



**Final 2026/2027
Integrated
Development Plan
(IDP) Review**

**Annexure F: ICT
Policies**

C 2779/03/2022
MC A/5716/03/2022

**9.A.7 [CC:CS]: APPROVAL OF THE INFORMATION COMMUNICATION
TECHNOLOGY (ICT) STRATEGY FOR MIDVAAL LOCAL MUNICIPALITY**

6/2/215

COMPETENCY: COUNCIL

PURPOSE

To approve the ICT strategy for Midvaal Local Municipality.

RECOMMENDATIONS

1. That the ICT Strategy for 2021-2026, be approved.
2. That Council Resolution C 2485/02/2021, be rescinded.

REPORT

The ICT Charter/Master System plan of Midvaal Local Municipality (C 2485/02/2021) was adopted by Council. Subsequent to a review of the ICT Charter/Master System plan document it is proposed that the document be rescinded and replaced by introducing ICT Strategy.

COMMENTS:

EXECUTIVE DIRECTOR: COMMUNITY SERVICES

Supported.

EXECUTIVE DIRECTOR: ENGINEERING SERVICES

Supported.

EXECUTIVE DIRECTOR: FINANCIAL SERVICES

Supported.

EXECUTIVE DIRECTOR: DEVELOPMENT & PLANNING

Supported.

**COMMENTS: MEETING OF THE MUNICIPAL MANAGER AND HEADS OF
DEPARTMENT: 22 FEBRUARY 2022**

Resolved to Recommend

That the Item be referred to the Section 80 Corporate Services Portfolio Committee.

**COMMENTS: SECTION 80 CORPORATE SERVICES PORTFOLIO COMMITTEE:
08 MARCH 2022**

The recommendations are supported.



**Enhancing service delivery through
innovative technologies**



ICT STRATEGY 2021-2026

Foreword by the IT Director

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I am grateful to present this ICT Strategy Document to the Midvaal Local Municipality (MLM) and community. It is a strategy we are hopeful will take us to a higher level of service delivery aptly supported by the Information technology deployed using best practices. We also are delighted that this Strategy will ensure that MLM will continue to maintain its high standards of service delivery. Under the concept of “cloud first”, which ensures that MLM benefits from already existing ICT cloud infrastructures internally and externally, we will deploy a structured approach in the monitoring of the quality of these Cloud Service offerings, which we have already started receiving in some business units. The strategy will ensure that the city is not left behind in embracing the paradigm of Smart Cities. Big cities around us and in other provinces have already put in place Smart City Concept strategies, which ensure efficient use of resources supported by smart technologies. This has space in our ICT Strategy. The ICT will also focus on addressing the highlighted limitations in the current services as documented in the Audit findings of the past cycle. We are also cognizant of the fact that strategies are not documents to gather dust, to this effect, we will put in a Performance Monitoring and Evaluation process with measurable indicators. After 3 years, we will report to MLM on the Performance of Strategy implementation and a further 2 years later, we will conduct an impact evaluation exercise.

In delivering this programme of technological change, it is important that we continue to adopt sound governance for oversight of the strategy and for ICT individual projects. A clear corporate and operational governance focus, ICT Steering Committee at the helm, will ensure that our Strategy objectives are met.

Finally, we must continue to invest in the development of our ICT support staff and ensure that our systems and services are appropriately configured to meet our needs.

S’phesihle Mnguni
IT-Director





Executive Summary

This strategy represents a significant change in how the Department uses and delivers ICT services, reflecting new opportunities presented by technologies such as cloud and changes in the ICT delivery landscape both within the public service and the wider environment.

This ICT Strategy sets in place the technology foundations needed to enable the business improvement transformation which the Municipality is committed to.

The development of this strategy is leveraged on the ICT Situational Analysis activities conducted in 2020 which saw the IT teams engaging and consulting widely across the Municipality. Issues raised in the Audit of the past cycle affected the choice of initiatives and objectives to drive the Strategy plan.

It must also be noted that the delivery of this ICT Strategy will fall under the overall control of the IT Director who is responsible for IT activity across the Municipality. Progress on the implementation of the strategy will be overseen by the Executive director Corporate Services and IT Steering Committee.

The ICT Strategic Plan is focused on pragmatic actions that we can take over the next five years. It will undergo a desktop review annually with a full review undertaken biannually. The Strategy Objectives are deliberately aligned to the MLM strategic themes (which are the corporate objectives). This will ensure that the strategy will address issues of business central to MLM

Furthermore, the Strategy looks critically at gaps within the ICT service offerings. An indication of the initiatives to address these gaps is provided. We have developed a Strategic plan with estimated timeframes for the delivery initiatives, hence fulfilling the Strategic objectives. A need to then measure the Strategy Implementation performance is stated.

The Strategy plan is a living document and will be implemented over a 5-year period, after which a revision is expected.

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1 ICT Strategy Background

The ICT Strategy is an approach to create an information technology capability for maximum, and sustainable value for an organization. The ICT Strategy is implemented using an ICT Strategic Plan which documents specific steps, deliverables, and timeline. The MLM ICT strategy will consider the organisation's broader vision and objectives as well and this will enable business to move forward with a clear technology roadmap.

1.1 Vision

The Strategy seeks to establish an IT Centre that will be renowned as being “the fountain of excellent ICT services to the internal staff and citizens” and also an integral component of Midvaal Municipality in its continuous delivery of an outstanding service to the community.

1.2 Achieving Our Vision

This vision will be delivered through a number of high-level objectives, which are then aligned to the initiatives:

- Consider the utilization of **Cloud facilities** as a first option in all future systems across the MLM.
- Develop engagement **programs** between the ICT Unit and its internal customers
- Use **a customer led approach** in Delivering Services.
- Ensure that **all Data** is properly warehoused, easily accessible and credible to support Business Services.
- Put in place robust **governance arrangements** to drive and oversee operations and implementation of interventions.
- Continue to build **best practice principles** to deliver a robust, secure and effective ICT service.
- Ensure that the MLM business systems **interoperate and eliminate** duplication.
- Ensure that MLM will continuously **uplift the skill** levels of the internal ICT Staff



- The ICT team will take advantage of improvements and **research innovations** in technology to support service delivery.

These objectives will be delivered through a programme of a number of initiatives which are set out in the strategy plan. Delivery of these initiatives will be aligned with the overall strategic objectives identified.

The Initiatives or programs delivery will require careful consideration of priorities and scheduling of resources. The strategy is an ICT strategy for the whole Municipality as such, its success will depend as much on the engagement of stakeholders and business units as it does on the role of the ICT Unit.

1.3 Alignment of MLM IDP Business Objectives with ICT Strategy

To align ICT strategy with MLM Strategic themes, hence MLM business objectives, every aspect of the ICT strategy should support the MLM business goals. In other words, all ICT systems, applications, processes, and budgets should agree with the overall MLM IDP (Integrated Development Plan) and its objectives.

Alignment is not the sole responsibility of the IT Department though. Various Business Leadership teams, in which IT resources reside, need to be aware of their responsibilities and links with the IT Department, something often neglected.

The Diagram below, Figure 1 illustrates the concept of alignment between MLM IDP strategic themes (see Table 1) and ICT Strategy objectives. The MLM Strategy objectives (themes) must align first with the ICT Strategic objectives. Then the MLM Principles will give guidance on how IT Governance will be implemented. The Municipal Initiatives will trigger the identification of the correct ICT initiatives (or projects), see Figure 2, below. At the end of the day, this integrated alignment will ensure that the overall MLM objectives are addressed.



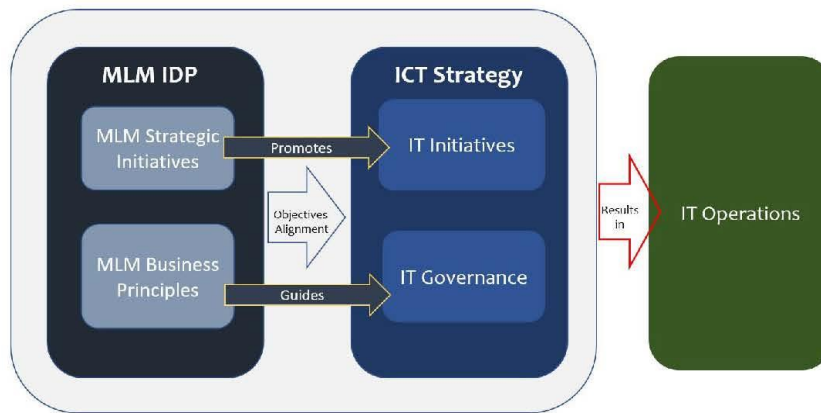


Figure 1 Conceptual View: Objectives Alignment

The key to an aligned ICT Strategy and MLML IDP business strategy is mutual leadership and accountability. IT must increase accountability for their results, but they must also hold the business accountable for IT.

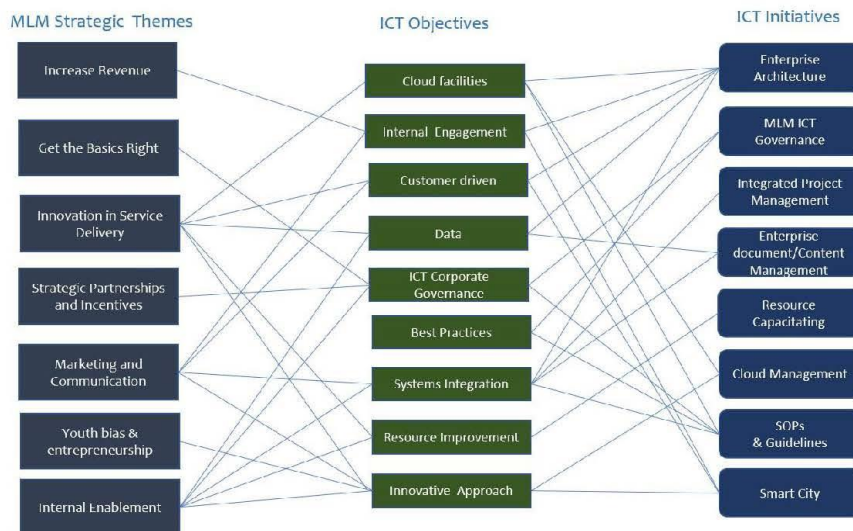


Figure 2: Detailed Strategy Alignment



Figure 2, shows a detailed alignment depiction Across MLM Strategic Themes, ICT Objectives and ICT Initiatives. The Relationships in some cases are many-to-many. Imply that a number of ICT Initiatives will fulfil the technological requirements of a number of the ICT Objectives. In turn, a number of ICT objectives will address the technological elements of an MLM Strategic Theme.

