management
6. Operations Optimization
7. Customer Service and Billing
8. Performance Management and Business Intelligence
9. IT Infrastructure

2009-2010 course of action

Projects within the programs have been prioritized for 2009 and 2010. Management decisions regarding prioritization for the remaining projects will be aided by the improvements implemented in 2009 and 2010.

The primary goals and strategies for 2009-2010 follow.

- **Organize a tactical transformation team comprised of department heads and program "owners" and put the team to work.**
    - Identify, task, and develop one or more business analysts to own each IT program.
    - Identify, assign, and develop employees representing key functional areas of enterprise applications, infrastructure, and IT programs to learn and apply concepts of technical project management.
    - Acquire consulting expertise and/or develop staff skilled in the concepts and execution of data management and business intelligence to perform and administer this critical information technology function.

- **Obtain meaningful information to make decisions.**
    - Remove management and technical impediments to improve the District's use of Hansen work orders in accounting for planned and unplanned staff action.
    - Fully execute the Hansen Development Services project to retire the HTE system and provide resource and work flow management tools for the engineering department.

- **Develop lasting fixes.**
    - Develop IT-related governance protocols and processes to ensure that information technology acquisitions and implementation follow a structured methodology going forward.
    - Use business process analyses to help implement and guide continuous process improvements in District-wide deployment and use of business applications.

- Develop a SCADA Master Plan to direct investments and actions to improve reliability and functionality of this critical operational system.
- Implement sound disaster recovery and security technologies.
- Continue support of the engineering department's integrated water modeling project—an element of the integrated water resources master planning process—as the business initiative to pilot development of:
    - the conceptual, logical, and physical data models required to thoroughly and properly establish the structure of the District's geodatabase, and
    - implementation of ESRI's ArcGIS technologies for full management of geospatial data, including data capture, data editing and quality assurance, data analysis, and data viewing for distributed assets such as water distribution lines and wastewater collection lines.

Estimated budget

The plan includes an estimated five-year budget of $13,970,000 that was developed by Westin Engineering consultants familiar with the District's existing IT baseline and goals and with the cost of similarly sized efforts implemented by other utilities.

The following table summarizes the IT capital improvement program over the five-year span and shows the annual expense as a percentage of the total.

PROGRAM	2009 Planned	2010 Planned	2011 Planned	2012 Planned	2013 Planned	2009-2013 Total
IT Master Plan CIPs	1,420,000	1,400,000	4,400,000	2,900,000	3,850,000	13,970,000
Percentage of 5 year total:	10%	10%	31%	21%	28%	

It is important to note that establishing an accurate budget for the IT Master Plan at this time is challenging for a number of reasons. The most significant variable is determining to what degree the District's own personnel can provide expertise in a variety of roles versus the amount of professional consulting required to either coach those functions or perform specialized tasks. A second challenge is determining how much information technology funding is already present in the planned and approved capital improvement projects of other departments and, as important, how much is not.

* * * * *

The recommended IT strategies, programs, and projects in the plan are aligned with the business strategies, goals, and objectives of the District. They account for the District's existing information technology strengths. And they encompass not only required information technology investments, but also the creation of functional roles, processes, and controls that do not exist at the District today but are essential in moving the IT Master Plan forward and attaining the benefits it identifies.

In the end, information technology is a cornerstone of the District's overall efficiency and effectiveness. The pace and degree of improvement in IT systems and functionality, along with increased ability of staff to use IT effectively, bears directly on the District's overall capability to maintain and improve service and product delivery.

District staff extends appreciation to the consultants at Westin Engineering who aided in the development of this initial IT Master Plan. Westin played a major role in conducting assessments, identifying needs, and helping to define the elements in this document.

Background

Challenges

The impetus for the IT Master Plan stems from a series of strategic challenges at the District, similar to those facing most public utilities today. They include:

- higher customer expectations (better service, safety, and value),
- continued improvements mandated by regulatory agencies,
- aging water and wastewater system infrastructure,
- a changing—and aging —work force, and
- budget constraints.

In addition, the "Comprehensive Management and Organizational Assessment" (the 2008 Westin report) concluded that the District is not realizing the full value of its investments and resources for the following reasons.

1. The District lacks sufficient staff to perform key functional roles such as applying and leveraging information technology across the agency that will lead to improved business processes and sustain continuous improvement, identify key business performance metrics to base decisions on, and instill best practices for managing information technology investments.
2. Information technology alone does not solve business problems or improve efficiency. There is a need to integrate the technology with business processes and train staff to maximize results.
3. Information technology projects under-delivered on functionality and over-ran budgets and schedules, largely because they were implemented with a departmental versus District-wide focus and lacked a clear linkage of the projects with specific District business objectives.
4. Projects lacked adequate funding levels to implement and/or sustain the information technologies and systems they introduced or affected.

These challenges represent a serious risk to the District's ability to continue to effectively fulfill its mission, vision, and goals.

Strengths

In meeting these challenges, the District's Board and management have committed to strategic responses that include:

- streamlined workflows that reduce and eliminate paper-based processes,
- integrated and unified approaches to performing the services the District provides,
- seamless integration of the District's internal and external business environments, and
- changes in the way the District performs key functions such as asset management, operations management, and customer service management.

The District also created the Information Technology Department and the department head-level position of Information Technology Director, which was staffed full time beginning in late February 2009 with a proven IT leader who has extensive experience in the delivery and application of

technology to meet business needs. The director is accountable to deliver the leadership and technical solutions that will fulfill the District's mission, vision, and goals.

Furthermore, the assessment of the District's existing information technologies and current personnel affirmed prudent investments and recognized strengths in several technology areas.

- The District has acquired a number of appropriate technical solutions through investments in major information technologies such as Great Plains, Hansen, ESRI, and WonderWare.
- The District has several competent, experienced employees capable of providing District-wide support for a number of the existing information technology investments.
- The extremely efficient and flexible IT infrastructure of virtualized servers, networks, storage, and telecommunications is a differentiating strength. The District is several years ahead in this technology area, with a solution in place that many agencies are still aspiring to attain.
- The District has wisely chosen and standardized a number of leading infrastructure solutions, including Microsoft, Dell, EMC, and Cisco, that have a broad base of support and robust technical certification programs in place.

The IT department has hired and developed competent and certified IT staff to administer and maintain the IT infrastructure.

Purpose of the Master Plan

Master plans are a proven, best-practice approach used by many forward-thinking water utilities to focus and steer large and complex undertakings. The District's IT Master Plan creates the bridge between business strategies and the information systems that support them. It highlights the business priorities for information technology within the District and the strategies and initiatives that will be required in future years to execute the plan. Overall, it identifies a strategic approach to information technology—carefully aligned with the District's business objectives and pragmatic actions, planned or under way, that are needed to achieve the strategic goals.

The IT Master Plan is a living document that will be revisited periodically to account for evolving business priorities, technology changes, industry best practices, and other influences on the District's information technology future.

Mission, Vision, and Guiding Principles

IT Department Mission

The purpose of IT is to enable businesses to operate faster, better, and more cost efficiently. While information technology continues to evolve, its purpose remains constant and is reflected in the IT department mission statement:

> **Provide timely, relevant, and accurate information, when and where it is needed, to support sound decisions that improve the quality, efficiency, cost, safety, and environmental footprint of the products and services the District delivers and uses.**

IT Department Vision

Simply put, the underlying vision needed to accomplish the department's mission is:

> **Turn data into information and information into action.**

Guiding Principles

To achieve the goals and implement the strategies in this plan, the ten guiding principles below focus on leadership and excellence through quality of service, responsiveness, innovation, professionalism, and teamwork. These principles require commitment not only from the District's IT professionals, but from all District employees, including the management ranks and policy-makers.

