

Digital Transformation for Water Utilities

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Abstract

Digital Technologies fundamentally impact all aspects of business and society. This is motivating all organizations to adopt and embrace Digital Transformation as an integral part of organizational business and growth strategy. This article provides the needed context and background for the impetus of Digital Transformation for HMWSSB, with a focus on the Approach, Process, Method and a Plan of action for achieving Digital Transformation. The article covers Digital Transformation through an evolutionary context of Technology over the past few decades, focusing on the last decade in particular, which has introduced many disruptive and radical technologies – that have impacted not just business, but society and culture as well. The Multi-pronged approach to be adopted for achieving a transformation, the 6 pillars of the organization that enable Digital Transformation – with enmeshing / integration of Business Processes is explained. The article concludes in eliciting an execution plan – towards achieving Digital Transformation with specific focus on HMWSSB – by providing an integrated approach that not only takes advantages of current investments in Digitization but also integrates discreet technologies to achieve the collective organizational goals – through seamless Systems Integration and digital transformation management.

Key Words: Digital Transformation, ICT, Emerging Technologies, Approach, Water Utilities

1. Introduction

The evolution of Information and Communication Technologies (ICT) over the past few decades has been impacting the way in which businesses are being conducted and the manner in which the business processes are being redesigned. The combined effect of business process re-engineering and technology adoption has been multi-fold in the transformation of organizations.

While the impact of these transformations in the private sector is obvious and evident due the significant profit motive, the adoption of technologies for transformation in government which is primarily service centric needed a structural re-orientation. The evolution of information technology as a key enabler has gone through three major transitions and today it is moving towards Industry 4.0.

These transitions when mapped to the adoption of ICT in governance bring about transformation of governance form good governance to e-governance and to Smart Governance finally aligning to Industry 4.0. The manner in which technologies have been adopted in governance over the past five decades could be summarized as follows:

- Early phases of technology usage were focused on “**IT for Computerization**” – an inward-looking approach.
- Next phase of adoption looked into integration as adaptive and intelligent systems using “**ICT for e-Governance**” – **citizen or consumer centric approach**
- In the current context it is “**ICT with Emerging Technologies as Industry 4.0**” for building Smart Governance that has a

convergence of ICT with a wide range of technologies - Sensor based IoT centric, GIS, GPS based Real-time Systems, Mobile applications and Analytics – A holistic approach

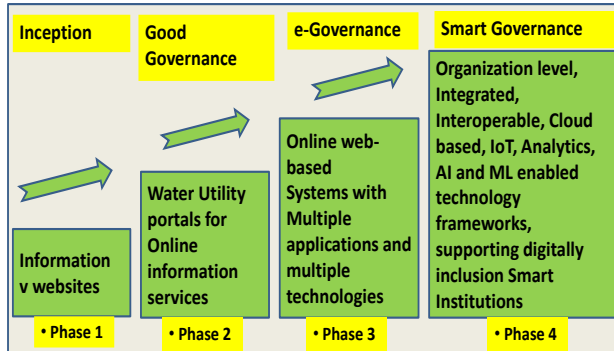


Fig 1: Adoption of ICT in Governance

Like any other governmental institutions, Water Utilities, which are predominantly government managed, have also gone through these transitions globally. Each at various levels of adoption from having simple billing applications to institution centric solutions. Water Utilities across the world are facing tremendous challenges in areas of water supply and water infrastructure maintenance. A significant percentage of water infrastructure the world over, is over a century old. Most of these need an immediate overhaul, demanding a huge capital investment.

There is also an imminent need to improve the efficiencies in the water supply - as sourcing, moving, treating, and disposing water calls for significant energy consumption. Over the last few decades, Information and Communication Technology has been a significant enabler in management of information and processes in Water Utilities. However, the technology push (disruptive technologies in the last decade), the information push (the need for real-time data analysis and insights) and the social push (an

increasingly mobile, tech savvy and information equipped customers) – have called for need for Digital Transformation to enable the Water Utilities to become operationally efficient, agile in customer engagement and develop & demonstrate Intelligence & Insights in transforming their business.

The need for Digital Transformation is because

- ICT synergizing with Emerging Technologies is transforming businesses and societies in a significant way. Water Utilities should take advantage of this and not be left behind.
- Water Utilities need to leap-frog to next generation institutions by learning from global experience and not suffer the pangs of evolution.
- Water Utilities need to gear-up and support the growth of the economy by providing smart urban water management.
- Water Utilities have to quickly move from e-Governance to Smart Governance using technology that impacts every walk of life.
- Absence of such a smart technology infrastructure would make Water Utilities non-competitive in their service context.
- Integrated view and participatory governance enable Water Utilities to cope to the increased pressures of urbanization and migration.