#	Strategic Theme	Description
1	Increase revenue	Increasing the revenue position of Midvaal Local Municipality to ensure its financial sustainability, provide improved services and enable growth
2	Get the basics right	Delivery of services through continuous improvement on our current processes and systems to ensure that we deliver on what is required of us
3	Innovation in service delivery	Innovating the way, we approach challenges and how we operate to enable us to do more with less
4	Strategic partnerships and incentives	Forming strategic alliances with commercial and non- commercial entities, improving inter- governmental relations and working together with the community to increase resources available to the municipality to create change
5	Marketing and communication	Improving communication with the community, other governmental departments, and internally within the municipal administration, whilst also elevating the perception of Midvaal within the broader economy
6	Youth bias & entrepreneurship	Aggressive creating an enabling environment for youth to thrive and to breed a culture of entrepreneurship
7	Internal enablement	Improving the municipality's ability to deliver on the 6 promises through by resolving challenges hampering its progress

Table 1: MLM Strategic Themes

1.4 Existing Environment

For the Strategy to succeed, there is a clear need of fitting it within the existing environment. This section provides a synopsis of the MLM ICT landscape. The definition of the existing environment is based on an analysis carried out on The IDP and Audit Reports, IDP Strategic Themes' alignment with ICT governance, All the ICT Systems across the Municipality, Existing Infrastructural documents, Standard Guides and Operational Procedures. The analysis was guided by:

- Defining the nature and scope of service delivery system problems
- Identification of the current strategies, be it from various business units and activities in place (through the analysis of the IDP)
- understanding the opinions and experiences of stakeholders
- defining a comprehensive view of the current situation of the organization



- detecting the gaps between the current state and desired state as stated in the MLM IDP
- Identification of the state of current improvement projects
- Analysis of the usage of the ICT guiding Frameworks like TOGAF and CobIT for building the Enterprise Architecture and ICT governance.
- Analysis of existing Partnerships internally and externally, and agreements in place.
- Defining the Corporate and Operational ICT governance processes

Furthermore, a critical analysis of the ICT and related business processes was viewed based on the Enterprise Architecture Togaf 9.2 Framework (Figure 3, below).

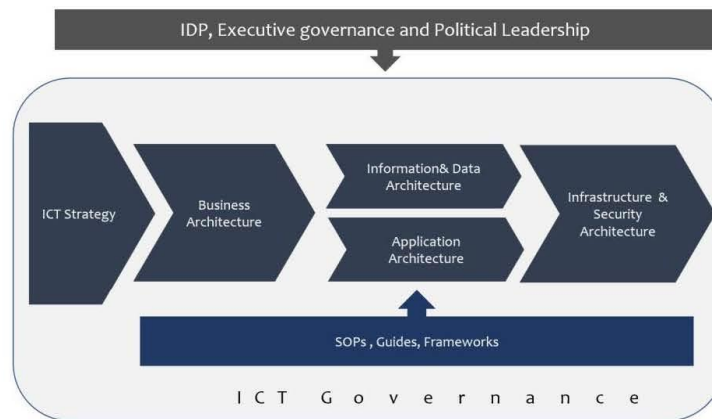


Figure 3: Enterprise Architecture Conceptual View

The EA template of analysing the environment categorized the landscape into:

- Business and Strategies
- Data and Information
- Business Applications/Software
- ICT Infrastructure
- Ops, Guides and Frameworks in use



1.4.1 IDP based environmental Analysis

The prime Strategic document, as required by the Municipal Systems Act No 32 of 2000 is the Integrated Development Plans (IDP). The IDP is a tool used by the Municipality to plan future development, guide and informs all planning, budgeting, management and decision. The IDP also contains the Municipal services delivery objectives.

Hence, Within the realm of this environmental analysis, The IDP is regarded as the main strategic document capturing service delivery objectives of MLM, is analysed against a backdrop of the adopted and recommend frameworks, legislations and Policy positions.

Item#	Analysis Criteria	comments	
1	IDP Executive Summary		
1.1	Does the IDP Summary provide an adequate summary of who the Midvaal Municipality is?	The Forewords, by both the Mayor and the Municipal Manager and the Introduction section of the IDP clearly articulates the Business programs, objectives, Key Challenges and Key Performance Areas	●
2	The King IV Code (practices under principle 12: IT Governance) recommends that the MLM governing body should:		
2.1	Assume responsibility by setting the direction for how the organization should approach and address information and technology (IT),	ICT Strategy for MLM is not in place, hence this initiative to put it in place.	●
2.2	Approve policy to give effect to the direction,	Strategic Policies on ICT are not in place. These will be developed per business unit once the ICT strategy has been finalized	●
	Delegate to management the responsibility to manage IT effectively	The IT department is located within the Corporate Services Cluster. Not much was evident in terms of MLM Corporate Management of ICT.	●



2.3	• Oversee the management of IT • IT risks are integrated into organization-wide risk management, • IT is used ethically and responsibly through an IT policy, • IT laws are complied with, • information management sustains and enhances the intellectual property protection of the organization, • an enabling and supportive IT architecture exists, • data protection, • information security law aspects are in place, • the risks pertaining to the sourcing of IT in IT contracts are managed, • the organization responds to disruptive technologies,	The Analysis revealed that • Some business Units were Running with their own ICT systems, either locally or in the cloud • The ONLY "visible" policy documents, though outdated were those relating to the systems under the custodianship of the IT Department • Data/Information Management is not strategically addressed • The Municipal IT Infrastructure strategy is not in place • It is also not evident as to how the municipal as a whole is responding to disruptive technologies. It must be stated though; that some Business Units have already started enjoying the use of Cloud Computing Technology.	
2.4	Consider receiving periodic independent assurances on the organization's IT arrangements, including outsourced services,	There is no regular and independent assessment of outsourced services	
2.5	Disclose the governance and management of IT by the organization, including disclosing an overview, focus areas, actions taken and plans.	Continuous monitoring and reporting are not evident. However, the IDP and Internal audits have highlighted gaps within ICT.	



1.4.2 Internal and Auditor General Audit Analysis

Another source of service delivery performance Management is Audit processes. An analysis of Audits carried out provided important insight into the gaps within the ICT environment and help shape out the ICT Strategy and intended initiatives to re-dress the situation and audit findings.

Item#	Gap Analysis Phase	Audit finding	Analysis of Redress	
1.0	IDP KPA1. Good Governance & Public Participation	Internal communication: It is reported that “internal communication is limited due to the internal operating structure, which supports a ‘silo’ way of working. There is limited flow of information between Departments, which results in a high level of inefficiency in multi-department projects, especially when multiple sign-offs are required”.	Systems are not integrated as affirmed during the environmental Analysis. No integrative programs at all levels of the Enterprise Architecture domain are in place.	●
		External Communication: It was cited that there was ineffectiveness in the use of a variety of communication channels in order to reach target communities. These are a result of a poorly integrated communication system within the municipality.	There is no program at present from an ICT perspective to address this gap.	●
2.0	IDP KPA 4:	Lack of capacity and skills	Outsourcing of Services is alleviating this problem	●



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	Institutional Transformation	Outdated internal technology and systems	In some instances, Business Units are using outsourced cloud services where technologies are far much better.	
		Inefficient internal processes for decision making, building plans, communications	No plan in place from the context of ICT	
3.0	IDP KPA 6: Physical Infrastructure & Energy Efficiency	Limited financing for infrastructure build	No ICT integrated future Plan is in place	
		Limited-service delivery enabling infrastructure in certain areas of the municipality	From a Context, this is not being addressed	
		Limited long-term planning with respect to infrastructure	No plan is in place	
AUDITOR GENERAL ANALYSIS -Final Management Report (2019)				
4.0	Information Technology Governance	The information technology (IT) master system plan was outdated.	The Master Plan has not been updated yet	
		There were also no formally documented processes relating to return on investment (ROI) and benefit realization (BR) in terms of IT spending.	No ROI determination documents	
		While IT risks formed part of the Municipality's operational risk register and was reported on collectively, strategic IT risk discussions were not taking place consistently during every Ethics and Risk Management Committee (RMC) meeting	Besides the IT Steering committee constituted at an operational level, this has not been fully addressed.	



		IT training could not be confirmed to have been taking place for IT personnel.	IT training programs are not well planned for. There are indications of Training plans being developed.	●
		Outdated information technology (IT) master system plan.	It was noted that the IT MSP contained outdated IT environment information	●
			The Alignment Exercise between IT plans and MLM Strategy is not taking place.	●
		Information technology risks not presented at the ethics and risk committee	There no Risk register management processes	●
		information technology system controls within Financial Systems	Real-time Logs of systems are not systematically provided. Although Some Periodic logs are being provided.	●
5.0	Information technology systems	IT controls pertaining to security management, service continuity, user access management and change control were not effectively implemented	Notable and documented controls are in place for those systems in care of IT Department. But there is lack of clarity on those systems controlled by other Business Units and also those controlled by Service providers (besides the commitments mentioned in Service Level Agreements).	●
		Access and Password a configuration setting on the network, and security log reviews on business systems were not effectively implemented	There are outdated SOPs in place on the IT department side.	●
		Administrator and external vendor, access and activity	The is no policy on Vendor Access Management.	●



	monitoring was not performed for all business systems	Individually, Business Units are following what SLAs contain.	
	System Security	MLM is busy working a new VPN Security program as the contract for the previous one came to an end in June 2021.	●
		Generally, across all Systems, The System security operations are not clearly defined. Updates, Configurations, Administrator logs are some of the outstanding issues	●
change management	The Program Change Management Policy did not address requirements for 3E, amongst other application systems used at the Municipality.	There is no Change Management process in place to support new and Upgraded systems	●
	Lack of formally documented processes relating to skills gap analysis of IT staff to identify training needs for the IT department	This has to be part of a comprehensive change management strategy. It is not in place	●

1.4.3 Analysis of System Documentation

Part of the ICT Strategy environmental analysis was to look at the existing documentation relating to the Business Processes, Software, Hardware and General Infrastructure.

The picture paints a clear lack of documentation. This documentation is key to all operational sustenance, systems integrations and improvement of programs. Hence it is imperative that all MLM systems and IT assets are well documented.



