Ministry of Water and Irrigation

IT ROADMAP FOR THE WATER SECTOR IN JORDAN

Prepared for
Water Governance Activity,
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EXECUTIVE SUMMARY

The Jordan water sector faces unprecedented **challenges in managing scarce water resources** while meeting **growing demand** across the Kingdom. The situation is particularly critical given the country's arid climate and dramatic population growth, which has surged from 7 million inhabitants in 2011 to nearly 12 million inhabitants projected for 2025. Current renewable freshwater resources stand at **approximately 90 cubic meters per capita annually**, significantly below the United Nations' water scarcity threshold of 500 cubic meters per capita per year.

To address this pressing supply-demand gap, Jordan has launched the **National Conveyor Project (NCP)**, its most ambitious strategic water infrastructure initiative to date. The project aims **to transport desalinated water from the Gulf of Aqaba to major population and agricultural centres** throughout the country, marking a transformative shift in water management. This national priority project is expected to revolutionize water supply infrastructure over the coming decades, notably enabling the transition from intermittent to continuous water supply in key areas such as Amman.

The proposed IT Roadmap will play a key role in supporting the NCP and broader sector objectives by creating **a comprehensive digital foundation across the entire water sector**. This is not just an IT program - it is a strategic transformation that will fundamentally enhance Jordan's water security and service delivery for generations to come.

The IT Roadmap will modernize core operational systems through standardized SCADA implementations, unified GIS platforms, and integrated ERP solutions. Advanced analytics and AI capabilities will optimize resource allocation and reduce water losses. Customer service will be enhanced through digital platforms enabling real-time communication and service management. The roadmap will guarantee system-wide interoperability and strong data governance by ensuring compliance with national data architecture standards, including metadata frameworks, taxonomies, and business ontologies that will facilitate efficient integration with other water systems and platforms, in particular with the centralized National Water Information System (NWIS) platform and national dashboards. It will also establish robust cybersecurity frameworks to protect critical infrastructure and ensure data quality across all entities.

Purpose and Outcomes

The proposed IT Roadmap charts an ambitious yet pragmatic path to establish Jordan as **a regional leader in smart water management by 2030**. Between 2025 and 2030, total investments amount to USD 157.6 million. Projects planned for 2025 are already funded or even completed, while the IT Roadmap focuses on the **five-year period from 2026 to 2030**, with targeted investments of **USD 153.6 million** to achieve four strategic objectives:

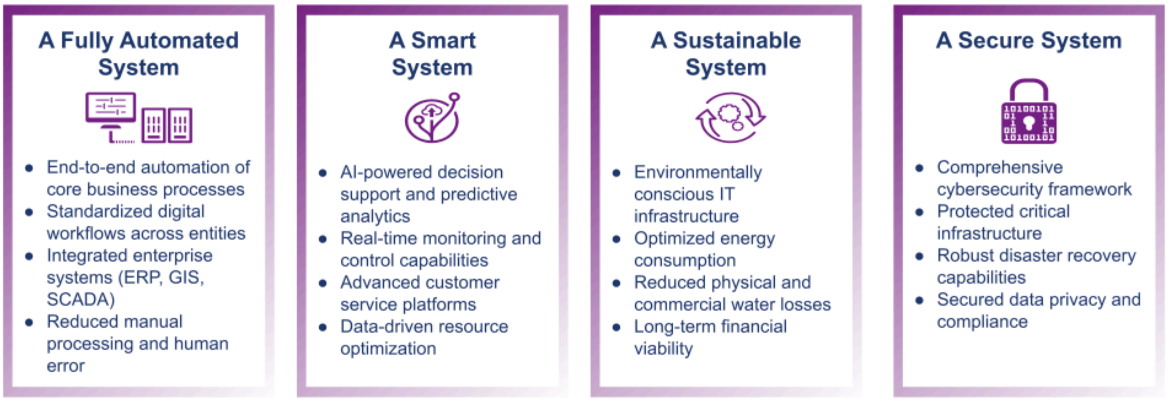

Figure 1: IT Roadmap Objectives

This transformation will deliver three key outcomes:

1. Improved water security through data-driven decision-making;
2. Enhanced operational efficiency and financial sustainability;
3. Better customer service for citizens.

To ensure successful implementation and sustainability, several critical success factors must be addressed:

- **Top Management Commitment:** endorsed by a monitoring and planning system utilizing KPIs, clear vision, and top-down commitment;
- **User Commitment and Employee Involvement:** supported by measuring users' utilization of core systems, linking to staff performance, training, and career development;
- **Clear Understanding of Requirements:** thorough mapping of legacy system functionalities and requirements to new systems, with continuous review based on business changes;
- **Practical Process Approach**: documentation and computerization of all processes to ensure tracking of business cycles and outcomes;
- **Continuous Improvement and Accountability:** following philosophy of ongoing enhancement while maintaining clear accountability for IT system operations;
- **Leadership Focus on Customer Service:** emphasis on improving satisfaction through fast, high-quality service delivery;
- **Fact-based Decision-Making**: decisions based on clear data and evidence, reducing human intervention through automation;
- **Effective Communication**: regular, clear communication to align stakeholders on shared vision and enable collective effort.

The roadmap **aligns with Jordan's Economic Modernization Vision 2033 and builds on existing investments from international partners**. With support from all stakeholders in establishing clear governance and securing necessary resources, its implementation can begin immediately, delivering tangible benefits within 12 months while building long-term capabilities for a water-secure future.

This report proposes a comprehensive IT Roadmap for Jordan's water sector, based on the assessment of the current state of digital maturity across all the water sector entities.

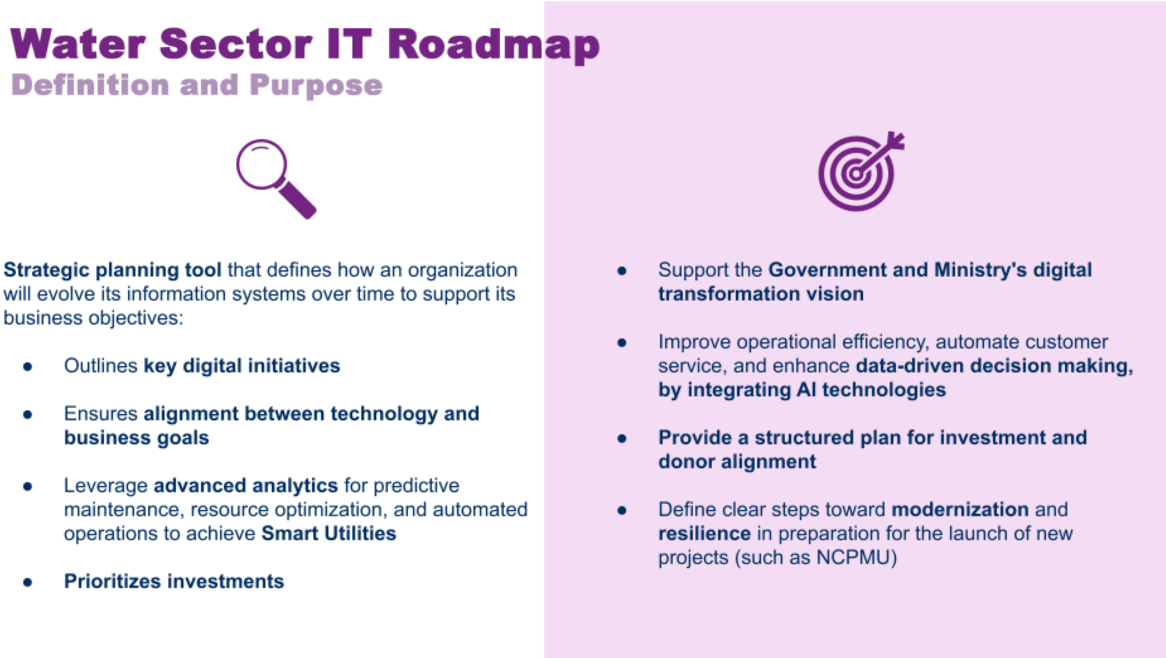

Figure 2: IT Roadmap - Definition and Purpose

Main Stakeholders

The assessment covered key stakeholders including MWI, WAJ, JVA and regional water utilities (Miyahuna, YWC, and AW), evaluating their existing systems, capabilities, and challenges.

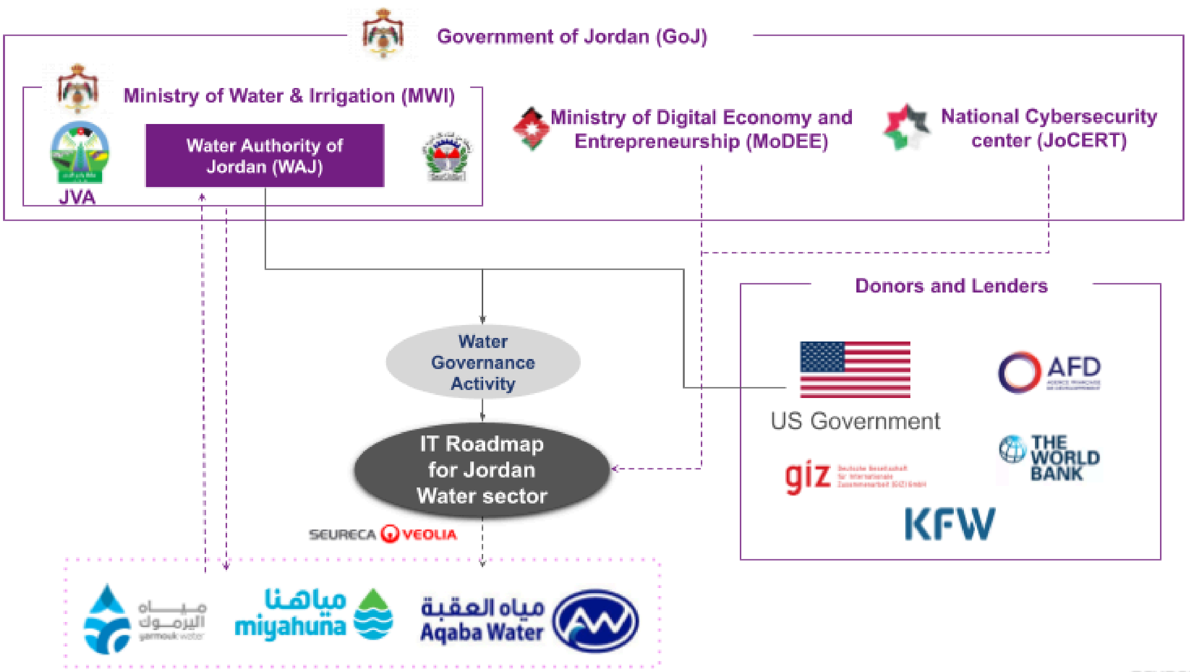

Figure 3: Simplified Stakeholder Organization

Key Findings

The comprehensive assessment conducted for this IT Roadmap reveals that while digital foundations exist, **the sector currently operates at about 50% of its digital potential**, with significant **disparities across entities** and **critical gaps in crucial areas including cybersecurity, data governance, and system integration**.

Key findings on the current state of digitalisation and data-based decision-making include:

- Varying levels of digital maturity across entities (50% average digitalization);
- Fragmented systems and limited integration;
- Critical cybersecurity vulnerabilities;
- Significant data quality and governance gaps.

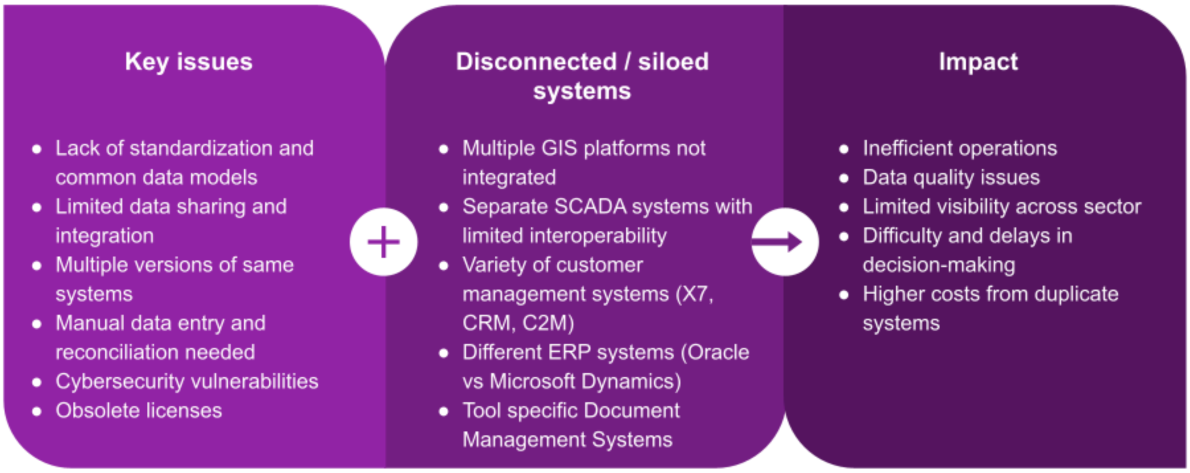

Figure 4: Key Assessment Findings

The roadmap proposes strategic initiatives aligned with national policies to enhance operational efficiency, service delivery, and data-driven decision-making through modernized IT infrastructure, integrated systems, and strengthened data governance.

Strategic Vision

Figure 5: Strategic Vision and Transformation Priorities for the Water Sector (2025–2030)

Main Initiatives

Major initiatives include:

- **IT infrastructure upgrades** to modernize hardware, networks, and connectivity across the sector;
- A **unified SCADA architecture** to ensure real-time monitoring and control of operational assets;
- A comprehensive **cybersecurity framework** to protect critical infrastructure and digital assets;
- Essential Business Applications, including:
  - **National Water Information System (NWIS)** enhancement and development as a central data hub for the sector,
  - **Enterprise GIS** for spatial data management,
  - **Integrated ERP** solutions for HR, finance, and procurement,
  - Customer Information and Engagement Platforms (e.g., **C2M**),
  - Work and Maintenance Information Systems (**WMIS**), among others;
- Strengthened **Data Management & Governance** to support data quality, ownership, accessibility, and informed decision-making across institutions.

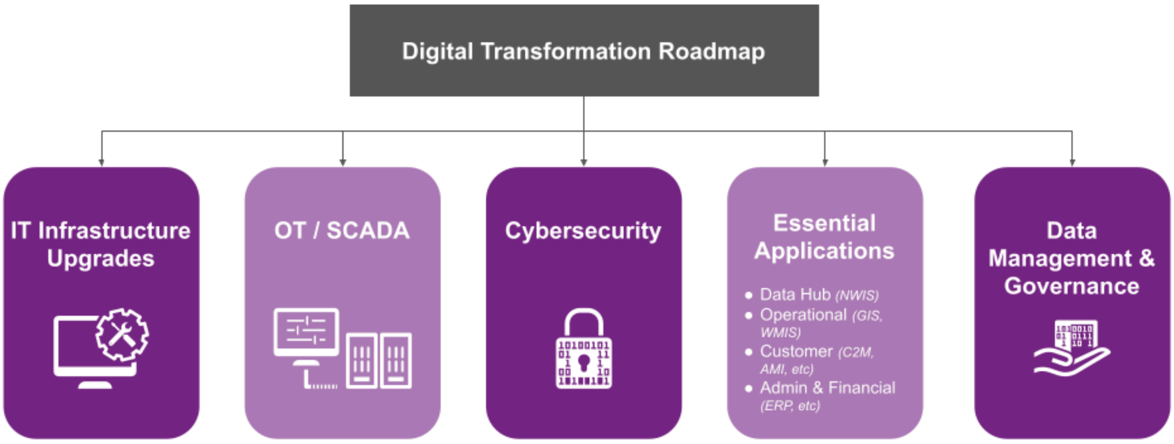

Figure 6: Main Packages Identified

The report provides detailed recommendations for implementation, resource requirements, and risk mitigation strategies to guide the sector's digital transformation over the next 5 years.

The implementation approach is structured as follows:

- Phased execution over 5 years;
- Dedicated governance structure with IT committee;
- Extensive capacity building and change management;
- Performance monitoring framework with defined KPIs.

The roadmap prioritizes immediate actions to address critical vulnerabilities while building long-term capabilities:

Near-term priorities (Years 1-2):

- Strengthen cybersecurity across all entities;
- Upgrade aging IT infrastructure;
- Establish data governance framework;
- Enhance NWIS as the sector-wide data hub.

Medium-term initiatives (Years 2-3):

- Deploy enterprise GIS solution;
- Implement unified SCADA architecture;
- Modernize customer service platforms;
- Develop advanced analytics capabilities.

Long-term transformation (Years 4-5):

- Enable AI-driven operations;
- Achieve full systems integration;
- Deploy smart metering at scale;
- Establish innovation capabilities.

The implementation of this ambitious IT Roadmap requires substantial investment, estimated at $153.6 million USD over five years. While several international partners — including the US Government (formerly through USAID), GIZ, Spanish Funding, UNICEF, and the World Bank — have already committed funding for specific initiatives, approximately **60% of the required budget (around $61 million USD in CAPEX)** remains unsecured. This figure only covers CAPEX and does not account for the additional $56 million USD in OPEX required to sustain and operate the system over time. This funding gap represents a critical challenge that needs to be addressed through diversified resource mobilization strategies and strategic partnerships.

The roadmap emphasizes practical approaches to maximize impact while optimizing resources. This includes encouraging joint initiatives between water sector entities to share costs and expertise, implementing a 'train the trainer' approach to build sustainable internal capabilities, and ensuring that all digital investments consider long-term operational expenses and maintenance requirements. Through these coordinated efforts and strategic resource allocation, the roadmap will transform Jordan's water sector into a digitally mature, efficient, and resilient system capable of meeting future water management challenges.

Focus on the National Water Information System (NWIS), the Water Sector Data Hub

The NWIS is intended to support water resource management, data collection, and information dissemination. However, systems and entities still operate in silos, limiting data integration and the ability to generate a unified sector-wide view.

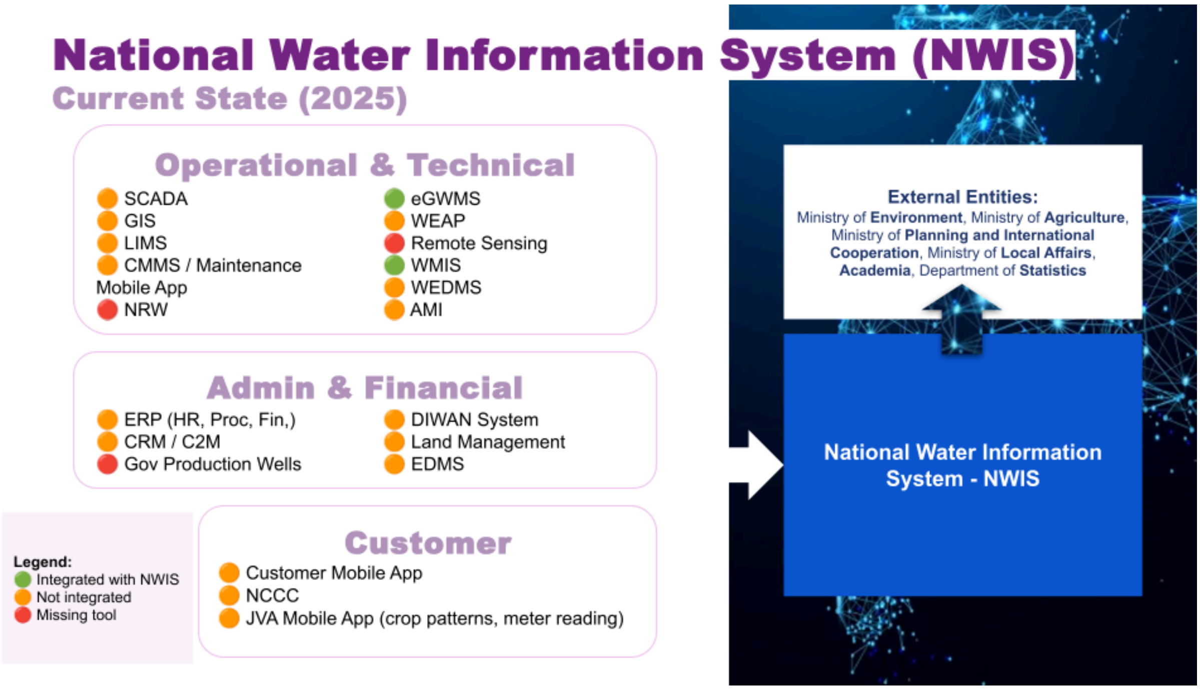

Figure 7: Current State (2025) of the NWIS Integration

The future NWIS will serve as the central nervous system of the water sector, integrating critical data streams to enable comprehensive water resource management and informed decision-making.

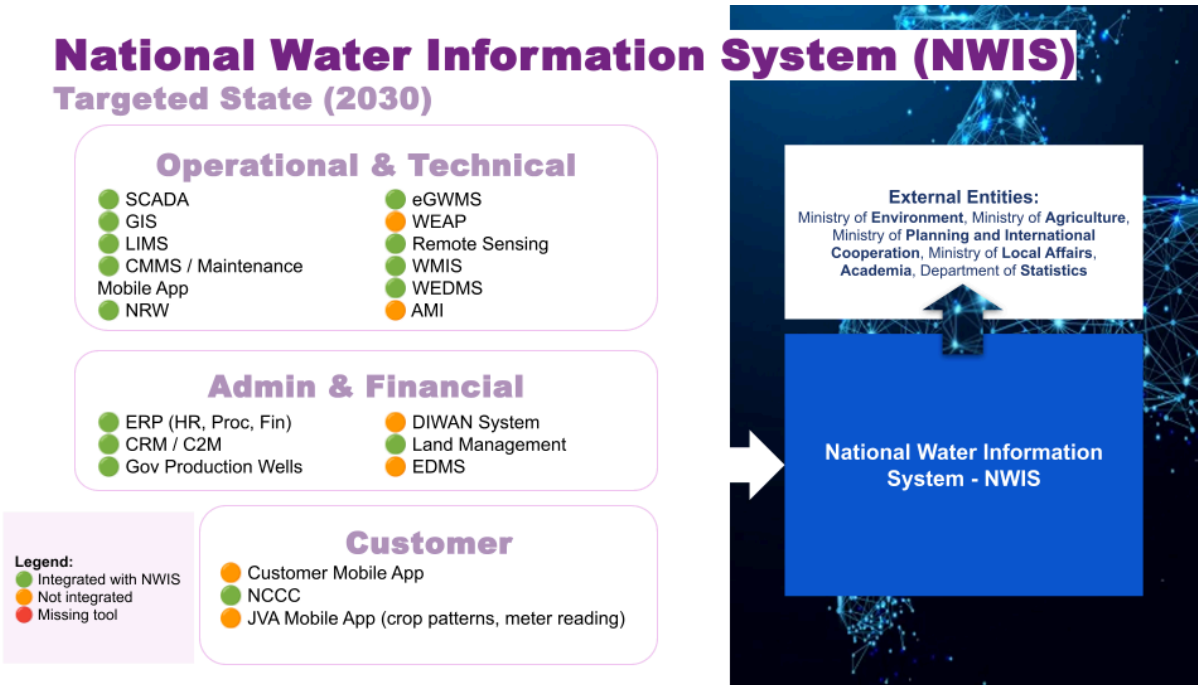

Figure 8: Target State (2030) of the NWIS Integration

Critical Success Factors

To ensure successful implementation, the sector will need to establish a **robust governance structure** led by the **Higher Committee** and the **Technical Committee**, with support from the **Technical Working Groups**. The Technical Committee, working closely with the specialized Technical Working Groups, will **coordinate implementation efforts across all entities. These groups will focus on key areas such as cybersecurity, data management, NWIS, GIS, and change management**. During the first 2–3 years, Technical Assistance will be crucial to provide international expertise, support knowledge transfer, and help manage the transition effectively.

In addition, the assessment has identified several critical guiding principles that must be followed:

- **Clear Role Definition**: Business units must lead information requirements and utilization, with IT providing technical support and enablement,
- **System Architecture**: Focus on integrated solutions rather than siloed systems, while minimizing customization to reduce complexity and maintenance costs,
- **Technology Strategy**: Strategically adopt cloud technologies in alignment with MoDEE policies, ensuring systems are scalable and sustainable,
- **Implementation Approach**: Take a holistic, sector-wide view through comprehensive planning, with clear requirements and success metrics defined upfront,
- **Sustainability Focus**: Build in measures for long-term sustainability from the start, including maintenance planning, training, and resource allocation,
- **Risk Management**: Recognize that technology alone is not the solution - change management, training, and process optimization are equally critical,

- **System Optimization**: Eliminate redundant systems and version fragmentation while ensuring compliance with intellectual property rights.

Adherence to these principles will guide decision-making throughout implementation to maximize the value and sustainability of digital investments.

DO	DON'T
• Ensure business units lead information requirements and utilization • Standardize systems and processes across entities where possible • Integrate solutions to enable data sharing and analysis • Build sustainability and maintenance into project planning • Set clear specifications and success metrics upfront • Take a sector-wide view in solution design • Validate compliance with national IT policies • Invest in change management and training	• Allow excessive customization of standard systems • Create new data silos or parallel systems • Implement technology without clear business requirements • Ignore long-term maintenance and support needs • Duplicate existing functionalities • Skip cybersecurity and data protection measures • Proceed without proper change management • Overlook intellectual property and licensing requirements

Next Steps

Communication

- **Communicate the roadmap with key stakeholders** (in particular with the government entities and donors)

Institutionalization

- **Higher Committee** leading the IT Roadmap *(already appointed)*
- **Steering Committee** coordinating the IT Roadmap implementation *(already appointed)*
- **Secure the funding** for the coming years' projects

Implementation

- **Form Technical Working Groups on specific work packages** *(cybersecurity, data management, NWIS, GIS, change management, etc)*
- **Implement the roadmap**, starting with: prioritized trainings (cybersecurity, etc), IT infrastructure upgrades, developing water sector standards (IT blueprint, cybersecurity, data governance, SCADA)

The IT Roadmap provides a structured path toward modernizing the sector's digital capabilities while ensuring long-term sustainability and security.

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ABBREVIATIONS AND ACRONYMS

AFD	Agence Française de Développement
AI	Artificial Intelligence
API	Application Programming Interface
ASEZA	Aqaba Special Economic Zone Authority
AW	Aqaba Water
BWI	Building Water Infrastructure
C2M	Customer to Meter
CAPEX	CAPital EXpenditure
CCNA	Cisco Certified Network Associate
CC&B	Customer Care and Billing
CMDB	Configuration management database
CMMS	Computerized Maintenance Management System
CRISP	Certified in Risk and Information Systems Control
CSPD	Civil Status & Passport Department
DAMS	Digital Asset Management
DLL	Dynamic-Link Library
DLS	Department of Lands and Survey
DMA	District Metered Area
DMS	Document Management System
DMZ	Demilitarized Zone network, a network not fully trusted by either side
DLS	Department of Lands and Survey
ECM	Enterprise Content Management
ERP	Enterprise Resources Planning
EOL	End Of Life
FARA	Fixed Amount Reimbursement Agreement
GFMIS	Government Financial Management Information Systems
GIS	Geographical Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GM	General Manager

GoJ	Government of Jordan
HMI	Human Machine Interface
HRMS	Human Resources Management System
HTTPS	Hypertext Transfer Protocol Secure
ICTD / ICTU	Information and Communication Technologies Department / Unit
IFIs	International Financial Institutions
IoT	Internet of Things
IS	Information System
IT	Information Technology
ITIL	Information Technology Infrastructure Library
ITSM	Information Technology Service Management
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
JOD	Jordanian Dinar
JONEPS	Jordan Online E-Procurement System
JVA	Jordan Valley Authority
KAC	King Abdullah Canal
KfW	Kreditanstalt für Wiederaufbau (Credit Institute for Reconstruction)
KPI	Key Performance Indicator
LIMS	Laboratory Information Management System
MCM	Million Cubic Meter
MoDEE	Ministry of Digital Economy and Entrepreneurship of Jordan
MoF	Ministry of Finance
MWI	Ministry of Water and Irrigation
NCCC	National Customer Complaint Center
NCP	National Conveyor Project
NRW	Non-Revenue Water
NWIS	National Water Information System
NWS	National Water Strategy
O&M	Operation and maintenance
OPEX	OPerational EXpenditure
OT	Operational Technology
PDA	Personal Digital Assistant
PDPL	Personal Data Protection Law

PLC	Programmable Logic Controller
PMU	Performance Management Unit
PMO	Project Management Office
PPP	Public-private partnership
PWD	Persons With Disabilities
QMS	Quality Management System
RDP	Remote Desktop Protocol
SCADA	Supervisory Control and Data Acquisition
SCC	Secondary Control central
SEMI	Smart Electronic Metrology Infrastructure
SG	Secretary General
SOP	Standard Operating Procedures
TIA	Totally Integrated Automation
TMG	Threat Management Gateway
UPMU	Utilities Performance Monitoring Unit
UPS	Uninterruptible Power Supply
URL	Uniform Resource Locator
USG	United States Government
USAID	United States Agency for International Development
VPN	Virtual Private Network
WAJ	Water Authority of Jordan
WEAP	Water Evaluation And Planning system
WEDMS	Water and Energy Data Management System
WGA	Water Governance Activity
WMIS	Water Management Information System
WU	Water Utility
WTP	Water Treatment Plant
WUA	Water User Association
WWTP	WasteWater Treatment Plant
YWC	Yarmouk Water Company

1 Water Sector Overview and Current State Assessment

Jordan is a water-scarce country with limited natural water resources, facing significant challenges from its arid climate and a growing population which has risen from 7 million inhabitants in 2011 to close to 12 million (11,844,408) in 2025. The renewable freshwater resources in Jordan are estimated to be around 90 cubic meters per capita per year, which is far below the water scarcity threshold of 500 cubic meters per capita per year set by the United Nations.

The **Ministry of Water and Irrigation** (MWI) oversees water management, supported by the **Water Authority of Jordan** (WAJ) and **three regional water utilities**: Yarmouk Water Company (YWC), Miyahuna, and Aqaba Water (AW). The **Jordan Valley Authority** (JVA) oversees the comprehensive development and management of water resources in the Jordan Valley. It focuses on their utilization for irrigated agriculture, domestic and municipal purposes, industry, and hydropower generation.

JVA is the exclusive institution responsible for surface water in the Jordan river valley and cooperates with WAJ in establishing and regulating public and private wells. It also participates in meeting the Kingdom's needs for drinking water in various governorates by providing not less than 30% of the required amount.

The Water Governance Activity (WGA), funded by USG, aims to improve the sector's sustainability through technical assistance and strategic development. An **Information Technology Roadmap project** was launched to enhance collaboration and data sharing among water entities, while also identifying potential investment opportunities for International Financial Institutions (IFIs).

Water Sector IT Roadmap - 2024

The water sector IT Roadmap document outlines Jordan's strategic approach to integrating digital technologies into the water sector to enhance governance, efficiency, and sustainability. Overall, the roadmap seeks to modernize the water sector by leveraging digital technologies to support better decision-making, optimize resource management, and build resilience against future challenges.

Figure 9: Water Sector IT Roadmap – Outcomes / Outputs (13/02/2024)

1.1 Key Water Sector Stakeholders

A clear understanding of the stakeholders involved in the water sector's digital transformation is fundamental to the successful design and implementation of the IT Roadmap. Each organization plays a distinct role in the governance, management, and operation of water services.

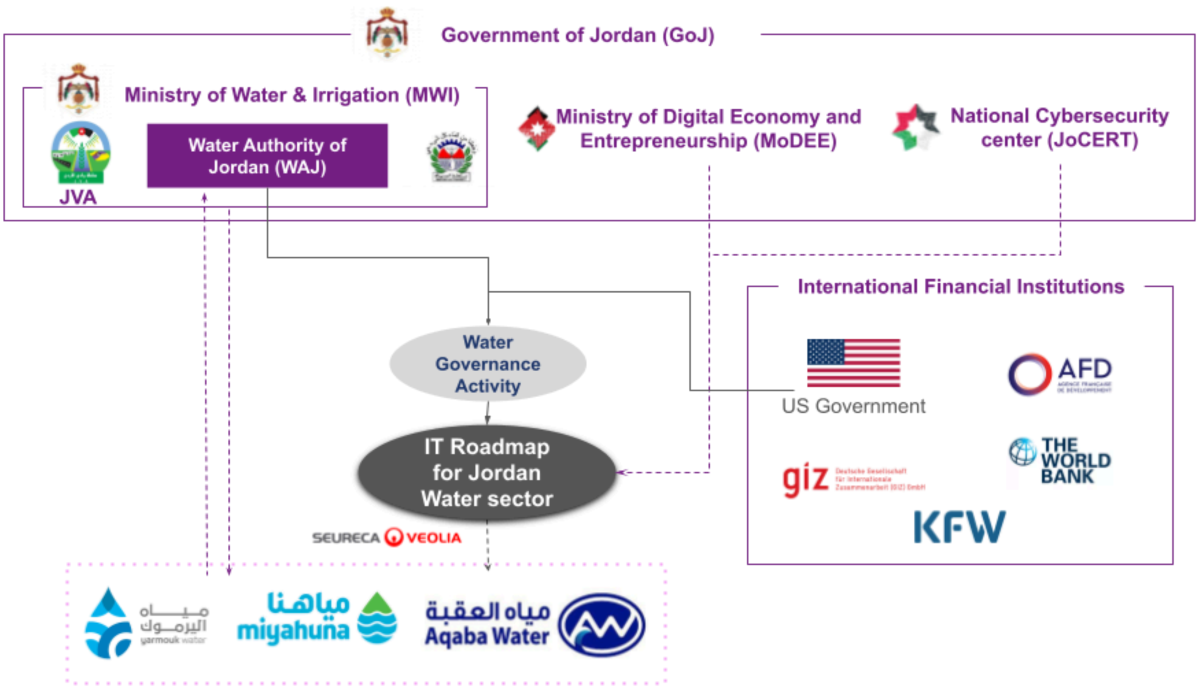


Figure 10: Simplified Stakeholder Organization

The **National Water Strategy 2023-2040** addresses Jordan's critical water scarcity by promoting long-term water security through enhanced supply from non-conventional sources and improved management practices. It aims to balance water demand with sustainable supply while supporting health, economic growth, and environmental protection amidst demographic pressures and climate change.

The strategy emphasizes the integration of **digital transformation and technology adoption** to drive economic growth and improve public service efficiency.

This document presents the outcomes of the on-site assessment carried out from July to November 2024:

- It provides a **detailed digital maturity diagnostic per business process** and highlights the **key strengths and weaknesses**;
- It suggests **high level areas for improvement** that will be detailed in a second phase, produced as a second step.

1.2 Stakeholder Engagement Analysis

After several meetings with national stakeholders, a presentation was made outlining the approach, methodology of the present project, and showcasing global success stories and innovations. A workshop was then organized, bringing together key stakeholders from Jordan's water sector, including WAJ, JVA, YWC, AW, Miyahuna, and MWI, to discuss current challenges and propose high-level solutions.

Three main themes emerged:

1. Customer Satisfaction - Improve Customer Experience

Ensuring customer satisfaction involves providing reliable potable water on demand and wastewater services through smart utility systems, establishing robust data governance, and creating a centralized national data hub for informed decision-making. **Streamlining services is crucial, including improving call center efficiency** and using chatbots for quick responses. Enhancing transparency and standardizing customer onboarding across water utilities are also important.

2. Save Every Drop of Water

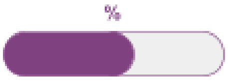
To save water, it is crucial to enhance metering systems and use smart meters for real-time data. Implementing advanced leak detection technologies allows for quick repairs and the identification of water theft, while artificial intelligence (AI) can optimize management through predictive models. Effective **asset management** involves integrating teams, creating a **master plan**, and utilizing **Geographic Information System (GIS)** for spatial data management. It also requires close collaboration between operations and maintenance (O&M) teams, as well as planning and financial teams to enhance efficiency and ensure seamless coordination.

3. Data Management and Data Governance

Improving data management requires **making data accessible** to enhance operational performance, establishing a centralized repository for water-related information, **integrating data from various sources for a comprehensive view**, and fostering accountability and informed decision-making throughout the organization. Ensuring **data accuracy** through quality assurance processes and implementing robust security measures are essential. Additionally, both data and **infrastructure must be resilient** to support operations. Improving data management also requires assignment of responsibilities within an accountable, institutionalized framework. Utilizing advanced analytics and data visualization tools will facilitate informed decision-making, while training staff will enhance their data management skills.

1.3 Assessment Methodology

Each entity process and sub-process is detailed in the following chapter based on the interviews conducted and the shared data analyses performed from July and November 2024.



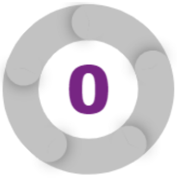
The level of digitalization of dataflow is assessed according to the criteria mentioned in the table below:

Oral only	Standardized forms and data collection in paper form	Office tools	Dedicated software	Integrated software / links	Hypervision
					
e.g., Phone, etc.	"Digitalizable" processes	e.g., Microsoft Excel, basic database	e.g., GIS, CMMS, CC&B	e.g., Fully integrated ERP	Digitalization from field to dashboard
0%	20%	40%	60%	80%	100%

Figure 11: Digitalization Scale used for the Diagnostic

This diagnosis was carried out from a theoretical point of view, aimed at analyzing the existence and capacity of the tools. However, it does not take into account the concept of user competence.

Another diagnostic conducted as part of this assessment aimed to evaluate the current level of data utilization for decision-making within this process. This approach allowed for a precise and detailed visualization of how data is integrated into strategic and operational decisions.



Level 0: Non-existent or unreliable data

- **Data availability**: Data is scarce or unstructured. Decisions rely heavily on experience, personal impressions, and an oral culture.
- **Tools**: No analysis tools are in use, or those available are purely descriptive, offering no deep exploitation.

Level 1: Raw data archiving and reactive decision-making

- **Data availability**: Raw data is stored in isolated silos but is not easily accessible. Decisions are made reactively in response to events, following a manual data collection process.
- **Tools**: Descriptive tools are used but do not offer automated analysis. Users still need to manually cross-check data.

Level 2: Data accessibility and basic analysis

- **Data availability**: Data is accessible, enabling responses to simple threshold breaches or events. Analysis remains limited to a reactive approach.
- **Tools**: Tools offer basic analyses on-demand, such as reports or simple performance indicators (KPIs).

Level 3: Dashboards and rudimentary anticipation

- **Data availability**: Data is more easily accessible via basic dashboards. Some indicators begin structuring decision-making.
- **Tools**: Tools provide initial data interpretation with the ability to anticipate certain events using KPIs, though the analysis remains limited and often user-dependent.

Level 4: Proactive analysis and decision-making based on forecasting

- **Data availability**: Data and certain KPIs are automatically pushed to relevant stakeholders. Decision-making is triggered proactively by real-time data analysis or alerts on predefined thresholds.
- **Tools**: Tools offer more advanced predictive analysis, allowing for anticipation of issues and identification of opportunities before they occur.

Level 5: Prescriptive decision-making and process optimization

- **Data availability**: Data is fully reliable, comprehensive, and integrated into decision-making processes. KPIs are optimized for automatic decision-making.
- **Tools**: Tools are based on advanced algorithms, using AI and machine learning to offer prescriptive analysis. They enable continuous and autonomous process optimization, providing recommendations or automated actions.

Figure 12: Data-Based Decision-Making Scale

2 Digital Maturity Assessment by Entity

2.1 Cross-Sector Digital Maturity Overview

Based on the comprehensive assessment of all major entities in the Jordan water sector (MWI, WAJ, JVA, and water utilities - Miyahuna, YWC, and AW), the sector's current digital maturity level can be characterized as 'Intermediate' with approximately 50% digitalization and limited data-driven decision-making (averaging 1.5 out of 5).

Despite a strong digital culture and good awareness of data management challenges, digitalization varies across entities, with Miyahuna showing higher maturity (60%) particularly in GIS implementation and customer workflows, and JVA slightly lower (40%), hampered by poor hardware infrastructure.

The sector demonstrates a solid foundation of digital systems, but the utilization of these systems for data-driven decision-making remains underdeveloped, with most entities scoring between 1 and 2 out of 5, indicating significant room for improvement in converting data collection into actionable insights.

This assessment is supported by several key observations:

1. While **core systems** like ERP, SCADA, and GIS exist across entities, they **are often fragmented, outdated, or underutilized**, with varying levels of implementation across organizations;
2. **Data collection shows a mixed landscape -** while there is a wealth of existing digital data, collection remains largely manual with with limited automation and integration and continued reliance on paper in some areas;
3. **Cybersecurity measures are basic and often insufficient**, with limited infrastructure and resources, though initiatives are underway to address this critical gap;
4. **Decision-making is** still predominantly **experience-based rather than data-driven**, despite good awareness of its importance and available digital tools;
5. **Customer service digitalization varies significantly** - from well-defined workflows in some utilities to incomplete customer information and partial digital journeys in others;
6. There is a **general lack of standardized data governance** across the sector, with data management often misaligned with business goals, hampering data sharing and integration.

However, the sector shows clear strengths and opportunities, including:

- Strong political commitment and international cooperation;
- Clear ambition and vision with strategies in development;
- Support from donors and WGA with available budgets;
- Modern digital tools deployed in certain areas;
- Smart metering initiatives seen as promising opportunities.

The sector is actively pursuing digital transformation through numerous strategic initiatives, guided by MWI's directive to provide a unified vision for IT in the water sector. This transformation is evidenced by the following table of ongoing digitalization projects, which demonstrates significant investment and international support for the sector's modernization.

These projects address critical areas including data management (WEDMS), cybersecurity, monitoring systems (UPMU platform), infrastructure (Bulk Water Metering, National SCADA), and integrated information systems (NWIS II, GIS database). With support from major donors like GIZ, USG, World Bank, and EIB, these initiatives will significantly enhance the sector's digital capabilities, particularly in areas of current weakness such as cybersecurity, data integration, and automated monitoring systems.

While the current maturity level reflects existing limitations in infrastructure, skills, and data governance, the combination of ongoing projects, available donor support, and clear ministerial guidelines indicate a clear trajectory toward higher digital maturity, with potential for significant advancement in the next 2-3 years as these projects are completed and implemented.