1. Drive IT initiatives according to business needs, goals, and objectives, and develop a sound business case before making any new investment.
2. Foster interdepartmental cooperation in everything we do.
3. View IT from the perspective of the entire agency and not from the perspective of individual departments.
4. Acquire, manage, and use technology resources economically and efficiently through standardized information technology selection and implementation processes.
5. Securely hold and manage technology assets to protect private information.
6. Develop mechanisms and processes to share information easily within the organization and with customers and partners.
7. Understand that availability and access to technology is a given, and design and build systems accordingly.
8. Aggregate, where feasible, to reduce duplication, and employ information technology that is flexible and interoperable to respond quickly and efficiently to changing business needs.
9. Devise strategies to leverage investments in the District's existing technology.
10. Train the workforce in the skills needed to effectively use IT systems and the information they contain.

Goals and Strategies

Immediately after the May 2008 Westin report was received, the District launched improvement efforts that resulted in the creation of the "2009-2013 Strategic Guide," which consists of goals and strategies related to four core areas—customers, employees, finances, and business practices. Information technology spans all four of the core areas, serving as an important element of the integrated approach to achieving many of the identified outcomes that are emphasized in the guide. Goals in the guide can be summarized broadly as business objectives for information technology delivery in the following categories.

- Business practices
- High-quality, responsive services to District customers
- Effective management of growth at the District
- Management to achieve standards prevalent in the utility industry and implementation of performance benchmarking to support improvement efforts
- Effective and efficient management of infrastructure assets and equipment
- Meeting regulatory requirements for water quality, capacity planning, effective management, operational reliability, and efficient maintenance
- Effective and efficient coordination with other utilities, agencies, outside contractors, and developers
- Expansion of employee knowledge to improve productivity and decision making and support their career development

To address the role of information technology in helping to achieve these business objectives, the plan identifies nine strategies, categorized and described below under business process improvement, data management, and technology.
The strategies also reflect the recommendations of the IT master planning process and were generated from consideration of the District's top business priorities and industry best practices. In essence, they fill gaps at the District that were identified when measured against best practices.

Each strategy contains strategic goals, objectives—or actions that will meet the goals—and a list of benefits expected from achieving the goals. Emphasis is on:

- use of technology to improve the quality customer service, internally and externally;
- use of technology to provide cost-effective service to internal and external customers;
- use of information management technologies and methods to improve decision support;
- delivering the right information in a timely manner to managers and staff regardless of where they are located;
- monitoring, supporting, and managing the District's operations in the plants and the field using appropriate technology;
- providing the information needed for business performance benchmarking; and
- turning the concept of teamwork into reality through the use of technology for communication, coordination, and decision support.

A. Business Process Improvement Strategies

Strategy 1: Adopt a District-wide approach to business process improvement

Goals

- Streamline business processes through effective implementation and integration of information systems across the District, including cross-departmental business processes associated with facilities asset management, planning and budgeting, purchasing, and regulatory reporting.
- Use the identified IT programs and projects as opportunities to review and re-design District business processes with consideration of the best practices provided by modern business applications.
- Maximize the District's valuable investment in business applications to drive business process improvements.
- Ensure cross-departmental collaboration to achieve the greatest value possible from investments in IT business systems.

Objectives

- Identify a department head sponsor for each of the nine IT programs in this IT Master Plan to ensure the program area has the appropriate support and resources necessary to achieve the goals.
- Identify, task, and develop one or more business systems analysts for each IT program to serve as subject matter experts in providing technical support of applications, information standards, business processes and procedures, and a bridge between users and IT staff.
- Use continuous process improvements to guide and implement business process analyses and attain optimal use of business applications.
- Execute a District-wide systems integration approach that uses core water/wastewater utility applications in conjunction with web technologies and decision-support software tools as appropriate to streamline business processes and make information widely available.

Benefits

- Elimination of silos through shared knowledge, integrated workflows, and collaborative support.
- Improved District business performance as measured by key performance indicators.
- Improved quality of service to external and internal customers.
- Improved knowledge management (the capture and sharing of knowledge).
- Improved value of IT initiatives—research has consistently demonstrated a higher return on investments for IT initiatives that have an organizational, rather than a departmental, focus.

Strategy 2: Establish District-wide performance management

Goals

- Formulate a District business performance plan by establishing enterprise-level key performance indicators and linking them with the District's business strategies.
- Integrate departmental business plans and performance metrics within the District's strategic plan.
- Formulate business process performance metrics and link those to the District's key performance indicators.
- Extend the value of existing business applications through integration with enterprise-class decision support applications that are founded on modern business intelligence and data warehousing technologies.

Objective

- Use business intelligence technologies deliver relevant decision-making information via business performance applications, including performance management dashboards.

Benefits

- Improved business performance.
- Improved business and operational reporting and analysis; corporate and government studies indicate 20 to 25 reports can be eliminated for each dashboard view developed for a manager, thereby improving productivity.

Strategy 3: Implement District-wide work and asset management

Goals

- Establish a District-wide asset management program to drive improvements in asset management throughout the District.
- Use the Hansen Asset System, in conjunction with GIS, to deploy applications that support the asset management program.
- Automate key District workflows associated with construction projects, maintenance tasks and projects, operations programs, IT projects, and more.

Objectives

- Deploy asset management applications using integrated, mobile applications built with Hansen Asset System and GIS.
- Deploy work and asset management applications throughout all District facilities and in the field, using mobile technologies and wireless connectivity.
- Integrate data from SCADA systems (through SCADA Historians) with Hansen Asset System to automate preventive scheduling triggers and asset failure analyses.
- Automate the transfer of project-specific and work order-specific labor to electronic timekeeping for payroll purposes, thereby improving the efficiency of tracking overall work time.

Benefits

- Elimination of manual data entry and duplicate data entry and processing.
- Improved life-cycle asset management.
- Improved financial control and visibility of costs associated with management of the District's plant and field facilities; case studies demonstrate significantly improved accuracy and timeliness using modern, enterprise-class asset management applications.
- Improved work management; for example, use of enterprise work and asset management systems have been shown to significantly reduce wasteful activities and improve productivity by as much as 40 percent.

Strategy 4: Adopt District-wide project management

Goal

- Adopt a District-wide approach to implement and perform project management, including standard District project management practices and governance systems.

Objectives

- Identify, assign, and develop staff representing major functional areas in the District to learn and apply concepts of technical project management.
- Implement Microsoft Project Server to support project planning, task management, resource loading, milestones, and inter-project dependencies.
- Use Hansen Asset System work management applications to formulate, track progress, and report on project work packages.

- Integrate existing construction project management practices with CIP management practices through integrated data and applications.

Benefits

- Improved management of project tasks that cross departmental lines or involve several departments for success.
- Avoid duplication of effort regarding the implementation of project management practices and systems.
- Enable sharing of project management knowledge and practices, thereby reducing the time and resources needed to train new project managers.
- Enterprise project management approaches, as opposed to departmental approaches, result in consistently superior project performance.

B. Data Management Strategies

Strategy 5: Implement District-wide business intelligence systems

Goals

- In addition to systems dedicated to data collection and transaction processing, implement decision-support systems (commonly referred to as business intelligence systems).
- Implement methods for widespread sharing of upcoming decision needs, decision making processes, and decision results.
- Provide support for continuous improvement initiatives through business intelligence applications focused on business-process performance measures.