	Documentation													
	Business Strategies	Budget Documentation	Performance	Business Functional Blueprints	Organograms (indicating ICT In Business Units)	Systems & ICT Policy documents	SOPS	Data Warehousing	Software/Application Specifications	Hosting Environments	Ownership & Custodianship	Licensing	Manuals	Training Programs
IDP development	●	●	●											
Business Processes				●	●	●	●							
Application & Software Management						●	●	●	●		●	●	●	●
Data Modelling							●	●	●	●		●	●	●
Hardware Management						●	●		●	●	●	●	●	●
Governance					●	●	●				●			

●	50% and above	●	20-49%	●	Below 20%
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1.4.4 ICT Governance

ICT Governance is made up of corporate governance and Operational Governance. Operational Governance is supposedly administered through the IT Department. The Department itself is located within the Corporate Services Cluster. The Mandate of the Department is derived from the IDP. The operational guidance of the Department comes from the IT Steering Committee. On the Hand, ICT Corporate Governance is under the custodianship of the Head of Department Corporate Services.

An environmental investigative analysis showed the following:

- There is no ICT Strategy in place, which should have been the Link between the IDP/Enterprise Governance and ICT Operations across the Municipality, hence this initiative.
- The IT Steering Committee Operations are pegged at the levels needed. The Committee is the body that would have been continuously checking on the operational efficiencies of ICT services Across the Municipality. A Clear term of reference of Steering Committee and ICT performance monitoring framework/guide is a necessity.
- There are no records to indicate the ICT Corporate governance activities from the Senior Management/Executive. It is not clear how the ICT challenges mentioned in the IDP are then addressed at both Corporate Governance and Operational Governance Levels. The Same applies to addressing Audit findings.

1.4.5 Cloud Systems Management

It is evident that MLM has embraced cloud computing services across most important business operations. MLM uses the Service Level Agreement (SLA) tool as a governance platform between mostly external service providers and MLM. Below are the summary details of the SLAs that were analysed



Number Systems	of	Hosting Location	Service Monitoring			
			SLA	MLM Monitoring Plans	None	
11		Cloud (offsite)	MLM			
		11 systems	11	0		4

Across all the systems hosted in the cloud, services offered include:

Storage Management, which would include

- VMWare (i.e., offering of virtualisation of server environment) Services
- Security Management

In summary, the overall agreements with external cloud service providers revealed the following:

- The assumption is that MLM has a control room of remotely monitoring the VMWare environment or at least is receiving the log files and Event files continuously.
- Secondly, Cloud Service Providers leave the maintenance of the VMWare environment in the hands of MLM.
- The Last assumption is that MLM has the skills set to perform the above maintenance and monitoring activities.
- Most Service providers support Service is limited to 12 hours per months which could only be carried over for 3 Months
- It is assumed that MLM has in place a Change Management program.
- MLM assumes all responsibility for Network connectivity, performance and configuration issues
- Data lost in connection service is the responsibility of MLM
- MLM must assume all responsibility for Data Back-Up and Recovery
- The SLA arrangements provide MLM with administrative rights in terms of management of data. However, within MLM, there are no Municipal plans to monitor this service.



- Cloud Services Schedules indicated that:
 - After hour Administration is not available. This implies that overnight issues will be attended to the following morning. But the other caveat to this is the fact that, should problems be raised by MLM, then the service provider has at least 5 days to respond to them.
 - The Storage Support is limited to 6 hours per month, this is a major risk, as the contract carried forward hours are valid for 3 Months ONLY.

1.4.6 Standard Operating Procedures and Policies

Key to ICT business operations is the Standard Operating Procedures (SOPs) to ensure uniformity and uncertainty to users and ICT policies. Table 2, provides an analysis of the status of SOPs and ICT Policies.

Item	Analysed	SOP Alignment with Policy	# Meeting Standards	Implementation Tools
Policy	5	n/a	5	0
SOP	25	0	2/25	0

Table 2: SOPs and Policies Analysis

This detailed environmental analysis revealed the following:

- Most of the SOPs developed qualify as guides to software use. They indicate steps undertaken in operating software for a particular task.
- SOPs must be informed by policy or frameworks. In this instance, that alignment did not exist.
- The biggest challenge with MLM is the availability of system records. If SOPs are developed on a standard Document Management tool across MLM, it would mean all staff will easily have access.
- Most of the Business Units don't have technical documents relating to the Systems within their custodianships. This can be attributed to the fact that they did not have dedicated resources



to conduct technical administration of the tools. In some scenarios e.g. On Solar, the responsibility to administer the software was shared between Finance and IT Department. There was no formal governance structure on that arrangement, and this also is risky in that certain responsibilities will fall off unnoticed.

- The Various systems show lack of integration, an issue highlighted in the audits.
- No data schemas were identified as defined in the ICT policies or Technical Frameworks. This going forward will provide a challenge to MLM as the management of data is key to the success of all systems. MLM invests about 80% of its ICT resources in Data Acquisition and Storage Facilities.

1.5 Infrastructure Analysis

The infrastructure environments analysis focused on the Operating Systems, Hosting environments and Connectivity. The IT Department did well in properly archiving most of the Infrastructural documents.

The connectivity infrastructure as shown in Figure 4 below indicated a combination of Fibre, ADSL and Radio Link.



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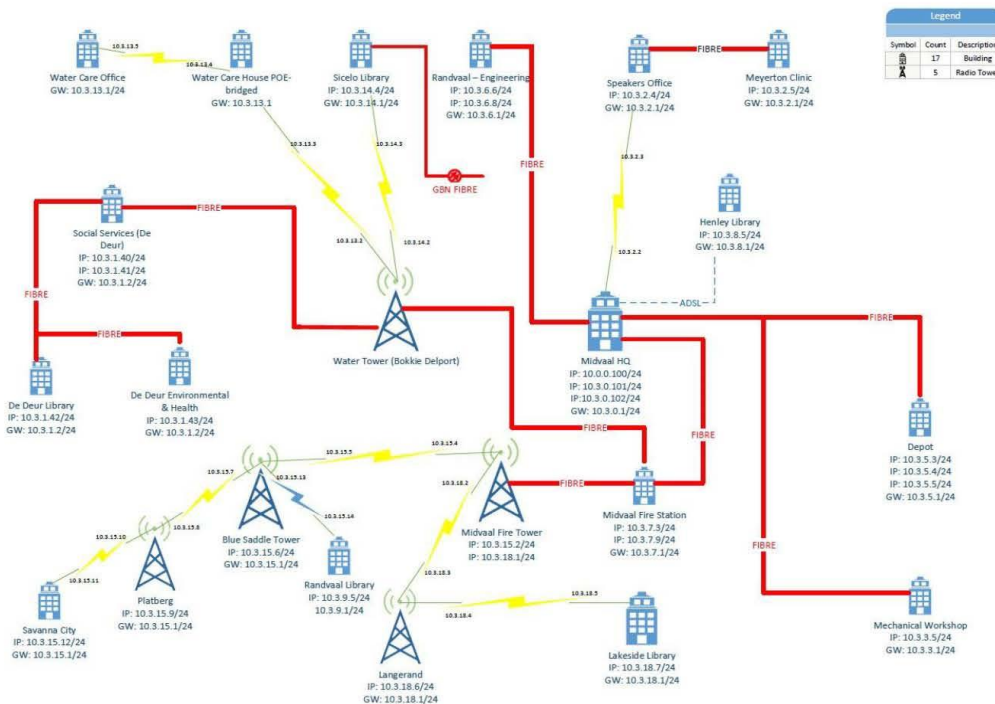


Figure 4: MLM Network Infrastructure

The Breakdown of the Wide Area Network for MLM can be summarized as:

- Fibre optic links to De Deur, Randvaal Engineering, Fire, Depots and Mechanical Workshop (marked with a red connection line);
- Radio links to Lakeside Library, Randvaal Library, Savanna City, Water care, Siculo Library and Speakers Office (marked with a yellow line);
- Telkom ADSL line to Henley-on-Klip library.

Performance Management of the connectivity is administered by the IT Department through:

- The uptime of these links is measured on by doing a ping to establish whether there is communication to each of the satellite offices daily basis
- In the background, a software program named “the Dude” also monitors the network.



MIDVAAL LOCAL MUNICIPALITY

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Application system name	System Resides at:	System Description	System Owner
SOLAR	<i>Physical locations:</i> Midvaal LM	Financial Management System	BCX (Annual License Renewal)
Payday	<i>Physical locations:</i> Midvaal LM Server	Payroll and HRM	PAYDAY (Annual License Renewal)
ABSA Business Integrator	<i>Hosted by Service Provider</i>	Banking Platform	ABSA
Eclipse Enterprise Edition (3E)	<i>Hosted by Service Provider</i>	Finance (Prepaid Water and Electricity)	Ontec
Quidity Records Management	<i>Physical locations:</i> Midvaal LM	Records management System	Sedibeng District Municipality
ManageEngine ServiceDesk	<i>Physical locations:</i> Midvaal LM Server	IT Service Desk Application	Midvaal LM (Annual License Renewal)
CP3	Hosted by Service Provider	Project Management	Novus3
Hosted Contact Centre and MyMidvaal App	Hosted by Service Provider	Call Centre and App	Vodacom
Cash Drawer	<i>Physical locations:</i> Midvaal LM	Cash Receipting system	Midvaal LM (Annual License Renewal)
CaseWare	Hosted by Service Provider	Financial reporting (AFS)	Midvaal LM (Annual License Renewal)
ManageEngine AD Manager, Self-service, Audit Plus, Password Manager	<i>Physical locations:</i> Midvaal LM	IT Service Management Application Suite	Midvaal LM (Annual License Renewal)
TCMS	<i>Physical locations:</i> Midvaal LM	Traffic fines revenue	Total Computer Services
IMQS	Hosted by Service Provider	Engineering Infrastructure Asset Management Software	IQMS
CitySolve	Hosted by Service Provider	Town Planning and Building Control Application	i@ Consulting
Microsoft 365 E3	Hosted by Service Provider	Emails	Midvaal LM (Annual License Renewal)
VOIP Telephone System	<i>Physical locations:</i> Midvaal LM	Telephone system	VOX Telecoms
Solarwinds Network Monitoring	<i>Physical locations:</i> Midvaal LM	Network Traffic Monitoring	Midvaal LM (Annual License Renewal)
Fortigate Firewall	<i>Physical locations:</i> Midvaal LM	Cyber and Network Security Appliance	Midvaal LM (Annual License Renewal)

Table 3: Server Infrastructure



Data and Systems Backups are essential to business Continuity. MLM has designed its backup processes as:

- Scheduled daily backups
- Month-end backups
- Disk to Disk Back up
- Daily replications of Core systems

The analysis can be summarised as:

- The WAN Connectivity architectural diagrams are deemed old
- Realtime Monitoring of Infrastructure is not in place, although the “Dude” Software was not clearly explained, we would assume it not effectively providing this function. Realtime SMS's and email alerts would have been received.
- Server Infrastructure is monitored mainly Through a service Provider. It is not clear how this operation is being supervised.
- The servers are running mainly on different versions of the same operating system. This can be attributed to the fact that they are hosted on different hardware platforms and managed differently.
- Most Data updates and maintenance are carried out by a Service Provider. The role of MLM in this regard is not very clear.
- No clear processes are put in place to test the Backups, hence providing a performance measure to the exercise.
- Disaster Recovery is essential for MLM to be recovered in case of natural and unforeseen disaster having occurred. No Disaster recovery plans are in place.