Funder / Donor	Beneficiary (utility) / end user	Project	Status / progress
GIZ	Water utilities + JVA + WAJ	**SWU - Water and Energy Data Management System (WEDMS)**	Awarded, starting to be implemented in AW Roll-out Timeline: 12 months
GIZ	All entities	**Cybersecurity**	In progress
GIZ	WAJ	**UPMU data collection platform**	TBC
GIZ	Water utilities + JVA	**SWU - Improve assets management in targeted utility**	Not started
GIZ	Water utilities + WAJ	**SWU - NRW Dashboard**	In progress
GIZ	Water utilities	**SWU - Sludge data management tool**	In progress
GIZ	Water utilities	**SWU - Digital platform for BWRO plants**	Not started
GIZ	MWI + WAJ + JVA	**WSG -MWI's institutional and digital capacities for the implementation of the NWMP Process**	In progress
GIZ	All entities	**WSG -Geographic Information Systems (GIS) in the water sector**	In progress
GIZ	All entities	**WSG -Develop National Digital Services Standards**	TBC
GIZ	MWI + WAJ	**WSG -Digital library for the Water Documentation and Awareness Center**	TBC
GIZ	MWI + WAJ	**WSG -Website for the Water Documentation and Awareness Center**	TBC
GIZ	WAJ + JVA	**WSG -National, digital water distribution tool for the WAJ and JVA.**	TBC
GIZ	MWI + WAJ	**WSG -"NEXUS Secretariat and Support"**	TBC
USG MESC II	Water utilities + JVA	**Bulk Water Metering**	FARA5 project managed by WAJ. Design finished. End:

Funder / Donor	Beneficiary (utility) / end user	Project	Status / progress
			2026
USG WEC	MWI, WAJ, JVA	**Water Accounting Plus**	Implementing (training users)
WGA	MWI, WAJ, JVA but useful for utilities	**NWIS II**	In progress
USG Building Water Infrastructure (BWI)	WAJ, JVA, utilities	**National SCADA**	FARA12 project
EIB, Dutch Gov, German Gov, USG	Water utilities	**National Conveyor Project (NCP)**	
USG WGA, WEC	MWI + WAJ + JVA + Water utilities	**The Coordination Window**	Not started - the Coordination Window centralizes communication and facilitates collaboration with government focal points for effective NCP implementation.
USG (FARA)	WAJ, MWI, JVA	**Network Infrastructure Modernization (HQ Amman**	Committed
World Bank	JVA	**Risk Index Tool** (dams)	
GIZ	MWI, WAJ, JVA	**GIS database**	RFP prepared for JVA (tendering phase)

Table 1: Ongoing Projects with a Digital Element

To maximize the impact of these initiatives, the sector should focus on:

- Standardizing core systems across all entities;
- Implementing data governance with clear ownership and accountability;
- Enhancing cybersecurity through comprehensive frameworks and training;
- Building digital capabilities at all organizational levels;
- Improving system integration while ensuring interoperability.

Focus on the National Water Information System (NWIS)

NWIS is designed to serve as the **central data hub** for Jordan's water sector, consolidating information on water resources including volumes and quality data to support national water security and broader development objectives. The system aims to fulfill three core functions:

- As a decision support tool, it should **enable strategic water resource planning, management optimization, and sophisticated data analysis**;
- It **promotes data democratization** by providing controlled access to authorized stakeholders across the sector, facilitating evidence-based decision-making;
- It **supports standardization** by promoting best practices and ensuring consistency in data management across the sector.

However, NWIS currently faces significant operational challenges that limit its effectiveness:

- **Technical integration issues** have rendered both the telemetry system and LIMS connections non-functional;
- WMIS suffers from **API instability issues**, notably losing connectivity during IP address changes;
- Additionally, many modules that appear as 'green' on the following diagram actually rely on **manual data entry**, creating inefficiencies and increasing the risk of errors.

These challenges substantially compromise NWIS's ability to serve as the sector's central data platform.

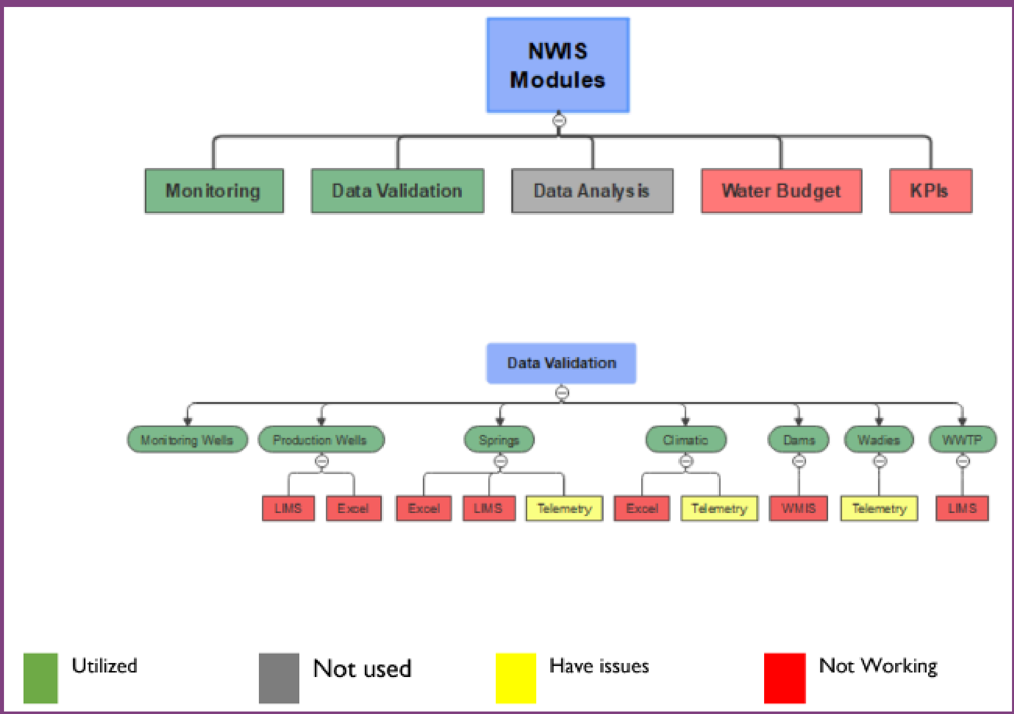


Figure 13: NWIS Module Status - NWIS Technical Assessment & GAP analysis (WGA, 27/12/2023)

2.2 Central Government Authorities

2.2.1 MWI

MWI Organization and Key Figures

The **Ministry of Water and Irrigation (MWI)**, established in 1988, is the central governmental body responsible for **setting national water policies, managing water resources, and coordinating the actions of the Water Authority of Jordan (WAJ) and the Jordan Valley Authority (JVA).** With an estimated workforce of 130 employees, MWI plays a strategic role in addressing Jordan's critical water scarcity challenges and ensuring the sustainability of its water sector.

The Ministry is structured under the leadership of a Secretary General and supported by three Assistant Secretary Generals.

- **The Assistant Secretary General for Administrative and Financial Affairs** supervises human resources, procurement, budgeting, and general administration;
- **The Assistant Secretary General for Technical Affairs** oversees water infrastructure, water resources management, and engineering operations;
- **The Assistant Secretary General for Strategic Planning** is responsible for developing national strategies, monitoring sectoral performance, and ensuring alignment with long-term policy goals and international cooperation efforts.

MWI also **coordinates donor-funded projects**, **oversees regulatory development**, and **supports research and innovation in water efficiency and reuse**. Although relatively modest in size, its role is pivotal in defining the strategic direction of the entire water sector and in harmonizing the activities of both implementing agencies and water utilities under a unified vision.

Business Process Assessment

MWI has been segmented into various business processes. These processes have been assessed based on two key criteria:

- **Digital Culture:** This scale ranges from a completely oral culture (0%) to daily use of advanced, integrated, and reliable digital tools (100%), including intermediate stages involving paper or Excel-based practices.

- **Data Utilization for Decision-Making:** This criterion spans from having no data or unreliable information (0) to a level where decisions are guided by digital tools (5).

The table below summarizes the main key findings by group of business processes:

Business Process	Sub-Business Processes	Key Findings
Strategic Planning	Policy & Strategy	The Ministry demonstrates strong capabilities in **scenario modeling and water resource optimization through WEAP software**, particularly for projects like the National Conveyor, but faces **significant operational constraints** due to single-user licenses limiting collaborative work. The manual data entry processes and lack of real-time data integration create inefficiencies and potential errors in data processing, while the drought monitoring system remains basic with opportunities for digital enhancement through PowerBI implementation. The department successfully uses ESRI StoryMaps and maintains detailed modeling scenarios, but energy considerations are notably absent from decision-making processes, with the primary focus remaining on water distribution quantity rather than efficiency.
	Drought Monitoring and Reporting	
	Water Demand & Allocation	
Financial & Accounting	Elaborate Budget - Control Budget Execution and Accounting	The financial systems show partial digitalization through GFMIS implementation for budget management and accounting, but suffer from inadequate real-time tracking capabilities that limit effective financial monitoring and decision-making. The absence of specialized asset management software creates challenges in tracking and maintaining the ministry's fixed assets, including meteorological stations, office equipment, and technical installations. The unclear asset ownership structures between WAJ and Water Utilities further complicates financial management and accountability. The reliance on basic office suite tools for asset tracking and limited digital integration of asset data indicates significant room for modernization of financial processes and systems.
	Asset Financial Recognition	
	Financial Reporting	
Administrative, Legal, HR (incl. HSE/QMS)	HR - Time Attendance & Payroll	While basic systems are in place through Oracle FAS for payroll and time attendance, and JONEPS for procurement, the department operates with fragmented document management systems across Diwan, Koha, and eFiles platforms. Performance management processes involve a mix of manual and digital approaches using Excel-based tracking alongside the Public Service Administration Commission platform. The department faces limitations from government recruitment freezes and lacks comprehensive digital platforms for HR management. The Women Studies Unit collects gender-related data but faces challenges with response rates and data completeness, while document management systems require better integration and accessibility features for gender and disabilities compliance.
	HR - Performance Development	
	HR - Recruitment	
	Tender and Procurement	
	Document Management / Archiving	
Technical Affairs	Project Management - National Conveyor	Despite having good project management tools through the e-Library system hosted by MODEE's data center and GIS capabilities for water resource mapping, the department is significantly hampered by unauthorized software licenses and limited integration between MWI and WAJ GIS platforms. The telemetry system, last upgraded in 2016, monitors over 100 rainfall stations but faces cybersecurity vulnerabilities that have led to restricted external access. The department successfully produces various reports including daily rainfall data and water budgets but relies heavily on manual data collection and communication through phone or WhatsApp, indicating a need for automation and modern data collection methods.
	Geographical Information System	
	Telemetry & Supervision	
IT Management	Network & Security Management	The department faces critical challenges with aging infrastructure, including network switches and fiber optic cabling over 15 years old,

Business Process	Sub-Business Processes	Key Findings
	IT Assets Management (Software & Hardware) User Support IT Project Management Data Management, Documentation and SOPs Disaster Recovery and Business Continuity	creating significant security risks and performance issues. The limited asset tracking capabilities and insufficient disaster recovery systems, with backup restoration untested since 2018, pose serious risks to business continuity. Data governance practices are minimal, with no centralized repository for documentation or standard operating procedures, while cybersecurity issues are compounded by outdated systems, lack of training programs, and absence of a Security Information and Event Management system. The department operates with basic helpdesk functionality but suffers from ineffective project management processes and poor data quality, hindering the development of a data-driven decision-making culture.

Table 2: Key Findings by Business Process for MWI

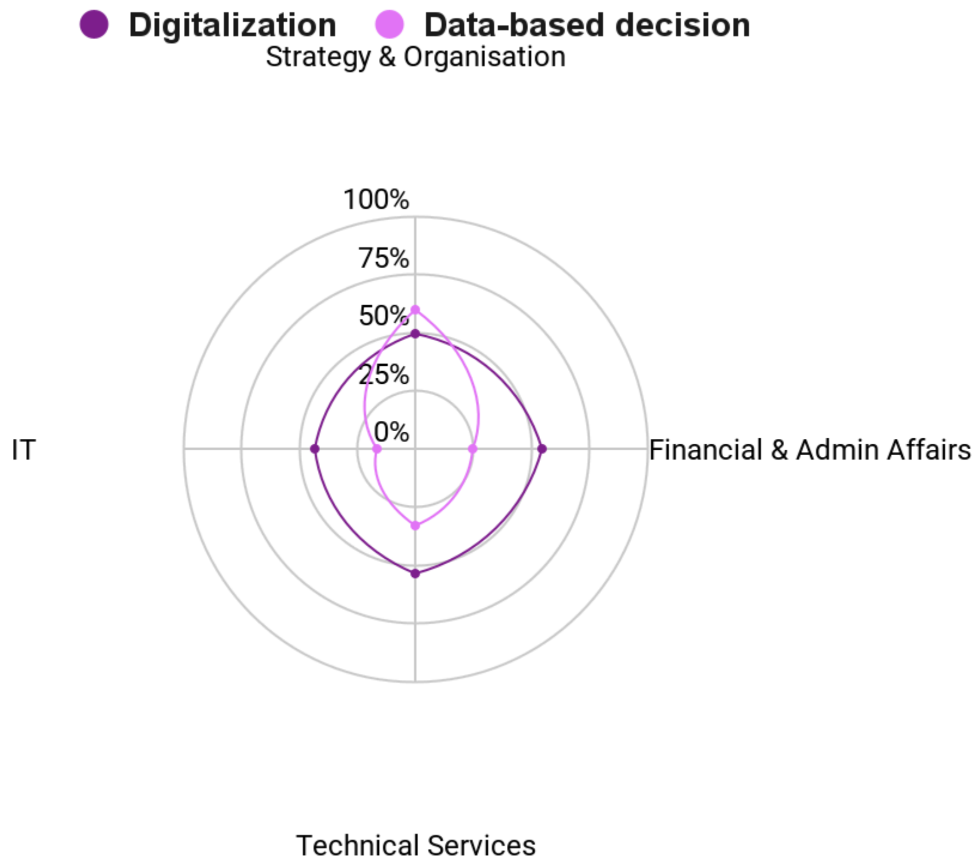


Figure 14: MWI Digitalization State

This above summary reveals **a significant gap in the availability of tools for certain processes**, particularly in the Financial & Administrative Affairs and IT Management. Furthermore, it highlights that even when tools are available, such as in Technical Services, they are **underutilized, with decisions seemingly not being driven by the data these tools provide**. This underscores the need for both acquiring appropriate tools and improving data-driven decision-making practices to enhance operational efficiency and achieve strategic outcomes.

Technology Infrastructure Assessment

In order to perform a comprehensive assessment of the existing Information Technology and Operational Technology (IT/OT) environment, and based on the business process assessments, a simplified high level data flow has been drawn up. This approach allows to identify the existing tools used in the different businesses, and the existing or planned data flows.

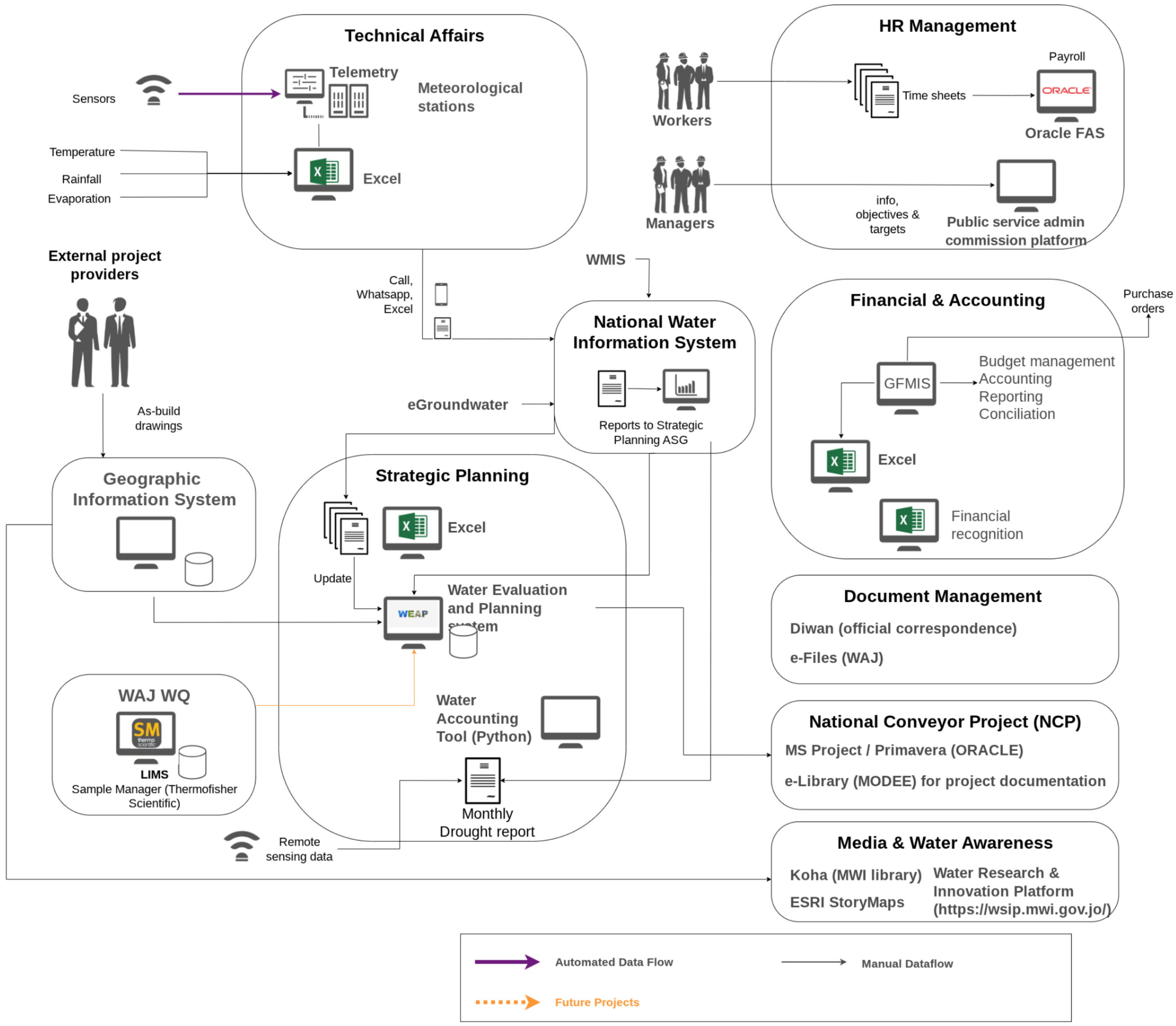


Figure 15: Simplified, High-Level MWI Dataflow

From an IT perspective SEURECA has identified several critical areas that require modernization:

- **Systems maintenance:**
  - Aging network infrastructure: Extreme Black Diamond and Summit switches have been in use for over 15 years with no spare parts available, and fiber optic cabling is more than 20 years old.
  - Outdated software and databases: Oracle Database 12c and Oracle ADF 12c are obsolete, WMIS and SCADA systems haven't been updated since 2016, and there's no functional test environment.

- Unsupported operating systems: Windows Server 2016 is nearing end of support (ending in 2027), and some workstations are still running Windows 7, creating major security vulnerabilities.

- **Network**
  - Aging network infrastructure: Extreme Black Diamond and Summit switches have been in use for over 15 years with no spare parts available, and fiber optic cabling is more than 20 years old.

- **Backup and disaster recovery**
  - The systems are insufficient. A recent backup restoration hadn't been tested since 2018, raising concerns about data recovery capabilities.

- **Reporting:**
  - Data governance practices are minimal, with no centralized repository for documentation, standard operating procedures (SOPs), or data inventory. This raises concerns about data quality and interoperability between systems.
  - No full data-driven approach While MWI has made strides in digitalization, there's a significant opportunity to enhance its data-driven decision-making culture. This includes strengthening data analysis capabilities, promoting data literacy, and fostering a greater reliance on data insights across all levels of the organization.

- **Cybersecurity:**
  - MWI faces major cybersecurity issues that require a comprehensive remediation plan.
  - Outdated systems reveal major security vulnerabilities.
  - There is a lack of cyber security training programs.
  - MWI needs a Security Information and Event Management (SIEM) system.

- **Process & Tools**
  - The lack of a centralized document management system (DMS) is a major weakness. This leads to difficulties in traceability, transparency, and version control of documents.
  - Despite the presence of some digital tools, many processes, including data collection for performance monitoring, still rely heavily on Excel and manual processes. This limits data reliability, creates redundancies, and hinders automation.

Strategic Position Analysis

The following SWOT analysis focuses on identifying four main elements: Strengths (internal advantages), Weaknesses (internal limitations), Opportunities (external factors that can be leveraged), and Threats (external risks or challenges). It will help gain a clear understanding for the development of the IT Roadmap to maximize strengths and opportunities while addressing weaknesses and mitigating threats.

STRENGTHS	WEAKNESSES
● **Staff ambition** and motivation ● Advanced optimization of water resources ● Detailed modelling of scenarios including for national conveyor ● Data guidelines development - working with technical affairs on SOPs ● **Innovative use of some modern tools** - utilization of ESRI Story Maps and PowerBI ● Data protection - data classification in accordance with **MODEE guidelines** ● Existence of formalized cybersecurity policies and professional-grade equipment (Fortinet firewall, FortiADC). ● **Sector-specific information systems** (NWIS, Oracle FAS, SCADA, GIS) already in place and in use.	● **Obsolescence of many network devices, servers, operating systems**, and critical software (Oracle 12c, ADF 12c, WMIS, SCADA). ● **Disaster recovery (DR) plan limited** to the ERP, lack of reliable global backup. ● **Lack of technical and cybersecurity training**, low staff awareness. ● Low integration and automation of data flows, reliance on manual data entry. ● Organization needs clarification (differences between English and Arabic versions of org. Chart for administrative affairs) ● Systems upgrade needed - outdated weather stations telemetry system (2016) ● **Tool licensing issues** (GIS) ● Lack of data governance and validation ● Lack of integration of systems and telemetry (100 stations) ● Energy considerations - not part of decision-making at the moment, main focus is getting enough water to everyone (pumping as much as possible). ● **Recruitment freeze** on all government ministries (except Health and Education) ● Unclear ownership of water sector fixed assets (with WAJ)
OPPORTUNITIES	**THREATS**
● Opportunity to develop NWIS into a **Data Hub for the sector** ● Opportunity to **rationalize GIS** in the sector (single instance separate data layers MWI / WAJ / JVA) ● Extend gender reporting to encompass the full sector, not just MWI ● Modernization of infrastructure ● Deployment of **certification training and cybersecurity** awareness program ● Integration and h**armonization of information systems** for better data governance ● Support from international donors (USG, GIZ) to finance digital transformation.	● **Increased risk of cyberattacks and data loss** due to obsolescence and lack of training ● **Illegal abstraction** - lack of policy tools ● Flash floods - **lacking early warning system**, risk of fatalities ● **Lack of data from each WU** - difficulty to get access to the data ● Interruption of critical services in case of a major incident due to lack of a comprehensive DR plan. ● Difficulty keeping up with technological advances without rapid and sustained investment.

Table 3: MWI SWOT

2.2.2 WAJ

WAJ Organization and Key Figures

The Water Authority of Jordan (WAJ) is the national institution responsible for managing Jordan's water and wastewater services, reporting directly to the Ministry of Water and Irrigation (MWI). It owns and supervises all water utilities in the country, with the exception of the Aqaba Water Company, where it holds a majority share of 85%. WAJ plays a central role in the planning, operation, and regulation of the water supply and sanitation infrastructure, serving approximately 1.7 million metered citizens through its affiliated WUs and managing over 7,000 private and governmental wells.

WAJ's mission spans the full water cycle, from the protection and monitoring of water resources to the treatment and distribution of drinking water and wastewater services. It also acts as a key player in conflict resolution related to water access and contributes to national water planning and drought resilience efforts.

At the national level, WAJ consists of seven main departments:

- **Water Affairs Department:** Coordinates the planning, design, and oversight of water infrastructure projects.
- **Water Basins Affairs Department**: Oversees the management, protection, and monitoring of groundwater resources, including private and governmental wells. It ensures compliance with extraction licenses, tracks illegal wells, and supports emergency planning at regional level.
- **Water System Operation & Maintenance Department**: In charge of the day-to-day operation and maintenance of water infrastructure, including pumping stations, reservoirs, and distribution networks. It ensures service continuity and responds to technical failures in coordination with local WUs.
- **Sanitation Affairs Department**: Manages the operation and oversight of wastewater treatment plants (WWTPs) across the country, contributing to water reuse and environmental protection in line with national policies.
- **Laboratory and Quality Affairs Department**: Responsible for water quality monitoring and compliance, operating central and regional laboratories to analyze samples and ensure public health standards are met.
- **Administrative Affairs Department**: Handles cross-cutting support functions, including human resources, finance, procurement, and logistics across WAJ and its regional branches.
- **Information & Communications Technology Department (ICTD)**: Leads WAJ's digital transformation initiatives, supporting SCADA implementation, GIS development, and information systems such as NWIS (National Water Information System). It also promotes the integration of digital tools for asset management and reporting.

WAJ's organization is aligned with the Ministry's strategic vision to enhance water security, improve service delivery, and modernize public sector operations. Its governance and financial procedures follow public service standards, with staff employed as civil servants and budgets managed under the oversight of the Ministry of Finance.

At the local level, WAJ supports regional WUs in delivering water and sanitation services, managing critical infrastructure, and implementing emergency response plans during peak demand or drought periods.

Business Process Assessment

WAJ, similar to water utilities, has been segmented into various business processes. These processes have been assessed based on two key criteria:

- **Digital Culture:** This scale ranges from a completely oral culture (0%) to daily use of advanced, integrated, and reliable digital tools (100%), including intermediate stages involving paper or Excel-based practices.
- **Data Utilization for Decision-Making:** This criterion spans from having no data or unreliable information (0) to a level where decisions are guided by digital tools (5).

The table below summarizes the main key findings by group of business processes:

Business Process	Sub-Business Processes	Key Findings
Corporate Strategy	Strategic and Business Planning Performance Monitoring and Reporting Internal Auditing Change Management	WAJ has initiated **several performance monitoring tools** (e.g., UPMU, NRW dashboards), but **data remains largely manually collected and Excel-based**, limiting reliability and automation. Key systems (X7, SCADA, ERP) are **not fully integrated**, creating fragmentation across reporting, auditing, and planning processes. This hinders real-time decision-making and operational efficiency. There is **no centralized project management or digital audit tracking platfor**m, reducing visibility on project risks and corrective actions. Change management lacks digital tools and data is not consistently used for strategic steering.
Operations & Maintenance (O&M)	Water Quality Management O&M Supervision Public Wells Management Private Wells Management Waste Water Management	O&M processes are **heavily impacted by fragmented systems, outdated tools, and critical resource gaps**. Water Quality is monitored through isolated lab results, with **limited automation or field sensor integration**. There is **no digital traceability** from source to tap, weakening proactive quality control. The **SCADA architecture remains heterogeneous and partially deployed**, limiting centralized oversight. **CMMS usage is inconsistent**; Excel-based tracking prevails, preventing effective asset and intervention planning. Public and Private Wells are **not centrally supervised**; key data (levels, quality, flow rates) are **manually tracked**, delaying response times and increasing the risk of resource overexploitation. Wastewater Management **lacks real-time visibility and standardized asset monitoring**.
Financial & Accounting	Elaborate Budget - Control Budget Execution and Accounting	The financial function is supported by a **centralized ERP system covering core accounting, asset management, and revenue collection**. However, budgeting remains outside the system, limiting automation and real-time control. Financial reporting is underutilized due to limited user capacity and low system maturity.

Business Process	Sub-Business Processes	Key Findings
	Revenue Management	Revenue processes rely on outdated platforms and face connectivity issues, hindering dashboard use and timely analytics. **Asset data is financially up to date but inconsistently archived**, with some classification inaccuracies.
	Asset Financial Recognition	Overall, fragmented systems, manual processes, and insufficient user training constrain financial oversight, scenario planning, and performance tracking. Investment in advanced ERP modules, improved integration, and user capacity building is essential to modernize financial management and align with WAJ's strategic objectives.
	Financial Reporting	
Administrative, Legal, HR (incl. HSE/QMS)	HR - Time Attendance & Payroll	WAJ employs around 2,500 staff, but HR **processes remain partially manual**. Time attendance is digitized at HQ via facial recognition, while field units still rely on paper forms. **Payroll is not fully integrated**, and **the employee self-service portal has security concerns**.
	HR - Individual Performance Management	Performance reviews occur quarterly but lack linkage to structured KPIs. There is **no formal development tracking**, limiting workforce planning. Training initiatives exist via an **LMS, but participation is low**.
	HR - Recruitment	**Recruitment is heavily delayed** (average 2 years) due to administrative bottlenecks and absent organization charts. A **new digital platform is under development** but not yet deployed.
	Tender and Procurement	Tender and procurement processes lack standardization and are only **partially digitized via ERP**. **JONEPS is rarely used due to usability issues**, and tenders are manually tracked, often via Excel. Evaluation is offline, and contract follow-up lacks automation.
	Document Management System	**A centralized DMS** is needed to be fully implemented within the different departments to improve traceability and transparency.
Technical Services	Project Management	WAJ oversees project planning, design, and monitoring; however, **many processes still rely heavily on manual methods and email-based coordination**. While the **Donor Coordination Platform provides a centralized system for tracking major externally funded infrastructure projects**, its use remains limited to donor initiatives. There is currently **no unified project management tool or standardized KPIs** applied across all WAJ projects.
	Geographical Information System	Additionally, design capacity is constrained by the **absence of licensed software**, which limits the efficiency and quality of technical planning.
	Non Revenue Water Management	The NRW Unit tracks water losses using Excel across 12 governorates, with limited follow-up due to **resource constraints**. Coordination varies across regions. GIS is in place but hampered by **server limitations** and **weak field synchronization**.
IT Management	Network & Security Management	The IT environment is characterized by a**ging infrastructure, fragmented practices, and a lack of standardization** across core domains. Network performance is constrained by poor cabling and limited Wi-Fi coverage. **Cybersecurity capabilities remain basic**, with no structured monitoring, insufficient tools, and governance still under development—exposing the organization to increasing cyber threats.
	IT Assets Management (Software & Hardware)	

Business Process	Sub-Business Processes	Key Findings
	User Support	**IT asset management suffers from inconsistent tracking of hardware and software**, absence of a unified inventory, and limited patching or license oversight. Similarly, user support is weakened by legacy tools, informal help desk processes, and the lack of an ITSM platform, resulting in poor traceability and service quality.
	IT Project Management	Project management is driven by active digital ambitions, but execution remains informal, with no standardized tools or methodologies and heavy reliance on ad hoc coordination. **Data governance is minimal**, with **no centralized repository for documentation, SOPs, or data inventory**, limiting quality assurance and interoperability.
	Data Management, Documentation and SOPs	
	Disaster Recovery and Business Continuity	Finally, **backup systems are outdated**, with critical gaps in testing, redundancy, and protection—highlighted by recent ransomware incidents. **A comprehensive modernization effort is urgently required to secure IT foundations**, formalize processes, and enable sustainable digital growth.

Table 4: Key Findings by Business Process for WAJ

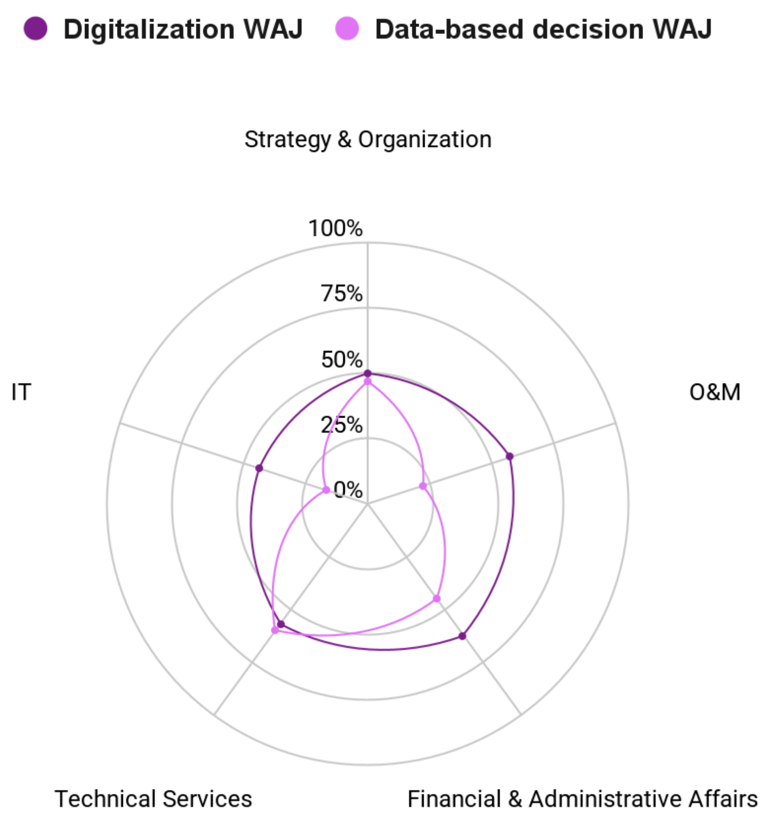


Figure 2: WAJ Digitalization State

The chart highlights opportunities to better align digitalization efforts with data-driven decision-making across WAJ's core functions. While notable progress has been made in deploying digital tools—particularly in

Strategy & Organization and O&M—there remains significant potential to more fully exploit the data these systems produce to inform strategic and operational decisions.

IT infrastructure, the backbone of digital transformation, shows clear room for modernization. Several longstanding systems would benefit from upgrades to meet current performance and interoperability standards. Improved integration across platforms would facilitate smoother information flows and unlock greater value from existing assets.

Similarly, Technical Services and Financial & Administrative Affairs present strong potential for further digital development, which could enhance efficiency and support more data-informed management practices.

Overall, this underscores the need for a dual approach: modernizing core digital systems while embedding a culture of data-driven decision-making. This will help ensure that technology investments translate into measurable performance gains and strategic agility.

Technology Infrastructure Assessment

In order to perform a comprehensive assessment of the existing Information Technology and Operational Technology (IT/OT) environment, and based on the business process assessments, a simplified high level data flow has been drawn up. This approach allows to identify the existing tools used in the different businesses, and the existing or planned data flows.

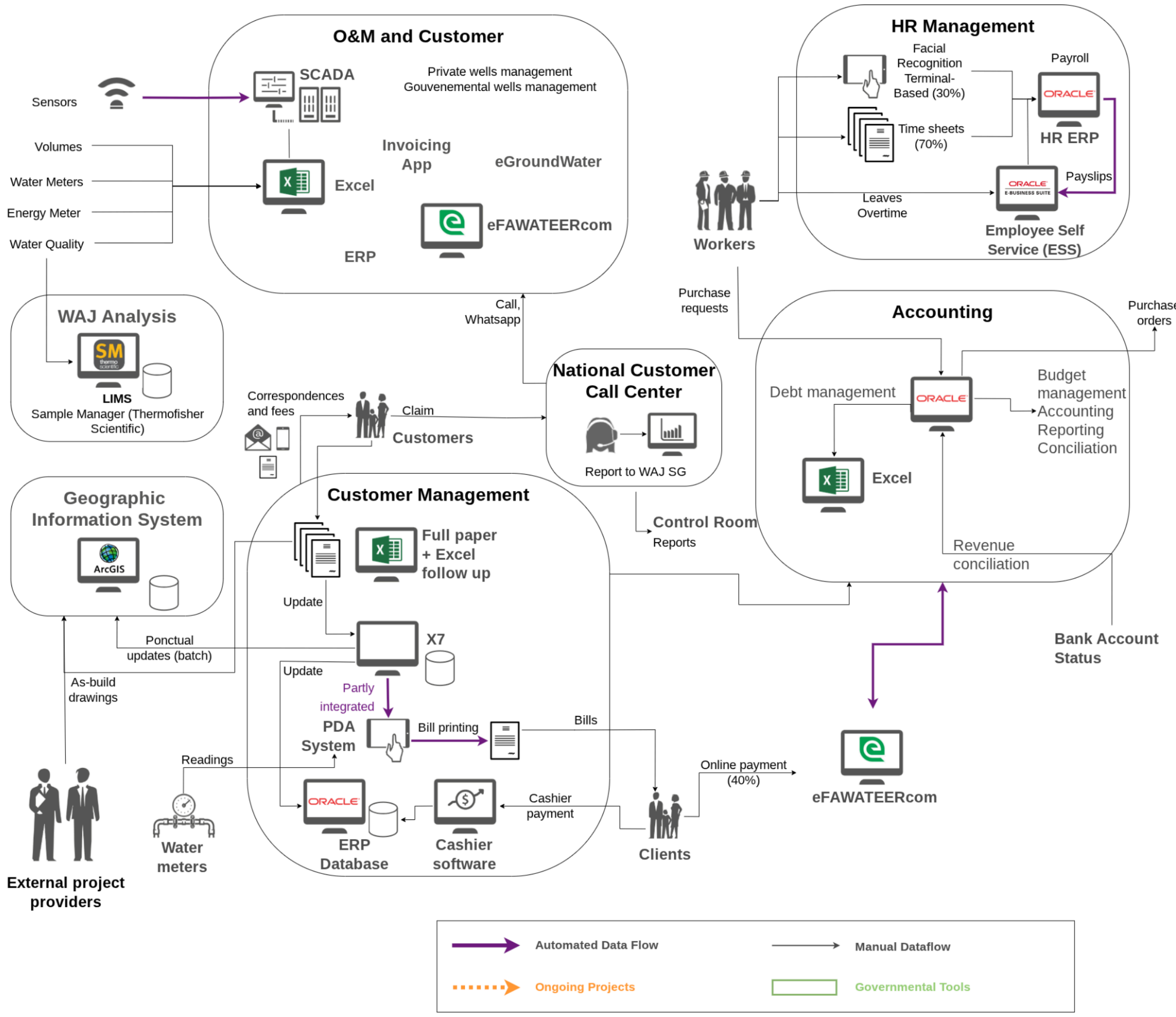


Figure 16: Simplified, High-Level WAJ Dataflow

From an IT perspective SEURECA has identified several critical areas that require modernization:

- **Systems maintenance:**
  - Servers are often outdated (Windows 2016) and overloaded, leading to slow performance.
  - Lack of Integration, systems operate in silos (e.g., ERP, X7, eGWMS, LIMS) requiring manual data entry and creating inconsistencies. The lack of integration between GIS and other core systems hinders effective data analysis.
  - Many software applications lack maintenance contracts, making troubleshooting and updates difficult. The telemetry software, for example, is outdated and lacks support.
  - While monitoring tools like Nagios and an ITSM-aligned ticketing system like ShortMaze are in place, modernizing them would enhance support services and decision-making.

- **Network**
  - Network cabling is antiquated (Category 4), causing connectivity issues. The data center is oversized and inefficient.
  - Inadequate Network: Limited bandwidth and outdated cabling result in slowdowns and disconnections, impacting productivity.
  - Wi-Fi access is extremely limited, even within WAJ headquarters.

- **Backup and disaster recovery**
  - The disaster recovery (DR) plan currently only covers the ERP system, leaving other critical applications without backup solutions.
  - High risk of IT service interruption in case of a major incident.
  - Backup procedures are insufficient to ensure fast and complete data restoration.

- **Reporting:**
  - Data governance practices are minimal, with no centralized repository for documentation, standard operating procedures (SOPs), or data inventory. This raises concerns about data quality and interoperability between systems.
  - No full data-driven approach While WAJ has made strides in digitalization, there is a significant opportunity to enhance its data-driven decision-making culture. This includes strengthening data analysis capabilities, promoting data literacy, and fostering a greater reliance on data insights across all levels of the organization.

- **Cybersecurity:**
  - WAJ faces major cybersecurity issues that require a comprehensive remediation plan.
  - Outdated systems reveal major security vulnerabilities.
  - There is a lack of cyber security training programs.
  - WAJ needs a Security Information and Event Management (SIEM) system.

- **Training**
  - Lack of formal security and technical training for IT teams.
  - Low cyber risk awareness across all staff levels.
  - Need for training and knowledge transfer due to upcoming retirements.
  - Insufficient capacity building for data management and digital transformation.

- **Process & Tools**
  - The lack of a centralized document management system (DMS) is a major weakness. This leads to difficulties in traceability, transparency, and version control of documents.
  - Despite the presence of some digital tools, many processes, including data collection for performance monitoring, still rely heavily on Excel and manual processes. This limits data reliability, creates redundancies, and hinders automation.

Strategic Position Analysis

The following SWOT analysis focuses on identifying four main elements: Strengths (internal advantages), Weaknesses (internal limitations), Opportunities (external factors that can be leveraged), and Threats (external risks or challenges). It will help gain a clear understanding for the development of the IT Roadmap to maximize strengths and opportunities while addressing weaknesses and mitigating threats.