It is in this context that Digital Transformation becomes an enabler for Business transformation in bringing about efficiency in operations, improve customer engagement, increase revenues and capital efficiency.

2. What is Digital transformation?

Digital Transformation is the application of Digital Technologies to fundamentally impact all aspects of an organization's business, society and culture. Until recent times, businesses have adopted digitization – which was essentially conversion of data and processes. However, with advent of disruptive technological inventions and innovations in the last 10 to 15 years (2006 – 2020), the technological paradigm has changed. It has moved from Digitization to Digitalization. Digitalization embraces the ability of the digital technologies to collect data, establish trends to help businesses and organizations make better decisions.

The Digitalization process which enables such a paradigm shift is seen as the Digital Transformation. It is important to note that while transitions are happening in technology, there are solutions that are enabled at various points in time that serve the specific / limited purpose of organizations. This implies that organizations need to simultaneously manage to live with existing systems that are heading towards technology obsolescence and also with solutions that are new and adopting cutting edge technologies. The need to bring them all into a consistent state is one of the key guiding principles of Digital Transformation.

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technological paradigm has changed. It has moved from Digitization to Digitalization. Digitalization embraces the ability of the digital technologies to collect data, establish trends to help businesses and organizations make better decisions. The technologies that have changed this paradigm in the recent times are

- The Mobile revolution
- Cloud Services
- AI and Machine Learning with Digital Twins
- Cognitive Computing
- IoT (Internet of Things)
- Virtual Reality and Augmented reality
- Analytics and Big Data
- GIS mapping
- Block Chain and security
- 5G

In today's world, data is everywhere (ubiquitous) and, in many forms, (text, audio and video). It is also created, published, accessed and analyzed in real-time. The advances in electronics and communication technologies have fostered the above innovations in computing as well. We are living in an age of massive disruption and technology is the main driver for this disruption. It is important for organizations to understand how to take advantage of the technological innovations and improve business success. A Digital Transformation strategy will best help the organizations achieve this objective.

To achieve a smooth transition a multi-pronged approach is adopted by organizations which include:

- Retain and Retire
- Re-purchase

- Re-host and Re-platform
- Re-architect

In various studies conducted by Cognizant it has been observed that 15%-20% of applications in organizations have been retained or retired. 40% have been repurchased. 30% have been re-hosted and 5%-10% have been re-architected. It can be observed that the Digital transformation process essentially touches all the aspects of technology adoption from solution architecture to solution deployment. It is also important to observe that up to 15% - 20% of the solutions have been retained as relevant to the organizational needs thus protecting the investments already made and a similar quantum retired where the cost of maintaining obsolete technologies is significantly high resulting in resource drain.

The 6- Pillar Digital Transformation model provides insights into the various aspects that need consideration in embarking on such an initiative by organizations.

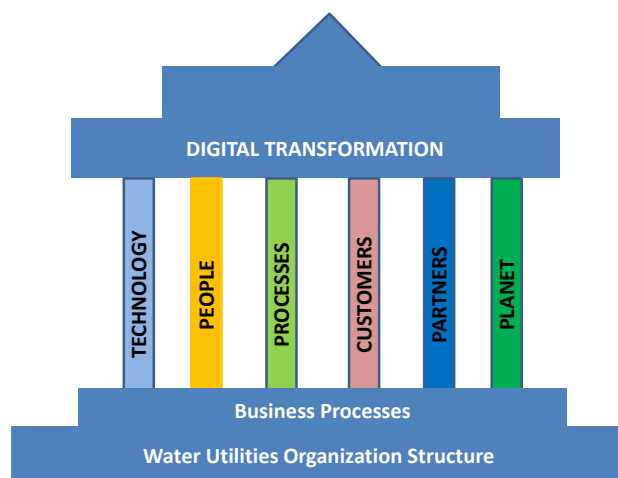


Fig 2: 6-Pillars of Digital Transformation

The 6-Pillar Digital Transformation model consists of not only the People, Process and

Technology – standard model - but also takes into account the elements of the ecosystem such as the customers, partners and last but not the least the Planet. Any strategy of Digital Transformation that does not look into the environmental sustainability would have long term impacts and setbacks.