Objectives

- Acquire consulting expertise and/or develop staff skilled in the concepts and execution of data management and business intelligence to perform and administer this critical technology function.
- Develop KPIs for core business processes such as asset management, operations management, maintenance management, construction project management, customer service management, personnel resource management, and financial management.
- Implement reporting applications to support standard District reporting requirements, including regulatory reporting, Board reporting, financial reporting, and performance management reporting.
- Implement analytical and statistical applications to automate the calculation and trending of metrics associated with organizational performance.
- Establish an online, intranet-based, District-wide guide to identify primary data sources, derived data, dataset versions, and data owners to ensure that critical information is used accurately and efficiently. Include guidelines for correct use of the data in reports and in decision making.
- As appropriate, consolidate isolated databases such as desktop Excel and Access applications currently being used by staff and supervisors to assemble decision support data for cost projections, budgeting, operations, and rate forecasting.

Benefits

- Improved ability to analyze issues and problems associated with District operations.
- Enable benchmarking to other utilities and agencies to encourage new ideas for improvements and to validate existing efforts.
- Improved ability to formulate long-range plans and budgets.
- Improved capture of the knowledge of District staff.
- Reduced number of isolated, decision-support databases scattered across various departments and work groups.
- Reduced use of manual, paper-based processes to support decision making.

- Improved productivity of decision makers, including supervisors, managers, and executives. Utility industry case studies have demonstrated that enterprise-class business intelligence systems reduce analysis and reporting efforts by nearly 50 percent, primarily through the elimination of duplicate efforts, inaccurate data, paper-based reports, and data reconciliations.

Strategy 6: Implement District-wide content management

Goals

- Improve the distribution and accessibility of documents throughout the District, especially engineering drawings, GIS maps, permits, and electronic forms.
- Improve the District's focus on content and document management and the value that those bring to the District in relation to the streamlining of business processes and facilitation of decision making.
- Use Microsoft Sharepoint Portal to upgrade the District's intranet website.

Objectives

- Expand the use of the District's existing electronic records management system to address District needs for electronic forms management, GIS integration, regulatory and legal records management, CIP project management, and operations documentation management.
- Implement electronic forms to streamline business processes, including the processes for engineering project authorization, new service connections, personnel management, and Board transmittals.
- Consolidate or integrate the District's electronic records management systems to provide ready access to electronic documents, records, electronic forms, and data via the District's intranet.
- Link relevant documents to specific field assets through GIS.
- Publish plant as-built drawings through an integrated District-wide content management solution (Sharepoint Portal integrated with the District's existing records management system).

Benefits

- Improved efficiency and productivity, especially through decreased reliance on paper and paper-based business processes.
- Support for efforts to move from reactive to proactive mode with regard to decision making, thereby improving management productivity and producing better decisions.
- Reduced time required to locate, assemble, format, and report information.
- Reduced time required to reconcile information that is located in various documents and forms.

Strategy 7: Implement a District-wide, enterprise-class geodatabase

Goal

- Implement a centralized, District-wide geodatabase to manage all of the District's geospatial information.

Objectives

- Implement ESRI's ArcGIS technologies for full management of geospatial data, including data capture, data editing and quality assurance, data analysis, and data viewing for distributed assets such as water distribution lines and wastewater collection lines.
- Develop the conceptual, logical, and physical data models required to thoroughly and properly establish the structure of the District's geodatabase.
- Link the District's geodatabase to business applications such as asset management and customer service to enable visualization of location status.

Benefits

- Improved efficiency and productivity for field staff needing to locate project activities, maintenance activities, easements, and customer premises.
- Improved decision making using geospatial views.
- Improved timeliness and quality of data captured in regard to assets and facilities and maintenance activities.

C. Technology Strategies

Strategy 8: Expand the use of mobile computing solutions

Goals

- Use mobile computing solutions to help streamline business processes, especially those associated with remote field work such as facilities maintenance, construction inspection, and pretreatment/industrial waste monitoring and compliance.
- Attain more consistent and rapid decision making by personnel on field assignments.
- Capture valuable personnel knowledge about the status and history of District water and wastewater system infrastructure.

Objectives

- Select and implement mobile computing solution(s) appropriate to needs.
- Expand the use of Hansen Asset System and SCADA Systems through mobile computing solutions appropriate to various District business needs for inspections, maintenance, and operations.
- Implement field (on-site) GPS mapping and tracking capabilities and establish procedures for GPS mapping.
- Implement field and plant bar-coding capabilities as part of mobile computing solutions to enable more rapid and efficient capture of specific assets being deployed, including meters, valves, pumps, motors, pipes, and more.
- Using a mobile computing solution, deploy applications to improve support for asset/facilities data capture, field inspection of construction, and dispatching of maintenance crews.
- Ascertain the most appropriate means of mobile connectivity to effectively and efficiently support mobile computing initiatives throughout the District.

Benefits

- Improved efficiency and productivity; for example, a reduction in "windshield time" for field maintenance staff.
- Improved decision making by field maintenance staff, construction inspectors, and maintenance crew dispatchers.
- Improved timeliness and quality of data captured in regard to assets and facilities and maintenance activities.

Strategy 9: Maximize the use of the District's IT infrastructure technologies

Goals

- Fully use the proven capabilities of District technologies for networking, data storage, and transactions processing.
- Drive enhanced business applications deployment through the foundation of the District's IT infrastructure.

Objectives

- Continue to maintain and invest in End-User and Core Computing technologies as appropriate for performance, capacity, and efficiency.

- Implement sound disaster recovery and security technologies.