STRENGTHS	WEAKNESSES
• **Dedicated internal resources** for data quality and governance (e.g., UPMU, Quality Control & Data Governance Unit) • Existing **ERP system** covers core financial functions (accounting, asset management, revenue collection) • **SCADA, GIS partially implemented** • **Strong initiatives** on the development of **performance dashboards** (e.g., NRW) • **Strong internal commitment to digital transformation at the top management level** • Hardware availability for all department visited • Teams knowledgeable and effective • **Well-established public well management practices** that could be leveraged to support national priorities • **Well-equipped and functional laboratory**, contributing to robust water quality monitoring and compliance with health standards	• **Unestablished data governance** • **Fragmented IT systems** (ERP, SCADA, CMMS, GIS) with limited integration • **Manual, Excel-based processes** dominate across departments (O&M, HR, finance, projects) • **Outdated backup systems** • No Information Technology Service Management (ITSM) solution • **Low user capacity and limited training** on existing digital tools • Resistance to change • Undersized project teams for deploying IT solutions • **Limited budget for IT investments** and maintenance, resulting in an aging IT infrastructure and poor connectivity • **Lack of a centralized document management system** • **Use of unlicensed software tools** (e.g., Power BI), posing cybersecurity and compliance risks • Complex competency mapping in certain technical areas, particularly bulk meter management, leading to potential inefficiencies
OPPORTUNITIES	**THREATS**
• Alignment with the **National Water Strategy 2023-2040** • Access to funding and technical assistance from international donors • Potential to adopt **emerging technologies** (AI, IoT, Cloud) to optimize operations and service delivery • Opportunities for **knowledge sharing and best practice exchange with other water utilities** in the region • Potential to enhance data-driven decision-making by **following international data management practices**	• **Increasing cybersecurity threats** • Growing water scarcity challenges demand innovative digital solutions and efficient resource management, which **current systems may not support** • **Rapid technological evolution may outpace WAJ's ability to upgrade and adapt its IT systems** • **Political and economic instability** could impact funding availability and delay digital transformation initiatives • **Difficulty attracting and retaining skilled IT professionals** within the constraints of the public sector

Table 5: WAJ SWOT

2.2.3 Jordan Valley Authority

JVA Organization and Key Figures

The Jordan Valley Authority (JVA), with over 1,000 employees, manages water storage and distribution, primarily for farmers and water utilities. Its mandate is to ensure equitable water distribution nationwide and to manage transboundary agreements related to water use and irrigation. Its responsibilities extend beyond water management to include economic development in the Jordan Valley, overseeing agricultural land, tourism concessions, and infrastructure development.

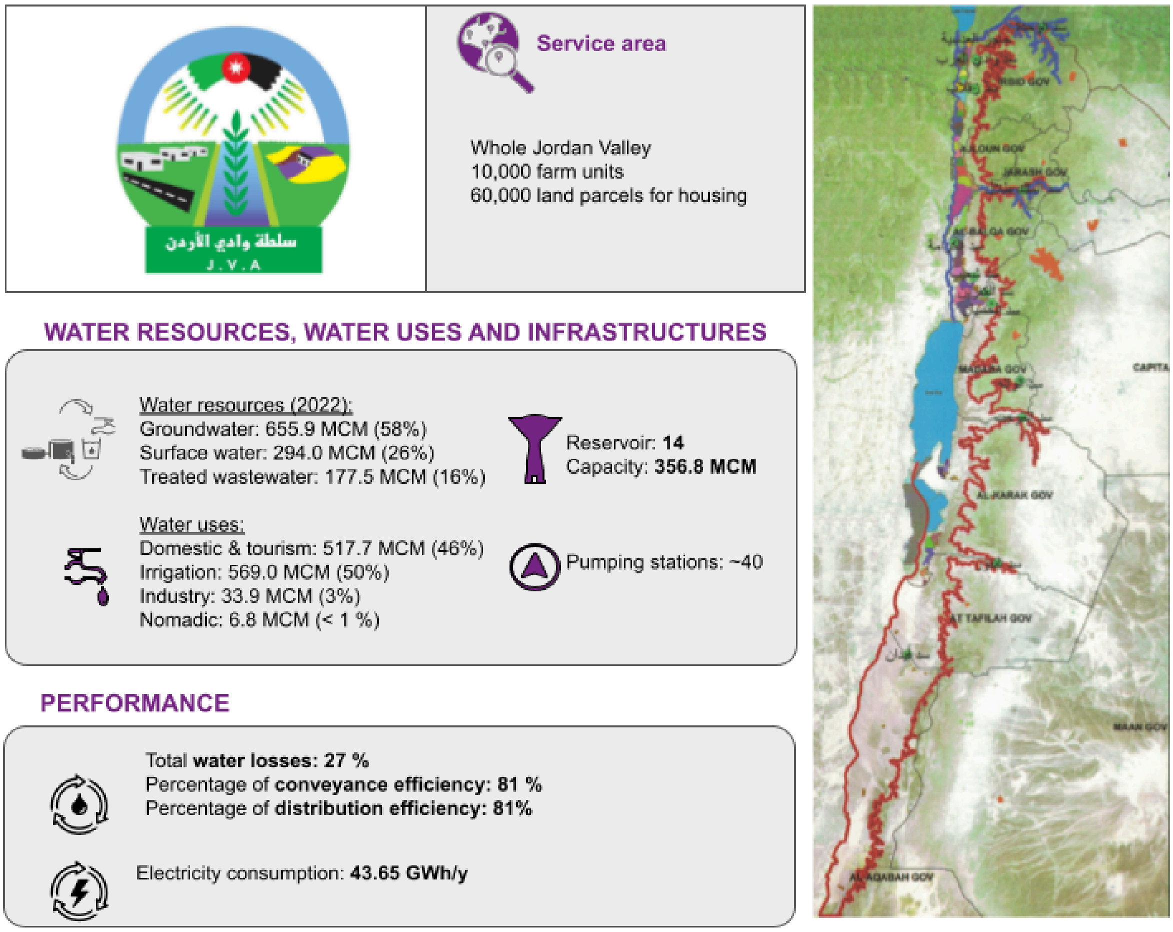


Figure 17: JVA Key Figures[2]

JVA operates under government regulations, with all staff as civil servants and financial procedures monitored by the Ministry of Finance (MoF). Its budget is not focused on financial balance but adheres to governmental accounting principles. As JVA undergoes digital transformation, it must align with broader water sector goals and national economic and public sector modernization visions while addressing its unique needs.

JVA activities revolve around two main locations: the **Head office** in Amman for support activities, and the **Jordan Valley** centered in Deir Alla for operational activities.

[2] *Source: data have been collected from the "Jordan Water Utilities Monitoring Report 2022" (UPMU)*

Head offices mainly hosts four departments:

- The **Administrative & Financial Affairs Administration**, in charge of Administrative Management, Finance, Human Resources, Bid and Procurement, Warehouse Management and Performance Management;
- Three departments involved in the governance and strategic management of water:
  - **Strategic Planning;**
  - **Shared Water;**
  - **Relations with Water Users Associations and Partners**;
- The **Technical Affairs Department**, composed of five directorates, is responsible for:
  - Water Quality Control;
  - Water Resources Management;
  - Water Losses Reduction and Energy Efficiency
  - Management of Large-scale irrigation Projects;
  - Water Harvesting and Laboratory Activities, which handle a significant share of technical tasks.

In the **Jordan Valley**, JVA oversees and supervises the operation of infrastructure while ensuring the distribution of water to agricultural plots, as well as to the cities of Irbid and Amman. Additionally, JVA supplies water to housing units and industrial and tourist areas located in the valley. These activities are regrouped as part of two departments:

- North and Middle Valleys Water Source Administration;
- South Valley Water Source Administration.

Business Process Assessment

JVA, similar to water utilities, has been segmented into various business processes. These processes have been assessed based on two key criteria:

- **Digital Culture:** This scale ranges from a completely oral culture (0%) to daily use of advanced, integrated, and reliable digital tools (100%), including intermediate stages involving paper or Excel-based practices.

- **Data Utilization for Decision-Making:** This criterion spans from having no data or unreliable information (0) to a level where decisions are guided by digital tools (5).

The table below summarizes the main key findings by group of business processes:

Business Process	Sub-Business Processes	Key Findings
Corporate Strategy	Strategic and Business Planning	JVA's **strategic plan is well-documented, shared and aligns** with the National Water Strategy and the Economic Modernization Vision. It addresses all challenges **with a focus on digital solutions and capacity building**. An accountable mechanism to monitor and report progress on Strategic Plan targets is still needed.
	Performance Monitoring and Reporting	This strategy, along with insights from top management, aligns with the on-the-ground assessment, highlighting the **need for comprehensive GIS deployment and improvements to Water Management Information System (WMIS) and Supervisory Control and Data Acquisition (SCADA) systems**. Despite attending capacity-building courses, JVA's Strategic

Business Process	Sub-Business Processes	Key Findings
	Change Management	Planning team sees limited opportunities for significant performance gains. Performance priorities are clearly identified; however, there is a **lack of tools to effectively address these priorities and to conduct change management.**
Operations & Maintenance (O&M)	Central Control	JVA benefits from a **mature tool** (WMIS) that is widely utilized by the teams in place. Although aging, the **SCADA system is also operational** and provides accessible and usable data. However, **these tools have not significantly evolved and are not geared towards advanced decision-making processes**.
	Supervisory Control and Data Acquisition	The reliability of volume measurements remains a work in progress, due to a lack of meters and reliance on volume estimations, which **prevents a clear understanding of the water balance**.
	O&M Distribution Operation	Daily field operations remain **heavily reliant on oral communication** and are primarily focused on distribution to farmers. **Key Performance Indicators (KPIs)**, such as NRW and the reliability of volume measurements - essential for technical performance - are **not effectively managed**, both in terms of reporting and decision-making. Despite the presence of Water User Associations (WUAs), their role is limited to water distribution to farmers. Some WUAs have the capacity to support basic O&M on the ground if they are provided with the necessary tools and capacity building courses, while closely monitored by JVA.
	Customer Service Management	
Customer Service Management	Land Management, Management of Operating Agreements, Contract Management Development of Activities within the Jordan Valley	The related **processes are complex and require significant time and energy** to carry out operations in accordance with legal requirements. There is a **strong reliance on multiple databases** that sometimes lack reliability. Nevertheless, **national tools and the knowledge and resilience of staff** allow them to seek information locally, through information fed by the existing WUAs and existing Ministerial tools.. The use of **three national databases and five local databases**, even just for managing plots and the names of owners and operators, significantly disperses efforts. The **processes are highly dependent on other ministries,** including finance, which greatly limits autonomy.
Financial & Accounting	Elaborate Budget - Control Budget Execution and Accounting	**National tools are not suited to the specific processes of JVA**, leading to the deployment of local databases that are neither managed nor administered effectively. **Dashboards are manual, and decision-making relies heavily on communication and individual experience**.
	Revenue Management	
	Asset Financial Recognition	
	Financial Reporting	
Administrative, Legal, HR (incl. HSE/QMS)	HR - Time Attendance & Payroll	There are some **ad-hoc tools for archiving** or managing these processes. However, it is regrettable that these processes, which are common across other ministries, have not been streamlined. The **training program is sporadic**: while it is tailored to current needs, it is not sustainable, and there is a **lack of focus on digital**
	HR - Individual Performance Management	

Business Process	Sub-Business Processes	Key Findings
	HR - Recruitment Tender and Procurement Document Management System	**solutions** in this area.
Technical Services	Project Management Geographical Information System Non Revenue Water Management	**Project management relies solely on national reporting tools**. The **GIS has not been updated since 2008**, resulting in unreliable or nonexistent data despite a coherent database structure. There is a **significant need for GIS enhancements**, and its implementation could lead to substantial improvements in JVA's cross-functional processes. The **overall strategy for NRW is comprehensive and well-defined.** However, the operational implementation of actions and the daily monitoring tools are inadequate for fostering an advanced culture of NRW management.
IT Management	Network & Security Management IT Assets Management (Software & Hardware) User Support IT Project Management Data Management, Documentation and SOPs Disaster Recovery and Business Continuity	**Current IT processes lack the support of automated tools**, which hinders operational efficiency. While some processes, such as inventory management, rely on files, there is **no automation in place at this stage**. Standard Operating Procedures (SOPs) do exist; however, their availability and accessibility are inconsistent, leading to potential gaps in process adherence and compliance. The **WMIS and SCADA tools remain under the responsibility of JVA**. However, it has been decided to outsource the IT services to WAJ, which is beneficial as it brings in a broader range of expertise and skills. Nevertheless, this arrangement presents challenges for the JVA due to insufficient communication and coordination. The lack of a designated liaison within the JVA complicates collaboration between the two organizations, leading to **extended processes and potential delays in decision-making.** *For the full assessment of WAJ regarding this shared function, please refer to the WAJ specific report (assessment done in November 2024).* Additionally, it is important to note that there is currently **no established data governance framework.** This absence of data governance raises **concerns regarding data management practices, data quality, and overall accountability**, making it imperative to develop a structured approach to data governance to enhance efficiency and reliability across IT processes.

Table 6: Key Findings by Business Process for JVA

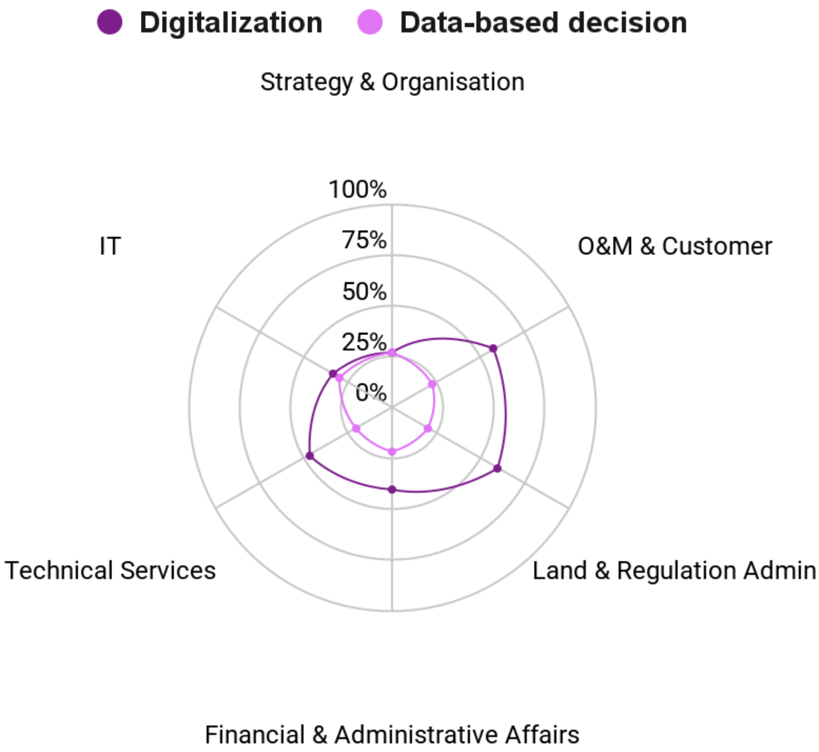
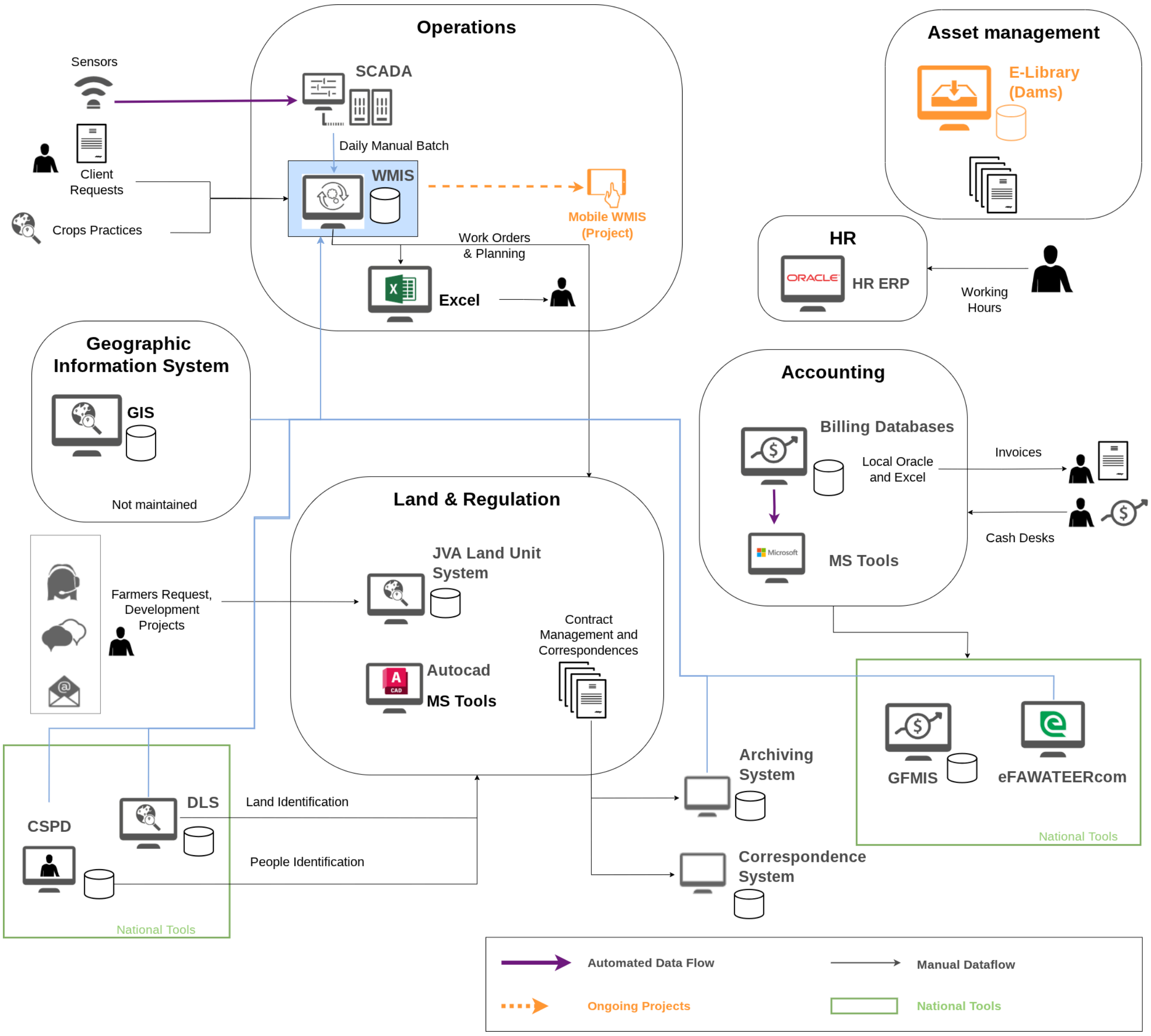


Figure 3: JVA Digitalization State

This above summary reveals **a significant gap in the availability of tools for certain processes**, particularly in the Strategy & Organization and IT Management. Furthermore, it highlights that even when tools are available, such as in O&M and Land & Regulation Administration, they are **underutilized, with decisions seemingly not being driven by the data these tools provide**. This underscores the need for both acquiring appropriate tools and improving data-driven decision-making practices to enhance operational efficiency and achieve strategic outcomes.

Technology Infrastructure Assessment

In order to perform a comprehensive assessment of the existing Information Technology and Operational Technology (IT/OT) environment, and based on the business process assessments, a simplified high level data flow has been drawn up. This approach allows to identify the existing tools used in the different businesses, and the existing or planned data flows.



This chart is based on SEURECA's understanding of the existing situation during the assessment carried out in July 2024.

Figure 18: Simplified, High-Level JVA Dataflow

From an IT perspective SEURECA has identified several critical areas that require modernization:

- **Systems maintenance:**
  - Hardware and servers have not been maintained for several years, raising concerns about service continuity and maintainability.
  - The help desk requires a new tool to establish a knowledge base, analyze tickets and requests, and reduce the time spent on collecting and resolving issues. The goal is to proactively anticipate and address potential problems.
  - The Human Resources (HR) systems are also outdated and need upgrades to enhance interoperability and accessibility.
- **Geographic Information System (GIS):**
  - The GIS currently operates independently within each directorate based on their needs (land, dams, investments, irrigation and control), leading to a lack of unified reference for geographic data.
  - All licenses are obsolete.
- **Water Management Information System (WMIS):**

- The system's architecture is outdated, with limited scalability and complex interoperability.
- User interfaces are not intuitive, resulting in users spending more time on data collection rather than analysis and actionable insights.
- Data storage and management practices lack centralized security measures, exposing the system to potential risks.

- **Reporting:**
  - No data-driven approach or architecture.
  - Poor automation for data quality and analytics.
  - No simple, real-time data consolidation.
  - Lack of data virtualization approach and/or single catalog of service data.
  - Lack of data accountability.

- **Cybersecurity:**
  - JVA faces major cybersecurity issues that require a comprehensive remediation plan.
  - Outdated systems reveal major security vulnerabilities.
  - JVA uses a directory hosted on an outdated server.
  - There is a lack of cyber security training programs.
  - JVA needs a Security Information and Event Management (SIEM) system.

Strategic Position Analysis

The following strengths, weaknesses, opportunities, and threats (SWOT) analysis focuses on identifying four main elements: Strengths (internal advantages), Weaknesses (internal limitations), Opportunities (external factors that can be leveraged), and Threats (external risks or challenges). It will help gain a clear understanding for the development of the IT Roadmap to maximize strengths and opportunities while addressing weaknesses and mitigating threats.

STRENGTHS	WEAKNESSES
● **Clear ambition and vision** ● Support from donors and WGA ● SOPs reportedly in place for all departments ● A long-standing, **mature organization** with well-established processes ● Existence of a **strategic plan,** shared and disseminated ● A central data collection tool (WMIS) to **support decision-making** ● A digital culture and good awareness of data management and decision-making challenges ● An existing **NRW action plan**, with extensive technical engineering ● A lot of existing data in digital format (even if disorganized) ● A SCADA revamping project underway and financed	● Heavy **dependence on the administration** (government level) for operational tools, with poorly shared needs ● A **multiplicity of tools** for managing operated lands ● A **non-existent or unusable GIS** ● **Financial managemen**t is **reactive**, not allowing for initiative ● **Incomplete digital focus on NRW** ● Very little digital customer communication, with little centralization ● Time wasted on processing Land & Regulation applications, leading to **poor customer experience** ● **No** unified, usable **material inventory**, no Computerized Maintenance Management System (CMMS) ● **Poor hardware material and infrastructures** ● I**nsufficient rights and license management** ● Lack of decentralization of digital tools for operational purposes (e.g., GIS) ● Lack of change management in tool implementation ● Uneven geographical deployment ● **No formal data governance**
OPPORTUNITIES	**THREATS**
● **Strong political focus for digitalization**, with high	● **Multiplying tools and data entry bases**

stakes ● Existence of **investment plans supported by donors** ● Shared needs with other stakeholders in the water sector, presenting **opportunities for cross-developments** ● **Remote sensing** (via satellite or drone imagery) could make major improvements (crops, ground humidity, weather forecasts), possibly coupled with AI ● **Aging hardware and software architectures** requiring a complete overhaul to provide IT solutions that meet modern standards of interoperability, multi-channel and security	● Data storage and management practices **lack centralized security measures**, exposing the system to potential cybersecurity breaches ● **Lack of standards** for codifying collection points and measurements ● **No global, unified vision for IT** in water sector ● **Cost and time required** to overhaul the IT technologies that are lacking ● Other organizations poaching employees ● **Population growth** requiring more services ● Natural disasters ● Siloed culture ● Cyber security issues

Table 7: JVA SWOT

2.3 Regional Water Utilities

2.3.1 Miyahuna

Miyahuna Organization and Key Figures

Miyahuna is responsible for providing water and sanitation services to an estimated population of 6,584,700 people in the Middle Governorate. In 2007, Miyahuna signed a delegation and development agreement with the Water Authority of Jordan (WAJ) under which Miyahuna has the authority to manage and operate water and wastewater facilities for period of 99 years, in addition to operating and maintaining water networks, operating and maintaining sewage collection networks, and operating several small sewage treatment plants. Since 2018, the governorates of Madaba, Zarqa as well as the Mahes and Fuheis districts in Balqa have successively been integrated in Miyahuna. In early 2023, Salt and Ain al-Basha were fully integrated. More recently, in 2024, Miyahuna began operations in Southern Shouneh and Deir Alla under a three-year Management Contract (MC).

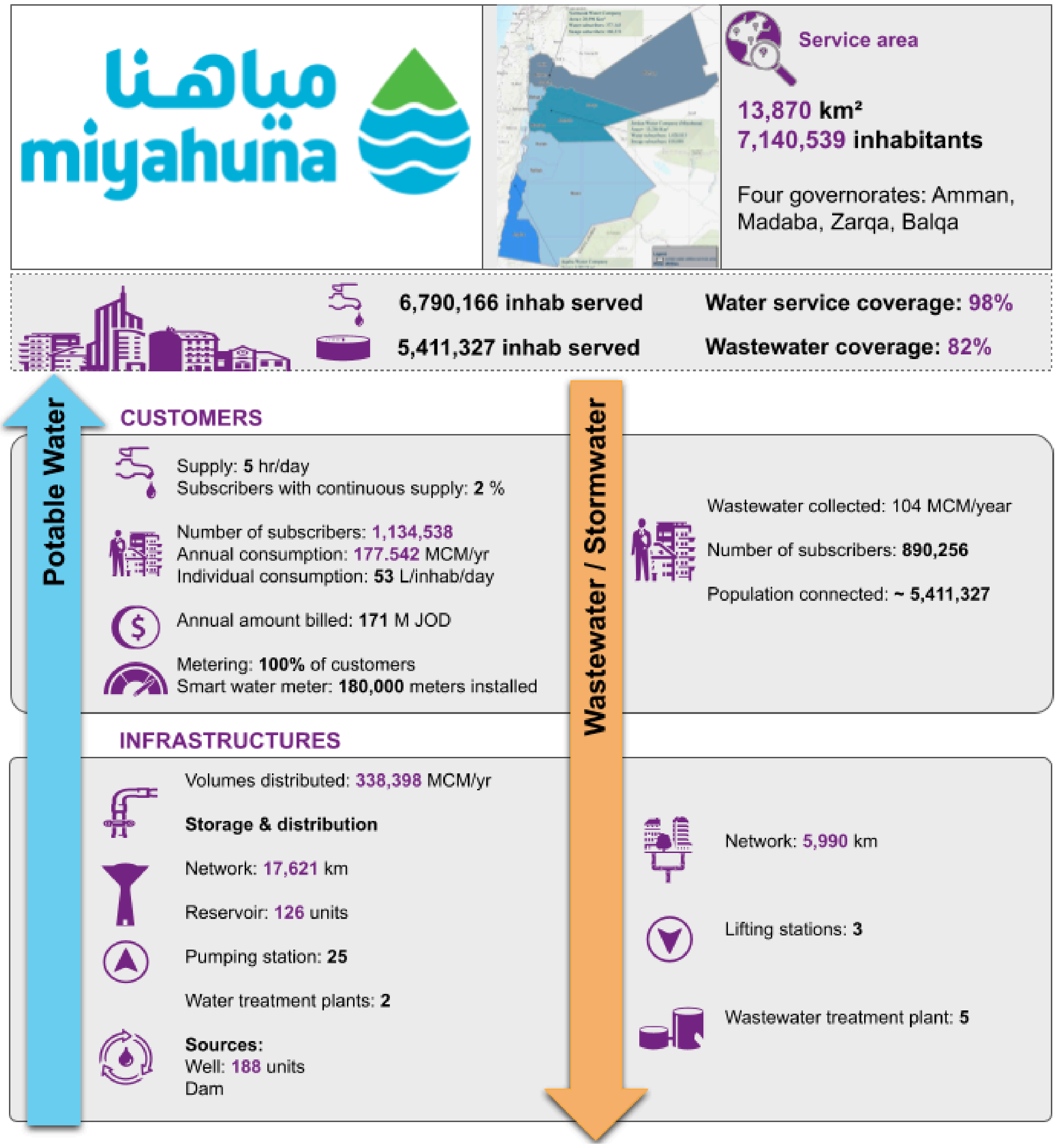


Figure 19: Miyahuna Key Figures[3]

According to SEURECA's assessment, **Miyahuna operates with both geographical and functional organizations.**

Due to the recent integration of other governorates, the current organization remains strongly based in Amman, which is the only one reporting directly to Miyahuna CEO and possesses the broadest range of expertise. Other governorates, Zarqa, Madaba and Balqa (Mahes and Fuheis), have a Deputy director as an intermediate between the CEO and the functional directorates.

Amman Governorate has various functional directorates, which have no direct hierarchical link to the corresponding directorates of other governorates, but rather an advisory and support role, such as:

- **The Operation Directorate**, in charge of:

[3] *Source: data have been collected from the "Jordan Water Utilities Monitoring Report 2022" (UPMU) and completed with "Jordan Water Utilities Monitoring Report 2023" (UPMU)*

- The maintenance of the networks (water and wastewater), WWTP, water treatment plant (WTP), wells, pumping stations and vehicles;
- The operations of water network (including tankers management, leaks repairs, replacement of connection) and WWTP;
- The management and maintenance of the Supervisory Control and Data Acquisition (SCADA) system;
- The management of the call center system (especially the complaints for “no water” or “visible leak”);

- The **Production Directorate**, in charge of the operation of the WTP and Zai pumping station;
- The **Water Quality Directorate**, in charge of performing all tests and managing the laboratory;
- The **Customer Services Directorate**, in charge of new contracts and house connection installations, customer information management, billing, debt management, and complaints management;
- The **Non-Revenue Water Directorate**, in charge of meters testing, illegal use and fraud management (inspections, penalty estimation), non-visible leak detection surveys, flow balance calculation;
- The **Technical Services Directorate**, in charge of planning and supervision of projects funded by external donors or internally, studies (when not outsourced), specifications and designs (especially on-site inspections for new connection);
- The **Financial Affairs Directorate**, in charge of accounting and financial reporting, cost control, financial analysis, budget planning and monitoring and cash management (cashiers);
- The **Human Resources Directorate**, in charge of recruitment, staff management, individual performance monitoring, time attendance and payrolls, safety;
- The **IT Directorate**, in charge of the management of hardware and software (including deployment of the Enterprise Resources Planning (ERP)), helpdesk, cybersecurity and GIS management.

Other Governorates have one or several offices with at least a different scope of activity:

- NRW management (especially illegal use and fraud management and leak detection);
- Customer management (front and back office);
- Operations (networks maintenance and operations, etc.).

Moreover, **some units and departments in Miyahuna are directly reporting to the CEO to address key or corporate-wide challenges**, such as:

- Performance management and strategic planification;
- Internal auditing;
- Communication and awareness campaigns;
- Legal affairs;
- Procurement and inventory management.

Business Process Assessment

Water utilities, such as Miyahuna, have been segmented into various business processes. These processes have been assessed based on two criteria:

- **Digital Culture:** This scale ranges from a completely oral culture (0%) to daily use of advanced, integrated, and reliable digital tools (100%), including intermediate stages involving paper or Excel-based practices.

- **Data Utilization for Decision-Making:** This criterion spans from having no data or unreliable information (0) to a level where decisions are guided by digital tools (5).

The table below summarizes the main key findings by group of business processes:

Business process	Sub-business processes	Key findings
Corporate Strategy	Strategic and Business Planning Performance Monitoring and Reporting Change Management	Miyahuna already has a **robust performance management culture**, with a dedicated unit and tool (GIS). However two main difficulties remains: • **Data is still missing in some services** (wastewater management, financial and administrative for instance); • **There is a lack of structured reporting processes** (particularly in governorates outside Amman) which can lead to a lack of credibility in the data collected. These points **limit the possible analysis of the data and therefore Miyahuna's ability to implement relevant change management practices** and anticipate potential risks. Despite these obstacles, Miyahuna has a **key strength: its 2024-2028 business plan**, which sets a shared vision of the utility's future targets. While the plan provides a strong foundation, there are opportunities to enhance its clarity; for example, it assumes that the water supply will remain constant throughout its duration, which may limit its reliability in the face of changing conditions.
Operations, Maintenance	O&M Production O&M Distribution O&M Wastewater Water Quality Management Energy Management Supervisory Control and Data Acquisition	Miyahuna's operations and maintenance systems show **varying levels of digitalization** across governorates. The **CMMS, implemented in Almotakamel ERP, is well-established** in Amman and Madaba, but still developing in other governorates. While it allows maintenance planning, it lacks advanced asset management functions and clear utilization for renewal decisions. Distribution operations benefit from **GIS and the ESNAD mobile app** in Amman, used in particular for leak management, but network management is significantly challenged by intermittent supply. **SCADA controls key valves in Amman, but its deployment is inconsistent across governorates**, with some sites still relying on legacy systems that pose continuity risks. **Wastewater operations lag behind in digitalization compared to drinking water.** **Water quality management is well-structured with a LIMS**, though upgrades are needed to support improved reporting. **Energy management is a critical focus**, requiring an improved data management system. Overall, there is an ambition to better utilize operational data, particularly from SCADA, but Miyahuna **lacks a comprehensive data strategy and faces cybersecurity risks in its OT network**.
Customer Service Management	New Connection Management	The processes in Amman differ from those applied elsewhere. It is **crucial to improve the customer information** held, especially

Business process	Sub-business processes	Key findings
	Customer Information Management Meter Management and Reading Billing Revenue Collection and Debt Management Illegal Use and Fraud Management Manage Customers Complaints	before migrating fully the ERP to Oracle, as 40% of customer contact information is incomplete. **IT issues are hindering performance**: remote meter reading is often done manually, the X7 system has limitations that lead to a proliferation of tools and a loss of efficiency, and some processes still rely on paper, such as field inspections for fraud management. However, once the second phase of the ERP system is implemented, **the C2M module will replace the entire X7 system**, potentially addressing many of these issues. These obstacles also reduce the ability to conduct in-depth data analysis for prediction and optimization, such as predicting illegal uses or advanced debt management. Although an application allows for advanced complaint management, it is underutilized by the commercial services, leading to in-person visits, degrading the customer experience, and preventing the tracking and analysis of customer relationships.
Financial and Accounting	Elaborate Budget - Control Budget Execution and Accounting Revenue reconciliation Asset Financial Recognition	**Oracle is well-implemented** so far and should enable it to streamline purchases, budget control, accounting and financial reporting. However, two weaknesses of the system remain: • **The cash reconciliation process is still mostly manual**. This should be settled with the implementation of the C2M module of the ERP; • **The financial data does not feed automatically into the overall reporting system**. The service appears to be viable but is actually dependent on state support and subsidies. SEURECA could not assess any implemented asset financial recognition process during diagnosis, however Miyahuna has SOPs related to fixed assets value adjustment.
Administrative, Legal, HR (including HSE/QMS)	HR - Time Attendance and Payroll HR - Individual Performance Management HR - Recruitment Tender and Procurement Warehouse Management	**Time attendance & payroll are fully automated within Oracle ERP** however this data is not used for performance improvement (absenteeism tracking for instance). Other HR processes such as individual performance monitoring and recruitment are manually handled which deeply complicates HR management. If the **purchase workflow is fully automated within the Oracle ERP, tenders and bids management still relies on MS Excel and MS Word**, even using paper support at some steps. Only procurement progress is monitored within the Oracle ERP. According to Miyahuna Warehouse SOPs, all procedures are carried out within the new Oracle ERP warehouse module. However it remains unclear how inventory data is used for stock predictions & other decisions.
Technical Services	Project Management	**Project management is still mostly based on the MS**. The Head of Technical Directorate highlighted that they would need a robust project management module in the new Oracle ERP.

Business process	Sub-business processes	Key findings
	Studies & Design	The on-site inspections process still relies heavily on the use of paper reports, particularly for the transmission of information from one department to another (sales to technical and vice versa).
	Geographic Information System (GIS)	Miyahuna has a **well-established GIS Department using ArcGIS** for various purposes, with plans to upgrade to ArcGIS Utility Network. While Amman has advanced capabilities, **efforts are underway to improve data accuracy, standardization, and integration across all governorates**, including the development of mobile applications for enhanced field operations and real-time data collection.
	Non-Revenue Water (NRW) Management	The NRW management process is still mostly based on MS Excel (water balance) and paper (reports). Miyahuna relies heavily on call center alerts (even for those made by operators) which enables at least a monitoring of the leaks/illegal usages detected but is not a sufficient solution regarding the criticality of the NRW challenge.
IT	Network and security management IT asset management (software and hardware) User Support IT project management Data Management, documentation and SOPs Disaster Recovery and Business Continuity	The IT Department has **SOPs and a document management system is implemented**. **Security seems to be well under control**. Generally speaking, **IT inventories are complete and well-documented**; however, they could be facilitated by the use of a CMDB, if this does not already exist. Several items of equipment are in need of replacement, particularly those critical to system security. **The IT team's good understanding of the various business processes, thanks to the organization in place, is a real strength for continuous improvement** in the use of digital technology to enhance performance; as is their “project mode” organization, which seems to be working well. Miyahuna is **lacking an up-to-date and thoroughly tested disaster recovery plan** which is critical to ensure continuity of service for its operations.

Table 8: Key Findings by Business Process for Miyahuna

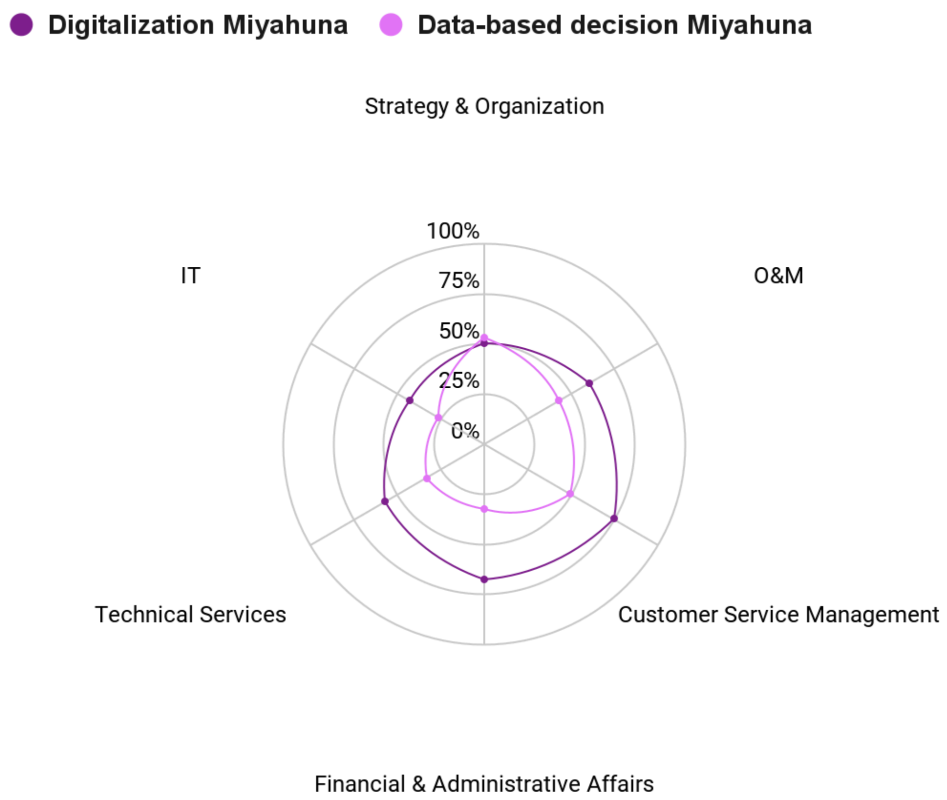


Figure 20: Miyahuna Digitalization State

This comprehensive analysis reveals critical insights into Miyahuna's digitalization efforts and their impact on operational performance:

Infrastructure and Tool Availability:
Core business processes, including customer management, operations and maintenance (O&M), and financial operations, are typically supported by dedicated software solutions. While there are currently separated systems only partially integrated one to another, there is a strategic initiative to integrate all functionalities into a unified ERP system integrated with the GIS. However, support services, particularly those crucial for addressing key challenges such as NRW management, lack adequate digital tools, potentially hindering the optimization of overall performance.

Data-Driven Decision-Making:
Miyahuna utilizes its GIS for overall performance management, enabling visualization of Key Performance Indicators (KPIs) and facilitating a holistic view of the utility's strengths and weaknesses. However, the inconsistency in data standards and reporting processes across governorates and departments significantly hamper advanced data analysis and predictive capabilities. In departments where data informs decision-making in day-to-day operations, it is predominantly used reactively rather than proactively. For instance, the leaks repairs are based on data reported throughout the call center, however it is mostly reactive, based on alerts of residents.

Wastewater Management:
It is worth noting that the digitalization of wastewater management processes lags behind other operational areas, indicating a potential area for targeted improvement.

This assessment highlights the need for Miyahuna not only to acquire and implement appropriate digital tools but also to cultivate a culture of data-driven decision-making. Such advances are crucial to enhancing operational efficiency, achieving strategic objectives and, ultimately, improving the utility's overall performance in water and wastewater management.

Technology Infrastructure Assessment

In order to perform a comprehensive assessment of the existing Information Technology and Operational Technology (IT/OT) environment, and based on the business process assessments, a simplified high-level data flow was developed. This approach allows us to identify the existing tools used in the different businesses, and the existing or planned data flows.