Technology – This pillar is the principal driver. Adoption of appropriate technologies makes the availability of the system Ubiquitous. Technology that is disruptive and inclusive enables the institution to co-create, interact, collaborate, transact with all the stakeholders in the eco-system and at the same time bring in efficiencies across the organization. Identifying the appropriate technologies is the key enabler in Digital Transformation

People – All Digital Transformational initiatives are enabled or disabled by the way / manner in which “People” are adopted into the enablement process. The key element of Digital Transformation is in building the capacities of the People – Internal and External, orienting them towards the transformation processes, upskilling them and creating an inclusive context. Setting up of the Digital Transformation teams consisting of User departments, technology department, technology partners, experts, Domain specialists is a primary enabler.

Processes - Unless the organizational processes are aligned, optimized, re-designed and re-defined, Digital Transformation is of minimal consequence. This pillar is as significant as technology because it is the appropriateness of the process definition that ensures its realization through technology. The identification of redundancies in processes, unnecessary steps, loops, archaic procedures and removal of these

in the context of technology adoption plays a very significant role in ensuring a longstanding transformation. This Pillar re-defines the organizational structure and also the realignment of evolving business rules that govern the organization to business processes.

Consumers - Consumer needs are to be understood and incorporated into the transformational road map. The major requirements of the consumers such as grievance redressal, service quality, communication and engagement need to be brought into Digital Transformation. There is a need to appreciate and understand that it's the customer who is the reason for the organization to exist and hence any transformational initiatives need to take into consideration the role of the Customer and working towards meeting these requirements.

Partners – Digital transformation happens only through an eco-system of partners. These include Technology Solution providers, Technology Services and infrastructure providers, Training partners, Bankers, Telecom partners, Consulting partners and staffing partners. Bringing these partners together into an overarching Technology Management framework is one of the key aspects to be considered for the transformation. This pillar determines the delivery of the technology identified and defined based on the robustness of the technology partners engaged in the transformational activities. The partners need to be enabling solution architecting, solution integrations, adherence to standards and enforcement of compliance, external interfacing and deployment mechanisms along with capacity building.

Planet – Last but not the least it is important that the Digital Transformation looks into environmental sustainability and the need to bring technology that is environment friendly be it as IoT or in the adoption of ICT enabled Smart Water management systems. Considering “Planet” not as a mere resource but as a live eco-system that sustains the water resources is imperative. The principal of sustainable development of water resources dovetailed with the adoption of appropriate ICT is the key to the proposed transformations in Water Utilities.

3. How do we go about with Digital transformation?

The Digital Transformation goes through three major stages

Inception stage

This is the stage where a detailed road map is prepared and would look into all the 6 Pillars

Technology – What is appropriate mix for

- Retain and Retire
- Re-purchase
- Re-host and Re-platform
- Re-architect

People – What kind of Capacity building, staff up skilling, Digital Transformation organizational re-structuring to be done

Processes – Which are the critical processes that need to be refined, re-defined, optimised

Customers – What are the most important customer requirements that need to be addressed

Partners – Who are all the partners that need to be onboarded

Planet – What are the critical elements that need to be identified regarding sustainability in defining the transformational Road Map.

As a part of this stage the following are activities are initiated

- The entire set up activities are performed in 2 phases –
 - Pre-Partner On-boarding
 - Post-Partner On-boarding
- During this inception stage Program Office, Project Teams, Quality Processes, Training infrastructure, office seating space etc are enabled
- On-boarding of the partner is also done in the inception stage

Construction and Deployment Stage

In this stage realization of the road map on all the 6 dimensions is achieved.

- Partner and the Organization co-create the solutions
- Solutions would Go-Live and are deployed
- Capacities within the organization are built

Post Deployment Stage

Post deployment stage looks into the sustenance of the solutions, systems and also looks into future proofing and obsolescence management. By this time the impact of transformation is felt across the organization and the enabling ecosystem. Consequentially, the following outcomes are realised:

- Partners to enable the Organization to become self-reliant
- Maintenance processes for Business continuity enabled