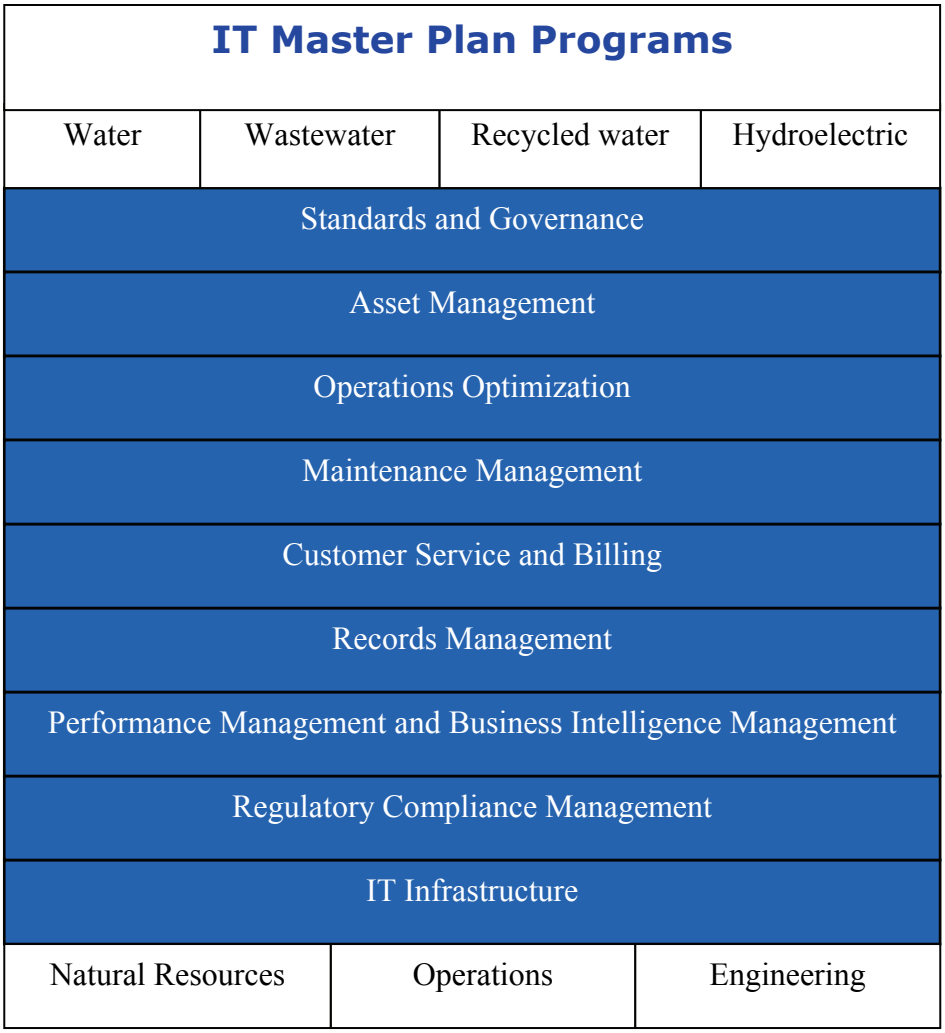
Benefits

- Unified business and operational management throughout the District.
- Provide a reliable foundation for all information management and decision support throughout the District.
- Improved efficiency of operations and maintenance of information technologies.

IT Programs

Success of the IT Master Plan requires that the plan's goals and strategies are turned into real operational efficiencies. The plan incorporates nine programs, or business focus areas, that span organizational silos (see the chart below). For more information, see Appendix A (Description of the IT Master Plan's Nine Fundamental Programs).

Each program is aligned with the plan's goals and strategies and, importantly, creates end-to-end ownership of the policies and practices that manage workflow and ultimately drive the daily activities of most District employees.



The programmatic approach points to the need for program "owners"—a key change in the way the District manages and aligns business processes. The program owners can and should exist in a variety of departments across the organization. However, they also answer to a department head sponsor who has responsibility over both the programs and an integrated set of projects that are managed by teams according to best-practice standards and supported by expert consultants as needed.

The lack of program owners at the District is one reason why the District has failed to realize the full value and effectiveness from its IT investments, as noted in the Westin report. It is also a crucial stumbling block in achieving operational excellence at the least cost.

Westin Engineering compared the District's practices with best industry practices and identified performance gaps in the District's business processes and information technologies. The following text discusses projects in each program area that are required to fill the gaps and attain the District's key business strategies.

IT Program: Standards and Governance

The purpose of this program is to establish the foundation of standards and District management team governance over those standards and their effective application. Each of the defined IT

projects within this program will implement applications for tracking standards and governance practices and processes within the District.

- **Asset Management Standards and Governance –** With industry best practices as a guideline, establish the standards for asset management data, systems, and practices.
- **Program Management Standards and Governance –** With industry best practices as a guideline, establish the standards for managing critical IT and engineering programs and projects, including standards associated with data, systems, and practices.
- **Records Management Standards and Governance –** With industry best practices as a guideline, establish the standards and governance for records management data, systems, and practices, including organizational responsibilities with regard to records stewardship.

IT Program: District-wide Asset Management

District-wide asset management projects provide support for the management of water, wastewater, and electric power generation facilities and equipment, including support for efforts associated with the upgrade, repair, and replacement of plant (vertical) and field (horizontal) facilities. The establishment of an asset registry—a database of all District assets—will provide the foundation for all future enhancements to CIP and refurbishment and replacement planning initiatives. IT projects in this category are listed below.

- **Asset Management Database Design and Conversion –** Design and implement a database of all District utility system assets, including both plant and field facilities. Convert and migrate all existing asset data into this database that will address regulatory requirements for a utility asset registry.
- **Asset Data Maintenance Tools** – Develop and implement the processes and data management software tools for editing and maintaining asset data, which links all asset data collection, asset data quality assurance, and asset data utilization efforts going forward.
- **Property Management Applications** – Develop and implement the applications needed to manage District properties, including rights of way for utility facilities.
- **Distributed Assets Modeling** – Implement the software applications needed to model and analyze the performance of the District's existing and future utility system facilities.

IT Program: Maintenance Management

Maintenance management projects are focused on enhancing and extending the value of the District's existing Hansen applications for both in-plant (vertical) and field (horizontal) facilities.

- **Field Maintenance and Inspection Applications** – Implements mobile applications for enabling District personnel in the field to maintain and inspect (for regulatory purposes) all distributed District assets such as pipelines, hydrants, customer connections, and more.
- **Treatment Plant Maintenance and Inspection Applications** – Implements applications for maintenance and inspection of assets within District treatment plant and pumping station facilities.

IT Program: Regulatory Compliance Management

- Regulatory compliance projects are directed at supporting the management of all District regulatory activities.
- **Laboratory Information Management System (LIMS) Upgrade** – Upgrade or replace the District's LIMS to support water quality data management, from collection through analysis and reporting.

IT Program: Records Management

The records management projects improve the electronic management and control of District records, forms, drawings, and other business and project documents. IT projects in this category are listed below.

- **Enterprise Records Management System Enhancements** – Upgrade and extend the existing electronic records management system to address District needs with regard to the management of "content" residing in records, documents, drawings, and forms; implement access to asset-related documents via GIS views; streamline workflows associated with forms routing and approval; establish and automate records archiving and retention policies.
- **Records Conversion** – Puts in place the equipment, protocols, and practices to convert relevant District paper records into electronic formats appropriate for use with the District-wide records management system.
- **Information Portal Enhancements** – Links the District's existing Sharepoint Portal System with the electronic records management system to improve the ease of access to District documents and records.

IT Program: Operations Optimization

This program is directed at extending the value of the District's SCADA systems to improve operations management capabilities.

- **SCADA Master Planning** – Formulates tactical and strategic action plans for applying enhanced SCADA capabilities for District operations management and optimization.
- **SCADA Enhancements** – Implements the enhancements recommended by the SCADA Master Plan.

IT Program: Customer Service and Billing

Customer Service Projects are focused on improving the District's ability to service the needs of its water and wastewater customers. IT projects in this category are listed below.

- **Development Services Management** – Develops and implements an application to manage the development services process within the District.
- **Customer Service and Billing System Upgrade** – Upgrades the District's existing Hansen Utility Billing applications.

IT Program: Performance Management and Business Intelligence

The projects within this program support the District's financial and business performance management activities. These projects implement an enterprise business intelligence system for the District, which provides the applications needed to support decision-making processes, including applications for planning, budgeting, forecasting, analysis, and management reporting. IT projects in this category are listed below.

- **Operations Data Integration** – Provides a secure means of accessing operations data from SCADA, LIMS, and other sources for operations trend analysis and reporting and enables data sharing among operations, engineering, and other District units.
- **Financial Management System Upgrade** – Upgrades the District's existing Microsoft Dynamics GP financial management suite of integrated applications such as general ledger, accounts payable, accounts receivable, fixed assets, project costing, purchasing, and others.
- **Human Resources Management and Reporting Applications** – Implements applications to improve management of personnel benefits, payroll, recruitment, and other human resources management activities.

- **Management Analysis and Reporting Enhancements** – Provides a suite of integrated applications for management analysis and reporting of all District business operations.

IT Program: IT Infrastructure

IT infrastructure projects provide the foundation for protecting and securing critical District information and for all District computing initiatives. IT projects in this category are listed below.