2 ICT Strategy Architecture

The development of the strategy includes developing a value proposition and decomposing the high-level strategic direction into four Strategic perspectives. The perspectives are those focus areas on which the organization must excel in order to fulfil its mission and achieve its vision.

These Strategic Perspectives are: Financial, Customer/Stakeholder, Internal Process and Learning and Growth (or Organizational Capacity). The perspectives work together in a series of cause and effect (or drivers and results), creating value from the internal to the external. When combined, the Strategic Perspectives frame and define an integrated strategy.

2.1.1 Customer Value Proposition

As part of IT service offerings, the Team will provide a two-week time period through which it will make constant monitoring and seeking satisfaction from internal staff and external citizens to ALL technological requests/or issues attended to. This will help in building confidence in the support services offered by the IT Team.

2.1.2 The Strategy Map

Key to the Strategy development is the Strategy Map. It is a simple graphic that shows a logical, cause-and-effect connection between strategic objectives.

Strategy mapping can vastly improve strategy communication effort. Most people are visual learners and so a picture of the strategy will be understood by many more staff members than a written narrative.

A balanced way of developing an ICT Strategy looks at the Municipality organization from four



different perspectives to measure its health. Each of these perspectives focuses on a different side of MLM, creating a balanced view of the organization.

The five distinct perspectives, aligned to the MLM ICT Strategy Mapping are:

Financial Perspective: How do ICT Services add value to the MLM? Just because we're taking a balanced look at the organization doesn't mean that we want to ignore traditional financial measures. Quite the contrary, the financial perspective is a major focus of delivering on the ICT strategy. Return on ICT investment will also be measured



Customer Perspective: How do we know that MLM customers (internal or external) are delighted? The customer perspective focuses on the people who are actually recipients of MLM ICT products and services. How are the customers kept happy? Customer satisfaction is a great forward-looking indicator of success.

Process Perspective: Are MLM ICT processes and Support services performing at levels sufficient to meet customer expectations? The internal business processes perspective looks at how smoothly MLM ICT business is running. Efficiency is important here. It's all about reducing waste, speeding things up, and doing more with less. Are there unneeded obstacles standing between new ideas and execution? How quickly can MLM adapt to changing business conditions?

The learning and growth perspective: looks at your overall corporate culture. Are staff aware of the latest industry trends? Is it easy for staff to collaborate and share knowledge, or is the Municipality a mess of tangled bureaucracy? Does everyone have access to training and continuing education opportunities?

Technology also plays a major role in learning and growth. Are people able to use the latest devices and software, or are MLM archaic systems stuck running yesterday's tech? What is IT Department doing to make sure the Municipality is staying ahead with technological changes? Are process improvement, technology and organizational infrastructure issues being addressed to implement a sustainable improvement program?

The map below (Figure 5) indicates how MLM ICT business organize their strategic objectives across the four perspectives of the balanced scorecard. Arrows are used to illustrate the cause-and-effect relationship between the objectives. By following the path of the arrows, you can see how the objectives in the lower perspectives drive the success of the higher ones. These causal relationships are central to the idea of strategic planning and management with a balanced scorecard. If you



Improve Knowledge and Skills and Improve Tools and Technology (in the Organizational Capacity perspective), you will more easily Increase Process Efficiency and Lower Cycle Time (in the Internal Process Perspective). If you do those things, you will more easily Lower Wait Time, and so on.

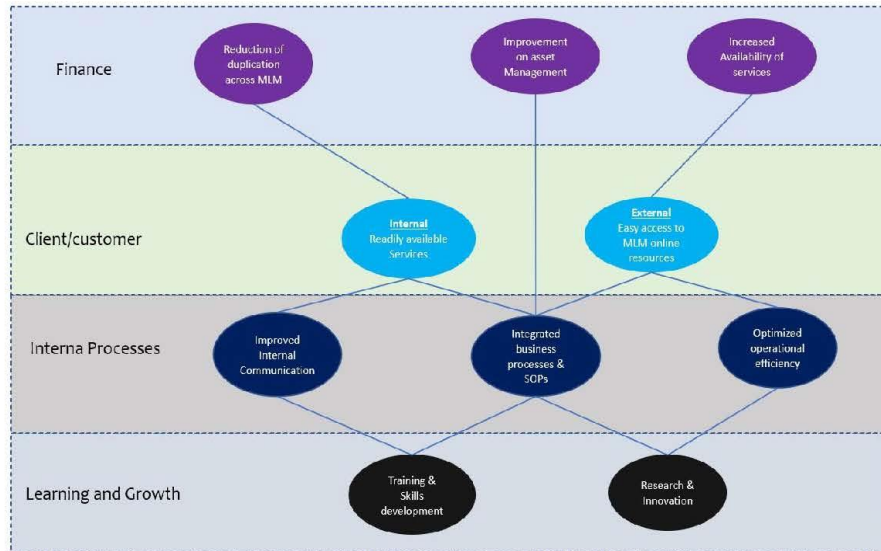


Figure 5: Strategy Map

With a well-designed strategy map, every staff member can know your overall strategy and where they fit in. It helps keep everyone on the same page, and it allows people to see how their jobs affect the MLM's ICT strategic objectives. With proper performance management tools, the strategy map will also show how the MLM is performing at a glance. Each bubble is automatically coloured red, yellow, or green based on your actual measures and the goals you set for them.

The Strategy Mapping benefits MLM in the following ways:

Integration: A Strategy Map will help keep Business Units and MLM aligned on the big picture strategy, goals, and the steps taken to achieve them. The simplicity of a Strategy Map means that MLM can quickly review it to remind the Stakeholders of the top priorities.



Organization: One of the major benefits of creating a strategy map is that it gives an opportunity to organize different perspectives, duties, and goals into a single easily interpreted visualization of ICT strategy. Oftentimes, these goals remain unstated or informal; by putting them in a strategy map, MLM is forced to clarify them and lay out ways to accomplish them.

Communication: With ICT Strategy goals and objectives established, a strategy map also services the critical function of communicating these goals to various stakeholders and team members. This will make sure everyone understands what MLM will be trying to accomplish.

Mission-alignment: Finally, a strategy map is a helpful tool for ensuring stakeholders and business units understand how their own goals and objectives align with overall ICT strategy goals and objectives. For business unit to stay committed, they need to be able to draw a specific connection between their efforts and overall MLM ICT efforts. Strategy maps help accomplish this.

2.1.3 The Business Priorities

Prior to implementing the ICT Strategy plan and moving forward with action steps, it is critical that priority areas and goals support the vision. It is also critical that each business Unit and individual understands which goals and tactics they are accountable to deliver on. Furthermore, it is important that they are aware of project expectations and understand what success looks like.

The Environmental analysis coupled with Stakeholder Engagements, IDP analysis and Audit analysis revealed the crucial gaps in ICT Governance and Operations. It is important to focus the organization on the execution of the most prioritized strategic projects versus creating a long list of potential actions and projects. Without this disciplined focus, organizations struggle to execute their strategy. The Prioritized areas are:

- ICT Governance
- Cloud Management
- Managing Systems Architectural documents across the entire MLM



- Developing Standard Operating procedures for directing use of ICT resources
- Coordinated Management of ICT projects
- Ensuring System Integration through creation of Enterprise Architecture

3 ICT Strategy Implementation Plan

The prioritized initiatives will be delivered through a well-coordinated ICT strategy implementation plan. Figure 6, provides a generic view of the implementation plan. Detailed planning, resource allocations and time scheduling will still need to be carried per each initiative during implementation. The success of the ICT strategy within the 5-year cycle is hinged on the successful implementation of these prioritized areas.

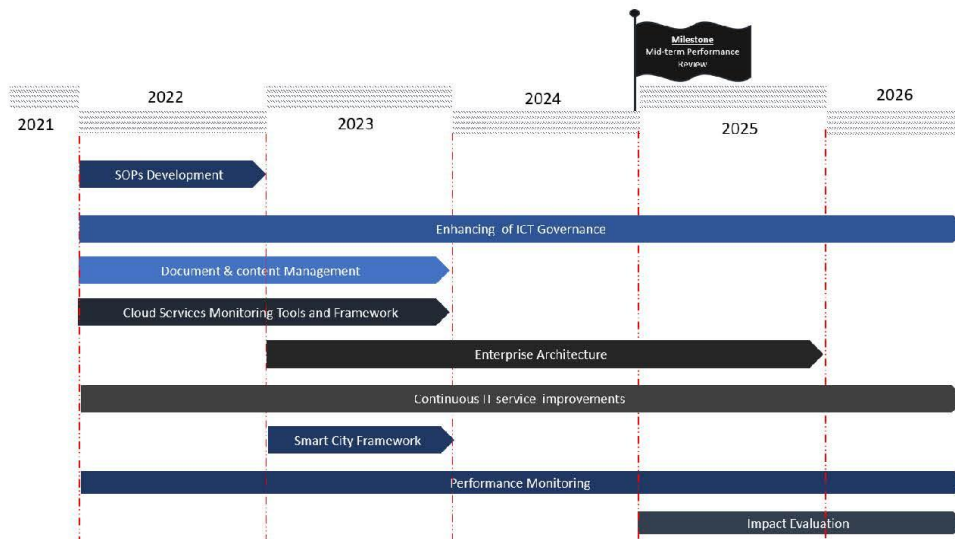


Figure 6: Strategy Implementation Plan

Below, each initiative identified is further elaborated upon in the context of MLM:



3.1 Initiative: MLM ICT Governance

Because of the holistic nature of ICT, and how it affects every aspect of Municipality business, Organizations like SALGA (in the A Municipal Guide / Roadmap to Successful ICT Governance Report), Recommend the Municipal Manager as the Strategic Executive of ICT, and the ICT Business Unit being treated at the same level with Internal Audit and PMU (See diagram below).