From an IT perspective SEURECA has identified five critical areas that require modernization:

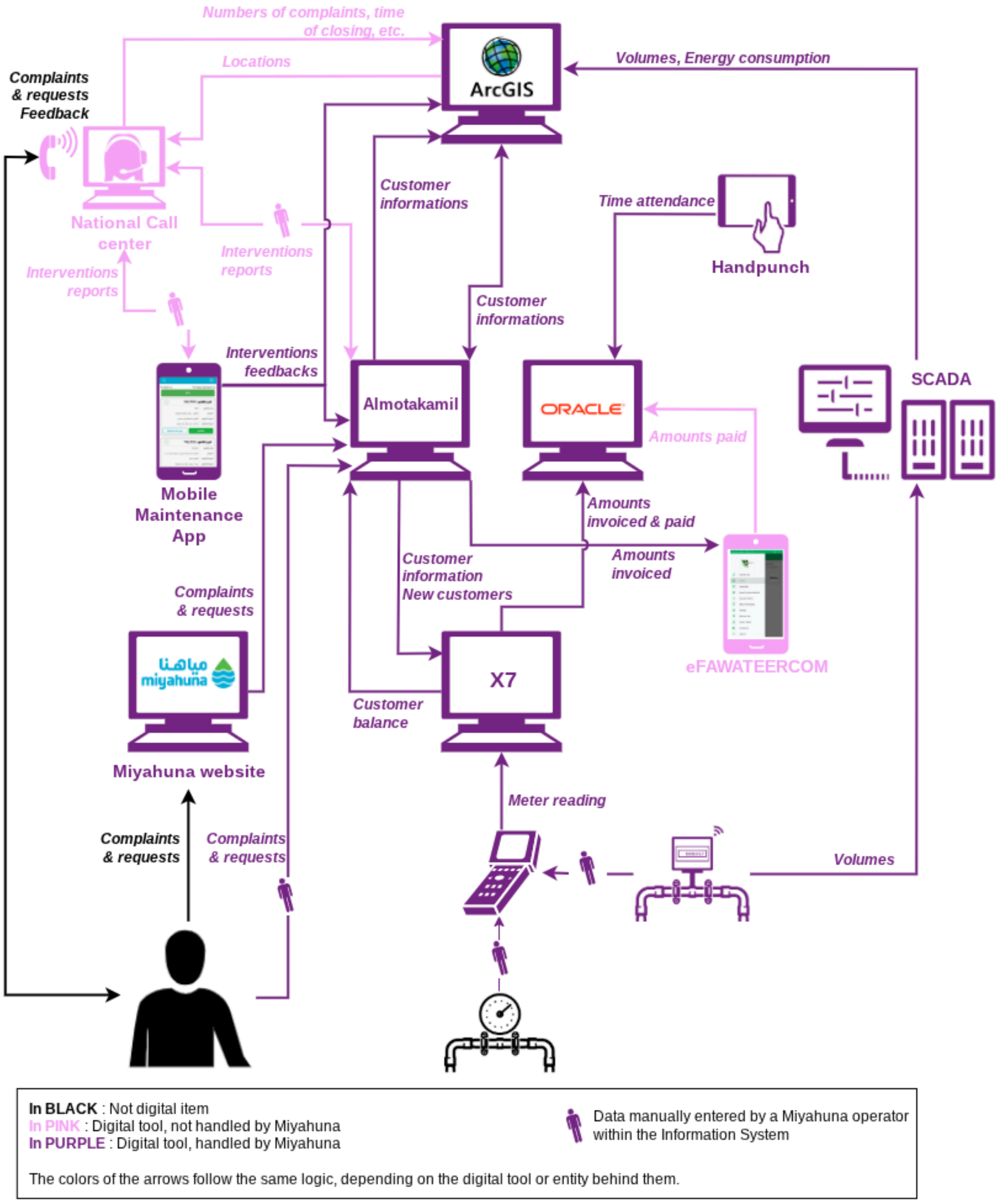
IT Infrastructure:
Some user terminals need updating, the operating systems (OS) for terminal or server are obsolete (for 40% of servers) or are no longer maintained, which raises issues of maintainability and security. Automated IT inventory management is designed to identify under-utilized and obsolete equipment, thereby reducing maintenance and new equipment acquisition costs. Rigorous IT inventory management makes it easier to track security updates and ensure that all devices comply with corporate security policies, thus reducing the risk of vulnerability.

Backup and Disaster Recovery Solutions:
Although this point is included in the organization's processes, it is not sufficiently detailed and equipped. This is a key element for cybersecurity issues and for enabling Information System (IS) transformations in the years to come.

Cybersecurity:
The teams have begun work that needs to be reinforced and continued to ensure that IT and OT systems are partitioned and inter-site links are guaranteed. It will also be necessary to integrate feedback from the in-depth audits carried out during the second half of 2024.

Data Management & Reporting:
There are gaps in the ability to leverage existing data. The absence of a data-centric approach or architecture limits the ability to exploit information strategically and make informed decisions. Lack of automation in the management of data quality and analysis leads to inefficiencies and risks of error. The lack of simple, real-time data consolidation makes it difficult to access the information needed to meet operational and strategic requirements. The absence of a single data catalog also hampers the ability to manage and share data consistently and securely.

OT/IT Convergence:
The IT Department has this challenge in mind and is working on the best way to integrate the SCADA data with other business tools. Its main challenge is the cybersecurity of the OT network, where it has only basic knowledge and is seeking advice from experts.



This chart is based on SEURECA's understanding of the existing situation during the assessment carried out in July 2024.

Figure 21: Simplified, High-Level Miyahuna Dataflow

Strategic Position Analysis

The following strengths, weaknesses, opportunities, and threats (SWOT) analysis focuses on identifying four main elements: Strengths (internal advantages), Weaknesses (internal limitations), Opportunities (external factors that can be leveraged), and Threats (external risks or challenges). It will help gain a clear understanding for the development of the IT Roadmap to maximize strengths and opportunities while addressing weaknesses and mitigating threats.

STRENGTHS	WEAKNESSES

• The organization supports IT projects implementation
• Existing OT infrastructure is modern and effective
• New ERP is used as the backbone of all processes
• GIS serves as foundation for performance monitoring (dashboards)
• 75% of the payments are made through electronic payment via bank applications
• Processes seem efficient (at least in Amman) and well-implemented
• Infrastructure is being upgraded and there are wireless and switching projects
	• Data Management lags behind Business ambition
	• Digital customer journey remains partially digitalised, not seamless
	  ◦ Smart meter implementation underperforms (3%) for large customers
	  ◦ 60% of Amman customers have incomplete information
	• Data analysis remains mainly descriptive
	• User access rights management lacks clarity
	• There are weak points in cybersecurity
	• Demilitarized Zone (DMZ) network needs to be strengthened for IT/OT exchanges
	• Control governance between Main, Local and HMI requires restructuring
	• Government subsidies indirectly support operations
	• No Accrual budget but only a cash budget, while the system is able to do both at the same time
	• AlMotakamel system, a built-in house system responsible for collections, with personal effort from Miyahuna staff, does not contain any control or monitoring tools.

OPPORTUNITIES	**THREATS**
• Preparation for rollout of the National Water Strategy is underway • Incentives provided to support change management (Maintenance Mobile App) • Data science offers high potential • OT dashboard could integrate into IT area • Archived SCADA data holds untapped potential • Security audit in progress • Smart metering for customers presents IT opportunities • CIS could benefit other organizations	• Lack of OPEX forecasting during project development by donors, which affects the ability to ensure the long-term sustainability of the project • The recruitment process is complex and demanding • Supplier reliance impacts IS sovereignty • Business Continuity/Disaster Recovery Plan implementation is essential • Smart meter platform issues necessitate manual reads • Paper-based archives persist for legal documents • New ERP transition demands careful management • Technical debt lingers

Table 9: Miyahuna SWOT

2.3.2 Yarmouk

YWC Organization and Key Figures

The Yarmouk Water Company (YWC), with over 1,400 employees across four categories of employment - including permanent staff, service purchase contracts, secondees from WAJ, and short-term contracts (STTAs) -, oversees the **management and distribution of water resources in the northern governorates of Jordan**, including Irbid, Ajloun, Jerash, and Mafraq. Its primary mandate is to **ensure a reliable and equitable supply of water** to residents, businesses, and industries, and **collection and treatment of wastewater**. YWC is responsible for maintaining and upgrading the water infrastructure to meet growing demands. Additionally, the organization plays a crucial role in environmental conservation, implementing sustainable practices to protect local water sources. Beyond water management, it contributes to regional development by supporting initiatives in tourism, agriculture, and community welfare.

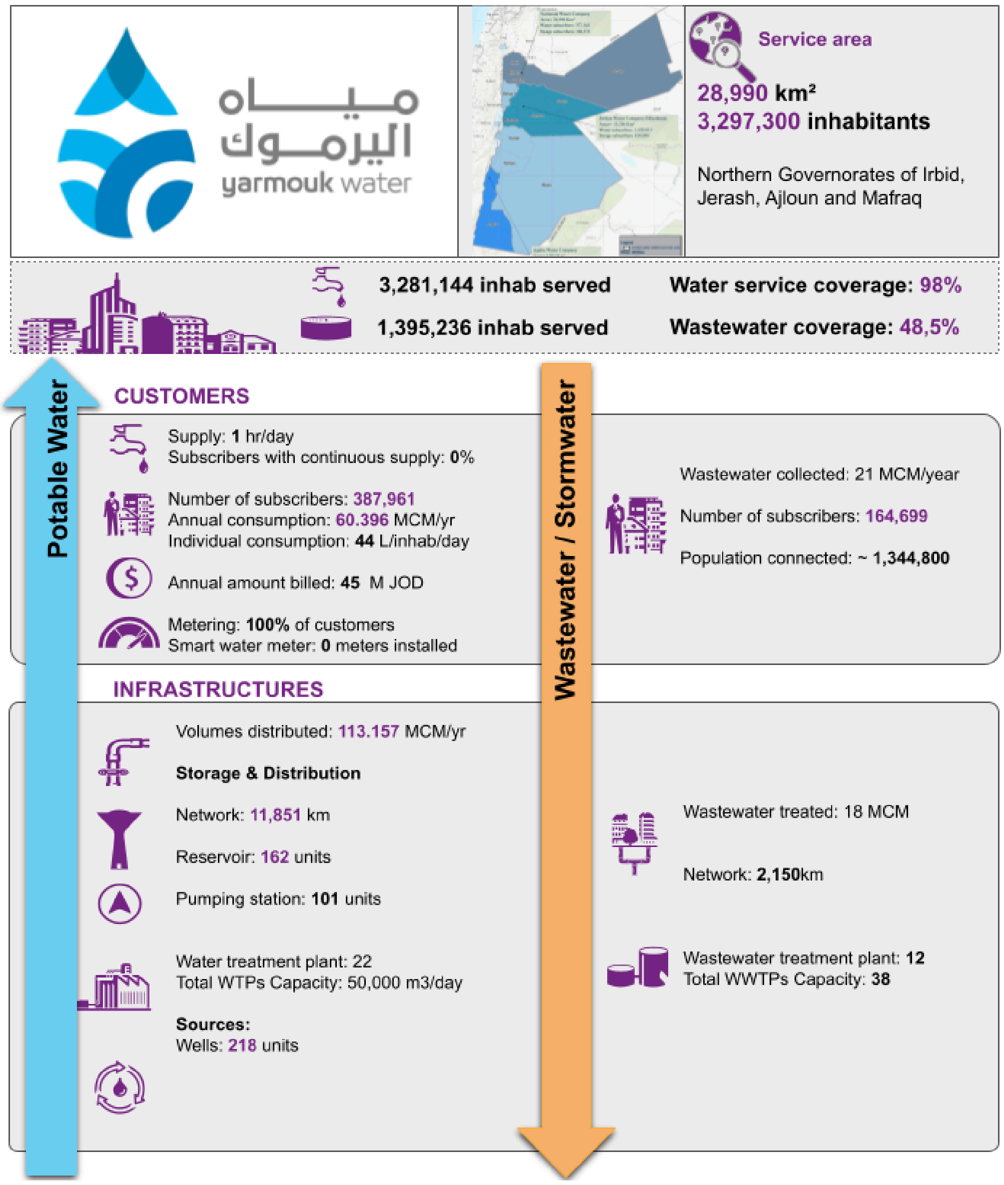


Figure 22: YWC Key Figures[4]

[4] *Source: data have been collected from the "Jordan Water Utilities Monitoring Report 2022" (UPMU) and completed with "Jordan Water Utilities Monitoring Report 2023" (UPMU)*

The Yarmouk Water Company (YWC) operates as a government-owned utility in Jordan, primarily serving the northern regions, including Irbid, Ajloun, Jerash, and Mafraq. Unlike private companies, YWC relies on public subsidies to maintain its operations, as revenue alone often falls short of covering operational expenses. Financial oversight is provided by Jordan's MWI and supported by international organizations like USG, which has assisted YWC in developing financial policies and efficiency programs. YWC's mandate is primarily service-driven, focused on delivering safe drinking water and managing wastewater amidst significant challenges.

The YWC is organized as follows:

- The **Direction of Administrative and Financial Affairs** is in charge of Administrative management, Finance, Human Resources, Bid and procurement and Information Technology (IT);
- The **Direction of Customer Service Management** is in charge of large consumer and performance monitoring;
- The **Direction of Operation** is in charge of the plant Operation and Maintenance (O&M) for the drinking and waste water;
- The **Direction of Technical** services is in charge of the Studies and Projects Management.

Business Process Assessment

Water utilities, such as YWC, have been segmented into various business processes. These processes have been assessed based on two key criteria:

- **Digital Culture:** This scale ranges from a completely oral culture (0%) to daily use of advanced, integrated, and reliable digital tools (100%), including intermediate stages involving paper or Excel-based practices.

- **Data Utilization for Decision-Making:** This criterion spans from having no data or unreliable information (0) to a level where decisions are guided by digital tools (5).

The table below summarizes the main key findings by group of business processes:

Business Process	Sub-Business Processes	Key Findings
Corporate Strategy	Strategic and Business planning Performance monitoring and reporting Change management	YWC **lacks a dedicated Business Planning Department and relies on national guidelines for strategic direction, but without formal multi-year planning.** A number of initiatives have led to the development of dashboards based on national indicators supplied by UPMU, to ensure the consistency of local indicators. Limited coordination and absence of digital tools hamper systematic monitoring, and existing tools like the Power BI dashboard faced challenges due to poor interdepartmental collaboration and absence of licence. Recently the IT department has utilized Oracle E-Business Suite 12.6 and Oracle Publisher to generate reports in various formats, allowing for efficient data manipulation and the creation of insightful dashboards. Additionally, change management and training remain underdeveloped, with minimal digital support for these processes. Significant efforts have been made to build staff capacity in the use of Oracle modules.

Business Process	Sub-Business Processes	Key Findings
Operation, Maintenance	O&M production O&M distribution O&M Wastewater Water quality management Energy management Supervisory Control and Data Acquisition	The visited pumping station struggles with **limited qualified staff and lacks a preventive maintenance strategy, relying heavily on corrective actions**. Existing SCADA systems cover potable water but lack automation and security, limiting oversight. An upgrade to a modern CMMS and SCADA software is critical to enhance asset management and data integration. Improved IT and OT collaboration and cybersecurity are also urgently needed. There is currently no confirmed information regarding the implementation of a CMMS although such a project would be essential to improve maintenance policy. **Wastewater treatment plants suffer from insufficient resources, leading to premature wear and tear on assets, including the SCADA system.** Quality management is largely delegated to WAJ, which operates a Laboratory Information Management System (LIMS); local analyses are traced in an office tool, with no links or cross-reporting. Energy management benefits from sufficient methodology and engineering to address the challenges. The integration of monitoring tools is underway with the support of GIZ.
Customer Service Management	New connection management Customer information management Meter management and reading Billing Revenue collection and debt management Illegal fraud management Manage customers claims Communicate with clients	YWC's connection process is entirely paper-based, leading to inefficiencies and data loss risks. Applications, validations, and installations lack digital tracking. **Data management relies on offline Excel sheets and the limited X7 system**. Despite these difficulties, the paper-based process benefits from rigorous management, allowing a deployment of new-generation and integrated tools under the right conditions. The new connection implementation involves manual checks for parts, while water bills are fully automated and IT has already prepared everything for integration with the ERP, eliminating the need for manual reconciliations. Fraud detection and claims management are ineffective, with poor data integration and reliance on untracked WhatsApp communications. Overall, the lack of digitalization hampers efficiency and service quality. The media team is well advanced when it comes to digital technology, using numerous digital tools. However, at this stage, the team works in silos.
Financial and Accounting	Elaborate Budget - Control Budget Execution and Accounting Cash management and revenue reconciliation	This process benefits from an appropriate ERP. YWC faces budget challenges, such as energy costs exceeding approved amounts, which undermines the credibility of its budgeting process. While the ERP includes controls for spending, these are often bypassed, leading to ineffective cash management. The Finance Department's roles lack clarity, resulting in poor tracking of collections and reconciliations,

Business Process	Sub-Business Processes	Key Findings
	Asset financial recognition	aggravated by the need for manual operations to monitor and improve the collection ratio. Additionally, although the Fixed Assets module is fully ready for use, it has not been activated by the financial department. As a result, the absence of an operational fixed asset register and regular valuations continues to impact accurate financial reporting.
	Financial Reporting	
Administrative, legal, HR (incl. HSE/QMS)	HR - Time attendance and payroll	The HR Department struggles with inefficient attendance tracking despite the existing integration of the time attendance system with the Oracle ERP, and a stagnant recruitment process, limiting staffing capacity. The ERP module for Performance Monitoring exists, and has been in use for the past two years in the IT department. Last year, it was adopted by all departments, according to information provided by the HR department. The IT unit informed us that centralized document management systems exist (Docutrak for letters registration and Docuware for saving documents images). Unclear asset oversight responsibilities create operational silos, hindering effective administration and compliance with legal standards. Tender and purchase processes are well digitized, demonstrating the ability to use the tools deployed within YWC. The ERP system's Inventory module is considered sufficient for existing business needs. The outdated servers hinder data sharing and increase the risk of data loss. Although the DocuTrak system is in use within the Diwan and DocuWare has been deployed for document archiving, the latter is not being fully utilized. This indicates a challenge in change management and user adoption rather than a purely technical limitation. Furthermore, replacing the outdated X7 system would be a critical step towards ensuring that departmental business cycles (workflows) are fully automated and effectively integrated.
	HR - Individual performance management	
	HR - Recruitment	
	Tender and Procurement	
	Warehouse management	
	Archiving, Document Management System (DMS)	
Technical Services	Project management	There is a Project Management Department (PMD) with volunteer skills to carry out projects. However, operating in silos does not always enable YWC to deploy cross-functional projects more effectively. The GIS benefits from standard rules and rigorous management, making it a widely used and relatively reliable tool. The updating of the database remains to be improved. NRW management is insufficient to meet the sector's challenges. Water balances, and more specifically commercial losses, are not monitored at all on a regular basis. The introduction of a monitoring system must be accompanied by an improvement in the performance culture in this area.
	Geographical Information System (GIS)	
	Non Revenue Water (NRW) Management	
IT	Network and security management	The IT team has developed a list of software and hardware as well as a list of licenses and hardware to purchase, which provides a solid starting point. However, these lists could be further refined and streamlined to simplify tracking and management.
	IT assets management (software and hardware)	
		The IT Department has no ticketing system, and user support is

Business Process	Sub-Business Processes	Key Findings
	User Support	limited, handling 30 daily requests (emails, phone call, whatsapp message and written forms) without analysis of recurring issues.
	IT project management	Projects are managed with a top-down approach, with limited user involvement, leading to under-utilized tools.
	Data Management, documentation and SOPs	Standard Operating Procedures (SOPs) are in place, stored on a shared drive, and distributed via email.
	Disaster Recovery and Business Continuity	The backup system is not up-to-date and does not cover all installations. There are some positive points concerning virtualization, the virtual machine backup system and the presence of SOPs, but these are only prerequisites for real mechanisms to ensure service continuity.

Table 10: Key Findings by Business Process for Yarmouk

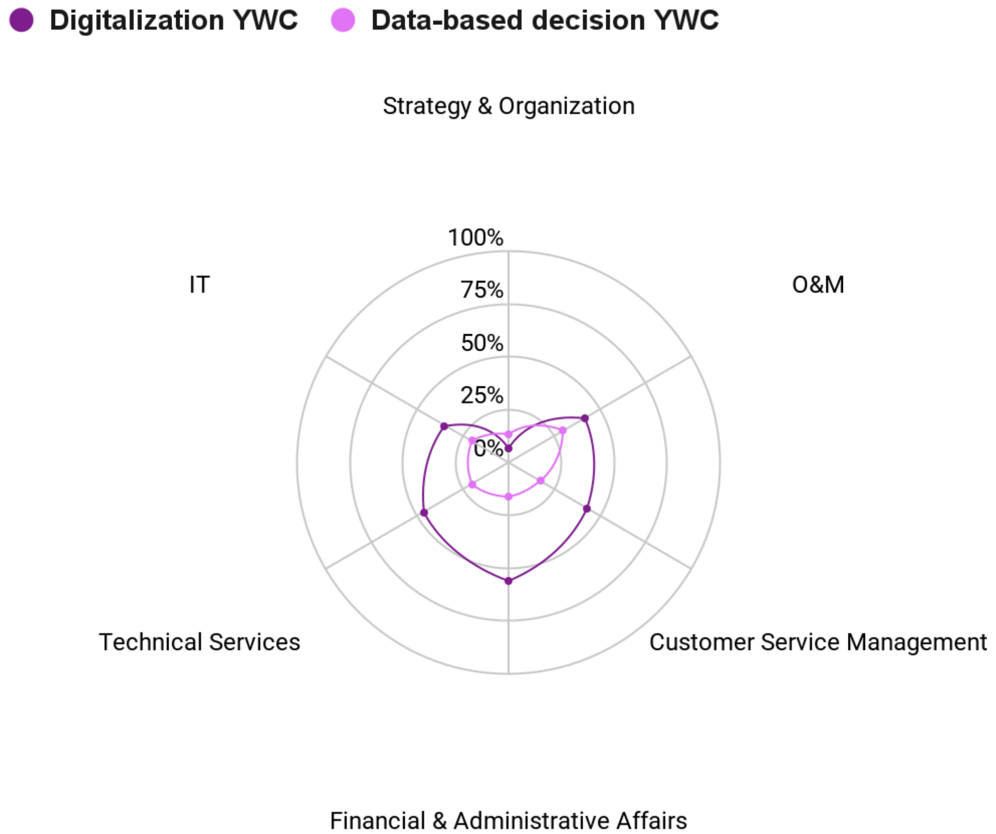


Figure 23: YWC Digitalization State

This summary visualization reveals a significant gap in the availability of tools for certain processes, particularly in the Strategy & Organization area. Furthermore, it highlights a critical issue: even when tools are available, such as in Technical Services, Customer Service Management and Financial & Administrative Affairs, they are underutilized, with decisions seemingly not being driven by the data these tools provide. This underscores the need for both acquiring appropriate tools and improving data-driven decision-making practices to enhance operational efficiency and achieve strategic outcomes.

Technology Infrastructure Assessment

In order to perform a comprehensive assessment of the existing Information Technology and Operational Technology (IT/OT) environment, and based on the business process assessments, a simplified high level data flow has been drawn up. This approach allows us to identify the existing tools used in the different businesses, and the existing or planned data flows.

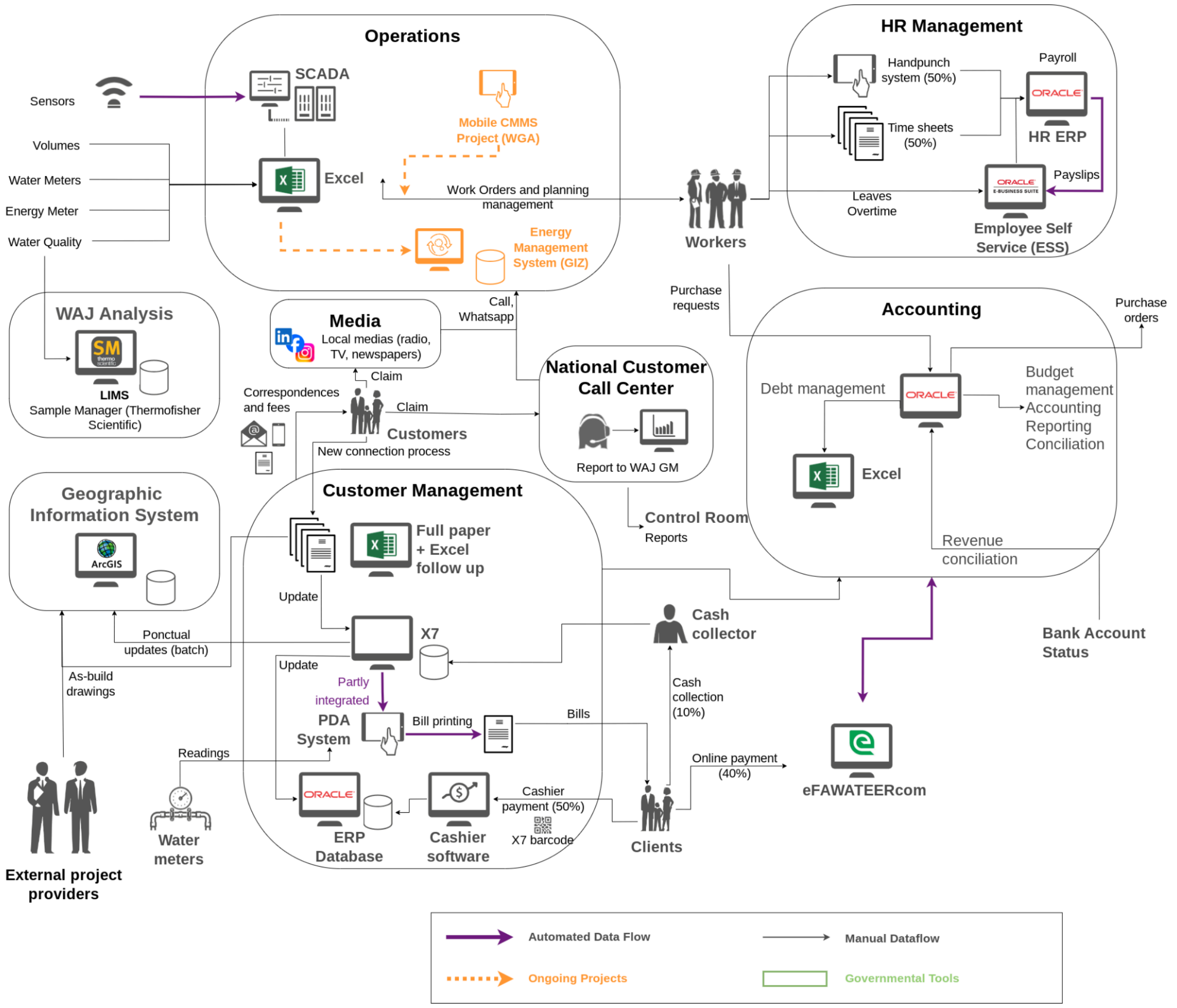


Figure 24: Simplified, High-Level YWC Dataflow

YWC faces significant challenges across its IT operations.

Many hardware and servers have **not been maintained for years**, raising concerns about **service continuity** and difficulties in renewing maintenance contracts. Cybersecurity vulnerabilities, including outdated operating systems such as Windows 7 and Server 2012, expose the utility to **major security risks**, emphasizing the **need for a Disaster Recovery plan.**

The SCADA system requires expansion to cover all northern governorates, while infrastructure upgrades (networks, servers, licenses) are essential to support e-services and new systems.

The ERP system presents a solid foundation, with potential for growth through better integration with other modules, reducing reliance on manual processes, and enhancing data quality. In cash management, the lack of integration between billing systems (X7), ERP, and banks forces manual registration, causing inefficiencies.

Finally, the development of an inventory and fixed asset management system, including proper asset tracking and depreciation schedules, will unlock valuable synergies and optimize resource utilization.

By addressing these areas, YWC can build a stronger, more resilient IT framework to support its future growth and sustainability.

Strategic Position Analysis

The following strengths, weaknesses, opportunities, and threats (SWOT) analysis focuses on identifying four main elements: Strengths (internal advantages), Weaknesses (internal limitations), Opportunities (external factors that can be leveraged), and Threats (external risks or challenges). It will help gain a clear understanding for the development of the IT Roadmap to maximize strengths and opportunities while addressing weaknesses and mitigating threats.

STRENGTHS	WEAKNESSES
• **GIS** is globally up-to-date and used in various departments (Customer Service Management, complaint management, rounds, etc.) • **Purchase and Warehouse management** (ERP) is well deployed and used (although this remains to be verified at governorate level) • Meter reading and Billing process with **Personal Digital Assistants (PDA)** is working properly • **Hardware availability** for all department visited • Procedures described and existence of SOPs • Certification ISO 27001 • Teams knowledgeable and effective • **Customer workflow** is well defined to consider **digitalization** • Good basis in the SCADA (completion, geographical and functional referencing) for **CMMS deployment** or **GIS enhancement** • Strong interest in digitalization within the teams, particularly regarding dashboards, with clear awareness of their added value	• Existing organizational chart but little known and sometimes not applied (vacancies, substitutes) - impact on the **clarity of mandates** • **Unestablished data governance** • **Lack of skills or person** (IT/OT) • Task completion on X7 requires navigating across multiple screens, which reduces efficiency and creates frustration • Lack of water network performance supervision tools, and **no water balance automated calculation** • Undersized project teams for deploying IT solutions • No Information Technology Service Management (ITSM) solution • **NRW**: different systems for transmission and distribution can **impact data quality and reliability** • **Not flexible or scalable x7 system** • **SCADA does not cover all sites in the North governorates** • While the IT department actively collaborates with other departments despite **limited staff and resources**, its strong influence on business strategy may still lead to a **risk of misalignment** between some technological initiatives and core business priorities • Some hardware, servers and OS are not maintained • Initiatives led by various departments (e.g., database creation, dashboards) using tools not validated or supported by the IT department
OPPORTUNITIES	**THREATS**
• **Strong political focus for digitalization**, with high stakes • Existence of **investment plans supported by donors** • Shared needs with other stakeholders in the water sector, presenting **opportunities for cross-developments** • **Streamlining of the existing IT/OT system at the National Level** • **Existing ERP user manuals** previously	• Lack of OPEX forecasting during project development by donors, which affects the ability to ensure the long-term sustainability of the project • **Strong paper culture that can resist to change management** • **Technical debt and** Windows 7 existence which can lead to a risk on security and continuity of service • Lack of OT skills and obsolescence of the OT hardware can lead to a non-functional SCADA system

developed; it is important to reference them and establish a plan for their effective implementation and usage	• **A tight budget due to the downward review of the GBD**. Insufficient Operational Expenditure (OPEX) impacting long term projects.

Table 11: YWC SWOT

2.3.3 Aqaba Water

AW Organization and Key Figures

AW, with over 500 employees, oversees the management and distribution of water resources in the Aqaba region, extending to the governorates of Karak, Ma'an and Tafileh for the management, operation and maintenance of water and wastewater networks. Its primary mandate is to ensure a reliable and equitable supply of water to residents, businesses, and industries, collection and treatment of wastewater and supply of reclaimed water for irrigation of park and green spaces, street cleaning and cooling of industrial processes. AW is responsible for maintaining and upgrading the water infrastructure to meet growing demands. Additionally, the organization plays a crucial role in environmental conservation, implementing sustainable practices to protect local water sources. Beyond water management, AW contributes to regional development by supporting initiatives in tourism, agriculture, and community welfare.

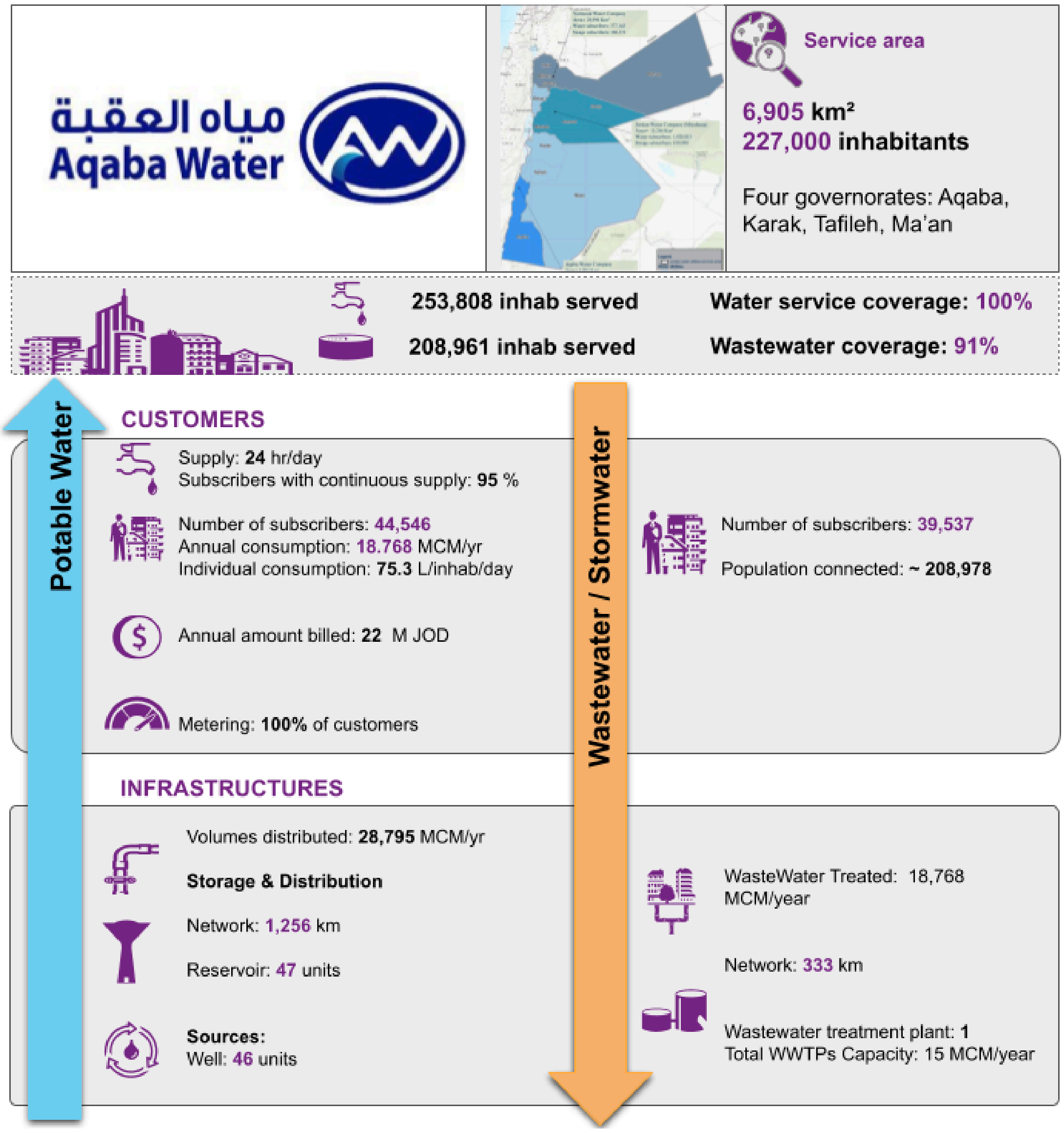


Figure 25: AW Key Figures (for Aqaba governorate only)[5]

AW is a limited liability company which owns and operates all water production and distribution assets and sewage collection and treatment assets in the Governorate of Aqaba, and bills and collects all associated charges from the customers served. It operates with stand-alone finance and management resources. 85% of its shares are owned by WAJ, an independent administrative body subordinated to MWI which governs public water supply and wastewater service in Jordan, 15% are owned by Aqaba Development Company (ADC), which is owned fully by the Aqaba Special Economic Zone Authority (ASEZA), the development arm of the Government of Jordan (GoJ) in the Aqaba Special Economic Zone.

AW manages an integrated water infrastructure system that includes potable water, wastewater collection and treatment and a treated sewage effluent system. The level of service in Aqaba surpasses that of other governorates in the southern and northern parts of Jordan. The water supply system operates on a continuous basis for water supply, and nearly 100% of customers in northern ASEZA are connected to the public sewer system.

[5] *Source: data have been collected from the "Jordan Water Utilities Monitoring Report 2022" (UPMU) and completed with "Jordan Water Utilities Monitoring Report 2023" (UPMU)*

The primary source of drinking water is the Disi wellfield, which pumps nearly 17 million m3/year of water from 12 wells to a collector tank. From there, the water flows to the terminal reservoirs, and then to the main primary tanks including Shallala reservoir and Aqaba reservoirs. The southern coast is mainly fed from Al Shallala reservoir supplemented by the desalination plant, which has a capacity of 5 million m3/year.

The sewer system extends across the populated districts within ASEZA and includes a main Wastewater Treatment Plant (WWTP) with a capacity of 21,000 m3/day. This plant features both mechanical and natural treatment units, producing treated sewage effluent that is pumped through two separate systems; the Agricultural Reclaimed Water (ARW) system and the Urban Reclaimed Water (URW) system. The primary consumers of this treated water are industrial and agricultural users.

On 15 December 2021, the WAJ signed a Management Contracts (MCs) agreement with AW to manage the water and wastewater services in the Al-Karak, Tafileh, and Ma'an governorates, thus expanding the service area of AW to cover all southern governorates of Jordan. The phased implementation started in Ma'an on 1 January 2022, in Tafilehon 1 April 2022, and in Al-Karak on 1 July 2022. AW had not experienced this size of service area before.

The Southern Governorates MCs, managed by a team reporting to AW with local management responsibility, cover water and wastewater networks, including wells and the Mujib Ultrafiltration plant, with a focus on providing 24/7 water supply. The scope excludes wastewater treatment plants, which fall under AW's External Projects/Contracts department in Aqaba. The MCs are overseen by a General Manager (GM) and structured similarly across three governorates: Karak (850 staff), Maan (600 staff), and Tafilah (300 staff), with staff members seconded to MCs from the Water Authority of Jordan (WAJ). The objective was to prepare the governorate for a potential integration into the AW company after the MCs conclude, integration which has now been confirmed at the beginning of 2025.

In addition, the GoJ is planning to construct the Aqaba-Amman Water Desalination and National Conveyor Project. This project is designed to desalinate and convey water from Aqaba to Amman and the southern and northern regions. Consequently, improvements to all recipient water supply systems are necessary to properly handle the additional water quantities and changes in resources.

Business Process Assessment

Water utilities, such as AW, have been segmented into various business processes. These processes have been assessed based on two criteria:

- **Digital Culture:** This scale ranges from a completely oral culture (0%) to daily use of advanced, integrated, and reliable digital tools (100%), including intermediate stages involving paper or Excel-based practices.
- **Data Utilization for Decision-Making:** This criterion spans from having no data or unreliable information (0) to a level where decisions are guided by digital tools (5).

The table below summarizes the main key findings by group of business processes:

Business process	Sub-business processes	Key findings
Corporate Strategy	Strategic and Business Planning	The organization has a well-defined strategy that is tracked using comprehensive, consolidated indicator tables. While these tables are stored on Sharepoint, the process of retrieving and integrating data lacks automation. The foundation for becoming a data-driven organization exists, but challenges persist beyond automation

<table>
<tr><th>Business process</th><th>Sub-business processes</th><th>Key findings</th></tr>
<tr><td rowspan="2"></td><td>Performance Monitoring and Reporting</td><td rowspan="2">issues.
Resource constraints and the absence of a robust framework have led to an over-reliance on external contracted staff for many key activities. This situation raises concerns about data governance, which should be addressed, especially considering the importance of resilience, performance and territorial security in the coming years.</td></tr>
<tr><td>Change Management</td></tr>
<tr><td rowspan="6">Operation, Maintenance</td><td>O&M Production</td><td rowspan="6">A significant lack of resources has been identified, forcing AW to rely on service contracts. This dependence hinders the organization from effectively following and executing standard operating procedures.
The CMMS tool (MP2) is obsolete and outdated, and the dedicated module for maintenance in the ERP does not meet the needs. Although AW is exploring solutions such as Fiix (Rockwell Automation), it lacks a comprehensive long-term strategy.
Despite having invested in a state-of-the-art SCADA system, many sites remain unconnected to the central room synoptics, limiting overall operational visibility and control.
There is a severe lack of personnel for IT and SCADA operations, with a notable absence of staff in the Central Control Room in Aqaba, as well as for overall process management, compromising real-time monitoring and control capabilities.</td></tr>
<tr><td>O&M Distribution</td></tr>
<tr><td>O&M Wastewater</td></tr>
<tr><td>Water Quality Management</td></tr>
<tr><td>Energy Management</td></tr>
<tr><td>Supervisory Control and Data Acquisition</td></tr>
<tr><td rowspan="7">Customer Service Management</td><td>New Connection Management</td><td rowspan="7">The audit findings indicate significant challenges in the company's customer service infrastructure and capabilities. The existing Enterprise Resource Planning (ERP) system is underperforming in its ability to address customer demands effectively. This inadequacy hampers the company's capacity to manage customer interactions and meet expectations optimally, potentially leading to decreased water customer satisfaction and complications in payment collection.
In addition, the audit highlights the absence of a Customer Relationship Management (CRM) system within the organization. This shortcoming prevents the company from proactively monitoring and anticipating customer needs, thereby limiting its ability to offer a personalized, responsive service. Implementing a CRM could not only improve the management of current demands, but also enable a more detailed analysis of customer trends and behaviour. Such insights could serve as a strategic asset, allowing the company to tailor its services more precisely to customer needs and preferences.
The management contracts in southern governorates produce an advanced dashboard on billing and revenue, used to manage performance. This could be extended to the rest of AW.</td></tr>
<tr><td>Customer Information Management</td></tr>
<tr><td>Meter Management and Reading
Billing</td></tr>
<tr><td>Revenue Collection and Debt Management</td></tr>
<tr><td>Illegal Fraud Management</td></tr>
<tr><td>Manage Customers Complaints</td></tr>
<tr><td>Communicate with Clients</td></tr>
</table>

Business process	Sub-business processes	Key findings
Financial and Accounting	Elaborate Budget - Control Budget Execution and Accounting	The audit report for the water company reveals significant operational and commercial challenges that are hindering its efficiency and customer service capabilities. Currently, all data relating to customers, water consumption and maintenance operations is collected manually. This manual process is not only time-consuming, but also increases a high risk of human error, potentially leading to inaccuracies in records and reports. The consolidation of this data is carried out by the UPMU, which adds a further layer of complexity and delay to the processing of the information. The lack of a CRM system makes the situation even worse. Without CRM, the water company is unable to centralize and analyze customer information effectively, limiting its ability to understand customer needs and behaviours. It also hampers the ability to personalize services, respond quickly to customer requests and implement effective loyalty strategies. In addition, the report points out that the current invoicing system is flawed. An inefficient billing system can lead to errors in invoices sent to customers, which can cause frustration and complaints, damaging the company's reputation. These combined problems - the lack of a CRM and a faulty invoicing system - are preventing the organization from meeting today's business challenges. These include the difficulty of optimising operations, improving customer satisfaction, and increasing profitability. To overcome these obstacles, it is crucial that the utility considers investing in modern technology solutions that would automate data collection and management, while improving the accuracy and efficiency of internal processes and initiating a data-driven approach that can be extended to the performance of the organization's other business processes.
	Revenue Management	
	Asset Financial Recognition	
	Financial Reporting	
Administrative, legal, HR (incl. HSE/QMS)	HR Management	AW faces significant staffing challenges, with 25% of its 518 employees on service contracts and 150 open positions. The HR department uses a mix of tools (Excel, ERP Microsoft Dynamics, LMS) but struggles to fully utilize them, particularly in succession planning and competency management. Partnerships with GIZ aim to improve technical and human resource capacities, but full integration remains a challenge.
	HR - Time Attendance and Payroll	
	HR - Individual Performance Management	The company employs a mix of manual and digital processes for performance appraisals, lacking a unified evaluation system across all employee types. This hinders efficient performance management and data-driven decision-making.
	Warehouse Management	80% of warehouse operations are automated through MS Dynamics 365. The JONEPS platform has been set up for tendering purposes, but it has not yet been used. Additionally, the lack of a fully implemented procurement plan and sourcing modules affects process standardization.
	Procurement / Purchase	
	Document Management System	The current Imagelinks system is outdated, lacking modern features and integration capabilities. This creates inefficiencies and hinders data centralization.