- **IT Security Enhancements** – Establishes the plans, polices, and procedures required to ensure IT security and the protection of critical District information.
- **Disaster Recovery / Business Continuity Planning and Preparation** – Formulates and implements the practices, processes, and systems for addressing the District's need to effectively recover from disaster and continue to deliver critical utility services to its customers.
- **End-User Computing Enhancements** – Provides the required, ongoing upgrades and replacements to the end-user equipment such as desktops, laptops, and printers.
- **Core Computing Enhancements** – Provides the required, ongoing upgrades and replacements to the District's core IT infrastructure elements that include wide-area networking, local-area networking, servers, and data center equipment and environmental controls.

Action Plan and Implementation Budget

2009-2010 Course of Action

With a wide range of needs and opportunities identified in the IT Master Plan and the District's "2009-2013 Strategic Guide," as well as in individual department project lists, there is a need to prioritize initiatives and stay on course. This section serves as a recommended strategy to achieve success by focusing on the few actions over the remainder of 2009 and through 2010 that will provide the most benefit and the best information to make additional decisions.

The approach is to remain on task with the selected actions until they are consistently working effectively, then take a careful look for the next, most significant opportunity or need and develop a plan to achieve and sustain it, and finally to apply the required resources to bring it under control.

At the core of this strategy is the assembly of a transformation management team comprised of program owners aligned to department heads. This tactical team will have sufficient depth and leadership to take actions on multiple key objectives simultaneously. Each of the actions and objectives will be managed as a technical project with defined criteria for success, documented action plans, visibility in all steps of the process, and the capturing of successful examples and skills learned during the process.

The tactical team is expected to devise and include long-term solutions as an integral part of fixes for the identified problems. After several formerly unmanageable problems become examples of permanent solutions, the tactical team uses the successful examples and skills learned to educate others in the organization on how to duplicate the success.

At this point, the program owners shift their focus toward constructing the governance, controls, and processes that codify the positive momentum created and continue to deliver incremental improvements and refinements to the initial solutions.

The District will need to invest time and effort to develop new leaders who can sustain the positive solutions and launch new improvements. The turn-around process outlined here can take a number of years, but it is a predictable and proven path for success.

2009 Objectives

Organize the tactical team and put it to work

- Identify a department head sponsor for each of the nine IT programs in the IT Master Plan to ensure the program area has the appropriate support and resources necessary to achieve the goals.
- Identify, task, and develop one or more business analysts for each IT program to serve as subject matter experts in providing technical support of applications, information standards, business processes and procedures, and a bridge between users and IT staff.
- Identify, assign, and develop staff representing major functional areas in the District to learn and apply concepts of technical project management.
- Acquire consulting expertise and/or develop staff skilled in the concepts and execution of data management and business intelligence to perform and administer this critical information technology function.

Obtain meaningful information to make decisions

- Remove management and technical impediments to improve the District's use of Hansen work orders and account for planned and unplanned staff actions. Currently, 20 percent of operations staff time is being captured in work orders compared to a reasonable target of 75 percent to 80 percent. The lack of effective management tools to provide accurate reports must be overcome.

- Fully execute the Hansen Development Services project to retire the HTE system and provide resource and workflow management tools for the engineering department. The District currently lacks a comprehensive view of the projects that engineers are working on as well as a mechanism to evaluate and prioritize all projects and determine those representing the highest return value to the District.

Develop lasting fixes

- Develop IT-related governance protocols and processes to ensure technology acquisitions and implementations follow a structured methodology going forward, including IT department engagement at the outset of a project to make certain that technology components are fully accounted for in the project's scope and value proposition.
- Use business process analyses to help implement and guide continuous process improvements available through the District-wide deployment and use of business applications.
- Develop a SCADA Master Plan to direct investments and actions to improve reliability and functionality of this critical operational system.
- Implement improved disaster recovery and security technologies.
- Continue support of the engineering department's integrated water modeling project—an element of the integrated water resources management planning process—as the business initiative to pilot development of:
    - the conceptual, logical, and physical data models required to thoroughly and properly establish the structure of the District's geodatabase and
    - implementation of ESRI'S ArcGIS technologies for full management of geospatial data, including data capture, data editing and quality assurance, data analysis, and data viewing for distributed assets such as water distribution lines and wastewater collection lines.

2010 Objectives

Obtain meaningful information to make decisions

- Develop performance metrics and standards for core business processes such as asset management, operations management, maintenance management, construction project management, customer service management, personnel resource management, and financial management.
- Establish an online, intranet-based, District-wide guide to identify primary data sources, derived data, dataset versions, and data owners and ensure that critical information is being use accurately and efficiently in trend management. Include guidelines for correct use of the data in reports and in decision making.
- Implement reporting applications to support standard District reporting requirements, including regulatory reporting, Board reporting, financial reporting, and performance management reporting.
- In the fall of 2010, revisit the IT Master Plan and update it for 2011-2015.

Develop lasting fixes

- Begin implementation of the SCADA Master Plan.
- Implement electronic forms to streamline business processes, including the processes for engineering project authorization, new service connections, personnel management, and Board transmittals.
- As appropriate, consolidate isolated databases such as desktop Excel and Access applications currently being used by staff and supervisors to assemble decision support data for cost projections, budgeting, operations, and rate forecasting.

- Continue to maintain and invest in End-User and Core Computing technologies as appropriate for performance, capacity, and efficiency.
- Implement Microsoft Project Server to support project planning, task management, resource loading, milestones, and inter-project dependencies.
- Continue to base and prioritize actions on factual data and significant opportunity

Looking Ahead

Until the 2009-2010 initiatives are in place and providing meaningful information for decision making, there are far too many variables and unknowns to accurately prioritize the remaining IT projects in a sequence that ensures the maximum benefit is achieved in the shortest period of time. Because the IT Master Plan is a living document and its implementation also delivers continuous improvement methodologies, following through with 2009-2010 actions will serve the District in prioritizing projects in 2011 and beyond.

Implementation Budget

Implementing the IT Master Plan carries a cost. An estimated budget has been developed for each major program area and placed in the District's 2009-2013 capital improvement program (CIP). The estimated budget, which totals $13,970,000 over five years, was developed by Westin Engineering consultants familiar with the District's existing information technology baseline, the information technology goals of the District, and the cost of similar-sized efforts implemented by other utilities.

Typical water utility IT capital project budgets range from 6 percent to 10 percent of the utility's overall capital improvement spending. Utilities spending on the high end of this range are generally playing catch-up after periods of low IT investment. Utilities spending on the low side of the range are generally sustaining their technology investments. Given that the District has made a number of sound investments in information technology over the past several years, has some successes to show for those investments, and has made information technology an important element in the future of the District, the IT Master Plan budget estimate is based on a conservative figure of 4.7 percent of the 2009-2013 CIP.

The IT Master Plan advocates a gradual, information-driven approach to expand and extend IT investments, using factual information and leveraging existing investments to the fullest before making new expenditures. This approach is also reflected in the estimated budget placed in the 2009-2013 CIP. The following table summarizes the IT CIPs over the five-year span and shows the annual expense as a percentage of the $13,970,000 total.

PROGRAM	2009 Planned	2010 Planned	2011 Planned	2012 Planned	2013 Planned	2009-2013 Total
IT Master Plan CIPs	1,420,000	1,400,000	4,400,000	2,900,000	3,850,000	13,970,000
Percentage of 5 year total:	10%	10%	31%	21%	28%	

It is important to note that establishing an accurate budget for the IT Master Plan at this time is very challenging for a number of reasons. The most significant variable is determining to what degree the District's own personnel can provide expertise in a variety of roles versus the amount of professional consulting required to either coach those functions or perform specialized tasks. Some critical roles in the IT department require skills not currently present in the District (see the nest section, Organizational Structure). A number of IT program areas require ownership and new skills to develop and sustain them. And a significant amount of District asset information must be collected and verified from the field—including the geospatial coordinates that require specialized tools and skills.