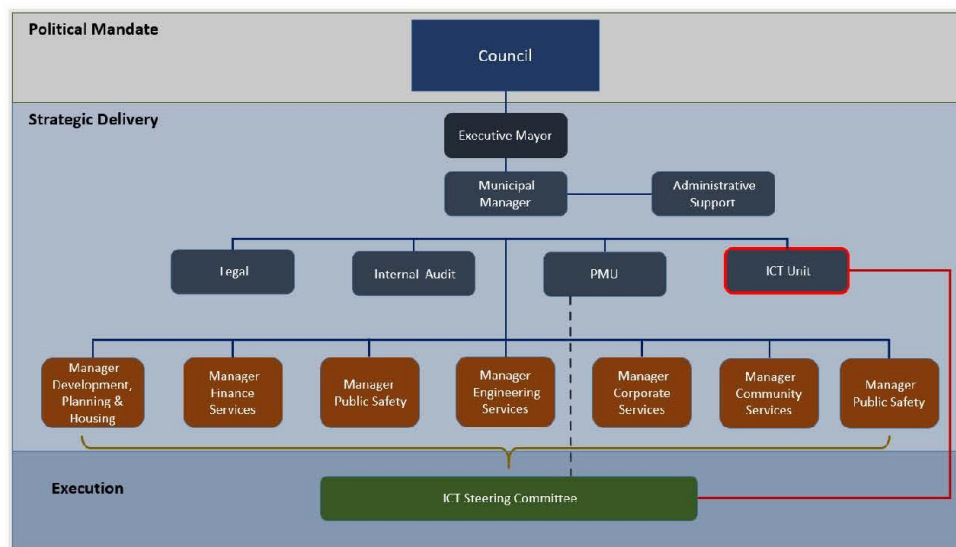


Figure 7: ICT Governance

The main issue that is clear and at the centre of ICT challenges, is the fuzziness of ICT governance within MLM. As already brought to the fore, we have Business Units implementing major systems



within MLM in 'Silos'. We have service providers running with major systems in the cloud, almost unmonitored.

There are two levels of Governance that need addressing for MLM:

- IT Corporate Governance
- IT (Operational) Governance

ICT Corporate Governance: The corporate governance of ICT is a subset of corporate governance and is an integral part of the governance system:

- The Executive Authority provides political leadership;
- The Accounting Officer provides strategic leadership; and
- Executive Management is responsible to ensure that the governance of ICT is implemented and managed.
 - ICT Corporate describes how the institution is directed and controlled and is in particular concerned with:
 - Organization: the organizational structures and coordinating mechanisms (such as steering forums) established within the institution and in partnership with external bodies;
 - Management: the individual roles and responsibilities established to manage business change and operational services; and
 - Policies: the frameworks established for making decisions and the context and constraints within which decisions are taken.

IT (Operational) Governance: It can be defined as the effective and efficient management of IT resources to facilitate the achievement of the Municipalities' strategic objectives. Furthermore, it:

- Provides the structure that links ICT processes, ICT resources and information to enterprise strategies and objectives;



- Enables the integration and institutionalization of best practices of planning and organizing, acquiring and implementing, delivering and supporting, and monitoring and evaluating ICT performance to ensure that the enterprise's information and related technology support its business objectives;
- Allows the enterprise to take full advantage of its information; and
- Identifies control weaknesses and assures the efficient and effective implementation of measurable improvements.

The Implementation of ICT Governance within MLM is recommended to be carried out in Phases. The following considerations will need to be taken into account whilst Building ICT governance:

- Defining appropriate organizational structures
- Integrating ICT Corporate Governance with Enterprise Governance
- Ensuring accountability for ICT throughout the enterprise
- Drafting and clearly communicating policies, standards and processes for ICT governance and control
- Effecting cultural change (commitment at all levels in the enterprise—from the executive office to the 'shop floor')
- Driving a process and culture of continuous improvement
- Creating optimum monitoring and reporting structures

3.2 Initiative: Enterprise Architecture

Municipal Systems Integration will be achieved once there is a blueprint on how to do so. This is made possible by the development of the Enterprise Architecture (EA). The EA is a logical organization of a business and its supporting data, applications, and IT infrastructure, with clearly defined goals and objectives for the future success of the business. A typical architecture consists of diagrams, or models, that show how aspects of the Municipality business relate.



Businesses should have an "as-is" architecture that represents its current state, and a planned architecture to show the direction of the business over the next one to five years.

Enterprise architecture aligns the following key areas:

- Business: Processes, strategies, organization charts, and functions
- Information: Conceptual, logical and physical data models to show what information is needed and how it relates to other information, for example, a customer and an order
- Application: Portfolios, interfaces, and services
- Infrastructure: Network concept diagrams, technology reference models
- Security: Provides a holistic security architecture or blueprint on all municipal systems
- Disaster Recovery framework: With Cloud and traditional Systems as part of the mix, the EA must consider how disaster management is to be implemented

The following industry standard frameworks can help the Municipality create an enterprise architecture:

- Togaf
- Zachman
- EA3
- DoDAF

Using a standard framework gives the architecture a "skeleton" from which building will rise from. A framework also provides guidance on what information you need to capture based on the stakeholders who will use the architecture. It provides guidance on organizing information but does not suggest a specific implementation for the architecture.



3.3 Initiative: Project Management Unit

The Project Management Unit (PMU) must be all inclusive, so that it coordinates all ICT projects and programs running across the city. This will also ensure integration of services. The PMU core responsibility is to set standards for how projects implemented, monitor their progress and ensure that the documentation is warehoused within the Document Management System.

The Project standards could include mandatory project templates but also rules on how projects must be carried out. For example, what lines of approval must be followed, which project stakeholders should be included and other rules.

The Table Below summarizes how this initiative would be carried out:

Phases	Activities
Phase 1: Assessment and Strategy The first goal of this activity is to assess the current status of project management and the current project portfolio within the organization. This assessment is followed by the development of a desired future state and a gap analysis between the current and future states.	• Assessment: The goal of this activity is to find the issues, gaps, challenges and key decisions to be made. • Current Project Portfolio: This includes carrying out a review of any existing project-based structures and a high-level assessment of the current portfolio of projects. • Organizational Culture: This should cover how projects are done today, the perception of project management, and what things are valued. Establish what existing project management methodology and governance reporting are in place. In addition, name the stakeholders who will be a key for the PMU project success. • Desired Future State: Outline a desired future state for Project Management based on the assessment findings. • Gap Analysis: Perform a gap analysis between the desired future state and the current state. This analysis will form the basis of the initial PMU Strategy and an Outline Business Case.



Phase 2: Project Initiation	• Business Case and PMU Charter: As part of this phase, a Business Case for the PMU will be completed as well as a Charter for the PMU. The aim of the PMU Charter is to outline what is in scope for the PMU and what services it will initially offer. • PMU Services: A successful PMU will offer a range of services that business units can rely on time after time. From the outset, the capability to deliver and support such services will not be in place. • PMU Roadmap: Services have to be introduced gradually and the PMU roadmap should clearly highlight this, explaining when certain key deliverables will be achieved. The PMU Roadmap will be ready with input from all stakeholders. The roadmap will include the rollout scope document that describes the goals, approach, risks, and constraints. It should also link to the training and change resistance strategies.
Phase 3: PMU Set up and development	• PMU Office Establishment: The physical place for the PMU is established, roles are defined, and staff are appointed to those roles to set up the PMU office.
Phase 4: Implement the PMU	• Having fully defined how the PMU will run, projects will be transitioned into the PMU, the planning of which will largely be driven by the outcome of a project review, carried out as part of the current situation analysis.
Phase 5: PMU continuous improvements	• The PMU improves its operations by measuring its effectiveness, implementing changes to existing services, and adding new services. • The PMU may also need to update its Charter. The PMU should assess the overall capability of the organization to reliably deliver acceptable project results on time and



within budget. It can then develop and carry out a long-term plan to improve that capability.

Table 4: Project Management Unit

3.4 Initiative: Enterprise content and document management

Content and document management creates the warehouse for the MLM's structured data (Through Business Application), and unstructured data in electronic or imaged documents (Word processing documents, spreadsheets, emails and reports). What came from the environmental analysis is that documents are not easy to locate within MLM. Even the creation process of the documents that came through is not systematic. A strategic approach to content and document management is needed by developing an Enterprise Solution.

The Municipality's enterprise data/ or information architecture needs to be modified to provide clear guidance in forms of processes on content and document creation and management. The Identified enterprise document management technology must have the following attributes:

- Ability to upload scanned hard copy documents and index them for easy search and retrieval
- Incorporated workflows in generating reports and documents of a certain nature.
- Ensure that document creation can be collaborative and there is version control
- Corporate document storage will be classified based on pre-defined MLM categories.

This Initiative will seek to:

- Develop Document and Content Management Plan for MLM
- Identify the appropriate Content Management technology
- Digitize existing documents and capture them into the Content Management System



3.5 Initiative: Cloud First and Governance

3.5.1 Cloud First

The question is no longer about whether the Department should adopt a cloud first approach in relation to the deployment of solutions; it is now a question of what system is moved, when and to what type of cloud (the deployment model). Deploying suitable applications and services to the cloud will provide greater levels of agility and resilience, provide increased access to the latest advances in technology and enabling future technology adoption, while also releasing capacity within the ICT Unit to develop and offer new value-add services. There are multiple routes to cloud adoption & different cloud models. All will need to be evaluated and assessed based on the specific needs of the Department and its Offices, taking account of both current and long-term demand. Cloud adoption brings significant advantages and benefits; however, there are also consequences, constraints and risks that need to be considered. These have implications for both the ICT Unit and the wider Department.