The Digital Transformation Execution Model

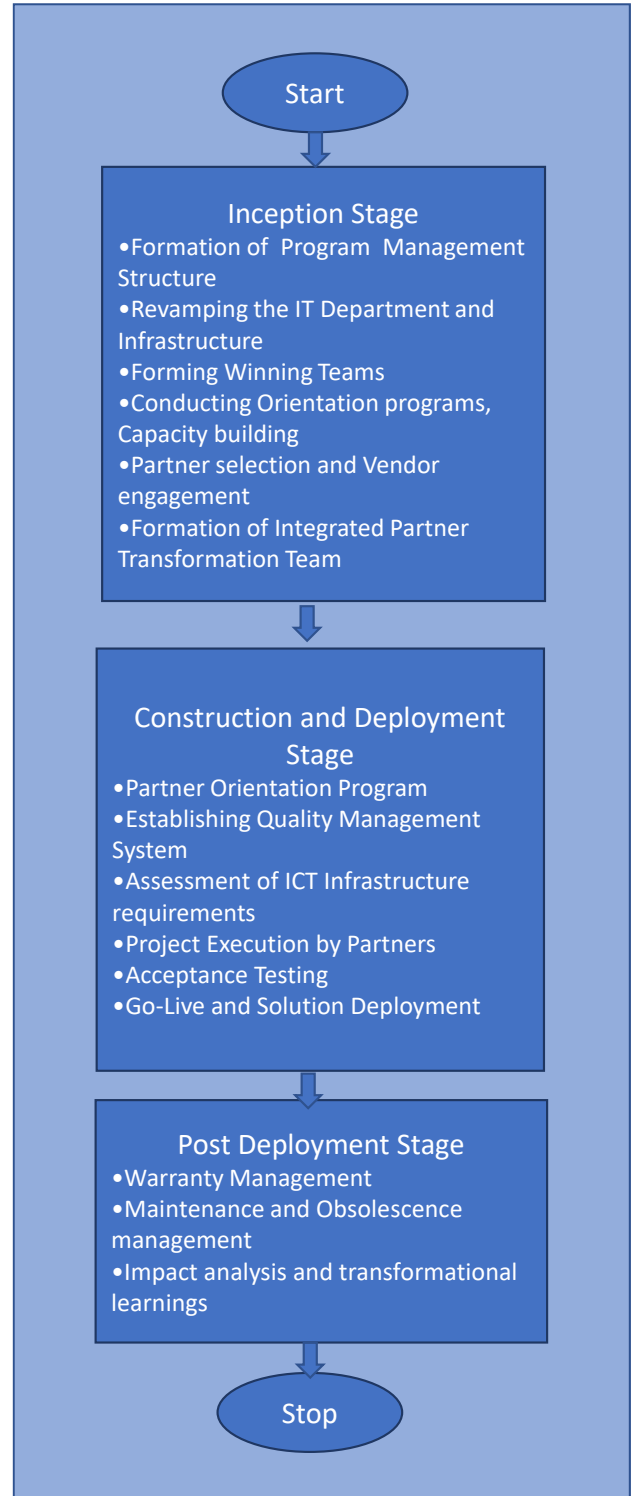


Fig 3: Digital Transformation Execution Model

4. Digital Transformation – A Case Study of HMWSSB

HMWSSB has embarked upon an IT journey over the last 2 decades. Many strides have been made in the areas of Revenue Billing, Collections, New connection management and O&M functions. Single Window Cell (SWC) and Metro Customer Care (MCC) have been the cornerstone of the HMWSSB's customer centric IT enabled applications which have helped the Board to deliver significant improvements in Water & Sewerage commitments to the public. IT enabled Revenue Billing & Collections are enabling the WB realizing the revenues with significant efficiencies. However, there is a felt need to improve efficiencies, and to become a Global leader solving critical problems of the 'business of supplying water & managing sewerage'. In order to achieve this, HMWSSB has initiated a Digital Transformation initiative with the following objectives:

- † Position HMWSSB as a "Global Leader" in adopting Information and Communication Technologies across the enterprise in providing world class services to its customers' delight and in building an innovative, agile, efficient and a learning organization
- † Assess its current "Digital Maturity" and provide the required strategy and a supportive IT Org structure that enables the envisioned organizational transformation
- † Make HMWSSB a technology driven organization that uses information, insights and predictive analytics as tools to bring in profitably, customer delight and organizational efficiencies

- † Provide the necessary strategic guidance to enable the development and deployment of appropriate technology solutions in all wings of the board to leapfrog to the next generation of institutions through innovation and quick / early technology adoption
- † Integrate the ICT systems which are developed / built on different technologies, supported by discrete set of business applications running in silos and managing Multi-Vendor Service Framework
- † Build capacities within HMWSSB to become self-reliant with Tech Savvy teams that drive the organizational efficiency, transparency and profitability

Approach by HMWSSB

The approach to Digital Transformation is a focused engagement which includes the following activities.

- Business (Departments) & IT Alignment – This activity begins with a review of the mission, vision, goals and strategy of the business, so that the organization can derive and deliver the business value from the IT initiatives.
- IT Current State Assessment – An assessment of the existing IT environment is done – including data centers (if any), networks, equipment, documentation and extent of use of IT. An assessment of the health of the current IT applications is also performed. This is done by conducting workshops, in-person interviews, ranking each major business process in terms of importance to the organization, etc. This

gives an indication concerning the systems – in terms of priority candidates for repair or upgrading. In this phase, aspects like use of outsourcing, outside IT service providers, state of IT management and best practices are also analyzed and benchmarked.