A second challenge is determining how much information technology funding is already present in the planned and approved capital improvement projects of other departments and, as important, how much is not. This level of detail is currently not tracked and reported; therefore, a mechanism for doing so must be developed and activated. Various departments in the District have funded numerous technology purchases, typically as part of a project. Such department-initiated technology projects largely fail to account for the full cost of the underlying layers of technology and the support required to fully implement and sustain them. This means the IT department must seek funding for servers, storage, and network upgrades at a later date to fill the gap in planning. One of the first steps the IT department will take under the IT Master Plan is coordination with the finance department to establish governance in both the CIP planning and purchasing processes to fully account for information technology costs in projects submitted by all departments.

Organizational Structure

The existing IT department provides the foundation, with a few changes, to fulfill the basic information technology support needs of the District and deliver the benefits identified in the IT Master Plan. The following describes the general structure of the IT department's teams under the plan and identifies needed organizational changes.

Desktop Support

The existing team of three IT technicians is primarily involved in IT-run activities (see Appendix B for explanations of plan, build, and run). This group is responsible for meeting the day-to-day user needs for IT services across the District. Currently, desktop support employees repair, maintain, and manage user–facing elements of IT, including workstations, user accounts and permissions, printers, and phones. Under the IT Master Plan, their role will be expanded to also provide basic support of enterprise software applications. Typically, these employees will spend about 60 percent to 80 percent of their time fulfilling user requests for service and diagnosing problems. The balance of their time will focus on recurring work to manage expensed IT services such as cellular data, Blackberrys, and telecommunications lines and circuits or in support of IT projects.

Infrastructure Support

The team of three system administrators provide plan, build, and run support of the District's IT computing and network systems. Two existing IT analysts in the department manage servers, storage area networks, local and wide area networks, and the telephone system. Responsibilities for the SCADA communications network, a private radio network, and programmatic logic control equipment will move to this team with the transfer of an employee from the operations department who is currently performing this work. This move will create the integrated team whose skills and responsibilities match those identified in the systems section of Appendix C.

Enterprise Application and Database Support

The team of four application administrators and a database administrator provide plan, build, and run support of the District's enterprise software applications and databases. Currently, the team is comprised of two IT analysts, one of whom supports the Hansen Computerized Maintenance Management System and will continue in this role. The other analyst previously supported the HTE system that is about to be decommissioned. Upon the employee's retirement this summer, the position will be refilled and emphasis placed on responsibilities for administering transactional SQL databases, with skills in data management and business intelligence to create District-wide primary data sources, consolidate isolated databases and assemble decision support data for cost projections, budgeting, operations, and rate forecasting.

Responsibilities for support of the ESRI Geographic Information System (GIS) will move to this team with the transfer of an employee from the Drafting/GIS unit. Two additional application administrator positions—the WonderWare SCADA System and Great Plains Financial Information System—are required, but not currently approved for hire. Of the two, the SCADA administrator is the most essential. Responsibilities for additional enterprise applications serving more specialized functions such as human resources, records management, integration services, business intelligence, and modeling will also be distributed across this team.

The lack of an integrated team of application administrator professionals is a primary reason for the Westin report findings that the District lacks sufficient staff to perform key functional roles to leverage and managing information technology investments; that information technology projects under-delivered on functionality and over-ran budgets and schedules; and that IT projects lacked adequate funding levels to implement and/or sustain the information technologies and systems they introduced or affected.

Other Changes

A final change to the current IT department is the transfer of the remaining Drafting/GIS unit to the engineering department. These employees research and produce maps and technical drawings for the District. The change will lead to improved efficiency and to better integration with the workflows that the employees support.

Benefits

The IT Master Plan provides the guiding principles and a strategic road map for the District. It highlights the business priorities for information technology and the strategies, resources, and IT projects that will be required over the next five years to execute the plan. Although the IT Master Plan is a new approach for this District, other utilities have successfully planned and implemented integrated technologies for information management and business process improvements using a similar approach.

The following benefits are among those that have been achieved by other utilities through the successful execution of IT Master Plans.

Improved productivity

- Reduced time and effort needed to capture information such as data associated with underground assets.
- Reduced time and effort required to locate, analyze, and report information.
- Reduced administration, freeing staff for more complex tasks.
- Improved ease of use; an example: remote deployment of asset and maintenance management applications to field personnel.

Improved external and internal customer service

- Improved exchange of information among District business units, enabling a more timely response to external and internal customer requests.
- Improved responsiveness in handling customer service requests, issues, and concerns.
- Quicker turnaround on requests for information by customers, District managers and staff, and other utilities and governmental agencies.
- Faster service hand-offs among District business units; example: timely completion and distribution of as-built drawings.

Improved decision support

- More rapid decisions, especially regarding issues related to customers, operations, maintenance, and asset management.
- Reduced submission errors, thus leading to improvements in the quality of data.
- Reduced data losses and fewer document misplacements.
- Improved ease of data accessibility.
- Improved ease of performing trends analysis such as for business and financial planning.

Improved value for District technology investments

- Improved integration of systems and applications, enabling the streamlining of business processes.
- Improved information quality and accessibility for all District personnel.
- Improved performance and use of existing systems.
- Lowered maintenance and support costs for purchased information technology.

Improved positioning of the District for future change

- Enables the District to deliver new or expanded services should management decide to do so.
- Allows the District to adopt more flexible and adaptable technologies.
- Improved ability to cope with the pace of technological change.
- Improved value of performance benchmarking to aid trend management.

Appendices

Appendix A. Description of the IT Master Plan's Nine Fundamental Programs

Standards and Governance

Standards and governance establish the foundation for the success of all other information management and technology initiatives. Included is the identification of critical organizational roles for data governance, data stewardship, application ownership, implementation sponsorship, and all of the critical standards associated with modern information technology management such as IT services delivery, IT project management, disaster recovery, data protection, and others. In addition, standards and governance include the standards associated with modern records management and modern asset management, both of which have undergone significant expansions in recent years through international initiatives that have also involved water/wastewater utilities.

Asset Management

This practice focuses on a number of critical business functions—asset identification and evaluation, maintenance management, work order response, and tax depreciation—within a water utility. The fundamental assumption is that everything within the utility can be assigned a value and therefore impacts the overall financial health of the organization. Asset management begins with the identification of assets and their financial valuation. This allows an organization to assign accurate values to its structures, facilities, equipment, customers, information, systems, employees, and so forth through a variety of financial analyses. The valuation establishes a baseline that can be tracked and analyzed relative to the organization's business strategies and goals. It also provides the basis for asset capitalization and asset maintenance life-cycle planning, which in turn is used to derive and estimate the total cost of ownership for any asset within the organization.

End-to-end management of water system assets and the generation of solid return-on-assets performance are no longer possible without the extensive use of a number of well-integrated information systems, including capital budgeting management, construction project management, maintenance management, and others.

Maintenance Management

This practice focuses on the management of labor and materials associated with the ongoing maintenance of District facilities and equipment. Maintenance management processes and applications are closely linked to overall asset management. Applications for maintaining field assets such as pipelines, hydrants, valves, and connections are deployed through mobile computers to maintenance supervisors in the field and include GIS views of the location of customer premises, facilities, and crews (for dispatching). An effective maintenance management program is essential to ensure that the District achieves a solid return on its investments in utility system facilities and equipment. Maintenance management practices and applications include work-order management, inventory management, preventive maintenance scheduling, job plan development and publication, safety certification tracking, and crew assignments. The information captured through maintenance management applications, especially the labor and materials costs applied to maintaining assets, is used by District management for asset management, activity costing, engineering, and operations planning.