MLM must consider other service delivery models such as platform-as-a-service and software-as-a service both of which have similar benefits, risks and implications for the ICT Unit (staffing and long-term role) and wider Department. These options will be considered using the Cloud First objective in building the business case for a new system. Note that Cloud First does not mean cloud only, but that cloud deployment should be the first option to be considered for new service deployment. Cloud deployment may be too private MLM cloud or to public cloud suitably configured to meet the MLM's security and privacy standards. It is hence imperative for the IT department to quickly develop an educational guide on "how to move into the Cloud", seeing that departments have already started using private cloud services without guidance.



3.5.2 Cloud Governance

The use of Cloud services within MLM has matured to a level that requires governance processes to put in place. This governance will consist of policies, guidance, processes and decision-rights.

Industry best practice defines cloud services on three different levels, Diagram below:

- Software as a Service (SaaS);
- Platform as a Service (PaaS);
- Infrastructure as a Service(IaaS).

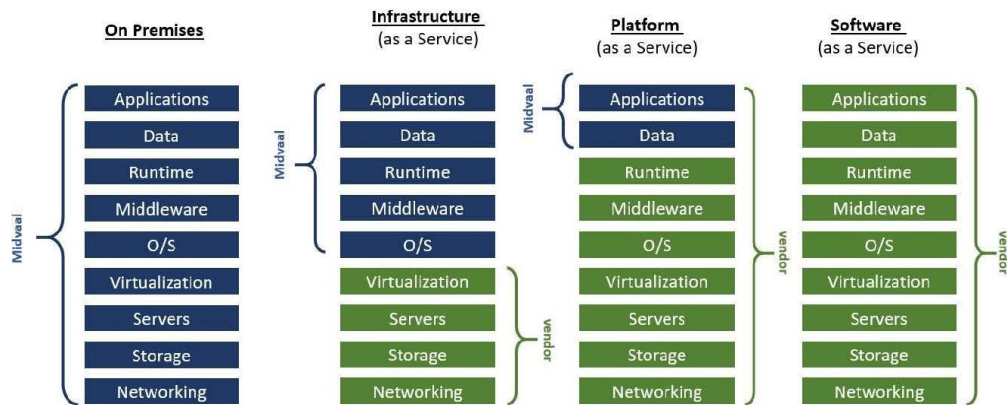


Figure 8: Cloud services

It must be appreciated that the new cloud environment is very different from traditional outsourcing and hence requires a new approach to governance and management. There are important risks that should be analysed before migrating to the cloud such as:

- Internal threats;
- Horizontal audit compliance;
- Performance metrics;



- Security;
- Accountability and responsibility.

To deal with internal threats, standards, interfaces, controls, and integration requirements should be addressed with **policies** and **procedures** that tell how everything fits together.

Horizontal audit compliance gives an overall view of all business units and unifies the information streams which help businesses to find vulnerabilities across the Municipality.

Achieving accountability in the context of cloud computing requires mechanisms that result in trust and security. These mechanisms range from auditing, tracking and reporting and monitoring through contracts and service level agreements. It is the customer's responsibility to enforce these mechanisms and to ensure successful implementation.

The best Cloud Governance model takes an approach of deconstructing the cloud. This approach starts by assessing each application domain or business process individually asking the following questions:

1. What (process) is moving to the cloud? (Application domain or business process)
2. How will it be delivered? (SaaS, PaaS, IaaS)
3. How will it be deployed? (Public, Private, Hybrid)

The next step for deconstructing the cloud is to get answers to four more questions:

1. Where will the data be located? (Internal or External)
2. Who owns the technology, services, and interfaces? (Proprietary or Open)
3. Are there expectations of collaboration and data sharing?
4. Who is managing the delivery? (Insourced or outsourced)
5. What unique risk factors arise from steps 1-4?



6 Control – What are the control modifications necessary for this cloud solution?

The expectation is that the IT Department will create a Cloud Framework document which will among other things:

- Provide policies on the MLM cloud
- Guide on how Business Units will move their systems into the Cloud
- How Cloud Based Systems will be performance Managed
- Type and Nature of service Level Agreements with Cloud Services
- How Cloud based Data will be secured

3.6 Initiative: Service Improvements and Performance Management

The general staff of MLM is impacted on poor ICT services on daily operations, so are the citizens who rely on online Municipal services. This initiative focuses on putting together the operational activities and also focusses on systems monitoring.

The services which need enhancing include:

- User desktop applications support
- Help Desk log management
- MLM ICT Assets Management
- ICT Procurement processes
- Resources Training and Knowledge Improvements

On the other hand, monitoring is essential for the health of the system and is important for both providers and consumers. Primarily, monitoring is a key tool for

- managing software and hardware resources; and



- providing continuous information for those resources as well as for consumers hosted applications on the cloud.

MLM is currently running a hybrid of Internally hosted and Cloud hosted applications. These have a myriad of maintenance techniques, all different. Cloud activities like resource planning, resource management, data center management, SLA management, billing, troubleshooting, performance management, and security management essentially need monitoring to effective and smooth operations of the systems.

Systems is needed for continuous measurements to assess resources or applications on various server environments platform in terms of performance, reliability, power usage, ability to meet SLA, security. Fundamentally, monitoring tests can be computation based and/or network based. Computation based tests are concerned about the status of the real or virtualized platforms running applications. Data metrics considered in such test include CPU speed, CPU utilization, disk throughput, VM acquisition/release time and system up-time.

Network-based tests focus on network layer data related metrics like jitter, round-trip time RTT, packets loss, traffic volume, etc. At run-time, a set of operations takes place in order to meet the QoS parameters specified in SLA document that guarantees the required performance objectives of the cloud consumers. The availability, load, and throughput of hardware resources can vary in unpredictable ways, so ensuring that applications achieve QoS targets is not trivial. Being aware of the system's current software and hardware service status is imperative for handling such uncertainties to ensure the fulfilment of QoS targets. In addition, detecting exceptions and malfunctions while deploying software services on hardware resources is essential e.g., showing QoS delivered by each application component (software service such as web server or database server) hosted on each hardware resource. Uncertainties can be tackled through the development of efficient, scalable, interoperable monitoring tools with easy-to-use interfaces.



As mentioned previously, application components (e.g., streaming server, web server, indexing server, compute service, storage service, and network) are distributed across cloud layers including PaaS and IaaS. Thus, in order to guarantee the achievement of QoS targets for the application as a whole, monitoring QoS parameters should be performed across all the layers of cloud stack including Platform-as-a-Service (PaaS) (e.g., web server, streaming server, indexing server, etc.) and Infrastructure-as-a-Service (IaaS) (e.g., compute services, storage services, and network).

Secondly, all the Municipal ICT Assets must be accounted for. These could be classified as:

- Data/Information
- Records
- Hardware Infrastructure: Switches, Connectivity lines, Servers
- Applications, Software and Operating Systems

This initiative advocates for:

- the creation of a single control room from which dashboards to various systems can be monitored in Realtime. Also, from the control room, reports of a periodic nature can be generated, and it will become easier to conduct diagnostic analysis of incidents as log reports could be easily accessible from a single point. The initiative will also create an ICT asset management plan and Platform for tracking MLM Digital Assets.
- Developing and control corporate wide ICT training and improvement programs
- Create Asset Management platform which will track MLM assets

3.7 Smart City Framework Implementation

MLM has shown that it has the ability to go out and take advantage of the latest of what technology can offer in improving service delivery. A case in point is that MLM have key systems already on cloud computing. Predictably, MLM will move towards smart management of operations. In this cycle of the ICT Strategy, it becomes then imperative that MLM develops a Smart City



Framework/Strategy document. Key Metros have done so across the country and a sizeable number of Municipalities in the world have had full implementations. Evidently, smart city approach provides a clear way of addressing traditional ways of operations within the city (see Figure, below)

	The Problem	The Smart City Solution
Planning	- Ad hoc and decentralized - Cost savings aren't realized - Limited potential for scalability of investment	- Coordinated and holistic - Resources are shared - Cost savings are fully realized - Investments are scalable - Improved City planning and forecasting
Infrastructure	- Runs inefficiently - Costs more money and resources to run	- Optimized with cutting-edge technology - Saves money and resources - Improved service-level agreements - Built on open standards
System Operators	- Guess at Infrastructure conditions - React to problems - Can't deploy resources efficiently to address problems	- Enjoy real-time reporting on Infrastructure conditions - Predict and prevent problems - Deploy resources more efficiently - Automate maintenance
ICT Investments	- Piecemeal and Siloed - Deliver sub-optimal benefit - Don't easily realize economies of scale	- Centrally planned - Deployed across Municipal departments and projects - Deliver optimal benefits
Citizen Engagement	- Limited, scattered online connection to citizens - Citizens can't make optimal use of city services (or easily find them)	- Complete and singular online presence - Citizens can easily find and use services - Citizens can participate in smart city initiatives - Two-way communications between MLM and people - Specialized services focused on individual citizen - Citizens can both contribute to and access Realtime intelligent city data and offer apps that use data
Sharing Data	- Departments and functions are siloed - Departments rarely share data and collaborate on initiatives	- Departments and functions are integrated and/or shared - Data is shared between departments and better correlated with other data services through open standards - Results are improved - Costs are cut

Table 5: Smart City Remedies

A smart city efficiently mobilizes and uses available resources (including but not limited to social and cultural capital, financial capital, natural resources, information and technology) for efficiently improving the quality of life of its inhabitants, commuting workers and students, and other visitors significantly improving its resource efficiency, decreasing its pressure on the environment, building an innovation-driven and green economy and fostering a well-developed local democracy.



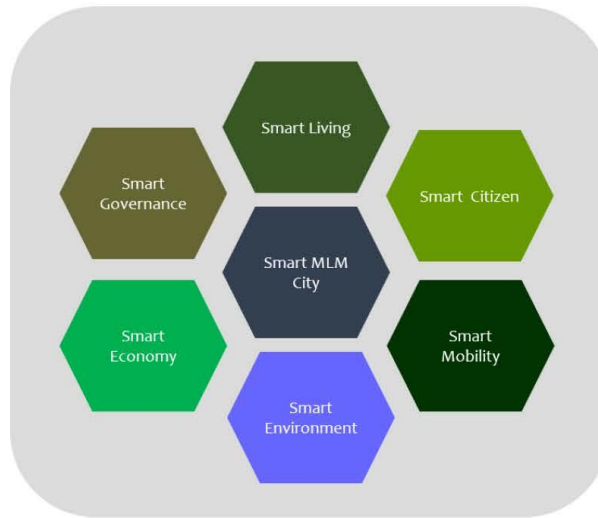


Figure 9: Smart City Concept

The MLM smart city context could be captured under the following attributes:

Smart City element	Attributes	Description
Smart Governance	Digital Administration	All Administrative communicate and communication will be based on an online system
	Online Citizen Services	Services to citizens will be provided through interactive online systems and smart phones apps
	e-Democracy	Issues of ward demarcations, electoral priorities, programs and electoral news require a digital platform.