Business process	Sub-business processes	Key findings
Technical Services	Project Management Geographical Information System Study, Design Non Revenue Water Management	AW has made significant strides in digitalizing its technical services, particularly in GIS and hydraulic modeling. It manages both external (donor-funded) and internal projects, using various tools including Primavera, AutoCAD, GIS, and ERP systems. The organization aims to implement a comprehensive project management system to accelerate project delivery. However, they face challenges with staffing and full utilization of available technologies. The organization uses advanced software like WaterGems and SewerGems for hydraulic analysis and network modeling. These tools allow for scenario management and analysis of water distribution systems. However, the extent of data-driven decision-making in daily operations is not clearly identified. The Technical and Commercial Loss Department focuses on reducing losses through metering systems (AMI and HHU). Data analysis is conducted quarterly and monthly for 22 DMAs, with plans to increase frequency. Currently, Excel is heavily used for analysis, but there are plans to integrate processes into the AMI system. The department is working on improving data quality and addressing metering gaps. AW has a robust GIS infrastructure with enterprise-level SQL database management. The system covers various utilities and infrastructure components. There are desktop and mobile licenses for different departments. Regular updates are made to reflect as-built conditions, and there is integration with WaterGEMS for hydraulic modeling. A project is underway to develop a centralized GIS for ASEZA.
IT Management	Network and Security Management IT Assets Management (Software and Hardware) User Support IT Project Management Data Management, Documentation and SOPs Disaster Recovery and Business Continuity	The observations concerning the IT Department are similar to those noted above: the organization suffers from a significant lack of internal resources, and projects are generally outsourced. The problem does not lie in the absence of data digitization, but in the lack of an expert system for consolidating data into information that can be used by the organization to improve efficiency and operational performance. Digitization is present, but data is still collected mainly via forms, and there are no Configuration Management Database (CMDB), ITSM, log centralization or knowledge base tools. These expert tools would make it possible to objectify the organization's processes and export them more easily to subcontractors, while providing analytics that could be exploited by QA to identify optimization and cost-saving levers. The architecture choices, including ERP, are based on Microsoft technologies, unlike the decisions made by other utilities. While this local approach makes sense given the access to Microsoft expertise in the region, it may not be advantageous on a national scale for water utilities. The issue of interoperability is not raised here, but the ability to exchange and leverage skills or developments made by Miyahuna or YWC could be beneficial.

Table 12: Key Findings by Business Process for Aqaba

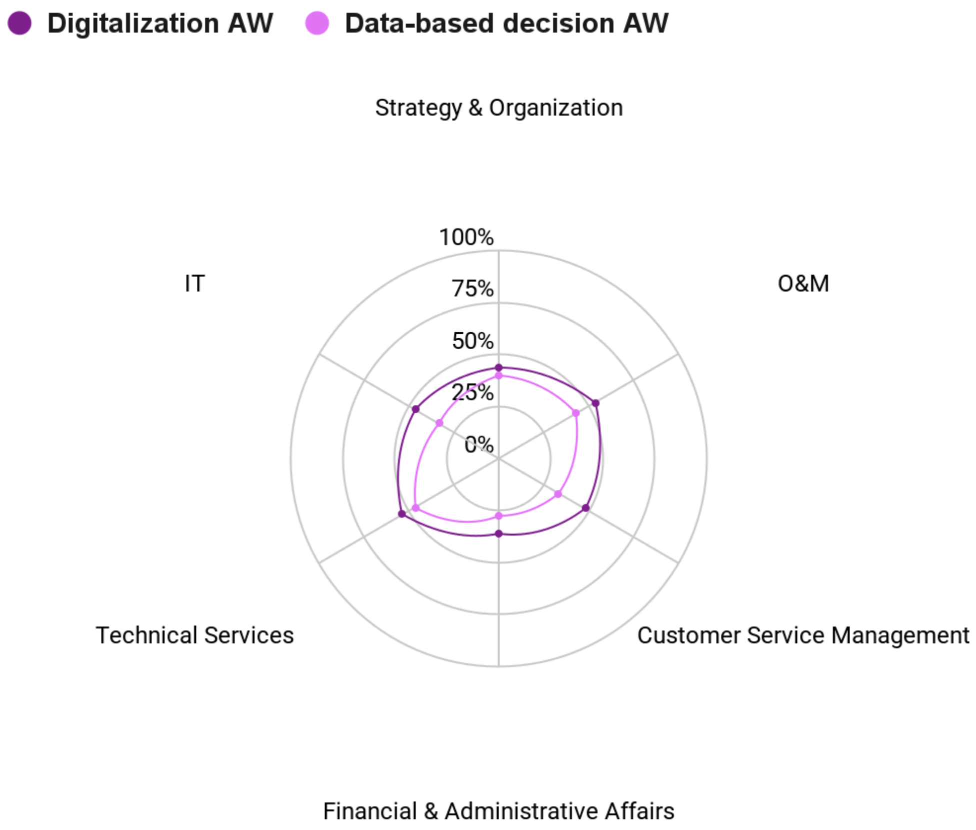


Figure 26: AW Digitalization State

This summary visualization reveals a significant gap in the availability of integrated tools for certain processes, particularly in the Customer Service Management, Strategy & Organization and Technical Services areas. Furthermore, it highlights a critical issue: even when tools are available, they are underutilized, with decisions seemingly not being driven by the data these tools provide. This underscores the need for both acquiring appropriate tools and improving data-driven decision-making practices to enhance operational efficiency and achieve strategic outcomes.

Technology Infrastructure Assessment

In order to perform a comprehensive assessment of the existing IT/OT environment, and based on the previous business process assessments, a simplified high level data flow has been drawn up. This approach allows to identify the existing tools used in the different businesses, and the existing or planned data flows.

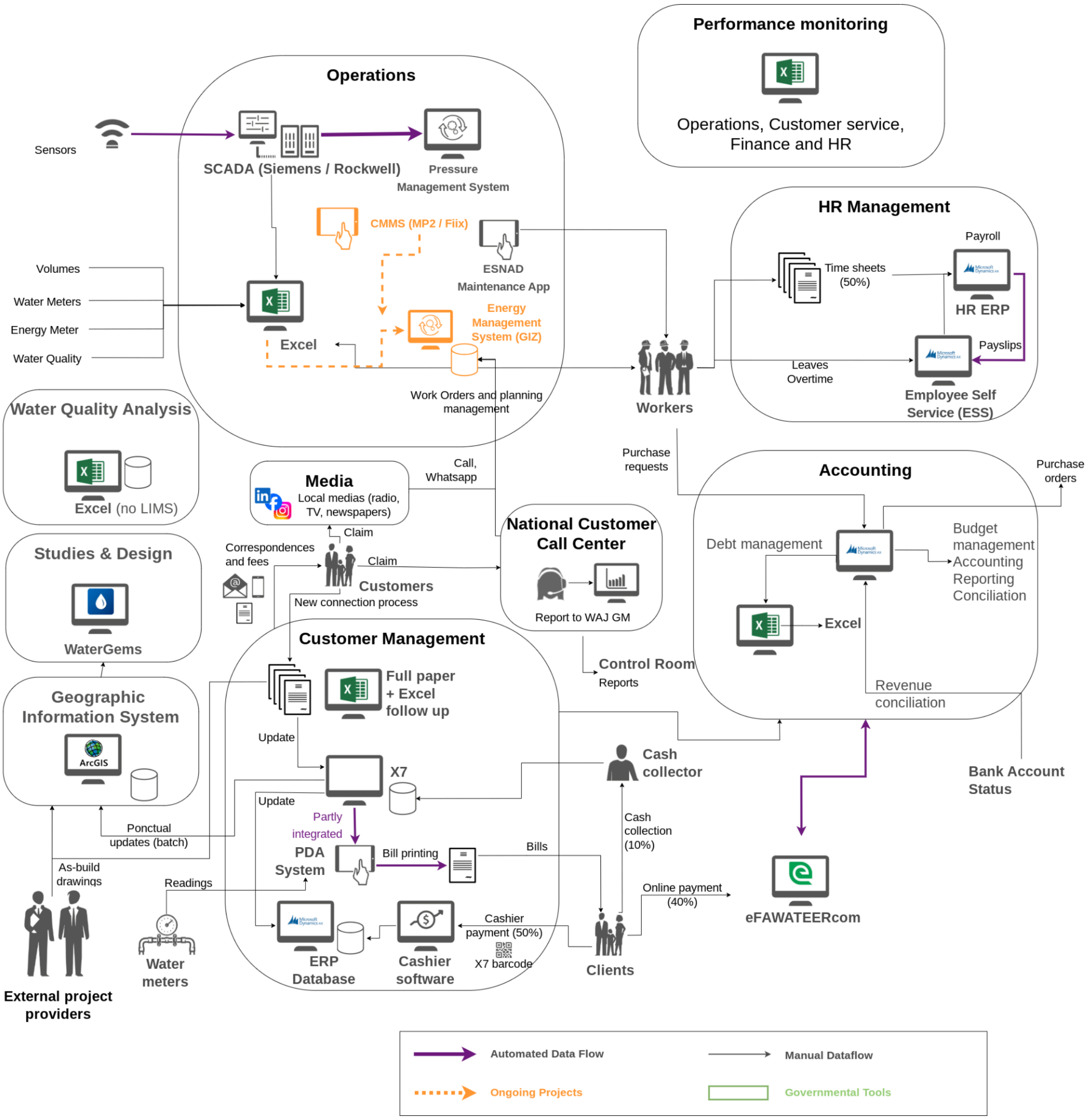


Figure 27: Simplified, High-Level AW Dataflow

Focus on IT

From an IT perspective SEURECA has identified various critical areas that require modernization:

- **Customer Information System (CIS):**
    - The ERP implemented by Aqaba using MS 365 Dynamics is currently unable to cover the needs associated with customers;
    - Most ERP modules, such as cash and bank, internal audit benchmark, CRM, are either not used or not implemented properly;

- **Reporting and Business Analytic Tools:**
    - There is a table for consolidating indicators, but no integrated, computerized, automated system for retrieving and integrating data. The strategy and tools for a data-centric approach do not exist;
    - There is no Business Intelligence (BI) system in place to consolidate and analyze data from all software and applications - it is currently done manually;
    - The lack of timely data and information across critical systems - such as CRM, cash and bank, and payroll (attendance control) - severely hinders the ability to make informed and effective decisions, impacting overall operational efficiency.
- **Resource and Expertise Shortage:**
    - There is a general lack of resources and specialized personnel to effectively manage the entire system:
    - Conflicting Interests and Overlapping Operations: Without clear standards for separating duties, tasks and responsibilities often end up being handled by just one person. This lack of separation causes inefficiencies and makes operations less secure.
- **Hardware**
    - Some server and switch equipment needs replacing;
    - Ensure high availability of strategic equipment. Fortigate must have high availability;
    - It is essential to back up the entire IT system on a second site, and to ensure disaster recovery in the event of a major incident.

- **Software and Database**
    - Independent Database and Application Management: Each governorate operates its own separate database and applications. For the **HHU system and mobile application, Ma’an, Al-Karak, and Tafileh utilize the ITAC mobile application, whereas Aqaba relies on the GCE mobile application;**
    - **Lack of an Automated BI System (except in the southern governorates)**: There is no Business Intelligence (BI) system available to automatically gather and analyze data from all software and applications. This process is currently handled manually using Power BI;
    - **Insufficient Integration Points**: Integration points are limited, with some integrations being executed manually through batch processing or offline methods;
    - **Computerized Maintenance Management System (CMMS)** tools are currently being evaluated and are not part of an integrated strategy.

- **Documentation:**
    - The assessment revealed a documentation deficiency, with a lack of user manuals and technical documentation for the applications. Providing comprehensive documentation is essential for effective system usage, troubleshooting, and maintenance.

- **Cybersecurity:**
    - The approach lacks resources;
    - Some topic-specific policies are partially available and should be verified to fulfill the requirements;
    - There is a lack of information security awareness, training and education;
    - Absence of Standardization in System Auditing: There is no consistent method for auditing the systems.

Strategic Position Analysis

The following strengths, weaknesses, opportunities, and threats (SWOT) analysis focuses on identifying four main elements: Strengths (internal advantages), Weaknesses (internal limitations), Opportunities (external factors that can be leveraged), and Threats (external risks or challenges). It will help gain a clear understanding for the development of the IT Roadmap to maximize strengths and opportunities while addressing weaknesses and mitigating threats.

STRENGTHS	WEAKNESSES

• **Clear ambition and vision**
• Support from international donors and WAJ
• Small company with **strong leadership**
• **100% coverage and continuous supply**, reclaimed water
• **Modern tools** on the 4 key utility applications - AMI, ERP, SCADA and GIS
  ○ .Net and SQL server database resources are easy to find in Jordan/Aqaba.
  ○ Dynamics ERP used for 5 years, more flexible than Oracle
  ○ Fairly cheap infrastructure to run (cloud)
  ○ Energy efficiency focus in control room, Total Cost of Ownership (also tenders)
  ○ Unified system for SCADA
• **New devices** for Aqaba and South Govs (90 HHU, laptops)
• Budget available (not being spent on salaries at the moment)
• Disaster plan in place (to be checked) - duplicate data room
• Validation from MoDEE for mobile applications
• SOPs reportedly in place for all departments - Maintenance, IT, CS, Water
• Expansion of the company geographically through water and sanitation management contracts in the southern governorates
• A cooperative local community that is receptive to development and change
• Aqaba has an up-to-date asset register
	• Difficulty in translating the vision into the right strategy and roadmap
	• Lack of executives and shortage of financial staff
	• Lack of a succession plan and loss of competencies
	• The company does not have quality certificates such as ISO, despite working efficiently and effectively
	• No CRM - although AMI could cover tailored needs
	• High level of external service contracts (128), posing risk with access/validation
	• "Weak employees on ERP" - everything goes through the IT Director
	• Most of ERP modules are not used
	• No controllers in the control room
	• Lack of change management in tool implementation
	• High complaint level in billing due to change from quarterly to monthly and from mechanical to smart meters (better accuracy of metering, no increase in revenue)
	• No call center, physical presence required
	• The southern governorates lack all the financial elements like tools, devices and services
	• IT structure does not include South Governorates, it needs first line of support (2-3 persons in each, connected with IT Dir in AW) and capacity building
	• Multiplicity of CMMS (MP2, Fix, Field Service in ERP)
	• No formal data governance in AW, but data collected is analyzed by section head and verified by managers
	• Procurement and HR are manual / paper-based, needs at least a hybrid approach to reach Amman companies
	• Southern MCs do not have an asset register

OPPORTUNITIES	**THREATS**
• Accelerate reporting • MoDEE requirements - asking to unify the approach back office (SANAD - all gov services, utilities) - common CRM, unify/centralize system and processes • IT Roadmap Committee agreed to use the CRM from Miyahuna (C2M) • Mutualize approaches, standards specifications • AMI being developed, could cover CRM but not unified • Bring GIS into operations (organization / use) • Simplify implementation of ERP • Need ST / MT / LT horizons (1 yr quick wins, 3 years and 5 years) • See other utilities where good, outsourcing vs internalization, example from banks • No LIMS, mostly Manual - could use WAJ's LIMS - asking access to avoid duplication • ASEZA - Special status for the city	• Lack of focus on OPEX during IT project development, which can impact long-term sustainability • No global, unified vision for IT in water sector • Business Intelligence - mostly excel based, PowerBI • Lack of resources - 150 open positions. AW is prevented from recruiting since 2016. • X7 billing lacks technical support, outdated (issue with number of customer number digit) • No CRM • Tools need some customization • CMMS obsolescence - MP2 on access / Windows 7 • Lack of asset register in other areas. Not detailed at system / equipment level • Conflicting, overlapping and duplication of operations between the company and WAJ • Poor communication and coordination between the company's departments

Table 13: AW SWOT

3 Strategic Framework and Policy Alignment

A clear understanding of the multi-level strategic framework is essential to ensure **alignment and coherence in the digital transformation of the water sector**. At the **national level**, overarching strategies such as the Economic Modernization Vision 2033, the Public Sector Modernization Roadmap (2022–2025), and the MODEE IT strategies set the country's digital ambition, positioning **Jordan as a regional leader in the Middle East**. At **sectoral level**, the National Water Strategy (2023–2040) and its associated IT Roadmap define the **specific digitalization goals** for the water sector. Finally, at the institutional level, each entity (MWI, WAJ, JVA, Miyahuna, YWC, AW) develops its own digital plans aligned with both national and sectoral priorities. Clarifying these interconnections is crucial to assess current positioning and define realistic and impactful digital trajectories.

Jordan's national strategies provide a strong foundation for digital transformation across all sectors, including water. Led by the Government of Jordan, but also Ministries such as MWI and MODEE, these strategic frameworks aim to position Jordan as a regional leader in digital innovation.

In particular, the IT Roadmap outline is designed with the result-focused methodology that aligns with the following visions, roadmaps and strategies:

- **Jordan Economic Modernization Vision 2033**,
- **Public Sector Modernization Roadmap 2022-2025**,
- National Strategy for Digital Transformation - REACH 2025
- National Water Strategy 2023 -2040.
- National Cyber Security - Strategy 2018-2023
- Jordanian Digital Inclusion Policy

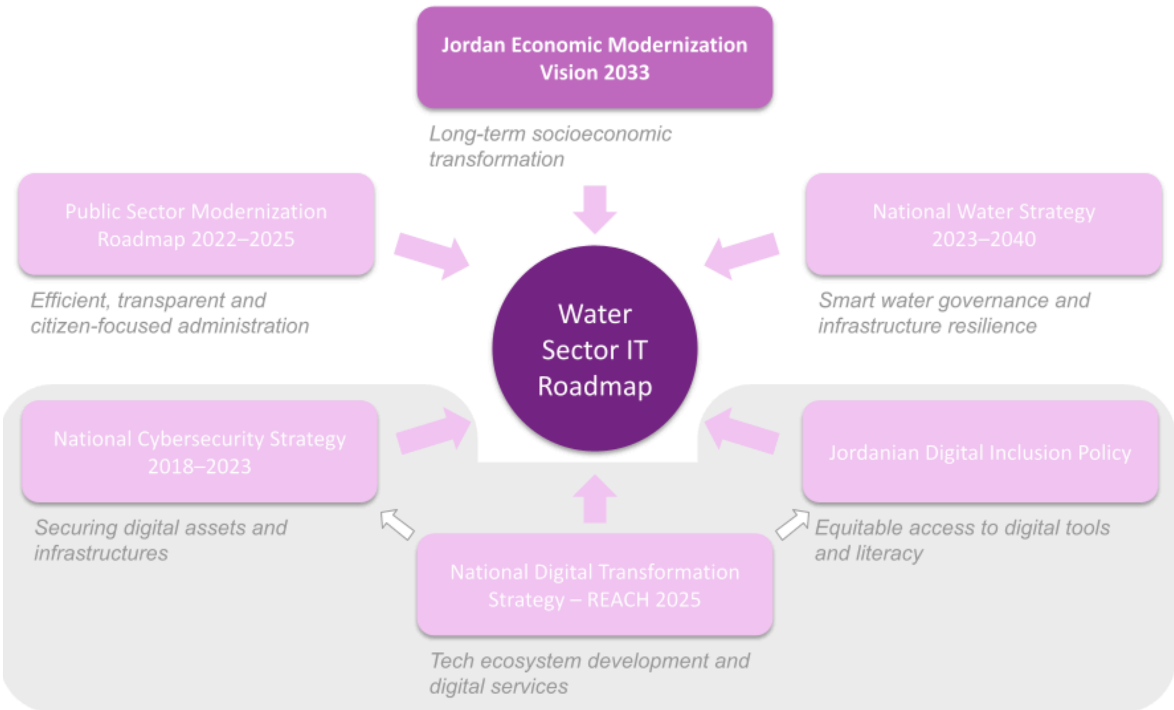


Figure: Strategic Anchoring of the IT Roadmap

This chapter offers an **overview of these national strategies** that guide and influence the water sector's IT roadmap, reflecting the country's broader vision to modernize public services, enhance data-driven decision-making, and become a digital showcase in the Middle East.

3.1 Economic Modernization Vision 2033

The *Economic Modernization Vision (2022–2033)* outlines Jordan's commitment to **leveraging digital technologies to modernize public services**, with water identified as a strategic sector. The vision promotes the use of smart technologies—such as real-time monitoring, AI, and system integration—to **improve operational efficiency, reduce non-revenue water (NRW), and optimize resource management.**

Key priorities include the development of **a unified digital infrastructure across utilities**, **integration of core systems (e.g., SCADA, GIS, ERP)**, and the **implementation of smart metering and automated data collection**. The strategy also emphasizes sector-wide **interoperability**, **cybersecurity**, and **data governance frameworks** to ensure consistent and secure information exchange.

Digital transformation is supported by the national "Smart Jordan" and "Sustainable Resources" drivers, which align with efforts to create a fully connected water sector. The vision includes clear governance mechanisms, investment planning, and performance tracking up to 2033, with specific digital milestones set for the 2022–2025 period.

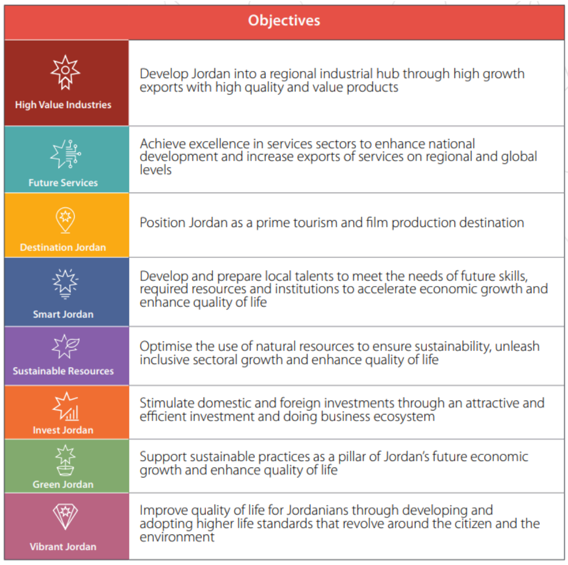


Figure 28: Strategic Objectives of Economic Growth Drivers - Extract from Economic Modernization Vision (2022–2033)

3.2 Public Sector Modernization Roadmap 2022-2025[6]

Jordan's public sector roadmap prioritizes **digitization and innovation as a core pillar of public sector modernization**, aiming to **fully automate government services and migrate at least 50% of operations to cloud platforms by 2025**. It emphasizes streamlining bureaucratic processes through efficient, **citizen-centric digital systems**, shifting from procedural reform to full digital transformation. Central to this is fostering interoperability and shared digital infrastructure across ministries, reinforcing the "one government" approach to reduce duplication and improve data flow.

The roadmap explicitly calls for **leveraging AI** and advanced technologies in recruitment, service delivery, and policy-making, signaling a strategic move toward intelligent, proactive public services. For water sector utilities, this strongly supports earlier priorities such as **real-time monitoring (SCADA)**, **automated data collection (NWIS)**, and **integrated systems (GIS, ERP)**. It also underlines the need for **data governance**, **cybersecurity**, and **digital maturity assessments** to ensure sustainable and secure digital transformation.

[6] https://govreform.jo/EBV4.0/Root_Storage/EN/EB_Info_Page/Road_map.pdf

Overall, the roadmap reinforces the strategic direction of **embedding cloud-based, interoperable, and AI-enabled digital infrastructure** into the public administration, laying a solid foundation for modernizing water utilities as part of an integrated, citizen-focused government ecosystem.

3.3 National Strategy for Digital Transformation - REACH 2025

The National Strategy for Digital Transformation in Jordan, as outlined in *'REACH 2025 Vision and Action plan'*, emphasizes the potential for digital technologies to drive efficiency and innovation across several key sectors, including water resource management. The strategy identifies tech-enabled solutions as crucial for optimizing water management, particularly in a region where water is scarce. By leveraging technologies such as the Internet of Things (IoT), big data, and sensors, Jordan aims to enhance the monitoring and management of water resources, thereby improving sustainability and reducing waste.

Figure 29: National Strategy for Digital Transformation Report, 2016

Jordan shows strong readiness for digital transformation on several fronts, as demonstrated by the actions outlined in the strategy, particularly on:

- **Action 4:** Transforming government and public sector to be "**digital by default**" by 2020 by **developing open data policy**, changing models of implementation based on Public/Private Partnerships and leading and accelerating digital innovation across government: This vision and action seeks to accelerate digitalization across Jordan. The Ministry of Digital Economy and Entrepreneurship (MoDEE) should develop an open data policy across government and program to activate the market by pushing open data uptake.
- **Action 14**: Establishing a state-of-the-art secure digital infrastructure. MoDEE should develop **national standards for the security of data and information**, and **accelerate the e-signature process**.
- **Action 15:** Leading nationwide focus on **data-driven transformation** by developing regional standards and securing operational models.
- **Action 18**: Exercising strong program accountability and progress monitoring by establishing a **systematic but dynamic program monitoring and evaluation system**

These actions highlight the country's commitment to developing a robust digital infrastructure, enhancing digital literacy, and integrating technology across various sectors.

However, it is Action 15 that mostly focuses on the strategic implementation of advanced technologies within the water sector to ensure sustainability and efficiency.

Action 15 **Smart digital economy infrastructure**	**Recommended main owner** Digital Economy Group/Committee

Leading nation-wide focus on data-driven transformation

… by developing regional standards and secure operational models for open data

Drive data-driven solutions across the MENA region, linked to higher education and developing digital economy solutions. International benchmark countries show that the backbone of the digital economy is data-led. This requires standards, security and interoperable business protocols across the economy. Therefore, it is of utmost importance that Jordan focuses on a data-driven transformation of the economy for example FinTech and eHealth protocols.

Action specified	**Recommended owners**
Immediate actions	
Assess the required reforms to drive data-driven transformation and enable the market potential of the data markets in the MENA region	Digital Economy Group/Committee
Define standards & interoperability conditions in areas critical to the digital economy in Jordan, such as the financial market (for instance, insurance exchange), health exchange, energy and water monitoring, etc.	Digital Economy Catapult HQ set up in Action 1, coordinate with working groups across key sectors
Subsequent actions	
Introduce open data policies	MoICT
Lead the investigation and proposal of a regional MENA cloud, big data, IoT initiative	Digital Economy Group/Committee in collaboration with MoICT
Set up collaboration between international universities and local universities to create a 'research cloud'	Digital Economy Group/Committee in collaboration with universities
Establish smart city data protocols to enable tomorrow's business models and services	GAM and relevant regulatory bodies

Regulations/Instructions/Decisions:

Within 6 months:
- Review regulations to drive data-driven transformation in key focus sectors
- Introduce open data policies starting with government

Within 1 year:
- Define standards & interoperability conditions in areas critical to the digital economy (in financial market, insurance exchange, health exchange, energy and water monitoring, etc.
- Establish smart city data protocols and standards of relevance to the launchpads e.g., eHealth protocols and standards for health, etc.

Scalability/sustainability

Start with Amman as a pilot and gradually scale to encompass the entire country

Budget Consideration:

Within budget of Digital Economy catapult, HQ

Selected KPIs

- Assessment completed within one year
- Collaboration between international universities and local universities to create a 'research cloud' set up within 1 year
- In a survey, 90% of companies assess that they have competitive standards and interoperable business protocols

Timeframe

Action	Year 1	Year 2	Year 3
SUPPORTING ACTIONS			
Action 15: Leading nation-wide focus on data-driven transformation			
Assess the required reforms to drive data-driven transformation and to enable the market potential of the data markets in the MENA region			
Define standards & interoperability conditions in areas critical to the digital economy in Jordan			
Introduce open data policies			
Lead the investigation and proposal of a regional MENA cloud, big data, IoT initiative			
Set up collaboration between international universities and local universities to create a 'research cloud'			
Establish smart city data protocols to enable tomorrow's business models and services			

Figure 30: Extract of the National Strategy for Digital Transformation, REACH 2025 - Action 15

3.4 National Cyber Security - Strategy 2018-2023 and Jordan National Cybersecurity Framework Capabilities[7]

The four strategic objectives define the key priorities for **achieving a cyber-secure Jordan** and outline the approach to their implementation.

Protect:	**الحماية:**
Enhances trust in and resilience of the Government, Critical National Infrastructure, businesses and the public against cyber threats	**تعزيز الثقة والمرونة لدى الحكومة والبنية التحتية الوطنية الحساسة وقطاعات الأعمال والجمهور لمواجهة التهديدات السيبرانية والتصدي لها، ويتأتى ذلك من خلال:**
• Publishing policies, and procedures to ensure a unified national approach to cybersecurity is established. • Establishing an appropriate governance structure and entities to ensure effective cyber security. • Building the necessary organisational structures to develop and operate the nation's cyber security and provide a unified source of advice in Government for threat intelligence and information assurance. • Establish cyber-security awareness and capacity building programs.	• نشر السياسات والإجراءات اللازمة لوضع منهجية وطنية موحدة للأمن السيبراني. • إنشاء نموذج حوكمة ملائم ومؤسسات تضمن تحقيق الأمن السيبراني الفعال. • بناء الهيكل المؤسسي اللازم لتطوير وتشغيل الأمن السيبراني الوطني وتوفير مصدر موحد للمشورة على مستوى الحكومة من أجل معالجة التهديدات الاستخباراتية والتثبت من المعلومات. • إعداد برامج خاصة بنشر الوعي وبناء القدرات في مجال الأمن السيبراني.
Detect:	**الكشف والتحري:**
Supports understanding and disruption of hostile action taken against the Kingdom and its information assets	**تعزيز فهم واعتراض الأعمال العدوانية التي تستهدف المملكة وأصولها المعلوماتية، وهو ما يتم باعتماد التدابير التالية:**
• Evolving existing cyber threat intelligence capability • Understanding the nations cyber space adversaries and their methods; • Ensuring security defences remain current, effective and continue to detect cyber security events. • Defining what is "normal" for the context and then detect anomalous events using a broad range of skills and capabilities.	• تطوير القدرات الحالية لكشف التهديدات السيبرانية. • فهم طبيعة أعداء الفضاء السيبراني الوطني وأساليبهم. • التأكد من جاهزية الدفاعات الأمنية وفعاليتها واستمرارها في كشف الحوادث الأمنية السيبرانية. • تعريف المستوى الطبيعي في هذا السياق ومن ثم ضبط الحوادث غير الاعتيادية من خلال نطاق واسع من المهارات والقدرات.
Respond:	**الاستجابة:**
Develops and deploys the appropriate capabilities to respond to cyberattacks in the same way as we respond to any other attack on National Security	**تطوير وتوظيف القدرات الملائمة للاستجابة للهجمات السيبرانية بنفس طريقة الاستجابة لأي هجوم آخر ضد الأمن الوطني، وذلك باتخاذ التدابير التالية:**
• Having well-defined and tested incident management processes, capabilities and mitigation activities; • Minimising and containing the impacts of cyber security incidents; • Restoring essential services; • Using root cause analysis and forensic tools post-incident to drive improvements.	• وضع عمليات وكفاءات ونشاطات لإدارة الحوادث بقصد الحد من الأخطار، بحيث تكون محددةً بعنايةٍ وفعالة. • تقليل واحتواء آثار حوادث الأمن السيبراني. • استعادة الخدمات الأساسية • استخدام التحليل للأسباب الجذرية والأدوات الجنائية بعد وقوع الحوادث من أجل تحسين عمليات الاستجابة.

[7] A new

Evolve:	**التطوّر:**
Develops the knowledge, skills and sustainable sovereign capability required to maintain robust cyber security, through academia, private sector, research and development and international partnerships	**تطوير المعرفة والمهارات والقدرات السيادية المستدامة والملائمة من أجل المحافظة على أمن سيبراني متين من خلال الوسط الأكاديمي والقطاع الخاص والبحث والتطوير بالإضافة إلى الشراكات الدولية، وذلك من خلال:**
• Partnering with the right organisations and partners to collaborate and share learning;	• الشراكة مع المنظمات والشركاء المختصين بهدف التعاون وتبادل المعرفة.
• Defining and establishing the key academic partners to build suitably qualified and experienced personnel, including the creation of a National Cyber Academy;	• تحديد الشركاء الأكاديميين من أجل تشكيل فريق عمل مؤهل ومتمرس بالإضافة إلى إنشاء أكاديمية وطنية للأمن السيبراني.
• Enacting the legislation and regulation needed to establish and operate National CyberSecurity	• تفعيل التشريعات والأنظمة اللازمة لإنشاء وإدارة الأمن السيبراني الوطني.
• Establishing the means to develop sustainable sovereign capabilities and corporate entities that can deliver effective cyber security initiatives;	• توفير الأدوات اللازمة لتطوير القدرات السيادية المستدامة والشركات التي يمكنها إطلاق مبادرات فعالة في مجال الأمن السيبراني.
• Establishing appropriate and robust national and international communication channels.	• إنشاء قنوات التواصل الوطنية والدولية الملائمة والمتينة.

Figure 31: National Cyber Security - Strategy 2018-2023 - Strategic Objectives

The **Jordan National Cybersecurity Framework Capabilities** provide the operational backbone to achieve these strategic objectives. The framework is built around six interconnected capability domains:

Figure 32: JNCSF Main Capabilities

- **Security in Architecture & Portfolio**: Establishes a strategic, design-driven approach to embedding cybersecurity from the earliest planning stages, aligning investments and services with enterprise architecture to ensure “security by design”;
- **Security in Development**: Integrates secure practices throughout the service and software lifecycle, including requirements management, secure coding, automated testing, and continuous integration, to safeguard systems against vulnerabilities;
- **Security in Delivery**: Protects data and services during transmission through encryption, monitoring, access controls, and change management, ensuring confidentiality, integrity, and compliance in service deployment;
- **Security in Operations**: Encompasses incident response, threat intelligence, vulnerability management, and continuous monitoring to protect live systems, maintain resilience, and reduce operational risk;
- **Fundamental Capabilities**: Cross-cutting enablers such as policy, risk, audit, vendor, workforce, legal, facility, and intelligence management, which underpin all other capabilities and ensure compliance, resilience, and governance;
- **Security in National Cyber Responsibility**: Promotes cybersecurity as a shared societal duty, fostering capacity building, innovation, and the development of national cybersecurity products through collaboration between government, academia, and the private sector.

Together, these capabilities create an integrated, holistic framework that strengthens Jordan's cybersecurity maturity, supports national digital transformation, and ensures the confidentiality, integrity, availability, and resilience of critical systems and data.

3.5 Jordanian Digital Inclusion Policy

The Jordanian Digital Inclusion Policy 2025, led by MoDEE, establishes a framework ensuring equitable access to the digital ecosystem across socioeconomic, geographic, and demographic divides.

Figure: Jordanian Digital Inclusion Policy Report, 2025

For the water sector's IT Roadmap, this policy requires us to prioritize the following:

1. **Universal Access & Connectivity**: Ensure services—particularly digital customer interfaces and rural infrastructure—are accessible even in underserved areas, aligning with national targets to bridge the urban–rural digital divide;
2. **Digital Literacy & Skills Development**: Embed training programs for both citizens and utility employees to use new systems (e.g., e-billing, mobile apps), complementing general population efforts outlined by MoDEE;
3. **Inclusive Service Design**: Design digital platforms that are age, gender, and ability-inclusive (e.g., e-payment), consistent with policy's emphasis on equity-deserving groups like women, youth, and persons with disabilities;
4. **Affordability & Accessibility**: Where needed, partner with telecoms to reduce connectivity barriers for low-income and rural users, in line with national broadband and shared infrastructure objectives;
5. **Stakeholder Engagement & Governance**: Involve equity-deserving groups directly in project design and feedback loops, following MoDEE's public consultation expectations and inclusive governance principles.

These digital inclusion principles must be woven into the roadmap's systems design, public interfaces, and operationalization. For example, remote meter-reading platforms should function in low-connectivity environments, user portals must support ADA accessibility and utility staff training must consider digital literacy as a core competency.

By embedding these principles, the water sector IT Roadmap not only supports national digital goals but also contributes directly to social equity, economic opportunity, and trust in public services: ensuring no citizen is left behind in Jordan's digital transformation journey.

3.6 National Water Strategy 2023-2040

The National Water Strategy 2023-2040 outlines Jordan's comprehensive approach to addressing its critical water scarcity challenges. This strategy serves as a roadmap for the nation's efforts to achieve **long-term water security by enhancing water supply** through non-conventional sources, **improving water management**, and promoting sustainability across sectors. It reflects the urgency of adapting to demographic pressures, climate change, and the overuse of groundwater resources, aiming to balance the water demand with sustainable supply while supporting Jordan's health, economic growth, and environmental protection. The strategy is aligned with broader national initiatives, ensuring that water governance, financial sustainability, and innovation are central to the country's development goals.

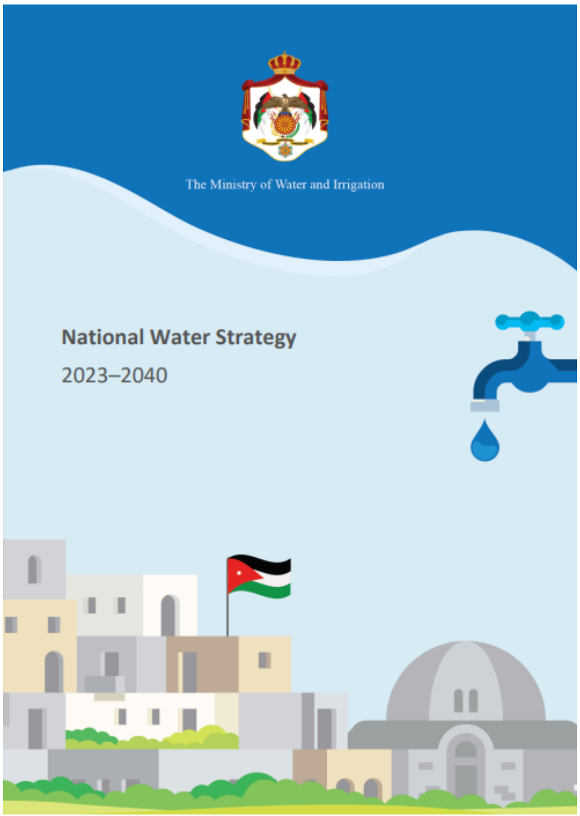


Figure 33: National Water Strategy 2023 - 2040 Report, 2023

The digital transformation and technology adoption in Jordan are expected to play a pivotal role in driving economic growth, fostering innovation, and improving the efficiency of public services. The strategy emphasizes the importance of **leveraging digital technologies to enhance productivity, create new business models, and deliver innovative services**. Key technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and blockchain are identified as strategic areas that will shape the future of various sectors.

Moreover, digital initiatives are anticipated **to promote social inclusion**, particularly by integrating women and marginalized communities into the digital economy. For these benefits to be realized, the strategy highlights the need for a supportive regulatory framework and significant investments in digital skills, ensuring that the digital transformation is both sustainable and inclusive.

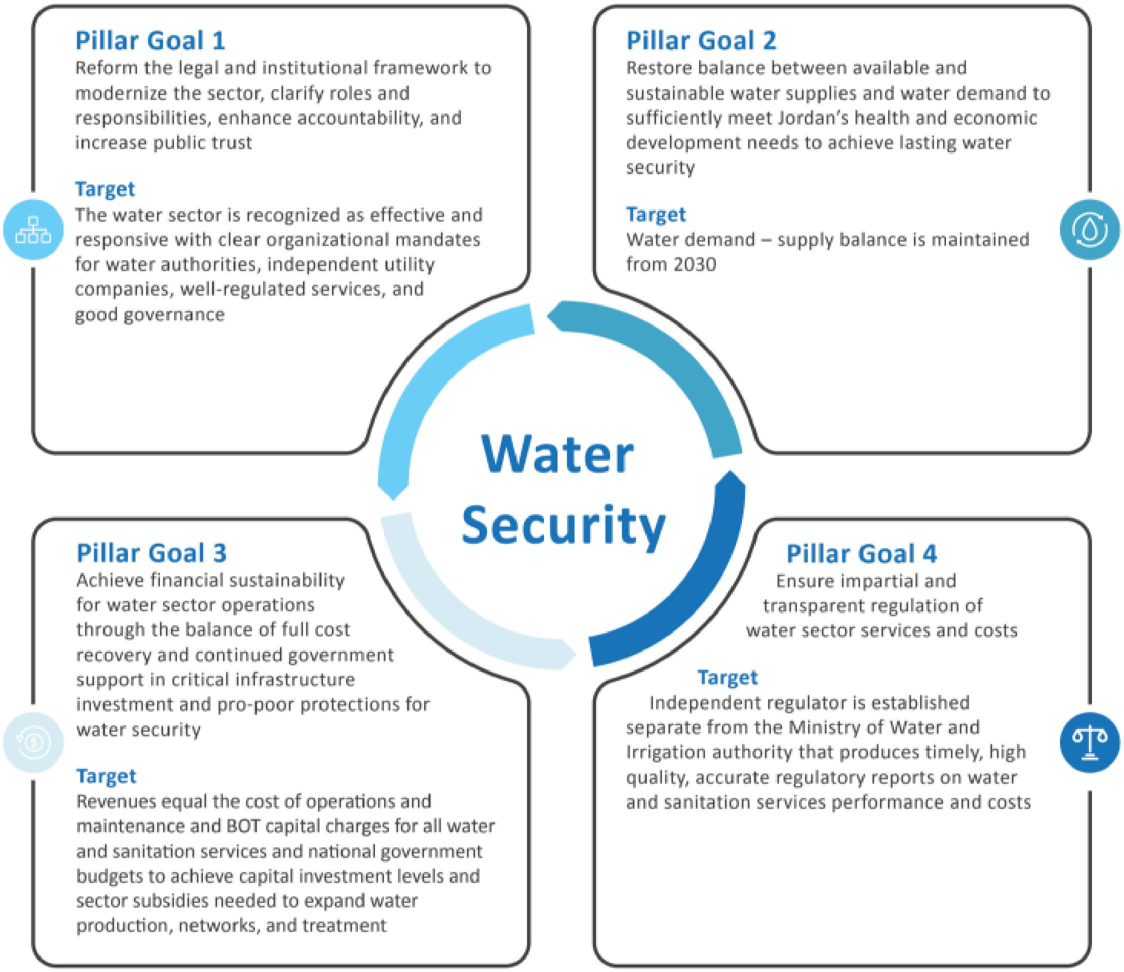


Figure 34: Water Security Pillar Goals

3.7 Strategic Alignment and Implications

Jordan is facing increasing pressure on its water resources due to rapid population growth, severe water scarcity, and climate challenges. In this context, **digital transformation is seen as a strategic enabler** to address resource scarcity, improve service delivery, and optimize operations across the water sector.