Regulatory Compliance Management

This practice ensures that appropriate attention is paid to water quality, public health, and environmental regulations. Being effective at this in the information age requires that a water utility

provide personnel with adequate information management tools to respond rapidly to situations that could compromise compliance.

Records Management

This practice is associated with the management of and regulatory requirements for tracking and accessing the wide variety of critical records associated with modern utilities. Included are records associated with Board actions, District property management, personnel management, financial reporting, regulatory reporting, permitting, construction project management, and others.

Operations Optimization

The practices associated with operations optimization, including operations planning and scheduling, are a large part of modern water and wastewater utilities operations. Utilities today are challenged by so many competing demands such as water quality, energy management, chemical costs, and environmental concerns that utility operations can no longer be managed without the support of information systems that automate aspects of operations planning and scheduling. This includes information systems such as SCADA, operations data management, work and asset management, geospatial data management, and mobile workforce management, among others. To continuously improve utility operational efficiency, it is essential that facilities and people are efficiently scheduled and the costs of the activities of both facilities and people are measured and compared to efficiency improvement targets. As viewed by the water/wastewater industry, solid information technology is necessary to this task.

Customer Service and Billing

This set of practices focuses on three critical business functions: acquiring and engaging customers, responding to customer service requests and other inquiries, and billing and receiving payments for the services provided to customers. Information in all three areas must be carefully recorded, integrated, and immediately available to customers and their service representatives. Water and wastewater utilities have recognized the value of customer call centers dedicated to providing the best possible customer service in these critical business functions. And with the advent of e-Business and e-Government, customers are increasingly seeking ways to interact with their utilities through the Internet, including electronic bill presentment and payment through Internet banking sites.

Performance Management and Business Intelligence

This practice recognizes that effectiveness and efficiency are the most important factors guiding all activities of a modern water/wastewater agency. An organization that strives to improve must first ensure its stakeholders that it can operate effectively and then work to achieve the best operational efficiency feasible. These challenges demand that business management principles be applied to the operation of a utility, including the development of a business strategy and the establishment of links between information systems and the business strategy.

Once consistent and sustainable operational effectiveness has been accomplished, the District can focus on achieving higher levels of operational efficiency, creating a two-pronged role for information technology. First, the need to support the establishment of new performance targets and the management activities required to achieve those targets. Second, the need to provide the information that business groups throughout the organization need to achieve their individual performance targets.

Another set of useful information is associated with decisions regarding the construction and management of facilities and equipment, which is measured by various performance metrics—including return on assets (ROA). Utilities, which have relatively large capital investments in facilities

and equipment, especially find that ROA is an essential means of measuring long-term business effectiveness and efficiency.

IT Infrastructure Management

This practice uses a centralized group with oversight of the acquisition and implementation of all information technology within the District. This group ensures that any new systems are compatible with the District's information technology vision and architecture, and that the investments meet stated objectives. The group must also develop and maintain short- and long-term information system plans.

Appendix B. IT Organizational Model

Among the standard organizational models for IT departments, the prototype that best matches the needs of the District—now and into the future—is the "lean" model. In accordance with lean principles, IT department resources will be limited to those needed to sustain the District's core technologies.

One way to visualize an integrated, lean IT model is to compare it to a Formula 1 racing team. These teams build high-performing racing cars under the direction of expert crew chiefs and mechanics who thoroughly understand every major and minor system and component of the race car, along with best practices required to win. They identify characteristics the racecars must have and then build the cars from parts and assemblies acquired from manufacturers that specialize in high-end motor racing. By pairing the best technical crews with the best racing parts suppliers, applying the lessons learned from previous races, and investing long hours at test benches and on test tracks for fine tuning, on race day the car flies around the track at more than 200 miles per hour, serviced at trackside by the pit crew in a matter of seconds and running at top speed for hundreds of miles to complete and possibly win the race.

The essential elements of the successful Formula 1 teams can be summed up as plan, define, design, construct, operate, maintain, and replace —very similar to successful use of information technology assets in the lean model that defines the District's IT department.

Plan and Define

The District's Formula 1 team now has a crew chief, but is currently a few mechanics shy of having a complete team. For example, there isn't an expert mechanic for the engine (we lack a Database Analyst), suspension and steering (we lack a qualified SCADA analyst), and aerodynamics (we lack an analyst for Finance, HR and document management systems). Yet the clock is ticking towards race day and the race team owner (also known as the District) expects to not only have a car ready to race, but to finish the race and be competitive.

In IT terms, the planning function is a blend of skilled District IT staff working closely with our major technology consultants, systems integrators, and vendors to achieve success. Where required, the District will contract for expertise in specialized roles. This blended IT team – working in collaboration with District business groups – provides the best approach to ensuring that improvement opportunities are uncovered, effective solutions are selected and implemented, and business improvements are realized. In the define phase, the business case for solutions is completed, project charters are formulated, and resource commitments are finalized. This sets the stage for management approval to go forward with the project.

Once a defined project has been approved, the team can move forward to complete detailed design and planning, acquire the technical components for building the complete solution, and then initiate the construct phase.

Design and Construct

In the Formula 1 world, once the racecar's design is perfected, the actual construction of the car goes to specialized fabrication companies that can assemble the varied components to the standards and specifications of the design team. Throughout the process, the design team mechanics stay involved to keep watch over their responsible areas of expertise, ensuring fit, finish, and quality are maintained. They get involved during bench testing to ensure the required performance is being met for the subassemblies that can be tested at that time. Finally, the entire team of mechanics, along with key representatives from the fabrication team and manufacturers gather at the test track to ensure the entire racecar performs to specifications prior to race day. Unless a major problem is uncovered, the fine tuning adjustments are made by the racing team's mechanics and the car is ready to compete.

In IT terms, District IT staff and business departments alike will plan solutions and set standards that will allow all large and medium-sized technology projects to be fulfilled by skilled external consultants that represent a flexible, highly-trained, on-demand workforce. Small-sized information technology projects will be considered for execution by District staff on a case-by-case basis, but they come last in priority, behind all day-to-day operations obligations. Skilled consultants will fulfill specialized roles that supplement the available District employee skills on an as-needed basis for information technology projects.

IT and business departments within the District must partner to successfully implement information technology solutions that improve performance and efficiency. This requires shared accountabilities for constructing the different elements of business solutions. Infrastructure technologies – such as computers and networks – are the sole responsibility of the IT department to build, sometimes with assistance from skilled external consultants. On the other hand, the construction of integrated business software applications is the primary responsibility of the business units, with support from IT and consultants in terms of guidance on underlying technology standards. In partnership with IT, the business units are responsible to ensure skilled and effective delivery of the software application projects – on-time and on-budget and with applied best practices.

Once a project has been delivered into production use, it moves into the next set of phases.