**AGENDA OF THE 3RD ORDINARY MEETING OF 2022 TO BE HELD ON THURSDAY,
24 MARCH 2022 AT 14:00 IN THE COUNCIL CHAMBERS**

Smart Economy	Innovation	Application of Smart Technologies within the economy business processes.
	Greenfield development	Use of Smart systems in the Environmental economic processes within MLM
	e-procurement	All the procurement processes to be fully online and available to the suppliers in a controlled manner
	Employment Opportunities	Continuously creating opportunities to the Citizens through smart technology
Smart Environment	Sustainable energy	Management of energy processes through smart systems.
	Water	Control the usage of water (smart meters) and conduct real-time leak detection operations
	Waste Management	Coordinate waste collection and processing through technological use
	Air quality	Manage and detect pollution around the city through use of sensors and Technology
Smart Mobility	Walkability	
	Transport options	Transport control and availability through smart systems
	Shared and Public Transport	Ensure all the public transport systems are scheduled and notifications of timetables are available to the Citizens online
	Traffic Management	Using smart-sensors, Traffic controls are optimized to avoid congestions and accidents
Smart People	Education	Online MLM Learning Systems and Library facilities



	Communication	Communication channels created to reach all citizens
	Open Data	Data availability to follow open standards and accessible
	Consultation and Engagement	Platforms created to allow citizen integration
	Cultural Activities	Use technology to provide outreach for cultural activities
Smart Living	Housing	Provide secure housing and services through technology
	Health	Telemedicine through mobile clinics and facilities must be within reach of the citizen
	Sewerage and Sanitation	Deployment of sensor technology onto Sewer leakage detection operations and Plant management
	IT Connectivity	MLM must work towards facilitation of the provision of Fiber and wireless technology connectivity to the Citizens
	Safety	With Smart systems, comes the issues of Securing the City through surveillance systems

Table 6: Smart Cities Attributes

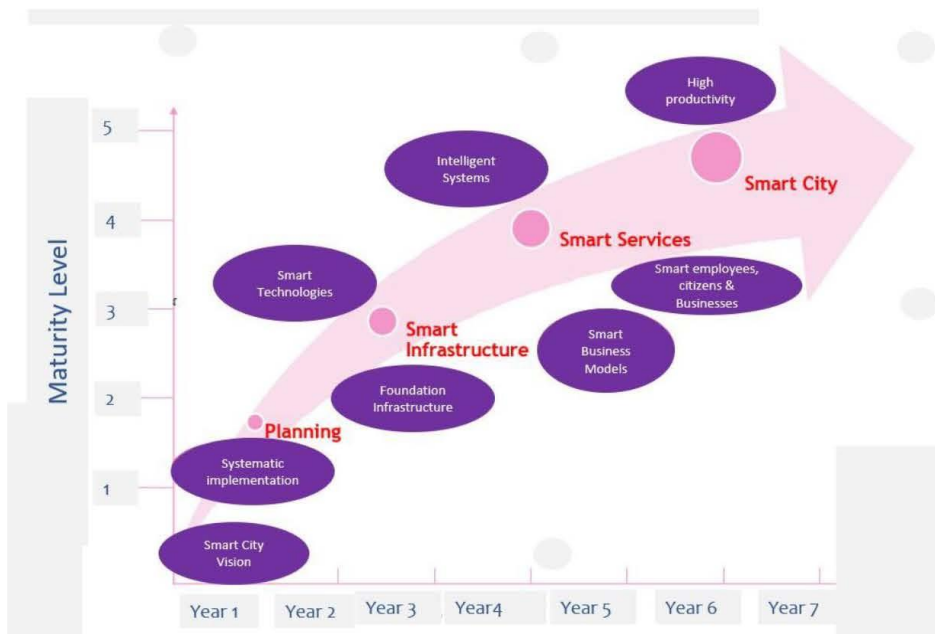
It is important to Apply the Smart Cities Maturity Model before embarking on the program. The SmartCities Maturity Model outlines five maturing levels that lead to an optimized Smart Cities approach.

This systems approach is enabled by increasing use of data and digital technologies to transform governance and service delivery models and citizen and business engagement. The



Smart Cities Maturity Model identifies these as critical dimensions that a Smart City must invest and commit to as part of its strategic intent.

Throughout the stages of the self-assessment, you are therefore prompted to consider the extent to which these dimensions are maturing. The ultimate vision is of a Smart City that strategically manages multiple systems at a city-wide level and through increased transparency, openness and shared accountability creates an innovation system that improves outcomes and enhances city performance.



The Smart Cities Maturity Model outlines five maturing levels that lead to an optimized Smart Cities approach. It describes that a maturing Smart City will increasingly plan and deliver services within an interconnected system (i.e., transport) as opposed to elements within the system.



Level Description	
Level 1 – Non-Existent/Ad-hoc/Chaotic	In this level there are no discernible smart city features in a municipality . There is no focused and municipal-wide strategy and planning for implementation of smart city capability. Activities and products implemented and used by the municipality that resemble smart city features are ad-hoc , un-coordinated and exist in isolation.
Level 2 – Defined / Systematic	In this level municipality has a defined enterprise-wide strategy to implement smart city capability. This is irrespective of the completeness of the strategy in covering comprehensive list of smart city dimensions, performance areas and goals. The strategy includes practical and systematic implementation approach with multiple streams and implementation phases. An implementation programs has been established, resourced and functional.
Level 3 – Purposeful / Repeatable	Armed with a clearly defined and implementable Smart City Strategy, in this level the municipality is purposefully implementing their smart city strategy as per their plan. There is a city-wide smart-city implementation programme which successfully coordinates the implementation of smart city capabilities across people, process and tools/infrastructure. The programme harnesses lessons learnt from previous implementation phases for improved results in subsequent phases. There are successful smart city capabilities the municipality can show case in at lead 2 key process areas.
Level 4 – Managed / Operationalized / Capable	In this level a municipality has implemented smart capabilities in varying degrees of success and efficiency across the municipal value chain in almost all smart city dimensions where applicable. In this level the municipality has achieved its smart city goals for smart administration, service delivery, governance, economy, environment, technologies and
Level 5 – Optimized / Efficient	At this level the municipality is fully smart city and continuously improves and enhances its citizen satisfaction levels.



The Smart City approach is made up of technologies that are already in use within MLM. Below, we attempt to categorize these technologies based on Municipal use. This will help in conducting a Technology audit systematically when putting together the Smart City Strategy/or Framework.

4 Monitoring and Evaluation of ICT Strategy

After developing the strategy, senior management often communicates its key themes to the organization, expecting employees to act quickly upon it. However, without a strategy control system that supports the strategy, it remains a wish list or a set of goals that may or may not ever be achieved.

The goal of the strategy control system is to ensure effective action throughout the organization. What gets measured, gets done is an old saying.

Key to ICT strategy implementation is the development of SMART (Specific, Measurable, Attainable and action-oriented, Relevant, and Time-bound) key performance indicators (KPIs). The KPIs will be developed to monitor operational service improvements and also to monitor development of Change programs (initiatives).

Hence, the monitoring of the effective implementation of the Strategy is divided into two parts: Service Improvements monitoring and Initiatives Monitoring.

4.1 Service Improvements Monitoring

The service improvements monitoring is based on the following Key Performance Indicators:



4.1.1 Financial Perspective KPIs

IT does not generate revenue directly, but there are some expenses that it makes sense to track. Here are examples of some performance indicators that MLM could use in this case:

- **IT expense as a percentage of total expense:** Running internal business systems or maintaining MLM's web portal's is neither IT-Department core competency, nor something that generates sales for it; this should be reflected in expenses structure. MLM budgeting must however, have enough to keep systems running smoothly.
- **IT expense per employee:** On the one hand the MLM staff need to be equipped with appropriate tools, on the other hand you need to know where to stop. A Comparison your data with benchmarks in your industry to make some conclusions.
- **Support expense per user:** Similar to the previous one. Having high support expenses (compared to the industry average or your own historical data) might indicate a potential problem. For example, MLM staff might contact IT too often because there are no clear manuals or people simply were not trained to use information systems.

4.1.2 Customer KPIs

Mostly IT department has two types of customers:

- **Internal customers** (Municipal Staff), and
- **External customers** (outside end users of MLM systems and Citizens in general.)



Another point is that today IT is not just about fixing computer-related problems, it's about providing the best experience to the customers; make sure IT Department is tracking respective experience/ engagement metrics as well. Below, are Performance Indicators that are appropriate:

- **Request response time, hours:** This will work as a leading indicator for the business goals related to the user/employee engagement. The faster an IT team responds to the support queries, the higher the engagement rate that is expected.
- **Business system use:** Take some business system in MLM (CRM, ERP, or BI dashboard), define an interval (for example 7 days) and calculate the percentage of registered users who used the system within the defined time interval. Compared to the historical data, this is a good lagging indicator for user engagement as well: if there is a top-notch computer software, but no one actually uses it, then it's time to start asking questions.
- **The number of critical problems reported by user.** Problems appear every day, but it is important to learn what critical problems were found and prevented by the IT Department internal team, and what critical problems were reported by the end users.
- **New Services Commissioned:** Another area of Performance is the turnaround times of on-boarding staff onto ICT platforms:
 - Time to register a new account, minutes or
 - Account creation success rate



4.1.3 Internal Processes KPIs

Normally, there are no problems with defining indicators for internal business processes. A good practice is to track separately downtime related to the security issues and create prevention plan respectively.

- **Mean Time Between Failures (MTBF).** Average time between failures.
- **Mean Time to Repair (MTTR).** Compare this indicator to the industrial benchmark. For example, if your service provider takes too much time to repair, then find someone who will do a better job.
- **Availability (uptime)** calculated as $MTBF / (MTBF + MTTR)$. Applied to your internal systems, network, website, etc.
- **Downtime related to security issue.** A lagging indicator for the IT security initiatives. For the leading actions one might plan regular security audits by experts.