Several national strategies, including *REACH 2025*, the *National Water Strategy 2023–2040*, and the *Water Sector IT Roadmap*, provide strong direction and reveal a shared ambition across institutions. From these frameworks and current sector dynamics, the following **key priorities** emerge for successful digital transformation:

- **Strategic alignment**: Ensure coherence between national visions and the institutional strategies of MWI, WAJ, JVA, and regional utilities, particularly in light of large-scale projects such as the **National Water Supply-Demand Model**, **Energy Management Plans**, and the **National Conveyor Project**.
- **Digital foundations**: Build on five core pillars — **data-driven decision-making**, **infrastructure digitization**, **modern customer service**, **cybersecurity**, and **personal data protection**.
- **Governance and architecture**: Clarify the roles of institutions in leading, coordinating, and implementing digital initiatives. Establish a **national data hub** with unified systems (NWIS, GIS, DMS, ERP, CRM), and formalize **data governance roles** (e.g., Data Owners, Officers, Stewards), particularly under WAJ.
- **Standardization and mutualization**: Follow MWI's IT guidelines to standardize specifications, mutualize tools and approaches (e.g., CRM, call centers, cybersecurity, Water Management Information System, SCADA system), and define a **unified KPI framework** for national dashboards.
- **Skill development and change management**: Support institutional and human change with targeted recruitment (promoting inclusion), upskilling, and an assessment of internalization vs. outsourcing.
- **Digital sobriety and resilience**: Ensure solutions are energy-efficient and environmentally responsible, and align with the **National Disaster Recovery Plan** for the sector.

Regarding strategic alignment of the data management, it is essential to adopt a structured approach that combines top-down strategic direction with bottom-up operational needs. Reliable data collection at the field level (from sensors, paper forms, spreadsheets, etc.) is the foundation for digital tools such as GIS, ERP, or CMMS. These tools support effective reporting and monitoring, which in turn feed into governance and decision-making processes.

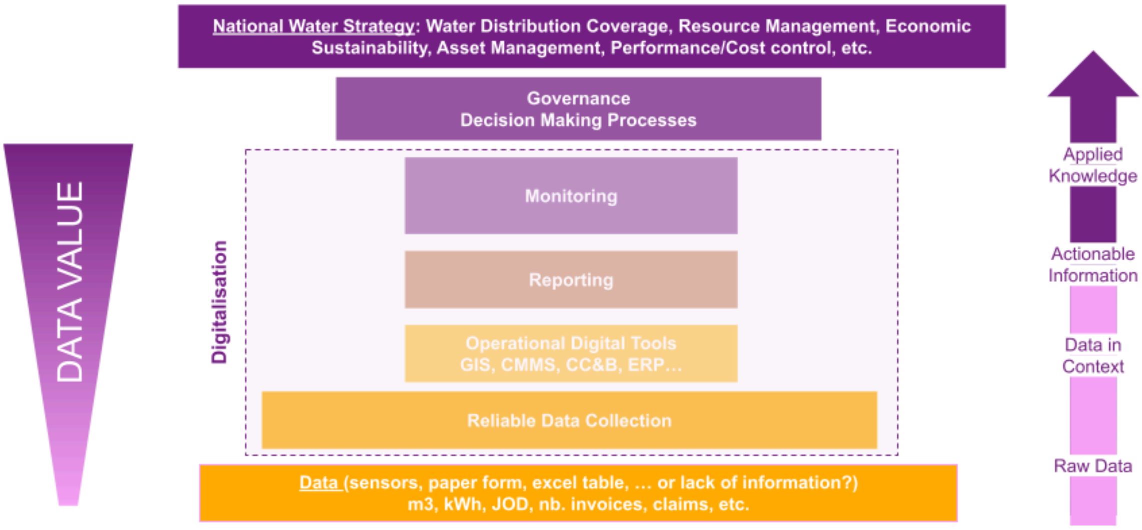


Figure 35: Data Management Pyramid: Bridging National Priorities and Field Realities

Aligning national strategies with local operational needs ensures that data collected is both usable and valuable. This cross-cutting methodology is essential for transforming raw data into actionable insights and applied knowledge—supporting coherent digital transformation across the water sector.

3.8 Strategic Trends and Future State Vision for the Water Sector

Jordan faces a severe water shortage, exacerbated by climate change and increasing water demand.

Historically, the primary water resource has come from the Jordan Valley, which is fed by the Yarmouk River and Lake Tiberias. This resource is used for agricultural purposes (more than 50% of the country's unirrigated land) and to partially supply the country's two main cities (Amman and Irbid). However, the quantities are limited due to upstream intakes and usage conflicts that are partially regulated by transboundary agreements. Groundwater is also being extracted from the various aquifers (basins) in the country but quantities are limited and some aquifers are already over-abstracted.

Jordan has one of the lowest levels of water availability per capita in the world, and this **availability is expected to decrease** further in the coming years. This issue is intensified by climate change, which is causing a significant reduction in rainfall in Jordan. At the same time, overall water demand is increasing due to:

- The strong population growth in the country, rising from 7 million in 2011 to 11 million in 2022, partly due to the Syrian refugee crisis;
- The growth in the number of economic, agricultural, and industrial actors, who are heavy water consumers.

To address this water challenge, the Kingdom has recently approved the "**National Conveyor Project"**, which includes a desalination plant and a 420 km pipeline aimed at securing potable water supply for the governorates of Amman (6.5 million inhabitants) and Aqaba (0.2 million inhabitants).

The project will exploit non-conventional sources, with water drawn from the Red Sea using a seawater reverse osmosis plant located south of Aqaba. It will be desalinated, pumped, and transported to Amman. The main objective of the project is to provide 300 million cubic meters of potable water annually to Amman and the areas along the pipeline route. This is equivalent to the annual consumption of about 4 million people.

This **National Water Strategy (2023-2040)** developed by MWI is coupled with an ambition to improve the operational performance of the country's public water utilities. Reducing physical and commercial losses (Non-Revenue Water), saving energy, improving the daily operation of services, and enhancing the skills of the staff are all issues that need to be addressed to provide excellent service to the population.

Over the next 3 to 5 years, several major developments are therefore expected in Jordan's water sector to address these pressing challenges:

- Implementation of the **National Conveyor Project**:
    - The Aqaba desalination plant and the 420 km pipeline will be a focal point, progressing to provide a significant new source of potable water to Amman and Aqaba, aiming to deliver 300 million cubic meters annually.

The National Conveyor: A Cornerstone of Jordan's Water Security.

The project encompasses the development of a major seawater desalination facility in Aqaba along the Red Sea coast, designed to produce up to **300 million cubic meters of water annually**. This vital resource will be **transported through an extensive network spanning over 300 kilometers** to serve the highland communities, including Amman. The initiative stands as Jordan's most significant water infrastructure investment to date, addressing critical water scarcity issues intensified by climate change, population growth, and regional uncertainties.

The project is **promoted by the Water Authority of Jordan (WAJ) and structured as a Public-Private Partnership (PPP)** with support from several international financial institutions (IFIs), including the European Investment Bank (EIB), the International Finance Corporation (IFC), and USG, among others.

The project's scope extends beyond physical infrastructure, incorporating a comprehensive digital aspect and promising to revolutionize water distribution in Amman by transitioning from intermittent to continuous supply systems, impacting the water sector IT Roadmap.

- Expansion of **Wastewater Treatment and Reuse:**
    - Increased investment in wastewater treatment facilities to enhance the capacity and quality of treated wastewater, which can be reused for agricultural and industrial purposes, thereby reducing the demand for freshwater.
- **Infrastructure Upgrades:**
    - Continued efforts to modernize and maintain water distribution infrastructure to reduce losses from leaks and inefficiencies. This includes upgrading pipelines, expanding the network, as well as improving reservoirs, and pumping stations.
- **Innovation and New Technologies:**
    - Investing in new technologies and innovative solutions for water management, such as smart water management systems and advanced water recycling methods;
    - Promotion and implementation of advanced irrigation techniques, such as drip and sprinkler systems, particularly in agriculture, which is the largest consumer of water in Jordan;
    - Encouraging the use of water-efficient appliances and fixtures in households and industries.
- **Policy and Regulatory Reforms:**
    - Strengthening water governance through updated policies and regulations that promote sustainable water use, conservation, and equitable distribution;
    - Implementation of stricter enforcement mechanisms to ensure compliance with water use regulations.

- **Climate Change Adaptation** Strategies:
    - Developing and implementing strategies to mitigate the impacts of climate change on water resources, such as improved water storage solutions and drought-resistant crop varieties.

- Enhanced **Transboundary Water Cooperation**:
    - Strengthening diplomatic and technical cooperation with neighboring countries on shared water resources to ensure equitable and sustainable management.

- **Public-Private Partnerships** (PPPs):
    - Encouraging greater involvement of the private sector in water infrastructure projects and service delivery through PPPs, leveraging private investment and expertise.

- Integrated **Water Resources Management** (IWRM):
    - Continued implementation of IWRM practices to ensure a holistic approach to managing water resources, considering the interconnections between different water uses and sources.

To support the effective implementation of the National Water Strategy, IT solutions deployed should focus on the following areas to enhance data-based decision-making and operational efficiency:

- **Reducing NRW to help reaching continuous supply;**
- **Increasing water resources through the integration of the National Conveyor Project;**
- **Improving revenue and collection efficiency to reach financial sustainability;**
- **Streamlining organization and reporting for better transparency, control and governance.**

4 Water Sector Digital Transformation Vision & Strategy

4.1 Vision

The strategic vision, as articulated by the WAJ Secretary General, aims to establish **a fully automated**, **smart**, **sustainable**, and **secure system** across the water sector.

Figure 36: Water Sector Vision

4.1.1 From foundations…

Before building a strategic vision, it is essential to ensure that the foundations of the system are **solid, coherent, and technologically future-proof to** support the digital transformation of the sector across all levels, **technical, organizational, and human**.

The first step is to verify that the **hardware infrastructure is functional, sufficient, and up to date**. This is necessary to ensure **service continuity, enhance resilience to operational incidents, and meet growing cybersecurity requirements**. A robust and reliable hardware base is the cornerstone of any sustainable digital transformation. It should be emphasized that the responsibility for maintaining and upgrading this infrastructure rests primarily with the individual entities, whose commitment is critical to enabling sector-wide progress.

Building on this, **software systems must also be modernized to guarantee interoperability, security, maintainability, and scalability**. Software should act as a unifying layer that allows all water utilities and sector stakeholders to operate efficiently, exchange information seamlessly, and respond proactively to crises.

Finally, **human capacity development** must be addressed to ensure that people are equipped with the **skills and mindset necessary to support and sustain the digital transformation**.

Once these foundations are in place, the strategic vision can be meaningfully developed.

4.1.2 … To innovation

4.1.2.1 Fully automated

The **modernization of OT**, particularly SCADA systems, and the **interconnection of field devices** represent a key step toward intelligent infrastructure supervision and integrated resource management. Real-time monitoring, predictive maintenance, and automated control are no longer ambitions, they are necessities for securing Jordan's water supply.

Industry 4.0

By embracing the principles of Industry 4.0—IoT, automation, data analytics, and cybersecurity—the water sector can radically improve its performance and resilience. Utilities such as YWC, Miyahuna, and AW already have the foundations needed to benefit from this transformation and move toward data-driven, service-oriented operations.

4.1.2.2 Smart

The digital transformation of the water sector must enable **smarter, data-driven operations**. This requires building interoperability across systems to ensure that data collected locally can flow seamlessly at the national level. Even with limited resources, interfaces can be developed to allow different **ERPs to exchange data and feed national platforms such as the National Water Information System (NWIS) with reliable, real-time information**.

In the longer term, consolidating ERPs and platforms across utilities represents a strategic opportunity. **Pooling systems can reduce infrastructure and maintenance costs, harmonize business processes, and help overcome the shortage of qualified IT and functional experts** by centralizing expertise. Combined with the harmonization of GIS, this approach paves the way for **an integrated digital ecosystem**.

Ultimately, this coherence enables the development of **a true enterprise architecture, an essential foundation for efficient, responsive, and transparent water governance at scale**.

4.1.2.3 Sustainable

To ensure long-term impact, digital investments must be designed with sustainability in mind, financially, technically, and institutionally. This means incorporating future OPEX considerations from the early stages of project design, strengthening local ownership, and building internal capacity to manage and maintain digital systems over time. Digital solutions must also support the efficient use of resources, including water, energy, and human capital, thereby contributing to climate resilience and operational efficiency.

4.1.2.4 Secure

As digital systems become central to water sector operations, **cybersecurity must be embedded by design**. This includes securing networks, devices, and data against evolving threats through updated infrastructure, encrypted communications, regular audits, and clear governance protocols. The development of **cybersecurity awareness among staff**, along with **sector-wide policies and response plans**, is critical to protect infrastructure and maintain trust in digital services.

4.1.3 Scalable and Future-Proof Architecture

The vision for the digital transformation goes far beyond technical upgrades. It represents **a paradigm shift, where information systems become strategic tools to enhance the performance, resilience, and sustainability of water services nationwide.**

4.2 Strategic Objectives and Target Outcomes for the 5 next years

To achieve a fully automated, intelligent, sustainable, and secure national system by 2030, the following strategic objectives have been defined for the next five years. Each objective is aligned with specific entities or processes and is supported by SMART key performance indicators (KPIs) with identified baselines where applicable.

<table>
<tr><th colspan="4">Fully Automated System</th></tr>
<tr><td>Responsible Entities</td><td colspan="3">MWI, WAJ, JVA, Water Utilities</td></tr>
<tr><td>Objective</td><td colspan="3">Accelerate the automation of key public sector services and administrative processes to increase efficiency, reduce human error, and enhance citizen experience.</td></tr>
<tr><td colspan="4"><u>Sub objectives</u>
Implement end-to-end automation of internal workflows and citizen-facing services across government institutions;
Standardize digital forms, data collection, and back-office operations;
Establish interoperability standards across water sector systems.</td></tr>
<tr><td>KPIs</td><td>% of core public services fully automated by 2030 (baseline: TBC% in 2024)
% reduction in manual processing time for administrative procedures by 2030 (baseline: to be measured per entity)
% digital form standardization across entities (Target: 100% by 2028)</td><td>Expected Outcome by 2030</td><td>A streamlined, paperless administration where service delivery is handled through interoperable, fully automated systems.</td></tr>
</table>

It directly relates to:

- **Strategy & Organization** processes such as *Internal Auditing*
- **O&M** processes such as *O&M Production, Distribution and Waste Water*, *Water Quality Management*, *Control & Data Acquisition*, *Control Center and Operational Scheduling*, *Telemetry*, *Energy Management*, *Public and Private Wells Management* and *Customer Meter Management*, which benefit from real-time data and remote operations.
- **Customer Management** processes such as *New Connection Management*, *Customer Complaint Management*, *Revenue Collection, Meter Management and Billing*, where automation improves accuracy and responsiveness.
- **Financial & Administrative Affairs** processes such as *Revenue Reconciliation and Procurement, Time and Payroll.*

Across these subprocesses, the average level of digitalization and data-driven decision-making was assessed as follows, providing a consolidated view of the sector’s current digital maturity.

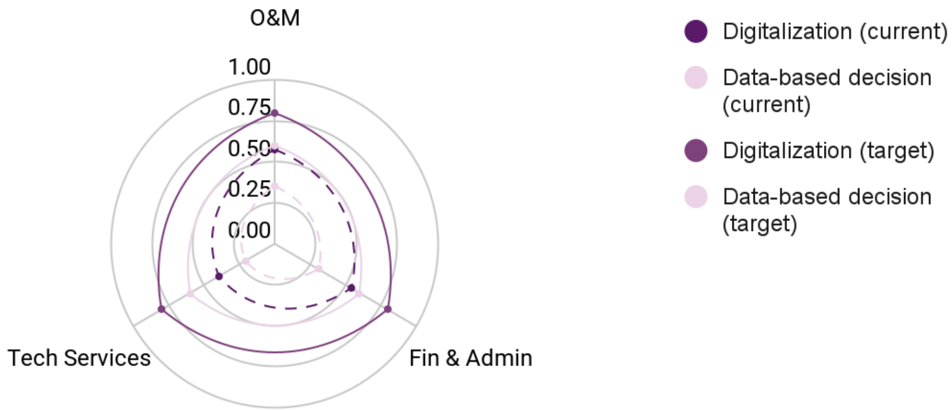


Figure 37: Digital maturity and data-based decision on Automated related business processes

Regarding the Automation objective, the ambition is to achieve **operational efficiency through real-time operations, automation, telemetry, and interconnected systems**. Currently, digital tools exist in several areas but remain fragmented and not fully leveraged for seamless operations. **By 2030, the goal is to reach around 80%** digitalization across the identified processes, meaning fully integrated systems that support remote operations, automated billing, revenue collection, and SCADA/telemetry-based monitoring.

As for data-based decision-making, the target is to reach 60% by 2030. This implies that dashboards and structured operational data will routinely support daily activities, enabling basic anticipation of issues and improved responsiveness. **The focus is on automation and operational continuity rather than prescriptive governance**.

Smart System / Smart Utilities			
Responsible Entities	MWI, WAJ, JVA, Water Utilities, IT Departments		
Objective	Build an integrated, data-driven governance model powered by AI, real-time analytics, and smart infrastructure.		
Sub objectives • Implement smart platforms for operational monitoring and resource management; • Integrate SCADA systems and develop centralized dashboards to support real-time decision-making; • Enable real-time data sharing and predictive analytics across entities; • Develop AI-powered decision support systems.			
KPIs	• % of operational processes supported by smart analytics by 2030 • % real-time data availability for critical systems • % reduction in response time for operational decisions	**Expected Outcome by 2030**	A connected ecosystem where decisions are informed, proactive, and citizen-centric, supported by AI and IoT infrastructure

It directly relates to:

- **IT** processes such as *Data Management* and *Project Management* which form the backbone of smart infrastructure.
- **Customer Management** processes such as *Customer Information Management* and *Fraud Detection* enabling better customer insights.

- **Technical Services** processes such as *GIS* and *NRW Management*, which enable smart decision-making on operation expert tools.
- **Strategy & Organization** processes such particularly *Performance Monitoring*, to promote data-driven governance.

Across these subprocesses, the average level of digitalization and data-driven decision-making was assessed as follows, providing a consolidated view of the sector's current digital maturity.

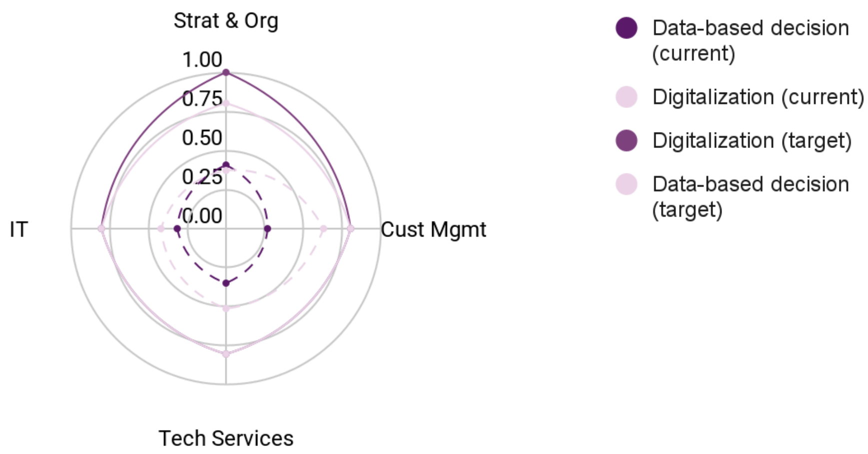


Figure 38: Digital maturity and data-based decision on Smart related business processes

Regarding the Smart objective, the ambition is to enable intelligence and data-driven governance. Currently, digitalization levels vary across the identified processes, with fragmented systems limiting the potential for intelligent operations. **By 2030, the goal is to achieve around 80% digitalization across IT, Customer Management, and Technical Services, ensuring integrated systems that support real-time insights, predictive analytics, and optimized decision-making. On the Strategy & Organization axis, leveraging the NWIS system, the target is 100% digitalization, enabling full visibility and hypervision at the sector level.**

As for data-based decision-making, the objective is to reach 80% across IT, Customer Management, and Technical Services, ensuring proactive and predictive decision-making. On the Strategy & Organization axis, the target is 100%, enabling prescriptive governance and optimization across the entire water sector.

<table>
<tr><th colspan="4">Sustainable System</th></tr>
<tr><td>Responsible Entities</td><td colspan="3">Digital & IT departments, Sustainability teams, Finance departments</td></tr>
<tr><td>Objective</td><td colspan="3">Ensure digital infrastructure aligns with sustainability principles, digital sobriety, and financial viability</td></tr>
<tr><td colspan="4"><u>Sub objectives</u>
● Minimize digital environmental footprint through digital sobriety, optimized data management, and green IT practices across the full technology lifecycle;
● Create an inclusive and ethical digital environment that ensures accessibility for all users while promoting responsible technology use; and
● Develop cost-effective and sustainable models for IT operations through optimized licensing, efficient resource management, and long-term financial planning.</td></tr>
<tr><td>KPIs</td><td>● % reduction in IT-related carbon emissions by 2030</td><td>Expected Outcome by</td><td>A balanced digital ecosystem that minimizes</td></tr>
</table>

	• % reduction in dark data by 2028 • % of systems with accessibility features by 2030 • % reduction in IT operational costs	**2030**	environmental impact while ensuring social responsibility and financial viability

It directly relates to:

- **IT** processes such as IT *Asset Management, User Support,* and *Project Management* which is essential to sustain the system.
- **Financial & Administrative Affairs** processes such as Document Management Systeù, *Budgeting, Asset Recognition*, and *Financial Reporting*, which ensure accurate tracking of costs and investments.
- **Technical Services** processes such as *Project Management & Studies*, where OPEX implications must be anticipated to guarantee sustainability.
- **HR Processes** such as *Recruitment and Individual Performance*, which are key to building and retaining digital capabilities.

Across these subprocesses, the average level of digitalization and data-driven decision-making was assessed as follows, providing a consolidated view of the sector's current digital maturity.

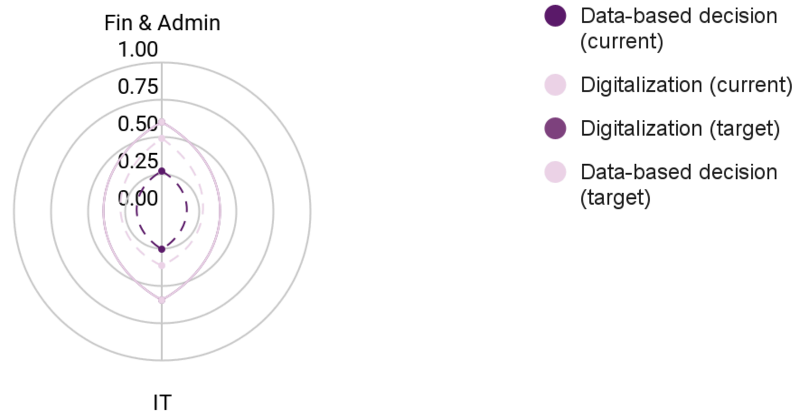


Figure 39: Digital maturity and data-based decision on Sustainable related business processes

Regarding the Sustainable objective, the ambition is to **ensure resilience, IT modernization, and efficient governance**. Currently, the identified processes rely on outdated or fragmented tools, limiting efficiency and long-term sustainability. **By 2030, the goal is to reach around 60% digitalization across Finance & Administration, IT, Technical Services, and HR**. This level corresponds to the adoption of dedicated software, modernized infrastructure, and standardized governance practices, ensuring efficiency without requiring sector-wide hypervision.

As for data-based decision-making, the aim is to reach 60% across these processes by 2030. This will ensure that reliable dashboards and structured data systematically support decision-making, enabling routine anticipation of operational issues, better resource allocation, and sustainable digital practices.

	Secure System		
Responsible Entities	IT Security teams, Risk Management departments, Operations teams		
Objective	Strengthen cybersecurity posture across all layers of national infrastructure, ensuring data confidentiality, availability, and integrity.		
Sub objectives • Establish comprehensive risk-based cybersecurity standards and monitoring; • Enhance incident response capabilities and resilience to cyberattacks; • Implement sector-wide disaster recovery and business continuity plans.			
KPIs	• % compliance with national cybersecurity framework (Target: 100% by 2028) • ≤4 hours mean time to respond to security incidents • 100% critical systems covered by disaster recovery plans	**Expected Outcome by 2030**	A robust digital environment that is resilient to cyber threats and aligned with global standards for cybersecurity governance.

It directly relates to:

- **IT** processes such as *Network & Security Management* and *Business Continuity*, for protection against cyber threats.

Across these subprocesses, the average level of digitalization and data-driven decision-making was assessed as follows, providing a consolidated view of the sector's current digital maturity.

Figure 40: Digital maturity and data-based decision on Secure related business processes

Currently, the level of digitalization in security-related IT processes stands at 42%, while data-based decision-making is only at 17%. This shows that some technical protections are already in place, such as firewalls or network segmentation, but they remain fragmented and insufficiently integrated. Most importantly, the very low score on data-based decision-making indicates that **cybersecurity is still mostly reactive**, with limited use of monitoring tools, dashboards, or predictive threat analysis.

By 2030, the ambition is to reach around 80% digitalization, ensuring modern and integrated cybersecurity and business continuity solutions across the sector. For data-based decision-making, the goal is 60%, which reflects the need to move from a reactive posture to a proactive one, supported by real-time monitoring, threat detection dashboards, and basic governance mechanisms. The aim is not hyper-optimized, prescriptive security, but rather a

robust, reliable, and resilient baseline to protect critical infrastructure and ensure continuity of service.

The Vision, objectives and strategy can be summarised in the following diagram.

Figure 41: Strategic Vision and Transformation Priorities for the Water Sector (2025–2030)

4.3 Strategic Initiatives and Programs

4.3.1 Sector-Wide Digital Initiatives

At the sectorial level, the MWI, WAJ, and JVA have defined strategic digital priorities aligned with broader governmental strategies. These entities focus on sector-wide coordination and systems that provide shared value and oversight. The cross-cutting projects are summarized in the following table.

Work Packages	*Objective*	Key Actions
OT/SCADA	Build a centralized, standardized SCADA capability for the country	Define and implement a unified national SCADA architecture to ensure interoperability and scalability
		Set minimum functional and cybersecurity standards for all SCADA systems across the country
		Establish a National SCADA Control and Monitoring Center for centralized oversight and incident response
		Develop and roll out training and certification programs to build specialized SCADA expertise within operational teams
Cybersecurity Enhancement	*Institutionalize resilience and incident response at entity level and consolidate national oversight*	Standardize cybersecurity protocols and procedures organization-wide
		Conduct regular security audits and penetration testing to assess system robustness
		Establish a centralized incident monitoring and response mechanism
		Establish a centralized Security Operations Center (SOC) with dedicated cybersecurity roles and incident response capabilities
		Implement prerequisites and deploy ISO 27001 and ISO/IEC 62443 standards, including necessary network infrastructure upgrades
Data Management & Governance	*Institutionalize data roles and improve quality sector-wide*	Appoint Data Officers and Data Stewards across all entities to ensure clear data ownership and accountability
		Define and implement a national data governance policy and operational model, embedded in a Data Governance Framework
		Establish metadata standards and a unified KPI framework for consistent data interpretation
		Deploy data management tools (data catalog, data lineage) to improve data accessibility and reliability
		Organize training and awareness programs to foster a strong data-driven culture and ensure compliance with data security and privacy regulations
GIS Enterprise Solution	*Establish enterprise-solutions and clear budget for application licences*	Implement unified GIS system across the sector - Building GIS Data module for the utilities and ministerial levels, and the Unified data GIS models using GIS Enterprise Solution, like ESRI - GIS software.
		Integrate GIS with other core systems (e.g., SCADA, ERP)
		Develop utility-level and ministerial GIS modules
		Implement a comprehensive GIS data cleansing and validation program to improve accuracy
		Train users and maintain asset mapping up to date

Work Packages	*Objective*	Key Actions
CRM	*Improve citizen engagement and service responsiveness*	Design and implement a unified CRM model for all utilities to standardize customer relationship management
		Enable omnichannel customer communication (e.g., email, SMS, WhatsApp) to enhance accessibility and responsiveness
		Integrate the CRM system with complaint handling, billing, and field operations to streamline service delivery and improve customer satisfaction
NWIS as Datahub	*Position NWIS as the central data backbone of the sector, enabling near real-time situational awareness*	Expand NWIS functionality and ensure interoperability
		Integrate with other core systems (e.g., SCADA, CRM, GIS, ERP)
		Implement automated data collection and validation
		Enable real-time data sharing and visualization across sector
Business Continuity Plans	*Guarantee service continuity in case of disruption*	Standardize and update infrastructure requirements to support effective Business Continuity Plans (BCPs) across all entities
		Conduct comprehensive risk and vulnerability assessments to identify potential threats to service continuity
		Draft, implement, and regularly test disaster recovery and business continuity plans to ensure preparedness
		Integrate continuity planning into the design and operation of IT and SCADA systems for resilient service delivery
Skill Development and Change Management	*Equip institutions with the right skills and structures*	Assess digital literacy and technical skill gaps
		Develop targeted training programs per role and system
		Create IT and digital transformation roles within each utility
		Promote inclusive recruitment to support sector diversity

Table 14: Key Work Packages Identified at Sector Level

This water sector strategy ensures vertical coherence and provides the digital foundations for cross-entity coordination, performance monitoring, and policy alignment.

4.3.2 Entity-specific Digital Programs

At entity level, which includes all water sector entities (MWI, WAJ, JVA and water utilities), digital transformation efforts are focused on operational excellence, service delivery, and customer interface modernization. In particular, JVA and the water utilities play a critical role in the implementation of digital systems that directly affect end users. The following table covers specific work packages required for JVA:

Work Packages	***Objective***	**Key Actions**
Lands system (Agricultural and residential)	*Integrate with other systems as financial and archiving*	Modernize land information systems
		Integrate with financial modules and document archiving
WMIS	*Re-engineering of WMIS system software and hardware*	Re-engineer WMIS software and hardware
		Link with SCADA, GIS, NWIS, and financial systems
Financial System	*Standard financial module covering all budgetary, expenditures, revenues, etc*	Ensure compliance with national financial reporting standards
		Enable forecasting and cost-recovery simulations

Table 15: Key Work Packages Identified For JVA

The following table covers work packages for all entities (MWI, WAJ, JVA and Utilities):

Work Packages	***Objective***	**Key Actions**
IT Infrastructure Upgrades	*Modernize and optimize IT systems to enhance reliability, security, and performance*	Upgrade outdated hardware, software, and network equipment across all entities
		Replace end-of-life systems (Windows 7, Server 2008, Oracle 10g)
		Implement comprehensive disaster recovery and backup solutions
		Consolidate and mutually operate data center infrastructures
Cybersecurity Enhancement	*Protect critical infrastructure from digital threats*	Develop and regularly update comprehensive security policies, along with conducting regular audits.
		Deploy and maintain protective measures such as firewalls, antivirus software, and intrusion detection/prevention systems (IDS/IPS).
		Implement secure access management with continuous monitoring of activities and access.
		Regularly raise awareness and provide cybersecurity training for staff on best practices.
IT Management	*Establish structured IT governance and asset visibility*	Map all software, applications, dataflows and hardware in each entity (2D diagrams)
		Implement IT asset management and CMDB
		Establish centralized databases and governance frameworks
		Deploy standardized IT service management tools
OT/SCADA	*Interconnect and share real-time scada*	Replace aging SCADA systems with modern, secure solutions

	information to improve decision-support tools	Securing networks and deploying cybersecurity standards
		Expand SCADA coverage to remaining governorates
		Implement SCADA maintenance contracts with specialized providers
		Integrate SCADA with other business systems (WMIS, GIS, ERP)
		Draft SCADA standards to serve as reference guidelines for all future installations
		Enable advanced analytics and AI-driven optimization
		Establish integrated operations centers
ERP	*Unify and modernize enterprise platform*	Replace X7 billing system
		Integrate billing systems with ERP
		Enable advanced budgeting and expenditure tracking
		Launch self-service portals and customer mobile apps
C2M	*Implement C2M across all water utilities*	Deploy unified CRM system across water utilities (by expanding Miyahuna experience in C2M)
Data Management & Governance	*Strengthen the data-driven approach*	Clean and validate existing databases to ensure data accuracy and reliability
		Regularly update and verify customer contact information (address, phone numbers, email addresses)
		Implement real-time data validation and synchronization processes across systems
		Deploy Business Intelligence (BI) tools and sector-specific dashboards, and promote their use to foster a data-driven culture and support informed decision-making
GIS Enterprise Solution	*Establish a Reliable and Usable Geospatial Data Source*	Define and implement sector-wide GIS data standards to ensure consistency and interoperability
		Clean and consolidate existing geospatial databases to improve data accuracy and reliability
		Provide capacity-building and training programs for staff to strengthen GIS expertise and promote sustainable use of geospatial tools
NWIS as Datahub	*Ensure Reliable Data Provision and Use*	Guarantee systematic data provision to feed the NWIS with accurate and timely information
		Build staff capacity to effectively use the NWIS for analysis and decision-making
Skill Development and Change Management	*Empower People to Drive Digital Transformation*	Develop utility-specific training programs to strengthen digital literacy and technical expertise among employees
		Implement internal change management initiatives to build ownership, reduce resistance, and ensure smooth adoption of new systems
Business Continuity Plans	*Safeguard Utility Operations Against Disruptions*	Design and implement business continuity plans tailored to each utility’s critical functions and operations

		Identify mission-critical processes (e.g., billing, water supply, emergency response) and establish contingency procedures
		Regularly test, review, and update continuity plans at the utility level to ensure readiness and operational resilience
C2M	*Implement C2M across all water utilities*	Deploy unified CRM system across water utilities (by expanding Miyahuna experience in C2M)
Business Applications	*Digitize operations to improve monitoring*	Implement CMMS, Asset Management, and Mobile Maintenance Applications to optimize operational workflows and track asset performance
		Deploy Customer Mobile Applications to enhance engagement and provide easier access to JVA services
		Integrate LIMS (Laboratory Information Management Systems) to ensure efficient management of water quality and laboratory data
		Utilize Energy Data Management System (EDMS) to streamline energy data collection, monitoring, and compliance processes
		Implement Performance Monitoring tools and dashboards to support real-time decision-making and track key performance indicators
		Develop Technical Affairs Applications to facilitate coordination, reporting, and management of technical operations

Table 16: Key Work Packages Identified at Entity Level

This regional approach ensures horizontal alignment across utilities and enables the sector to move collectively toward a smart, customer-centric, and data-driven future.

5 Priority Roadmap Initiatives

Based on the assessment of the entities and the vision shared by the sector, the following chapter proposes a consolidated vision of the action plan and national-level initiatives

Several key initiatives have been identified at the sector level to drive digital transformation in a coordinated and coherent manner.

The first and foundational work package consists of **establishing clear ownership and leadership of the Digital Roadmap** by appointing a dedicated lead and ensuring that staff across all entities are actively engaged in the transformation journey.

Following this, a second major initiative will **focus on sector-wide IT management through the development of an IT Blueprint and the definition of shared standards to guide infrastructure, systems, and operational alignment**. Similarly, critical domains such as **cybersecurity**, **data management**, **SCADA**, and **GIS** require the establishment of common frameworks **to ensure interoperability, consistency, and secure information exchange** across entities.

This unified approach will ultimately enable the sector to leverage the **NWIS as a centralized Data Hub, serving as the backbone for data-driven decision-making, cross-entity collaboration, and continuous digital innovation.**

5.1 Change Management and Skill Development

Successful digital transformation requires a comprehensive change management approach to guide stakeholders through the transition and ensure adoption of new systems and processes, with particular focus on training, communication, and capacity building across all organizational levels.

5.1.1 Digital Roadmap Execution and Management Team

To ensure successful implementation of the IT Roadmap, a robust governance structure will be established, led by the **Higher Committee** and the current **IT Technical Committee**, with support from the **Technical Working Groups**.

The IT Technical Committee, working closely with the specialized Technical Working Groups, will **coordinate implementation efforts across all entities, allocate resources, monitor progress, and ensure that all digital initiatives remain aligned with the overall business strategy and sector priorities**. The Technical Working Groups will **provide expertise** in key areas such as cybersecurity, data management, NWIS, GIS, and change management, ensuring structured and effective execution of the IT Roadmap.

5.1.2 Employee Engagement

To support digital transformation, a structured approach to employee engagement will have to be implemented across the sector. The first step will involve **assessing staff needs** and **developing tailored career development plans**. A yearly training calendar will have to be designed, 23 specialized courses have already been identified, covering IT tools, cybersecurity, data management, GIS, SCADA, programming, AI, and more. These trainings will have to be delivered regularly to enhance technical skills and support continuous learning.

In parallel, strategies will be developed to **attract and retain qualified IT and technical professionals**, including knowledge transfer plans to mitigate the impact of upcoming retirements.

Social inclusion initiatives will be promoted to foster diversity and equity within teams. Engagement levels will be regularly monitored, and a performance management system will be implemented to support productivity and professional growth.

Considering employee engagement and capacity building at the sector level, rather than individually within each entity, ensures **consistency, efficiency, and long-term impact**.
A centralized approach enables the design of **unified training standards, facilitates resource sharing, and avoids duplication of efforts**.
It also promotes **collaboration** across entities, supports coherent digital culture, and ensures that all staff, regardless of their organization, develop **aligned competencies to support sector-wide digital transformation objectives**.

The list of national-level projects can be found in the following table.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		CHANGE MANAGEMENT									
TRS-3	Sustainable	IT Strategy & Planning Manager	Establish IT roadmap strategy leadership	Not started	100%					High	Low
TRS-6	Automated	Sector-wide license procurement governance	Centralize procurement processes	Not started	100%					High	High
TRS-7	Sustainable	R&D Strategy	Develop innovation and R&D strategy	Not started					100%	Low	Low
TRS-8	Sustainable	Digital / IT Training Program	Develop and deliver IT skills training program	Not started	25%	25%	15%	15%	20%	High	Low
TRS-9	Sustainable	LMS Awareness Campaign	LMS Awareness Campaign	Not started	100%					High	Low
TRS-10	Sustainable	Employee Engagement Program	Implement employee development program	Not started		25%	25%	25%	25%	High	Low

Table 17: List of Changement Management Projects (National-level)

5.2 IT Management

5.2.1 Digital Blueprint

The digital transformation of the water sector must begin with the **development of comprehensive Digital Blueprints**, both at the level of individual entities and at the sectoral level. These blueprints serve as **strategic foundations for aligning IT capabilities with business objective**s and for **ensuring consistency, scalability, and sustainability** in digital efforts across the sector.

FOCUS ON DIGITAL BLUEPRINT

A Digital Blueprint is a **strategic document** that outlines an organization’s current and target digital landscape. It serves as **a foundational guide for aligning technology investments with business objectives, ensuring that IT systems, data flows, infrastructure, and digital services are coherent, scalable, and future-ready.**

A comprehensive Digital Blueprint should include:

- **Current State Assessment**: Inventory of systems, applications, infrastructure, and dataflows
- **Gap Analysis**: Identification of inefficiencies, redundancies, and outdated systems
- **Target Digital Architecture**: Future-state vision including architecture, technology stack, and integration principles
- **API Strategy & Interoperability Guidelines**: Standardized approach to system integration and data sharing
- **Implementation Roadmap**: Phased plan with milestones, priorities, and risk management
- **Digital Governance & Support Framework**: Roles, SLAs, KPIs, and capacity-building measures
- **Cybersecurity & Data Protection Strategy**: Security controls, compliance, and resilience planning
- **Sustainability & Scalability Considerations**: Long-term viability and adaptability of systems

5.2.2 Infrastructure Upgrade

The IT infrastructure is a fundamental asset that underpins all critical operations. However, the current state of this infrastructure, characterized by significant technical debt, presents growing operational risks and hinders innovation and performance optimization.

This initiative proposes a targeted modernization program aimed at transforming our infrastructure from a reactive cost center into a strategic performance driver. The objective is to build a resilient, secure, and scalable technology foundation capable of supporting the sector's future ambitions.

Our assessment has identified several major pain points that directly impact the sector's objectives:

- **Risk Exposure**: The use of end-of-life (EOL) hardware and software components increases the attack surface and the risk of critical failures. The absence of a formalized and tested Disaster Recovery Plan (DRP) exposes the organization to prolonged service disruptions.
- **Operational Inefficiency**: The current architecture struggles to support the real-time processing of growing data volumes (from IoT, SCADA, and smart meters), limiting the ability to make data-driven decisions to reduce Non-Revenue Water (NRW) and optimize energy consumption.

- **Lack of Agility**: The deployment of new applications and services is slowed by the infrastructure's rigidity, which delays the implementation of innovation projects and improvements to customer service.

These findings make modernization imperative to reach the strategic objective to have a fully automated, smart, sustainable, and secure system.

5.2.3 API Library

Another key initiative shared at the sector level is the development of **a centralized API Library**. This library is essential to facilitate interoperability and data exchange between systems and stakeholders. It includes detailed documentation on endpoints, authentication methods, data formats, and integration guidelines for key systems such as eGWMS, EDMS, HR, Finance, and Asset Management Systems, and GIS and spatial data services (e.g., ESRI REST APIs).

This API Library supports a modular, service-oriented architecture and ensures systems can scale and evolve efficiently over time. It is important to note that creating an API library doesn't inherently increase cybersecurity risks, but it introduces new elements to secure. Risks depend on how well it is implemented and maintained. Following best security practices can control or minimize these risks.