Business (Departments) & IT Alignment

The existing business organization of HMWSSB is organized in the form of Wings / Departments. The following table provides a comprehensive list of the departments.

Sl. No	Name of Department / Wing
1	Stores, Inventory & Procurement
2	Transmission
3	Design & Mapping
4	Projects
5	Finance & Accounting, Assets, Audit, Estate
6	Quality Control of works and projects
7	Water Quality Assurance and Testing
8	Sewage Treatment Plants
9	Personnel & Administration (P&A) – Legal & Vigilance
11	Customer Service and Grievance redressal
12	Revenue and Billing
13	Operations & Maintenance
14	Personnel and Administration (P&A) – Human Resources Management including payroll

Fig 4: Departments brought under Digital Transformation

One of the important objectives of the “Business and IT alignment” is to create an Information organization for HMWSSB which will meet the needs and objectives of the Functional organization. If this has to be accomplished, it is imperative for the Business departments to anchor the knowledge and ownership of the Business Processes in the organization. In order to draw parallels to

Functional Organization and Information Organization, the functional departments have been mapped to sub-systems of the Information system.

A comprehensive list of Business Processes that need to be enabled with IT have been identified. For every process, a team of Process Champions and Process Owners have been formed. The following approach has been adopted by the HMWSSB in order to document the new Business Processes, review the existing Business Processes.

- Formation of Process Champions for every Business Process / Department / Wing
- Formation of Process Owners for every Process – under the leadership of the Process Champion
- (Process Champions are typically the Heads of the Department or the experienced Functional Manager of the specific Process & Process Owners are the Functional Managers who execute the oversee the business processes).
- Conducting Workshop sessions with every group of Process Champions & Process Owners to arrive at the following
 - Business Processes in Each Department
 - Business Functions in every Process
 - User Stories pertaining to every function
 - Dashboard Requirements for every role and function

The above effort has resulted in arriving at the following Business Processes for HMWSSB – which are grouped according to sub-systems. These processes become a basis for assessing the Functional completeness of the IT Solution(s) enabling the business. The Process Champions who have enabled the above, will become the nodal team which will

anchor the assessment of functional completeness.

#	Department Name / Sub-System	# Business Processes	# Business Functions
1	Personnel and Administration		
	HRMS	19	100
	Vigilance	1	3
	Legal	6	186
	ACB Cases	7	10
	Dispensary	1	15
2	Finance and Accounting, Asset and Audit	7	458
3	Stores, Inventory & Procurement	6	33
4	Customer Service	4	43
5	O&M	10	156
6	Revenue and Billing	10	89
7	Water Quality Assurance and Testing	10	34
8	Projects	6	54
9	Quality Control	3	45
10	Transmission	5	72
11	Design & Mapping	7	165
12	STPs	5	50
	Grand Total	106	1510

Fig 4: Process Mapping in the Departments

HMWSSB is adopted the Digital Transformation Execution Model and is has executed the first step – Inception stage.

The Construction stage of the initiative is in progress and the proposed partner engagement is in the following manner:

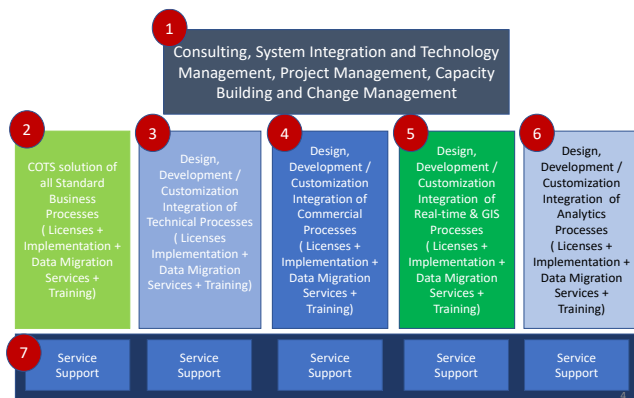


Fig 5: App Mapping in the Departments

Each of the solutions focusses on some of the critical aspects of the transformational initiative that cover the entire organization.

5. Conclusions

The Digital Transformation initiatives globally have been successful when they have adopted an **execution model** that encompasses the entire organizational requirements. It is imperative to understand the need to plan the transformation based on the “**6 Pillars**” of the Digital Transformation model. It is also observed that the **inclusion** of the experienced staff of the Water Utilities in defining the transformational goals and outcomes significantly enables its realization. Lastly the engagement of right technology **partners** plays a pivotal role in transformation of the organization.

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