Operate, Maintain and Replace

In the Formula 1 world, on race day the success or failure of the car depends on the effectiveness of the design and construction for the conditions of the track, the pit crew (IT Support Desk staff) to do routine maintenance of the car during the race to keep it in peak operating condition, and the skill of the driver (the business) to operate the car to the fullest of its capabilities. During the race, only subtle adjustments can be made to the car during pit stops. The crew chief and mechanics can build a very competent racecar for any given track. But the driver is a variable that either accentuates or negates the car's capabilities – making the difference between a first place finish, somewhere in the middle of the pack, or even crashed against the wall and out of the race (which could lead to a replace condition). The foundation of a successful racing team is the ability for the driver and support teams to communicate requirements, expectations, and results clearly and concisely well ahead of the race so that the car can be prepared exactly to the driver's liking and confirmed to meet expectations by race day. Then during the long, arduous race, the driver is on their own to make continuous and normally subtle adjustments on the track – braking, accelerating, and steering - to pass or avoid other cars. During pit stops, communications again come into play as the driver seeks to have the mechanics make adjustments to account for changing conditions on the track. Finally, after the race, the driver and mechanics debrief, reviewing what went well, what didn't, starting the planning process again with the changes needed over the next few days so that the car can be tested and confirmed ready for the next race one week away. These changes can

range from subtle preventative maintenance and operational tuning adjustments, to extreme, such as replacing the racecar, depending on the challenges faced.

Back in the IT world, District IT staff will focus their attentions to the continuous fine adjustments and recurring maintenance tasks that ensure the systems run optimally and reliably. Because they are working with highly integrated systems, every change – no matter how subtle – has the potential to break other essential functionality elsewhere in the system. Integrated systems require meticulous documentation and well-defined processes to test and validate major functionalities. Every change must be thoroughly researched and its impact understood before the change is made. Additionally, IT staff must contend with the layers of integrated hardware and software underneath the integrated application software – all of which requires periodic patches and service packs. Though nonessential change will be avoided, change is inevitable and large amounts of the IT staff's time will be spent understanding and anticipating how change will impact the unique combination of products and configurations used within the District, how the risks of change can be mitigated, and communicating this to various business stakeholders in plain English.

Many of these same considerations apply to the business departments in the District. Business processes are just as integrated as IT systems, and require careful consideration of the consequences before they are changed. Changes in workflows and business processes can also create impacts on the underlying information technologies that support them. Flexible information technologies can accommodate small changes in business process as normal tuning and require little to no action from the IT department. However, the business department must keep a close watch on the fine adjustments they are making (using KPIs) to ensure they are addressing the desired condition without creating unintended consequences (just as a racecar driver must keep their eyes on both the track ahead and their instrument panel to operate the racecar effectively and not leave it stranded on the track). More significant changes needed by the business bring us back to the joint planning phase, where in extreme cases, solutions must be replaced instead of repaired due to obsolescence, improper fit, or redundancy.

When there are lulls in the action, District IT staff will keep themselves educated on the latest information technology advances and sharpen best practice skills. They must also respond quickly to resolve unexpected problems, then invest many additional hours to understand what caused the issue, develop a course of action, and implement changes to prevent the possibility of recurrence. They will train and educate technical points of contact in departments and program owners on methods to improve efficiency and quality. They will jointly plan with the business departments to understand and assess requested changes, determining if the cost of implementing the change exceeds the proposed benefit, and seeking alternatives to achieve the improvement more economically.

Once a proposed change or mandated upgrade appears to have merit or appreciable benefit, it moves into the plan and design phase and starts the cycle over.

There is one significant difference between being an IT professional versus being a member of a Formula 1 race team. In today's business world, systems have to be continuously available, even during maintenance. Applied to the Formula 1 world, this means executing pit stops and changing tires while the car is still going 200 miles per hour around the track.

Appendix C. Roles and Responsibilities Related to IT

The following defines conceptual roles and responsibilities at the highest level between the IT department and the various other divisions, departments, and functions within the District in regards to the fundamental building blocks of information technology (systems, software, and data). Clear and more granular distinction of these accountabilities and rolls – including financial responsibilities - will come with the IT-oriented Administrative Practices and Standard Operating Practices that will be developed within the Standards and Governance Program.

Systems

The IT department owns and specifies the systems and technology that host the software and store the data, organize it, present it, and protect it. Further, the IT department owns the responsibility for these items across their entire life cycle, from inception to retirement.

There are instances where non-District owned information technology systems require access to District data, software and/or systems. An example is a business-to-business portal that allows District information to flow to a contracted third party to perform specialized services, such as the District's current agreement with DataProse to produce utility billing statements for the District's customers. In these situations, there is a shared responsibility between the IT department and each business area that needs access to District data, software and/or systems. The IT department is responsible to specify the standards and conditions upon which such access will be allowed while ensuring cyber security and operational needs are met, and the responsibility of the department desiring this access to justify it and manage their business partner.

Software

Software applications are a bridge between IT functions and business needs. As such, the ownership and specification of business software applications must be a shared responsibility between the IT department and each business area that gets beneficial use from the information and functions of a particular software application. Because breadth and importance of software applications within the District will vary widely, two distinct responsibility models exist – one for enterprise software and another for departmental software.

Enterprise software is described as a software application (like Supervisory Control and Data Acquisition (SCADA) System, Hansen Computerized Maintenance Management System (CMMS), ESRI Geographic Information System (GIS), and Great Plains Financial Information System (FIS)) serving users in multiple divisions and/or departments. The IT department is responsible for centralized management of enterprise software, performing functions including defining the architecture and standards; maintaining licensing, patching, releases, data dictionary, standardized reports, and integrations to other enterprise software and departmental software. Each business area that uses enterprise software is accountable to supply one to several technical liaisons responsible to define and apply policies and best practices for that software application's use within their domain. This is also the means by which suggested enhancements and improvements or functional gaps in technology are transmitted from the business function(s) into the IT department along with the corresponding business benefit or impact of addressing the need. This differs from an outage, where something that used to work no longer functions as specified.

Departmental software is described as a software application that will serve no more than a single department. In a truly integrated information technology environment, such single-purpose application software use is minimal, but it certainly can exist. One of the problems with software is that regardless of the number of users, there is a significant amount of professional IT resource overhead that is required to maintain each software application. Even though departmental software may benefit a single user, it still requires a defined architecture and standards;

maintenance of licensing, patching, releases, data dictionary, standardized reports, and integrations to other software for the life of the product within the District (generally three or more years for off-the-shelf software). Because of this significant overhead, the department using this software is accountable to fund the professional IT resources performing these maintenance functions until the software is either retired or replaced by functionality of enterprise software.

Data

Data has distinct ownership rights and properties. Data's life cycle follows the path of creation, modification and/or view, and deletion. The creator is recognized as the owner, who can then grant rights to others to view or modify. The creator is also accountable for defining when data can be deleted (based on relevant regulatory and governance standards that may apply). Generally, data ownership follows the organizational structure, so for example, finance defines the rights of others respective to the data it creates. Operations, engineering, human resources, etc., do the same. Aside from the data the IT department creates, the IT department's role is to advise and consult the business areas about ways to acquire the data, improve the quality, and put it to beneficial use as information.

Data dictionaries or catalogs are essential tools and processes required in the quest to turn data into information, and have shared accountability between IT and the business areas. The IT department is accountable for creating and maintaining the technologies that enable effective data management – including data location, source, owner, rights, and other metadata (characteristics that describe the data in business terms). The business areas are accountable for ensuring the accuracy and reliability of data collection and entry, specifying who has access rights to data, formulating appropriate metadata (business) descriptors for data elements, and appropriate use and interpretation of data in analyses and reports.

Compliance

Because of the comprehensive view that IT staff have of the quantity, quality, and applicable use of data as information, along with the software and systems supporting it, IT staff have an obligation to audit and call out exemplary, acceptable, and unacceptable conditions of data and technology use. In this role, IT staff act as the watchdog – however responsibility always remains with business management to act on the information provided.