5.2.4 Sustainable Digital Audits

Toward the later stages of the 5-year digital transformation journey, once core digital systems and practices are well-established, the sector will take responsibility for organizing Sustainable Digital Audits. These audits will:

- Evaluate the long-term sustainability, efficiency, security and sovereignty of digital systems;
- Ensure alignment with national digital strategies and sectoral goals;
- Guarantee the maintainability of digital solutions for all users;
- Promote digital inclusion and equitable access to services for all stakeholders;
- Foster continuous improvement and technology lifecycle management to strengthen the resilience and value of digital investments.

By embedding sustainability and accountability into digital governance, the sector will ensure the resilience and value of its digital investments over the long term.

The list of national-level IT Management projects can be found in the following table.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		IT MANAGEMENT									
ITM-1	Sustainable	Development of the IT Blueprint	Create IT architecture documentation	Not started	33%	33%	33%			High	High
ITM-2	Automated	API Library	Develop a specialized API library for Jordan's water sector, covering ERP, CRM, NWIS, SCADA, and telemetry	Not started	40%	40%	20%			High	High
ITM-9	Sustainable	Sustainable Digital Audit	Assess digital tools' environmental impact to reduce the sector's carbon footprint	Not started					100%	Low	Low

Table 18: List of IT Management Projects (National-level)

5.3 Cybersecurity

The increasing reliance on digital systems across the water sector, spanning administrative IT environments and critical OT infrastructures, requires a **unified, resilient, and proactive cybersecurity strategy**.

5.3.1 Cybersecurity Strategy

In response to this need, a comprehensive **cybersecurity strategy is currently under development** as part of an ongoing initiative funded by USG through the BWI program. This strategy will serve as a foundation for sector-wide resilience and digital risk management.

It should be designed to ensure:

- Sector-wide **alignment with international and national cybersecurity standards** (e.g., ISO 27001, NIST, IEC 62443), ensuring interoperability, accountability, and consistent maturity improvement;
- The establishment of a clear **cybersecurity governance model** in each entity, with defined responsibilities, escalation paths, and alignment with national frameworks;
- **"Security-by-Design"** and **"Privacy-by-Design"** are embedded from the outset in all digital initiatives, including ERP systems, smart metering projects, and automation solutions.

5.3.2 Security Operations Center

Given the scale and fragmentation of the water sector, the **establishment of a centralized Security Operations Center (SOC) emerges as a critical enabler for the effective implementation of the cybersecurity strategy.**

FOCUS ON THE SOC

The SOC will act as the primary command center for **real-time monitoring, detection, analysis, and response to cybersecurity threats** across the entire Jordanian water sector.
To ensure operational efficiency, sector ownership, and integration with national mandates, the SOC will be **hosted within WAJ**, acting as the reference hub for all water entities.

SOC Recommended Organization
The SOC will be staffed by at least five dedicated cybersecurity analysts, ensuring continuous coverage and high-level expertise:

- **2 Level 1 Analysts** *(Tier 1 – Frontline Operators)*: Monitor dashboards, handle basic alerts, conduct initial triage, and escalate complex cases.
  They ensure rapid response and filtering of high-volume events.
- **2 Level 2 Analysts** *(Tier 2 – Incident Responders)*: Experts who investigate alerts escalated by Tier 1, correlate complex logs and behaviors, and lead containment and response activities.
  The presence of two ensures that at least one responder is available at all times.
- **1 Level 3 Analyst** *(Tier 3 – Senior Security Architect)*: Oversees the most critical incidents, defines advanced detection logic, and designs and optimizes correlation rules for evolving threats.

SOC Technical Capabilities
The SOC will be equipped with advanced infrastructure to ensure high-performance threat detection and efficient incident response, including:

- **SIEM platform with a capacity >10,000 EPS** (Events Per Second), scalable to cover all

water sector logs and event sources;
- **Log storage capacity for 13 months**, including 12 months of standard retention plus 1 month of immediate access for investigations;
- **Real-time correlation performance under 100ms**, enabling detection of fast-paced threats like brute force attacks;
- **Integrated dashboards for threat intelligence, vulnerability trends, and incident tracking**;
- **Potential integrations with national entities such as the National Cybersecurity Center** for coordination and regulatory compliance.

As of 4 June 2025, a new Cybersecurity and AI Unit has been established, laying the groundwork for centralized capabilities that closely align with the operational needs of a sector-wide SOC.

5.3.3 Cybersecurity Awareness

Developing and delivering basic cybersecurity training across the sector is crucial to **build a strong, unified defense against cyber threats**. Such training helps raise awareness of common risks, promotes best practices, and ensures that all employees, from operational staff to management, understand their role in protecting sensitive data and infrastructure.

By **standardizing cybersecurity knowledge and practices** sector-wide, in alignment with the Jordan National Cybersecurity Framework, the entities can **reduce human errors, improve incident response, and foster a culture of security vigilance**. This collective effort strengthens the resilience of the entire sector, making it harder for attackers to exploit vulnerabilities.

Figure 42: Example of Cybersecurity Awareness Poster[8]

[8] Poster source: Awaretrain

The list of national-level cybersecurity projects can be found in the following table.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		CYBERSECURITY									
CYB-1	Secured	Water Sector Cybersecurity Framework	Define cybersecurity governance and standards	Not started	100%					High	Low
CYB-2	Secured	Basic Cyber Security Awareness Training	Deliver urgent training on Cybersecurity	Not started	70%	30%				High	Low
CYB-6	Secured	Advanced Cybersecurity Monitoring and Threat Intelligence Tools	Deploy Advanced Cybersecurity Monitoring and Threat Intelligence Tools (SIEM, SOAR, UEBA, TIP, ASM)	Not started				20%	80%	High	Low
CYB-7	Secured	SOC Implementation	Establish SOC for continuous monitoring, expert incident response, and enhanced security	In progress	80%	20%				High	Low
CYB-8	Secured	OT Cybersecurity Standards	OT Cybersecurity Standards: IEC 62443 (entire series), ISA/IEC 62443-3-3	Not started	20%	25%	25%	20%	10%	High	High
CYB-9	Secured	IT Cybersecurity Standards	Standarising and ensure IT Quality Standards ISO 27001:2022 ISO 27001:2022 & NIST Cybersecurity Framework v1.1	In progress	50%	13%	13%	13%	13%	High	Low

Table 19: List of Cybersecurity Projects (National-level)

Note: All updates and investments related to cybersecurity risk mitigation will be managed at the entity level.

5.4 Data Management & Governance

Effective data management and governance frameworks are essential to ensure data quality, accessibility, and security while enabling evidence-based decision-making throughout the water sector, addressing current gaps in data ownership, validation processes, and cross-entity data sharing. Some guidelines and best practices are given in Chapter 7 - Data Governance Framework and Standards.

5.4.1 Data Governance Definition

As a cornerstone of digital transformation, effective data governance ensures reliable, secure, and accessible data to drive informed decisions. **Appointing a dedicated Data Officer at WAJ will centralize leadership of data governance, defining ownership, roles, and enforcing data quality, security, and compliance standards across all systems.**

Standardizing data formats and implementing regular validation will ensure consistency and integrity, while secure access controls will protect sensitive information. To embed a data-driven culture, teams will have to be trained on best practices, and **data stewards identified across entities for each business process to develop local expertise in analytics and governance.**

5.4.2 Data Governance Policies and Standards

Once the Data Officer is appointed, its primary responsibility will be to **establish clear data governance policies and standards**. This includes **standardizing data collection methods and unifying data management practices across all departments to ensure consistent data quality, security, and accountability.**

They will also oversee the creation of **a centralized database** paired with the governance framework to enable **secure, integrated, and accessible data management**. The framework will be put into practice through structured processes, continuous monitoring, and immediate training to equip teams with essential data management skills.

5.4.3 Business Intelligence and Analytics

To ensure consistency across entities, a sector-wide initiative will define **a unified approach to business intelligence and analytics**, beginning with a comparative evaluation of available platforms based on technical capabilities, cost-effectiveness, user-friendliness, and operational relevance.

Once the preferred analytics platform is selected, **standardized reporting and visualization tools will be developed at the sector level**, including a central business intelligence interface for the MWI. Teams across all entities will receive comprehensive training to ensure proper utilization and long-term sustainability of the solution.

The list of data management projects at national level can be found in the following table.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		DATA MANAGEMENT / GOVERNANCE									
DMG-1	Smart	Data governance leadership (Data Officer)	Train a Data Officer	Not started	100%					High	Low
DMG-2	Smart	Data governance leadership (Data Stewards)	Develop local data governance and in-house data analytics expertise	Not started	100%					High	Low
DMG-3	Smart	Data Governance Framework	Define data governance and standards	Not started	80%	20%				High	Low
DMG-4	Smart	Data Governance Implementation	Implement the Data Governance	Not started	30%	35%	35%			High	High
DMG-5	Sustainable	Dashboard Development	Comparative assessment to determine the most suitable dashboarding tool	Not started	40%	40%	20%			High	Low
DMG-6	Sustainable	Dashboard Development	Dashboard for MWI	In progress	90%	10%				Low	Low

Table 20: List of Data Management Projects (National-level)

5.5 SCADA

The **Supervisory Control and Data Acquisition (SCADA) systems form the backbone of water operations**, with current systems showing varying levels of implementation across entities and requiring standardization, security enhancements, and expanded coverage to enable comprehensive real-time monitoring and control of critical infrastructure.

The SCADA implementation should follow a structured architecture:

Tier	Description
Tier 0	Central Monitoring Center at WAJ to oversee national data aggregation and analysis
Tier I	Main SCADA control centers at regional utilities (JVA, Miyahuna, YWC, AW).
Tier II	Sub-control centers managing clusters of Tier III sites
Tier III	Individual water facilities (pumping stations, reservoirs, wells, etc.)

From a sector-wide perspective, the following strategic priorities have been identified to enable effective implementation, interoperability, and long-term sustainability of SCADA systems across Jordan's water sector:

- **Establish a Secure and Unified National SCADA Framework**: Develop and implement a standardized SCADA framework that ensures interoperability across all utilities while embedding cybersecurity principles by design. The framework should define common technical standards for system architecture, data governance, communication protocols, and access control. It must also include mandatory cybersecurity requirements—such as network segmentation, intrusion detection, encryption, and incident response—based on internationally recognized best practices (e.g., NIST Cybersecurity Framework).
- **Achieve Full SCADA Coverage and Future-Proof System Design**: Accelerate the deployment of SCADA infrastructure at Tier II and III levels in underserved governorates. Prioritize the upgrade of legacy systems (e.g., JVA) to ensure alignment with national

standards and long-term maintainability. Design all systems to be scalable and ready for future integration of secondary and tertiary networks (e.g., DMA zones and customer metering).

- **Operationalize WAJ Tier 0 Central Monitoring Center**: Finalize and activate the national Tier 0 SCADA platform at WAJ to enable centralized monitoring, real-time data analytics, and strategic decision-making across the entire water sector.
- **Establish Dedicated In-House SCADA Maintenance Units**: Create specialized automation and maintenance teams within each utility to strengthen technical self-reliance, reduce dependency on external vendors, and enhance operational continuity.
- **Invest in Capacity Building and Workforce Retention**: Implement structured training programs and retention strategies, including contractual commitments, to build, certify, and retain a skilled SCADA workforce throughout the sector.

These priorities have been reflected through specific projects, as outlined in the table below. Given that SCADA system upgrades are tailored to each utility's context, detailed projects are presented in the utility-specific lists provided in Annex 5.3.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		OT / SCADA									
OTS-1	Sustainable	Standardized SCADA Architecture Framework	Establish unified SCADA standards covering compatibility, cybersecurity, data management, maintenance, and performance to ensure secure and efficient operations	In progress	70%	30%				High	Low
OTS-2	Automated	Implementation of Nationwide SCADA System	Implementation of Nationwide SCADA System FARA 12 PHASE III. Scope : Level 1 to 3	In progress	33%	33%	33%			High	High
OTS-4	Automated	WAJ SCADA Expansion	Expand SCADA to the remaining five governorates and integrate new sites into the WAJ system, including software upgrades as needed	In progress		40%	40%	20%		High	High
OTS-12	Smart	Non Revenue Water - PoC (WAJ)	Consolidate WAJ NRW Dashboard, linked to the National Smart Bulk Water Metering and Monitoring system	Not started			60%	20%	20%	High	Low

Table 21: List of OT/SCADA Projects (National-level)

FOCUS ON CUSTOMER SMART METERS

The costs related to the procurement, installation, and commissioning of customer smart meters have **not been included in the scope of this Digital Roadmap**. While smart metering is recognized as a key long-term enabler for **customer-centricity**, **operational efficiency**, and **water loss reduction**, the deployment of smart meters falls under capital investment planning rather than digital systems planning.

However, to provide an indicative cost reference for future investment planning, the following estimates can be considered for the three utilities (average cost of ~500 USD per meter - device, installation, communications):

- Miyahuna: Approximately 1,000,000 meters, would represent an investment of ~500 million USD;
- YWC: Approximately 380,000 meters, would represent an investment of 190 million USD;
- AW: Approximately 50,000 meters, would represent an investment of 25 million USD.

These figures are rough estimates and should be refined through feasibility studies and procurement assessments. Moreover, such investments are typically phased over several years and may be supported by donor funding or public-private partnerships.

5.6 GIS

ArcGIS Pro Utility Network is Esri's next-generation geospatial platform for modeling, managing, and analyzing complex utility networks with high precision and scalability. Designed to support advanced asset management, network tracing, and real-time decision-making, it offers utilities a powerful framework for modernizing their GIS capabilities.

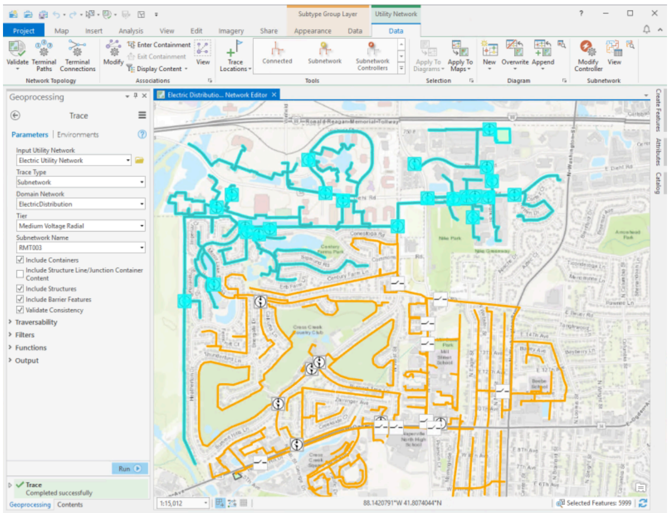


Figure 43: ArcGIS Pro Utility Network Interface

As part of the digital transformation agenda for Jordan's water sector, the migration to ArcGIS Pro Utility Network represents a major strategic initiative. This project, implemented across the sector, aims to transition from legacy GIS models to **a unified, high-performance spatial data infrastructure**. It will enable enhanced **data quality, advanced analytics, and dynamic visualization** through features such as topology rules, automated validations, and integration with tools like dashboards and mobile field apps. By standardizing GIS practices and equipping staff with modern tools and training, the project will strengthen operational efficiency, support evidence-based decision-making, and improve service delivery across the sector.

The migration process, although appearing linear conceptually, is actually iterative and non-linear. It begins with validating the source data against predefined quality control (QC) rules, followed by cleaning and preprocessing data errors. The clean data is then transformed into a format compatible with the target utility network.

Key steps include:

- **Data Validation**: Identify data gaps that must be filled to complete the migration successfully.
- **Gap Filling**: Collaborate with the GIS team at the water company to complete missing data.
- **Staging Environment Setup**: Install necessary ArcGIS software and licenses, replicate GIS data to a staging geodatabase (version 10.8.1.2.6 or later), with Oracle 19c or SQL Server 2016 as the RDBMS, and ensure proper user roles for the utility network owner.
- **ETL Configuration and Execution**: Map and transform data schema and objects from the existing ArcMap utility model to the new ArcGIS Pro utility network model.
- **Topology and Quality Checks**: Enable topology, add topology rules, and configure Data Reviewer quality checks to validate data completeness.
- **Publishing**: Publish the utility network to ArcGIS Enterprise Portal and enable branch versioning for web service edits.
- **Testing and Acceptance**: Conduct testing and approval by the water company.
- **Production Deployment**: Prepare and deploy the production environment from staging.

- **Configurable Apps Setup**: Configure ArcGIS Enterprise portal apps (Dashboard, Experience Builder, Field Maps) to support decision-making and field operations.
- **Training**: Provide instructor-led training on ArcGIS Pro Utility Networks, potentially in group sessions.

The list of national-level GIS projects can be found in the following table.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		GIS									
GIS-2	Sustainable	GIS Framework	Restructure GIS data and database model	Not started	100%					High	Low
GIS-3	Sustainable	GIS License Provision and Training	Renew GIS licenses and provide training	Not started	30%	20%	17%	17%	17%	High	High
GIS-7	Smart	GIS Training	Enhance GIS capabilities and network analysis	Not started	70%	30%				High	Low
GIS-8	Smart	GIS AI	Implement Geo-AI capabilities	Not started				50%	50%	High	High

Table 22: List of GIS Projects (National-level)

> It is recommended to establish a single ESRI–GIS contract for the entire sector, hosted within ICTD, to optimize time and resources. Each entity would maintain its own database schema replica while synchronizing updates with the centralized database.

5.7 NWIS as a Data Hub for the Sector

A key project shared across all entities in the sector is the development of the **National Water Information System (NWIS)**, which is intended to support water resource management, data collection, and information dissemination. It is currently operating through parallel systems (WIS 2020 and NWIS v2) that **require consolidation and modernization**. The future NWIS will serve as the **central nervous system of the water sector**, integrating critical data streams to enable comprehensive water resource management and informed decision-making.

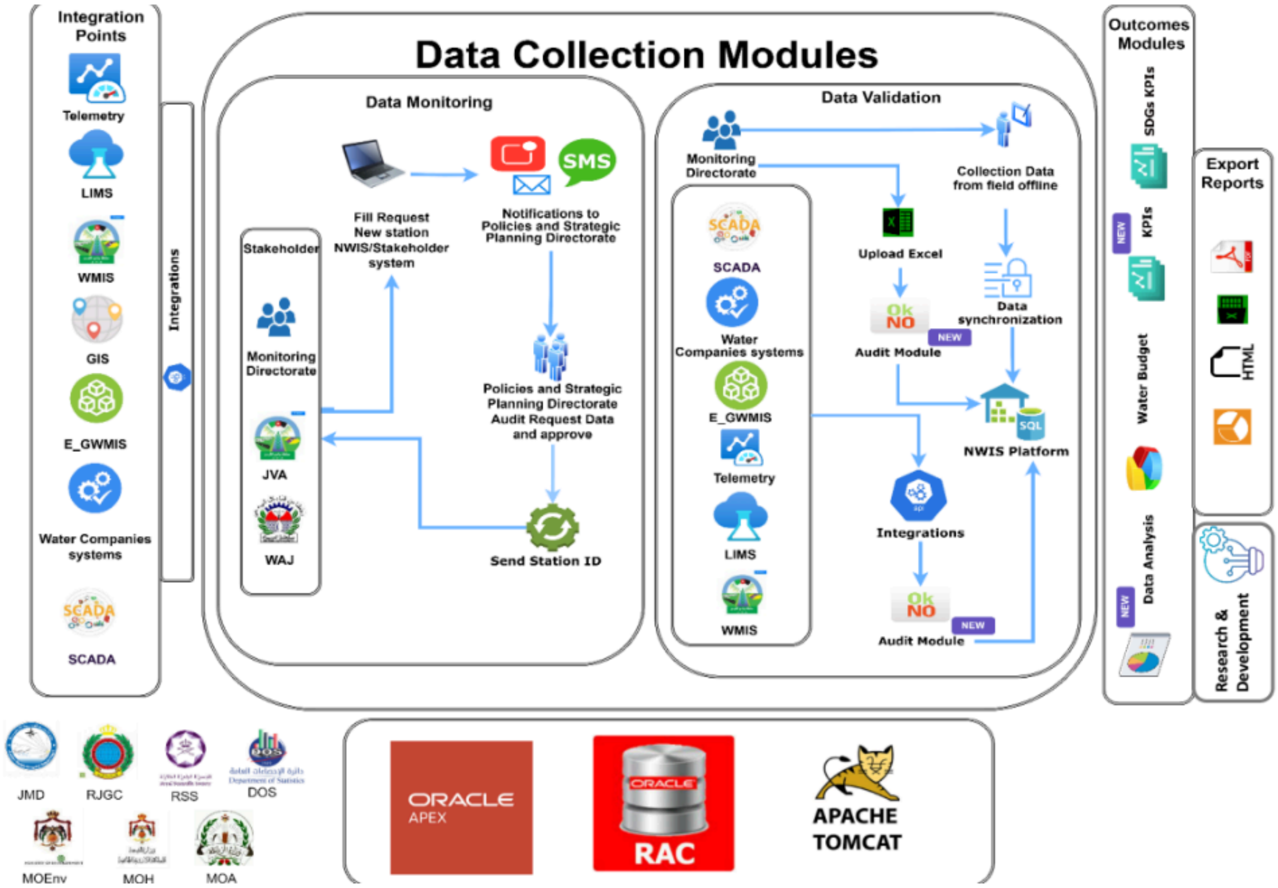


Figure 44: Structure of NWIS

The NWIS must address several key challenges to ensure its effectiveness and sustainability:

- **Preserving data sovereignty across systems** like GIS, SCADA, LIMS, and ERPs;
- **Ensuring standardized and granular data integration** across entities;
- **Enabling interoperability** across diverse technologies and communication layers;
- **Managing large data volumes** through scalable architectures;
- **Complying with national regulations**, notably the Personal Data Protection Law (PDPL), to guarantee data security and privacy.

In order to scale and enhance this application effectively, it is essential to **first stabilize the underlying source systems** (such as SCADA, GIS, ERP, and eGWMS). This stabilization process is assessed individually for each entity, to ensure alignment with their operational context and on-the-ground realities.

Current State	• Two parallel systems operating:
	    ○ WIS 2020 (v1) using outdated Oracle Forms 6i/10g
	    ○ NWIS (v2) using Oracle ADF with JDeveloper/Oracle 12.2
	• Plan to merge both into NWIS II using Oracle APEX platform
	• Server will be hosted at ICTD using existing Oracle database licenses

Integration Status	Several modules showing issues: • Telemetry (red status) • LIMS integrated but non-functional (red status) • WMIS experiencing API connectivity issues • Manual workarounds being used for green-status items

12-Month Quick Wins Roadmap	Systems ready for integration: ● LIMS ● WMIS ● eGWMS (private wells) ● GIS ● Telemetry (daily batch updates) Government-owned wells system not yet ready
Technical Considerations	Oracle APEX chosen for: ● Ease of learning ● API export capabilities ● Compatibility with existing infrastructure ● Data validation responsibility lies with data owners Need for validation on telemetry and field observations

Table 23: NWIS Overview

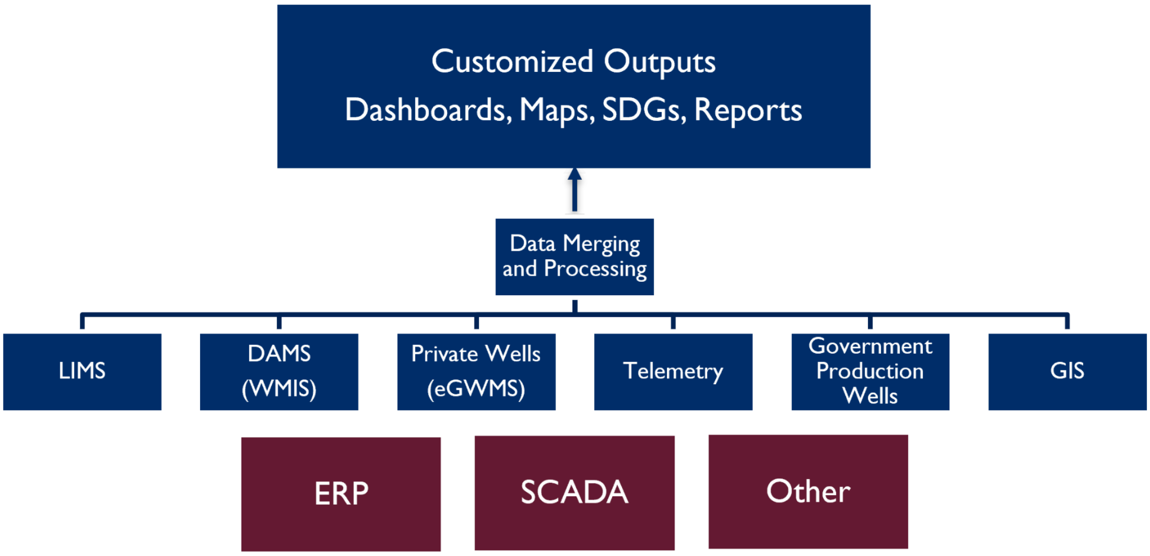


Figure 45: Proposed Approach for Upgrade of NWIS - MWI Presentation 22/10/2024 (USAID)

The list of NWIS projects can be found in the following table.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		NWIS									
NWI-1	Smart	NWIS Development	Integrate systems from WAJ, JVA, Utilities	In progress		30%	70%			High	Low
NWI-2	Smart	Integration of NCP, DAOM and SAMRA	Integrate data from NCP, DAOM and SAMRA into the NWIS Platform	Not started			33%	33%	33%	High	High

Table 24: List of NWIS Projects (National-level)

6 Resource Requirements and Capacity Building

6.1 Investment Requirements and Funding Strategy

6.1.1 Investment Categories and Cost Structure

BUDGET ASSUMPTIONS

The amounts presented in this action plan are based on:

- Bottom-up estimates grounded in expertise and tailored to the local context;
- Budgets provided by the respective entities.

These figures should be considered indicative only, as they are estimates and may be affected by fluctuations in foreign exchange rates.

Overall cost for implementation of the roadmap

The total cost of the IT Roadmap amounts to **$157,583,981 USD**. However, some of the listed projects are in progress or already have funding committed by donors.

Status	Cumulative CAPEX	Total 5-year OPEX	5-Year TOTEX
Completed	$520,548	$296,484	$817,032
In progress	$33,828,500	$21,722,250	$55,550,750
Not started	$66,641,100	$34,575,100	$101,216,200
Grand Total	**$100,990,148**	**$56,593,833**	**$157,583,981**

Table 25: Summary of Status of IT Roadmap Projects

Donor committed	Cumulative CAPEX
GIZ	$7,219,000
Not funded	**$61,341,100**
Spanish Funding	$1,000,000
UNICEF	$22,000
USG - BWI	$300,000
USG - MESC (FARA)	$28,029,500
USG - WGA	$3,038,548
World Bank	$40,000
Grand Total	**$100,990,148**

Table 26: Summary of Committed and Uncommitted CAPEX

The remaining budget required for the implementation of these uncommitted projects amounts to **$61,341,100 USD in CAPEX** over five years, in addition to **$56,593,833 USD in OPEX**.

<u>The following sections of the report will focus exclusively on the projects that have not been funded and finalized by 2025.</u>

The necessary CAPEX investments for the sector plan implementation are **up to $31,613,960 USD** in Year 1 (2026). The additional annual OPEX associated with the implementation of the action suggested amounts **up to $11,974,859 USD** in Year 5 (2030), considering that all actions have been implemented, which represents almost 3.3% of the annual turnover of the utilities ($342,547,800 collected in 2022[9]).

The graph below gives the distribution of CAPEX and OPEX over the period of implementation of the roadmap.

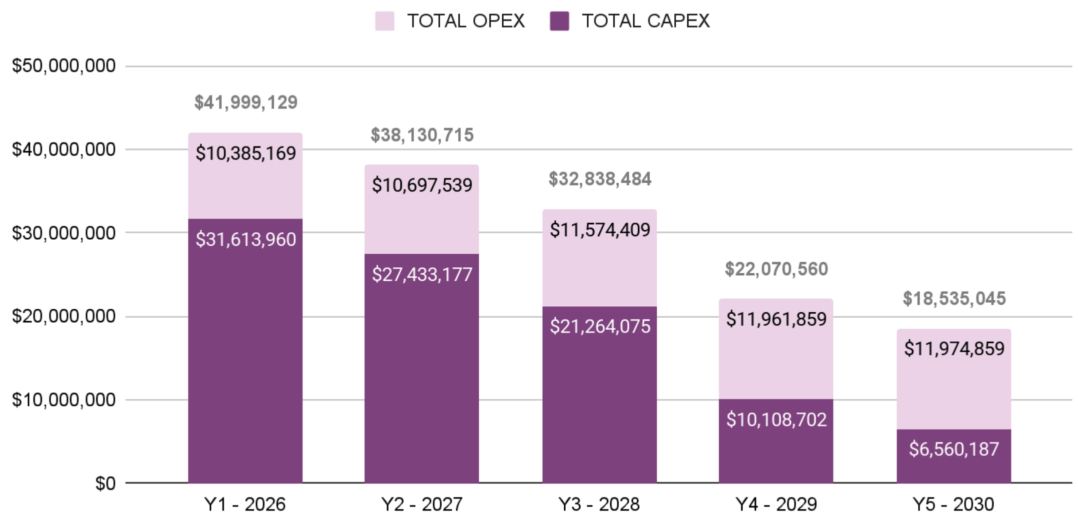


Figure 46: Investment Distribution (CAPEX and OPEX) over the Implementation Period

The following graph shows the investment in each work package (CAPEX and OPEX) over the 5-year period. The CAPEX over the 5-year period is divided between the amount already committed and non-committed.

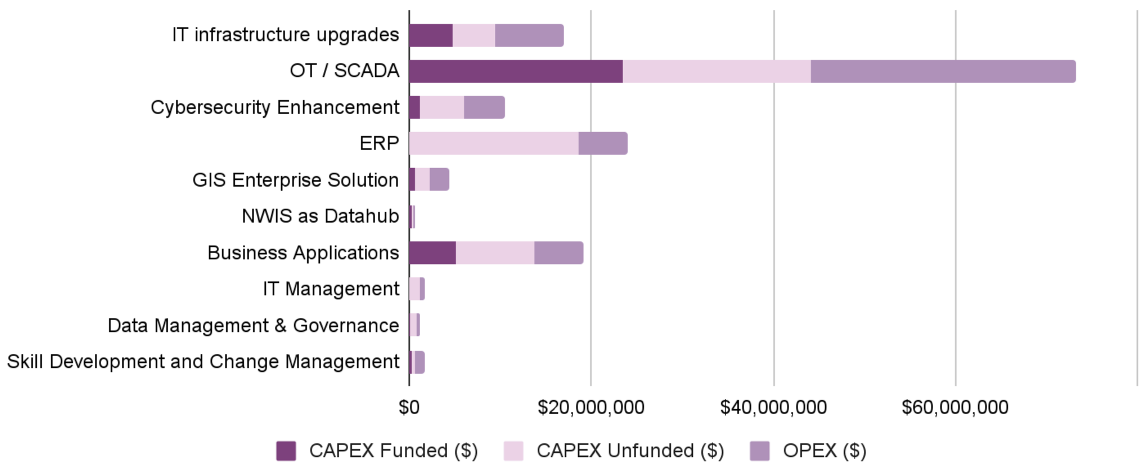


Figure 47: Distribution of Total Investment (CAPEX and OPEX) by Work Packages

[9] *Source: data have been collected from the “Jordan Water Utilities Monitoring Report 2022” (UPMU)*

The graph below shows the evolution of CAPEX over the next 5 years, detailing the amount for each category of action. The curve illustrates the percentage of initial budget execution year after year.

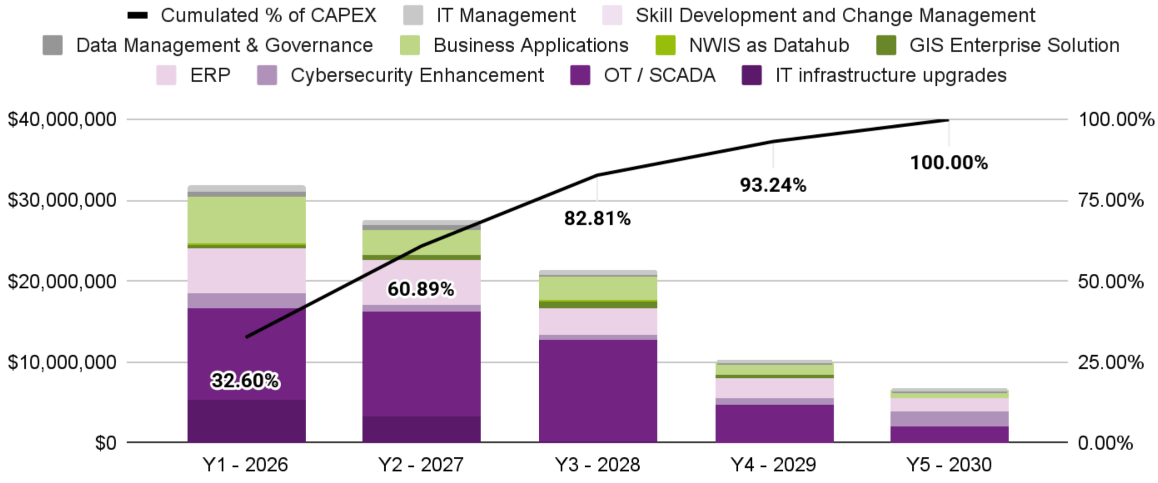


Figure 48: Distribution of CAPEX by Work Package over the Implementation Period (2026-2030)

The major investments between 2026 and 2030, are due to:

- The expansion and modernization of SCADA to all sites;
- The modernization of the IT infrastructure (network, data centers, severs);
- The development of WMIS and the Financial Module for JVA.

The graph below shows the distribution of the IT Roadmap budget (including committed) over the Jordan Water sector.

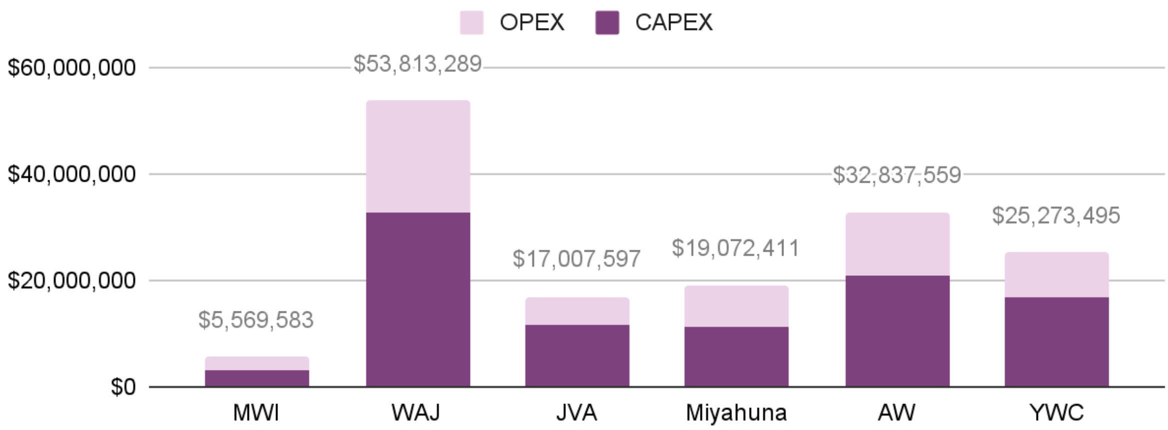


Figure 49: Distribution of Investment by Entity

Finally, the graph below illustrates the repartition of the budget (including committed) amongst the identified objectives.

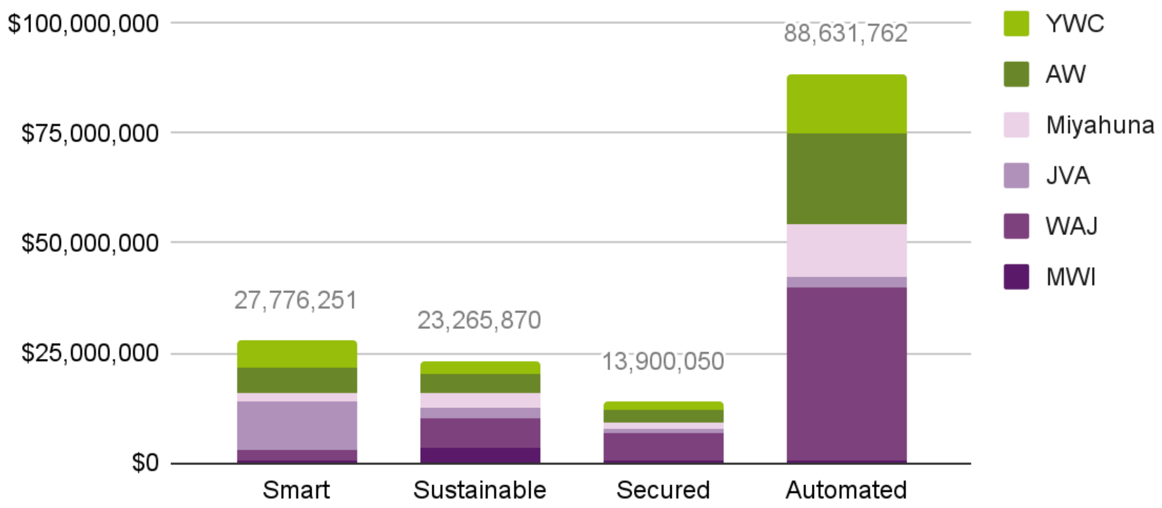
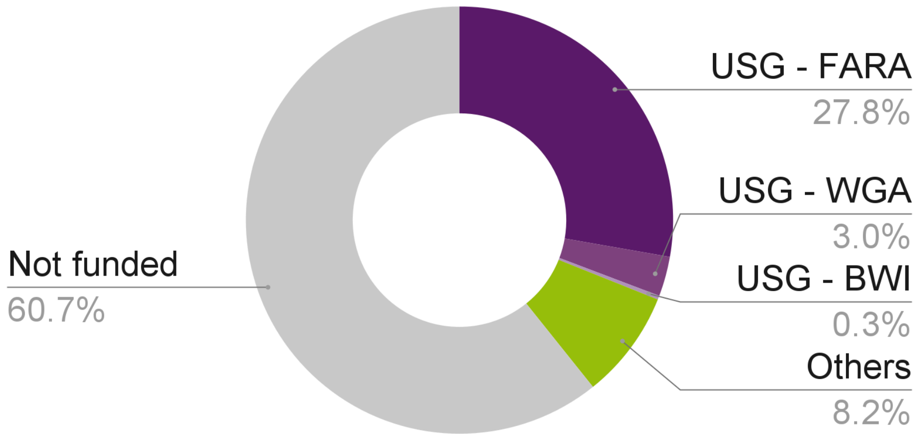


Figure 50: Budget Distribution (OPEX/CAPEX) by Objective

The following chart illustrates the current level of donor commitment across the IT-related projects identified in the IT Roadmap, showing that only 40% of the required funding has been secured.



"Others" includes the following donors: GIZ, Spanish Funding, UNICEF, and the World Bank.

Figure 51: Donor Committed on Listed Projects

This funding gap highlights the need for a diversified and proactive resource mobilization strategy to support the implementation of the IT Roadmap.

Adequate funding and resources

Implementation of the strategy requires substantial resources, both financial and technical. This encompasses securing sustainable funding mechanisms through diverse sources (government, private sector), optimizing existing resources through improved efficiency, and developing strategic partnerships with development partners and private sector entities (international financial institutions, utility bonds, public-private partnerships etc). The ability to mobilize and effectively allocate these resources will be crucial for achieving strategic objectives.

A variety of funding instruments may be leveraged to support digital transformation in the water sector:

- **FARA (Fixed Amount Reimbursement Agreement) – USG**: A result-based funding mechanism where disbursements are made upon achievement of predefined milestones. It ensures strong accountability and performance tracking but requires precise planning.
- **Bilateral Programs**: Agencies such as GIZ, AFD, or JICA may support technical assistance, capacity building, or digital infrastructure as part of broader water sector initiatives.
- **International Financial Institutions (IFIs)**: Entities like the World Bank, EIB, or IsDB can provide loans or grants with embedded digital components, often within larger investment frameworks (e.g., NRW reduction, service delivery, resilience).
- **Climate & Green Finance**: Digital systems that enhance efficiency and reduce losses (e.g., SCADA, smart meters) can qualify for funding through Green Climate Fund, Climate Investment Funds, etc.
- **Public-Private Partnerships (PPPs)**: Engaging private operators in financing or operating IT solutions (e.g., AMI systems, cloud platforms) with adequate safeguards on data and performance.
- **Government or Utility Co-financing**: Domestic budget allocations or cost-sharing with utilities can ensure local ownership and long-term sustainability of digital initiatives.

BUDGET ESTIMATES AND NEEDS FOR INTERNAL STAFF REINFORCEMENT

The support provided by external experts or diverse development needs (project management, training, support in drafting and implementing procedures, support to definition of needs for new tools, etc.) **is included in the financial estimates and will enable staff to improve staff's skills and the level of digitalisation of the entity.**

It is worth noting that, **in the budget estimates**, the internal staff reinforcement **(salary costs) has not been included.**

Therefore, certain aspects of digitisation require an assessment to evaluate the possibility of recruiting new staff in order to face the new needs (e.g. SCADA experts, call centre).

6.1.2 National-Level Investment Plan

The budget execution over the 5 years regarding the Sector projects is **$48,496,840 USD**, representing **32% of the total IT Roadmap budget**.

The necessary CAPEX investments for the sector plan implementation are **up to $8,936,193 USD**, in the first year. The additional annual OPEX associated with the implementation of the action suggested amounts **up to $4,424,680 USD** in 2030, considering that all actions have been implemented.

The graph below gives the distribution of CAPEX and OPEX over the period of implementation of the roadmap.

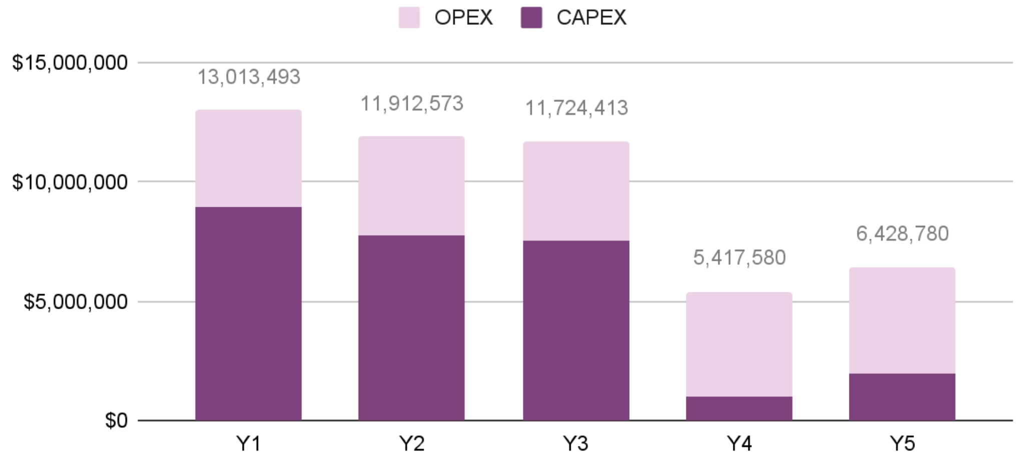


Figure 52: Budget Distribution (OPEX/CAPEX) over the IT Roadmap Implementation Period (2026-2030) for the Sector Projects

The IT Roadmap outlines three main areas of strategic investment to support a smart, integrated, and resilient water sector:

- **Cross-Sector Digital Infrastructure**: Development of core systems such as the National Water Information System (NWIS) and a Central SCADA platform to ensure real-time monitoring, data sharing, and national coordination.
- **Shared Services and Platforms**: Deployment of common tools like Geographic Information Systems (GIS) and interoperable ERP modules, promoting standardization, cost-efficiency, and streamlined operations across utilities.
- **Capacity Building and Digital Skills Development**: Sector-wide training programs in cybersecurity, ERP/SCADA/GIS systems, and change management to build local expertise and ensure sustainable digital transformation.

The graph below illustrates the projected investments allocated to each identified work package over the implementation timeline.

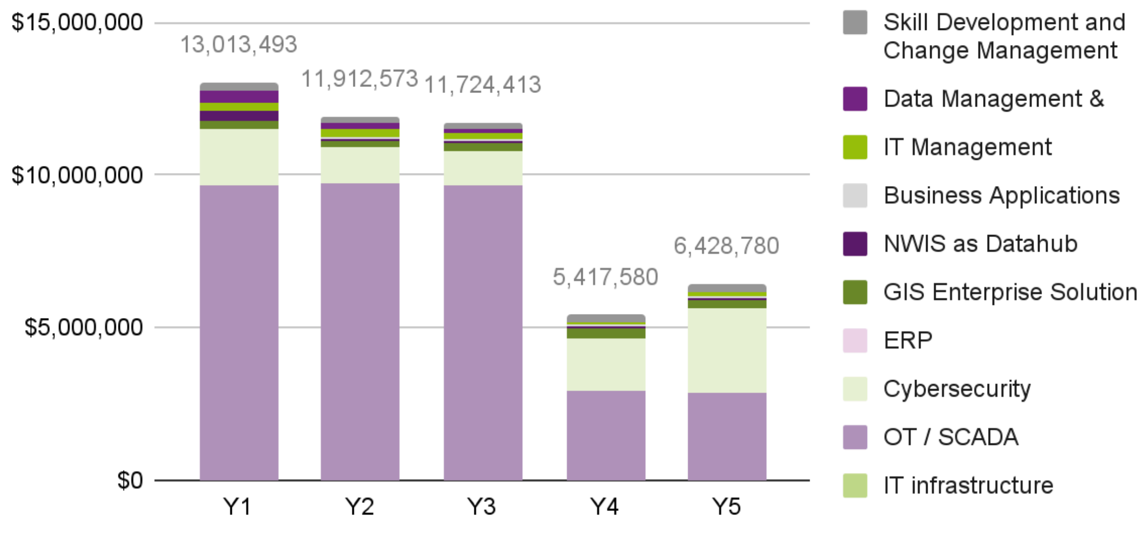


Figure 53: Budget Distribution of the Work Packages over the IT Roadmap Implementation period (2026-2030) for Sector Projects

6.1.3 Institutional Investment Plans

6.1.3.1 MWI Digital Programs Investment

The budget execution over the 5 years regarding the MWI's projects is **$3,846,350 USD**, representing **3% of the total IT Roadmap** budget.

The necessary CAPEX investments for the sector plan implementation are **up to $1,140,067 USD**, in the second year. The additional annual OPEX associated with the implementation of the action suggested amounts **up to $285,387 USD** in 2030, considering that all actions have been implemented.

The graph below gives the distribution of CAPEX and OPEX over the period of implementation of the roadmap.

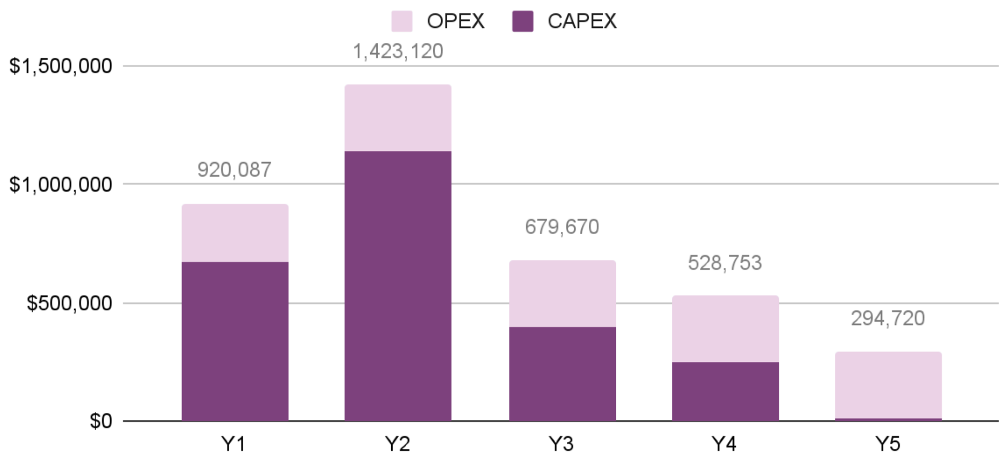


Figure 54: Budget Distribution (OPEX/CAPEX) over the IT Roadmap Implementation Period (2026-2030) for MWI

The graph below illustrates the projected investments allocated to each identified work package over the implementation timeline.

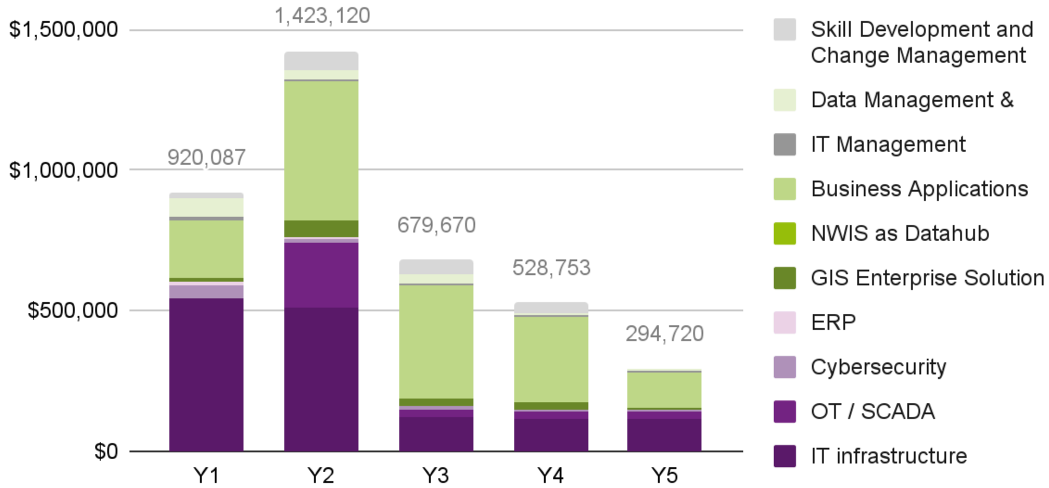


Figure 55: Budget distribution of the Work Packages over the IT Roadmap implementation period (2026-2030) for MWI

6.1.3.2 WAJ Digital Programs Investment

The budget execution over the 5 years regarding the WAJ's projects is **$14,754,585 USD**, representing **9.5% of the total IT Roadmap budget**.

The necessary CAPEX investments for the sector plan implementation are **up to $3,716,167 USD**, in the first year. The additional annual OPEX associated with the implementation of the action suggested amounts **up to $1,011,291 USD** in 2030, considering that all actions have been implemented.

The graph below gives the distribution of CAPEX and OPEX over the period of implementation of the roadmap.

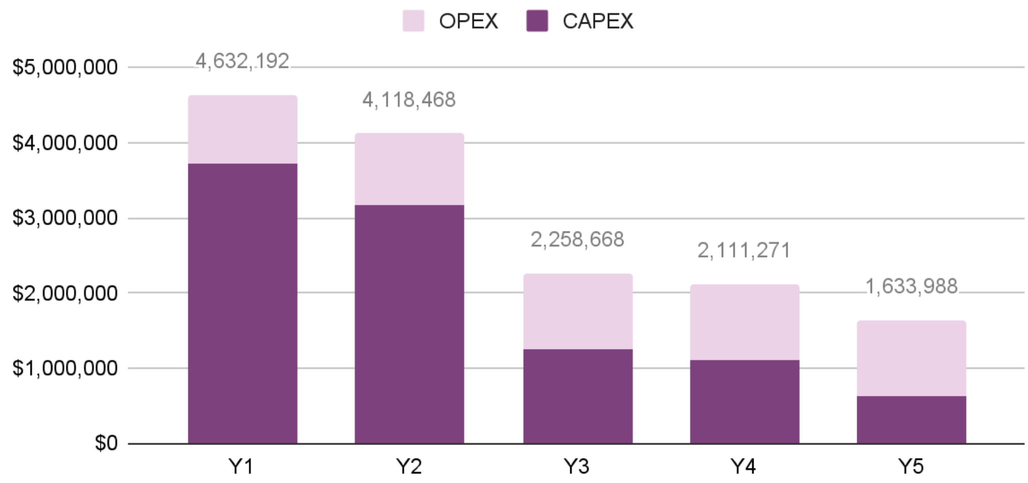


Figure 56: Budget Distribution (OPEX/CAPEX) over the IT Roadmap Implementation Period (2026-2030) for WAJ

The graph below illustrates the projected investments allocated to each identified work package over the implementation timeline.

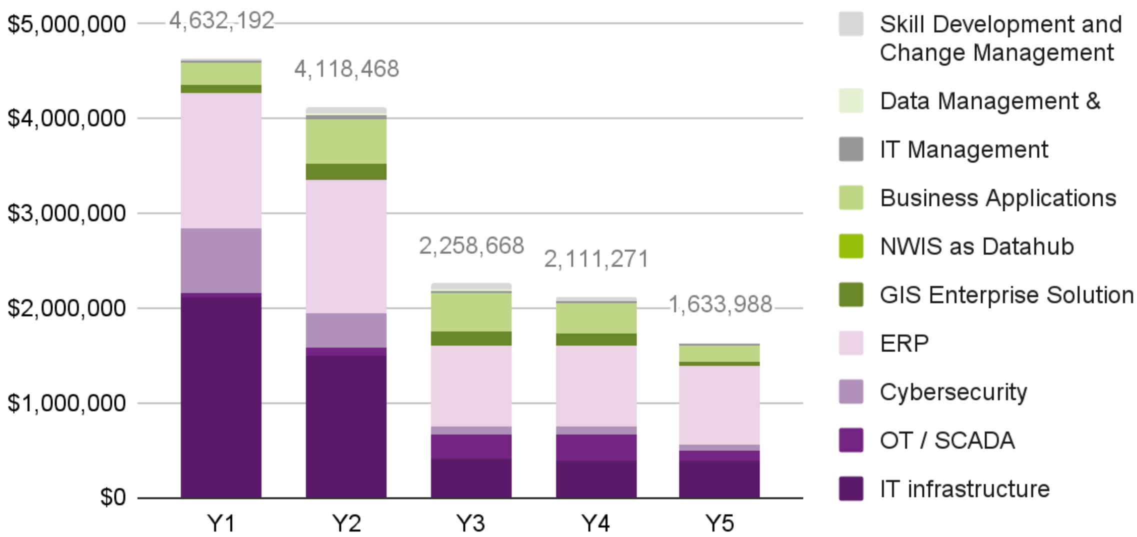


Figure 57: Budget Distribution of the Work Packages over the IT Roadmap Implementation Period (2026-2030) for WAJ

6.1.3.3 JVA Digital Programs Investment

The budget execution over the 5 years regarding the JVA's projects is **$15,119,083 USD**, representing **10% of the global IT Roadmap budget**.

The necessary CAPEX investments for the sector plan implementation are **up to $3,619,608 USD**, in the second year. The additional annual OPEX associated with the implementation of the action suggested amounts **up to $1,018,573 USD** in 2030, considering that all actions have been implemented.

The graph below gives the distribution of CAPEX and OPEX over the period of implementation of the roadmap.

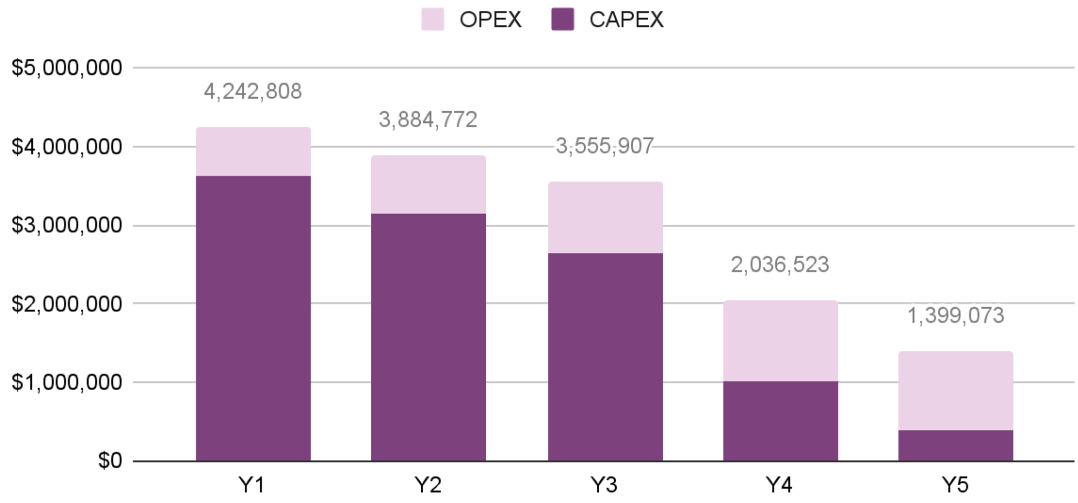


Figure 58: Budget Distribution (OPEX/CAPEX) over the IT Roadmap Implementation Period (2026-2030) for JVA

The graph below illustrates the projected investments allocated to each identified work package over the implementation timeline.

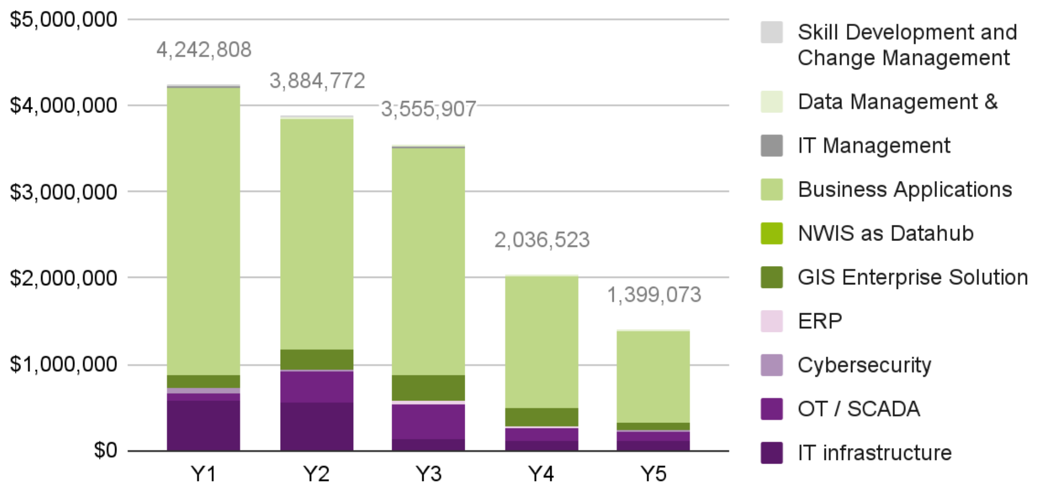


Figure 59: Budget Distribution of the Work Packages over the IT Roadmap Implementation Period (2026-2030) for JVA

The core of JVA's IT investment is centered on the development and expansion of the Water Management Information System (WMIS). This comprehensive initiative includes key components such as smart metering for large and small customers, IoT and sensor integration, GIS and remote sensing, advanced data analytics and reporting, mobile access for both users and staff, as well as dedicated modules for financial management, land and investment tracking, water budgeting, and water loss control. The total projected investment for this initiative amounts to approximately 7,458,000 USD over the 5-year period.

6.1.4 Regional Utilities Investment Plans

6.1.4.1 Miyahuna Digital Programs Investment

The budget execution over the 5 years regarding the Miyahuna's projects is **$17,164,647 USD**, representing **14% of the global IT Roadmap budget**.

The necessary CAPEX investments for the sector plan implementation are **up to $2,594,953 USD**, in the third year. The additional annual OPEX associated with the implementation of the action suggested amounts **up to $1,364,520 USD** in 2030, considering that all actions have been implemented.

The graph below gives the distribution of CAPEX and OPEX over the period of implementation of the roadmap.

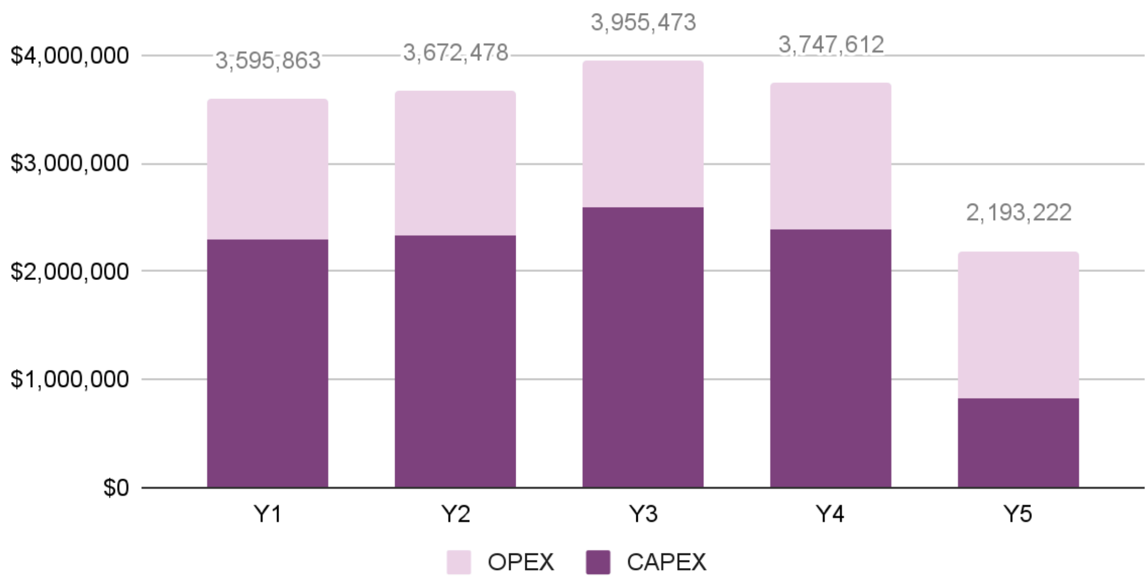


Figure 60: Budget Distribution (OPEX/CAPEX) over the IT Roadmap Implementation Period (2026-2030) for Miyahuna

The graph below illustrates the projected investments allocated to each identified work package over the implementation timeline.

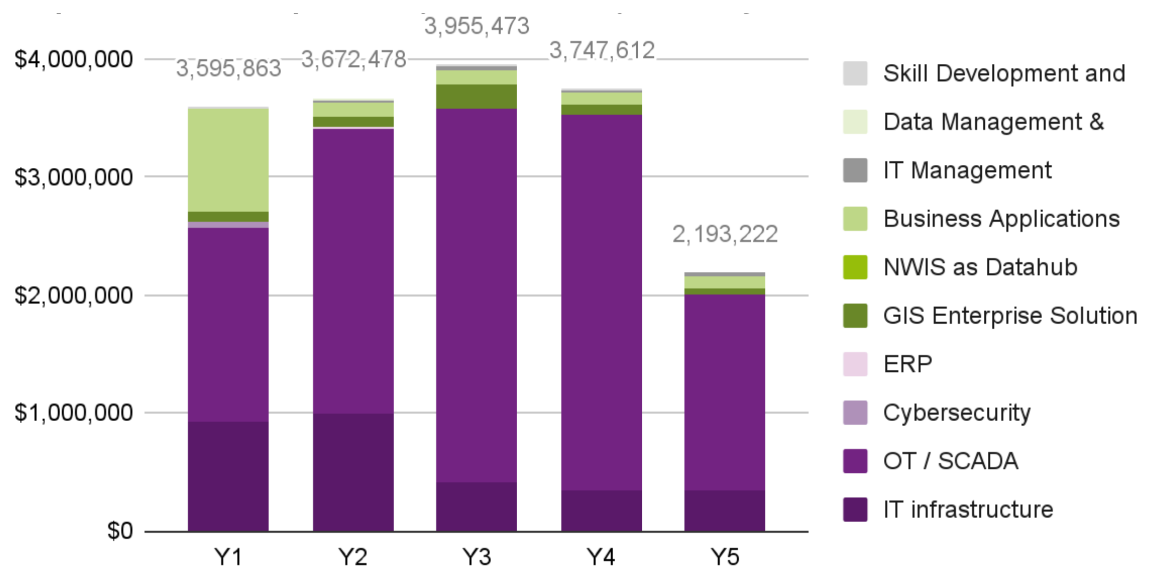


Figure 61: Budget Distribution of the Work Packages over the IT Roadmap Implementation Period (2026-2030) for Miyahuna

6.1.4.2 YWC Digital Programs Investment

The budget execution over the 5 years regarding the YWC's projects is **$23,363,431 USD**, representing **15% of the global IT Roadmap budget**.

The necessary CAPEX investments for the sector plan implementation are **up to $6,505,086 USD**, in the first year. The additional annual OPEX associated with the implementation of the action suggested amounts **up to $1,485,564 USD** in 2030, considering that all actions have been implemented.

The graph below gives the distribution of CAPEX and OPEX over the period of implementation of the roadmap.

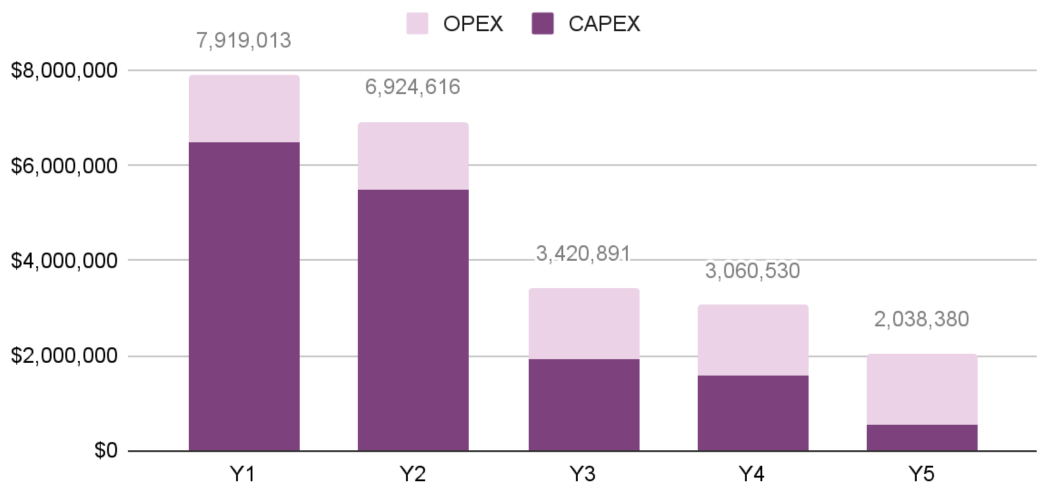


Figure 62: Budget Distribution (OPEX/CAPEX) over the IT Roadmap Implementation Period (2026-2030) for YWC

The graph below illustrates the projected investments allocated to each identified work package over the implementation timeline.

Figure 63: Budget Distribution of the Work Packages over the IT Roadmap Implementation Period (2026-2030) for YWC

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		BUSINESS APPLICATIONS									
BUA-15	Smart	SWU - Energy Data Management System Implementation (utilities + JVA)	Implementation of an Energy Data Management System	In progress	100%					High	High
BUA-16	Smart	SWU - Improve assets management in targeted utility	Improve assets management in targeted utility	Not started	10%	40%	30%	20%		High	High
BUA-17	Smart	SWU - NRW Dashboard	Select and implement digitalization in minimum five specific processes in the commercial, physical and monitoring/measurement levels aimed at reducing NRW in the regions of Mafraq, Balqa, and Karak	In progress	10%	40%	30%	20%		High	High
BUA-18	Automated	SWU - Sludge data management tool	Development of the sludge and wastewater dashboard and mobile application.	In progress	10%	40%	30%	20%		High	High
BUA-19	Automated	SWU - Digital platform for BWRO plants	To develop digital dashboard for visualizing KPIs, monitoring and reporting for BWRO plants	Not started	10%	40%	30%	20%		High	High
BUA-23	Sustainable	Recruitment Platform Deployment	Develop a web page on the respective website	Not started	50%	30%	20%			Low	Low
BUA-25	Sustainable	AutoCAD License and Training	Renew AutoCAD licenses and provide training	Not started		50%	30%	20%		Low	Low
BUA-44	Automated	YWC Handheld units for billing improvement	Procure and Deploy handheld meter reading and billing units	Completed						High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		IT MANAGEMENT									
ITM-1	Sustainable	Development of the IT Blueprint	Create IT architecture documentation	Not started	33%	33%	33%			High	High
ITM-2	Automated	API Library	Develop a specialized API library for Jordan's water sector, covering ERP, CRM, NWIS, SCADA, and telemetry	Not started	40%	40%	20%			High	High
ITM-3	Sustainable	IT Governance	Define IT roles and responsibilities	Not started	45%	20%	20%	15%		High	Low
ITM-4	Sustainable	IT Project Management	Implement IT project management tool	Not started			100%			High	Low
ITM-5	Automated	IT Service Modernization - CMDB	Deploy IT asset management system (configuration)	Not started		25%	25%	25%	25%	High	High
ITM-6	Sustainable	IT Service Modernization - ITAM	Implement IT service management tools	Not started		25%	25%	25%	25%	High	Low
ITM-7	Sustainable	IT Service Modernization - ITSM	Support tool implementation	Not started		25%	25%	25%	25%	High	Low
ITM-8	Sustainable	IT Knowledge Base	Create an IT knowledge base	Not started		25%	25%	25%	25%	Low	Low
ITM-9	Sustainable	Sustainable Digital Audit	Assess digital tools' environmental impact to reduce the sector's carbon footprint	Not started					100%	Low	Low
		CHANGE MANAGEMENT									
TRS-3	Sustainable	IT Strategy & Planning Manager	Establish IT roadmap strategy leadership	Not started	100%					High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		CHANGE MANAGEMENT									
TRS-4	Sustainable	Change Management program	Team reorganization	Not started	20%	20%	20%	20%	20%	High	High
TRS-5	Automated	Customer database cleanup	National campaign to verify update customer details (mobile number)	Not started	33.33%	33.33%	33.33%			High	High
TRS-6	Automated	Sector-wide license procurement governance	Centralize procurement processes	Not started	100%					High	High
TRS-8	Sustainable	Digital / IT Training Program	Develop and deliver IT skills training program	Not started	25%	25%	15%	15%	20%	High	Low
TRS-9	Sustainable	LMS Awareness Campaign	LMS Awareness Campain	Not started	100%					High	Low
TRS-10	Sustainable	Employee Engagement Program	Implement employee development program	Not started		25%	25%	25%	25%	High	Low

Table 38: List of YWC Projects

11.6 AW IT Roadmap Program

Aqaba Water's IT Roadmap initiative focuses on maintaining high service standards and operational efficiency in this key economic zone, particularly integrating the Southern Governorates Management Contracts into key AW systems. The list of AW projects can be found in the following table.

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		IT INFRASTRUCTURE UPGRADES									
ITI-3	Sustainable	AW Network Assessment (incl. Southern Governorates)	Assessment of AW network and necessary upgrade needed	Not started	100%					High	Low
ITI-8	Sustainable	AW Network Infrastructure Modernization	Replace switches and implement HA FortiGate firewall	Not started	50%	50%				High	High
ITI-9	Secured	AW Data center rehabilitation	AW Data center rehabilitation - UPS, IT Generator, Fire Fighting system, CCTV - and Serveur Virtualisation Program	Not started	100%					Low	Low
ITI-10	Secured	AW Project rehabilitation Data center - Cooling system	Cooling system replacement in the data center	Not started	100%					High	Low
ITI-11	Secured	AW Infrastructure (Cloud, data protection, and DR)	Strengthening data protection and IT resilience through cloud solutions	Not started	56%	11%	11%	11%	11%	High	High
ITI-22	Sustainable	AW Terminals Infrastructure Modernization	PC upgrades and standardization Replace 230 PCs with Windows 11 Pro compliant hardware	Not started	67%	8%	8%	8%	8%	High	Low
ITI-23	Secured	Standardization of Operating Systems for Servers	Migrate to current OS versions - Migrate servers from Win2003/2008 and RHEL5.5/CentOS7	Not started	33%	33%	33%			High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		IT INFRASTRUCTURE UPGRADES									
ITI-24	Secured	Windows deployment infrastructure	Deploy Windows 11 with standardized images and automation	Not started	33%	33%	33%			High	Low
ITI-25	Secured	Automated Backup and Disaster Recovery Implementation (Miyahuna, JVA, YWC, AW)	Implement automated daily backups with offsite storage and testing	Not started	50%	50%				High	High
ITI-32	Sustainable	JONEPS infrastructure	IT infrastructure upgrades JONEPS	Not started		50%	50%			Low	Low
		OT / SCADA									
OTS-1	Sustainable	Standardized SCADA Architecture Framework	Establish unified SCADA standards covering compatibility, cybersecurity, data management, maintenance, and performance to ensure secure and efficient operations	In progress	70%	30%				High	Low
OTS-4	Automated	WAJ SCADA Expansion	Expand SCADA to the remaining five governorates and integrate new sites into the WAJ system, including software upgrades as needed	In progress		40%	40%	20%		High	High
OTS-7	Automated	AW SCADA Upgrade	Integrate governorates into unified SCADA system and upgrade current SCADA system	Not started	30%	30%	20%	10%	10%	High	High

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		OT / SCADA									
OTS-8	Automated	AW SCADA Upgrade for Southern Governorates	Consultancy to define SCADA requirements for the Southern Governorates. Scope : Level 4 & 5 : Dashboard and connection to ERP (financial model)	Not started	30%	30%	20%	10%	10%	High	High
OTS-13	Smart	Non Revenue Water Deployment	Expand on other entities	Not started				50%	50%	High	High
OTS-20	Smart	AW AMI deployment (smart meters + platform)	AMI System Deployment FARAs 1 and 3 - Phase II AW	In progress						High	High
OTS-23	Sustainable	AW - Outsource the operation support and training for AW operating systems - FARA 14 Phase III	Outsource the operation support and training for AW operating systems FARA 14 Phase III	In progress	50%	50%				High	High
		CYBERSECURITY									
CYB-1	Secured	Water Sector Cybersecurity Framework	Define cybersecurity governance and standards	Not started	100%					High	Low
CYB-2	Secured	Basic Cyber Security Awareness Training	Deliver urgent training on Cybersecurity	Not started	70%	30%				High	Low
CYB-3	Secured	Equipment consolidation IT and OT	Upgrade firewalls and server infrastructure to enhance security, performance, scalability, and availability	Not started	80%	20%				High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		CYBERSECURITY									
CYB-8	Secured	OT Cybersecurity Standards	OT Cybersecurity Standards: IEC 62443 (entire series), ISA/IEC 62443-3-3	Not started	20%	25%	25%	20%	10%	High	High
CYB-9	Secured	IT Cybersecurity Standards	Standardize IT quality with ISO 27001:2022 & NIST CSF v1.1	In progress	50%	13%	13%	13%	13%	High	Low
		DATA MANAGEMENT / GOVERNANCE									
DMG-2	Smart	Data governance leadership (Data Stewards)	Develop local data governance and in-house data analytics expertise	Not started	100%					High	Low
DMG-3	Smart	Data Governance Framework	Define data governance and standards	Not started	80%	20%				High	Low
DMG-4	Smart	Data Governance Implementation	Implement the Data Governance	Not started	30%	35%	35%			High	High
DMG-5	Sustainable	Dashboard Development	Comparative assessment to determine the most suitable dashboarding tool	Not started	40%	40%	20%			High	Low
DMG-7	Smart	Document Management System (DMS)	Enhance ECMS (Laserfiche) and expand licenses to meet governorate and branch needs	Not started		50%	50%			High	High
		ERP									
ERP-1	Sustainable	ERP Fundamentals	ERP Training	Not started	100%					High	Low
ERP-2	Sustainable	ERP - AW Southern Governorates Expansion	ERP - AW Southern Governorates Expansion	Not started	50%	50%				High	High

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		ERP									
ERP-5	Automated	AW ERP - Phase 2 (EBS)	Implementation of advanced ERP modules to enhance financial, operational, HR, and customer service management (Phase 2).	Not started			50%	30%	20%	Low	High
ERP-8	Smart	AW ERP - Phase 2 (C2M)	Oracle Application C2M New Licenses + implementation	Not started	30%	30%	15%	15%	10%	High	Low
ERP-10	Sustainable	Financial System Upgrade - Phase 2	Automate revenue collection with eFAWATEERcom	Not started			50%	50%		High	High
		GIS									
GIS-2	Sustainable	GIS Framework	Restructure GIS data and database model	Not started	100%					High	Low
GIS-3	Sustainable	GIS License Provision and Training	Renew GIS licenses and provide training	Not started	30%	20%	17%	17%	17%	High	High
GIS-7	Smart	GIS Training	Enhance GIS capabilities and network analysis	Not started	70%	30%				High	Low
GIS-8	Smart	GIS AI	Implement Geo-AI capabilities	Not started				50%	50%	High	High
GIS-10	Smart	Ground Penetrating Radar (GPR) for utilities operation team	Improve GIS data quality	Not started			100%			High	High
GIS-11	Smart	GIS Data Cleansing	Improve GIS data quality	Not started	25%	25%	25%	25%		High	High

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		GIS									
GIS-12	Smart	RTK (Real-time kinematic positioning) Procurement and training	RTK Procurement and training	Not started		50%	50%			Low	Low
		BUSINESS APPLICATIONS									
BUA-2	Automated	Computerized Maintenance Management System - Phase 1 (Fundamentals)	Implement maintenance management system	Not started		50%	50%			High	High
BUA-3	Smart	Computerized Maintenance Management System - Phase 2	Deploy predictive maintenance analytics	Not started			15%	25%	60%	High	High
BUA-4	Smart	Maintenance Mobile App	Maintain the existing Maintenance Mobile App	In progress	20%	20%	20%	20%	20%	High	High
BUA-5	Smart	Maintenance Mobile App Expansion	Expand the Maintenance Mobile App to include sewage services, covering both the necessary hardware (PDAs) and software development	Not started			80%	20%		High	High
BUA-7	Automated	Customer Mobile App - AW / YWC	Expand the deployment of Miyahuna Mobile App to AW and YWC	Not started	80%	20%				High	High
BUA-13	Automated	Expand WAJ LIMS to AW and JVA	Expand WAJ LIMS to AW and JVA	Not started	50%	50%				High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		BUSINESS APPLICATIONS									
BUA-14	Automated	AW LIMS System	AW LIMS System	Not started	30%	20%	17%	17%	17%	High	Low
BUA-15	Smart	SWU - Energy Data Management System Implementation (utilities + JVA)	Implementation of an Energy Data Management System	In progress	100%					High	High
BUA-16	Smart	SWU - Improve assets management in targeted utility	Improve assets management in targeted utility	Not started	10%	40%	30%	20%		High	High
BUA-17	Smart	SWU - NRW Dashboard	Select and implement digitalization in minimum five specific processes in the commercial, physical and monitoring/measurement levels aimed at reducing NRW in the regions of Mafraq, Balqa, and Karak	In progress	10%	40%	30%	20%		High	High
BUA-18	Automated	SWU - Sludge data management tool	Development of the sludge and wastewater dashboard and mobile application.	In progress	10%	40%	30%	20%		High	High
BUA-19	Automated	SWU - Digital platform for BWRO plants	To develop digital dashboard for visualizing KPIs, monitoring and reporting for BWRO plants	Not started	10%	40%	30%	20%		High	High
BUA-21	Smart	AW Performance Monitoring	Performance Monitoring of utility	Not started	33%	33%	33%			High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		BUSINESS APPLICATIONS									
BUA-22	Smart	Deploy advanced analytics, AI, and integrated dashboards for data-driven decision making	Implement BI dashboards for decision-making	Not started					100%	Low	High
BUA-23	Sustainable	Recruitment Platform Deployment	Develop a web page on the respective website	Not started	50%	30%	20%			Low	Low
BUA-24	Sustainable	Hydraulic Modeling License and Training	Renew Sewer Gems and Water Gems licenses and provide training	Not started		50%	30%	20%		Low	Low
BUA-25	Sustainable	AutoCAD License and Training	Renew AutoCAD licenses and provide training	Not started		50%	30%	20%		Low	Low
BUA-26	Sustainable	Primavera License and Training	Renew Primavera licenses and provide training	Not started		50%	30%	20%		Low	Low
BUA-43	Automated	AW Support Southern Governorates MC-Billing - HHU (Karak, Tafilah, Maan)	Procure and Deploy handheld meter reading and billing units	In progress	100%					High	Low
BUA-45	Automated	AW Hydraulic Modeling (SewerGEMS, WaterGEMS licenses)	AW Hydraulic Modeling (SewerGEMS, WaterGEMS licenses)	Not started	30%	20%	17%	17%	17%	High	Low
BUA-46	Automated	AW GIS, AutoCAD, Primavera license renewals	AW GIS, AutoCAD, Primavera license renewals	Not started	30%	20%	17%	17%	17%	High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		BUSINESS APPLICATIONS									
BUA-47	Automated	AW LMS Expansion for Southern Governorates	AW LMS Expansion for Southern Governorates	Not started	30%	20%	17%	17%	17%	High	Low
BUA-48	Automated	AW Planning and Projects (GPS RTK device, GPS hand device)	AW Planning and Projects (GPS RTK device, GPS hand device)	Not started	30%	20%	17%	17%	17%	High	Low
BUA-49	Automated	AW Contingency, support, and other business applications	AW Contingency, support, and other business applications	Not started	100%					High	Low
		IT MANAGEMENT									
ITM-1	Sustainable	Development of the IT Blueprint	Create IT architecture documentation	Not started	33%	33%	33%			High	High
ITM-2	Automated	API Library	Develop a specialized API library for Jordan's water sector, covering ERP, CRM, NWIS, SCADA, and telemetry	Not started	40%	40%	20%			High	High
ITM-3	Sustainable	IT Governance	Define IT roles and responsibilities	Not started	45%	20%	20%	15%		High	Low
ITM-4	Sustainable	IT Project Management	Implement IT project management tool	Not started			100%			High	Low
ITM-5	Automated	IT Service Modernization - CMDB	Deploy IT asset management system (configuration)	Not started		25%	25%	25%	25%	High	High
ITM-6	Sustainable	IT Service Modernization - ITAM	Implement IT service management tools	Not started		25%	25%	25%	25%	High	Low

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		IT MANAGEMENT									
ITM-7	Sustainable	IT Service Modernization - ITSM	Support tool implementation	Not started		25%	25%	25%	25%	High	Low
ITM-8	Sustainable	IT Knowledge Base	Create an IT knowledge base	Not started		25%	25%	25%	25%	Low	Low
ITM-9	Sustainable	Sustainable Digital Audit	Assess digital tools' environmental impact to reduce the sector's carbon footprint	Not started					100%	Low	Low
ITM-10	Sustainable	AW Staff Training in IT Management, Governance, and Development	AW Staff Training in IT Management, Governance, and Development	Not started	60%	40%				High	Low
ITM-11	Sustainable	IT Organization Chart for Southern Governorates	IT Organization Chart for Southern Governorates	Not started	50%	50%				High	Low
		CHANGE MANAGEMENT									
TRS-3	Sustainable	IT Strategy & Planning Manager	Establish IT roadmap strategy leadership	Not started	100%					High	Low
TRS-4	Sustainable	Change Management program	Team reorganization	Not started	20%	20%	20%	20%	20%	High	High
TRS-5	Automated	Customer database cleanup	National campaign to verify update customer details (mobile number)	Not started	33.33%	33.33%	33.33%			High	High
TRS-6	Automated	Sector-wide license procurement governance	Centralize procurement processes	Not started	100%					High	High

#	Main Objective	Project	Short Description	Status	2026	2027	2028	2029	2030	Importance	Effort
		CHANGE MANAGEMENT									
TRS-7	Sustainable	R&D Strategy	Develop innovation and R&D strategy	Not started					100%	Low	Low
TRS-8	Sustainable	Digital / IT Training Program	Develop and deliver IT skills training program	Not started	25%	25%	15%	15%	20%	High	Low
TRS-9	Sustainable	LMS Awareness Campaign	LMS Awareness Campain	Not started	100%					High	Low
TRS-10	Sustainable	Employee Engagement Program	Implement employee development program	Not started		25%	25%	25%	25%	High	Low

Table 39: List of AW Projects

SEURECA

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