4.1.4 Learning & Growth KPIs

From the management point of view, we need to understand if IT is on the find-and-fix-problems rail, or it is learning from its errors. Here are two indicators that are a good starting point for this.

- **The number of returning problems** (also known as: percentage of tickets reopened). Is a good lagging indicator of IT Department improvement efforts: if the team did well first, then less repeat problems will appear?
- **Restore success rate.** Emulate system crash, track the percentage of data restored and restoration time. Such emulation will generate an action plan for IT system improvement.

The KPI dashboard below then captures and summaries the KPIs measures.



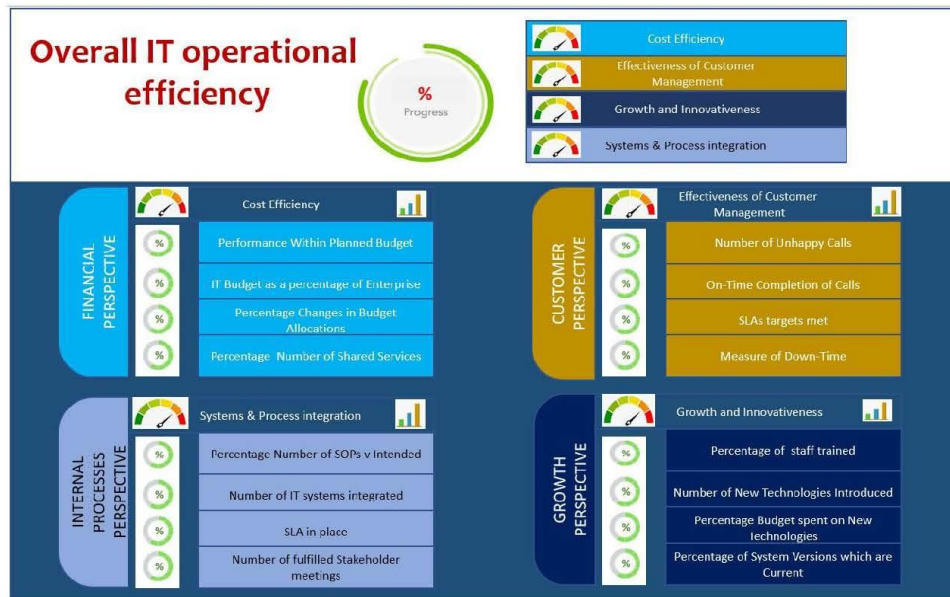


Figure 10: Dashboard for KPIs

4.2 Monitoring Initiatives (Programs)

Key performance indicators (KPIs) in project management consist of various specific measurement tools for indicating how well teams are achieving specific goals. Project management KPIs are generally agreed upon early in the project.

Top project management benchmarking measures include return on investment (ROI), productivity, cost performance, cycle time, customer satisfaction, schedule performance, employee satisfaction and alignment with strategic business goals.

The Dashboard below shows the indicators alignment to the various initiatives with target reporting spread over the 5 years; life cycle of the Strategy.



Initiative	KPIs	Year 1	Year 2	Year 3	Year 4	Year 5
Development of SOPs	% of SOPs Developed	100%				
Dev Cloud Framework	% of Cloud Implementation	50%	50%			
Dev DMS	% DMS Development	50%	50%			
ICT Governance enhancement	% of SOPs Developed	40%	20%	20%	10%	10%
Dev of FA	% of EA Developed		40%	30%	30%	
Framework of IT Services Improvements	% IT Service Improvements	20%	20%	20%	20%	20%
Smart City Framework	% of SC Framework Developed		100%			

4.3 Evaluation Plan

In addition to monitoring the progress of strategy implementation, the Digital Transformation Strategy for MLM will undergo an internal evaluation within the next three years. The objective of the evaluation will mainly be to verify the extent to which expected strategy results have been achieved, review the relevance of selected strategy priorities and objectives, and review the efficiency of strategy implementation and governance schemes. The questions guiding the evaluation exercise will be conducted by the Project Management Unit or Performance Management Division with the support of the ICT steering committee.

In general, these evaluations will mostly analyse complex issues and capture intended and unintended effects, investigating the reasons why certain aspects of an activity or action have or have not been implemented as planned. Appendices



Concluding Remarks

The ICT Strategy is a living document. Technologies do change hence disrupting the plan of actions. Based on the Budget and priorities, some of the Initiatives might be impacted upon. The Expectations are that the key initiatives will be implemented within the life cycle of this ICT Strategy.



Appendix 1: Smart Technologies Categories

The Smart City concept is made possible by a number of technologies. Looking closely, some of these technologies are already in use with MLM. Below, we have classified them and referenced them to some use cases.

Smart Water Technologies

Smart Technology	Description	Use Cases	Architecture Layer
• smart water meter • Smart Water Management system • Flow Meter Sensors	• Advanced metering technology Management of water supply using sensors and software.	Account for all water used and create revenue	Technology and Infrastructure
		Control water flow, cut water supply, monitor water usage and storage	
		Functionality Used to manage the entire system	
		Remotely analyse the water Allow or stop the flow of water at specific points	



Smart Waste Management Technologies

Smart Technology	Description	Use Case	Architecture Layer
Smart Trash	Intelligent identification, sorting and recycling process.	Prevent the wrong stuff from finding its way into areas where they can cause harm	Information Technology
Waste Collection Apps	Local waste collection with waste and recycling information	Garbage and waste collection	Technology Infrastructure
IoT-Related Solutions	Network of devices connecting trash bins and smart devices	Offer communication solutions between the trash bins, the citizens, and the garbage collection agencies	Technology, Infrastructure
Fill-Sensors	Capacitive fill-level sensor for soiled media	Sends real-time data to city cleaning agencies	Technology, Infrastructure
Ultrasonic fill-level Sensor	Wireless ultrasonic fill-level sensor	Secures monitors in containers and sends real-time data to city cleaning agencies	Technology, Infrastructure

Smart Technology for Energy

Smart Technology	Description	Use Case	Architecture Layer
Smart Grid	Management Systems for electricity supply system	Efficient energy transmission	New technologies and equipment



Roof top wind power systems for municipal offices	Electricity generation	Green energy production and cost effectiveness.	Clean energy technology
Roof top/Parking Solar PV system	Electricity generation	Green energy production and cost effectiveness.	Clean energy technology
Smart Meters	Monitoring energy usage in real time	Allow power suppliers to offer tariffs that help consumers manage energy usage	Technology

Smart Transportation Technologies

Smart Technology	Description	Use Case	Architecture Layer
Intelligent Transport System	An advanced Application in transport and traffic management.	Innovative services Relating to different models of transport and traffic management.	IoT system
Smart Traffic Lights	Vehicle traffic control system	Intelligent routing of vehicle and pedestrian traffic	Specialized Technology
Street Hazards App	Application allowing drivers to report road hazards	Application automatically reports Hazards using GPS	Technology infrastructure



Roads and Storm Water

Smart Technology	Description	Use Case	Architecture Layer
Sanitary Sewer Overflows	Vast system of sanitary sewers and stormwater drains.	Properly convey sanitary flows	Infrastructure and Technology
“Smart” Storm water Management Solution	Manage Stormwater and implement stormwater infrastructure	Moving storm Water away from the city and save lives	Infrastructure and Technology
Data-Driven Urban Water Management	Collecting and Utilizing Large Amounts of Data in UWM	Addressing challenges such as better rain-data management, sewer network operation and management, and drinking water	Infrastructure and Technology
Green Storm water Infrastructure	Manage wet weather impacts	Reduces and treats storm water and its sources	Green Infrastructure



Disaster and Emergency

Smart Technology	Description	Use Case	Architecture Layer
Agile Security Technology	A Technological approach based on the premise that most crimes and terror-related activities are not random and can be predicted	Prevent crimes and terror-related activities.	Specialized Technology
Facial Recognition	Identification of individuals	Identify criminals and terror suspects	Specialized Technology
CCTV Surveillance	Identification of individuals Unusual activity identification	Identify individuals or activities that are abnormal and pose a security threat	Specialized Technology
Smart Card Reader (RFID reader)	Device used to gather information from an RFID tag	Track individual objects using radio waves	Specialized Technology
Biometric Sensors	Transducers that change biometric traits of individuals into electric signals	Identify Specific individuals	Specialized Technology



Policing

Smart Technology	Description	Use Case	Architecture Layer
CCTV surveillance	Identification of individuals and activities	Used to assist in identifying suspects at the scene of	Specialized Technology
Facial Recognition Technology	Identification of individuals	Used of investigations, missing people, pre-crime programmes, etc.	Specialized Technology
Body Cameras for Police	Recording event during a crime	Provide evidence and pre-crime programmes, court processes.	Specialized Technology
Dash Cameras for Police vehicles	Recording event during a crime	Provide evidence and promote responsible policing	Specialized Technology
Gunshot Detector/ Sensors	Identify and convey the location of gunfire	Identify the source of gunfire	Specialized Technology
Drone Surveillance	Risk-free aerial surveillance and observation	Advanced aerial surveillance and monitoring	Specialized Technology
Biometrics and DNA registrations System for offenders	Forensic identification	Accurate and efficient individual identification	Forensic science technology



Health and Social

Smart Technology	Description	Use Case	Architecture Layer
Telemonitoring	Monitoring patients	Remote monitoring of patients with kidney failure	Medical technology
RFID Technology	Live medical monitoring	tracking radiotherapy patients, hospital equipment and staff	Medical Technology
Telehealth	Technology used to store, share or analyses health information	Improve interactions between health providers and patients	Specialized Technology
Da Vinci Surgical System	Robotic surgical system	Facilitate complex surgery using minimally invasive approach	Specialized Technology
Tele stroke	An approach to treat vascular strokes	Allow neurologist to provide remote treatment for stroke victims	Specialized Technology



Human Settlement

Smart Technology	Description	Use Case	Architecture Layer
Energy efficient buildings	Heating and ventilation technologies	To make efficient use of resources such as water and electricity	Infrastructure
Intelligent Buildings	Intelligent Buildings for sustainable human settlement	Advanced technologies used to develop high-performing buildings	Technology and Infrastructure
Smart Green Buildings	A series of smart and intelligent buildings	New energy ecosystem that connects smart green buildings to a smart grid that optimizes energy usage	Technology and Infrastructure



Environment

Smart Technology	Description	Use Case	Architecture Layer
Smart Environment (Smart Ecosystems)	A physical world that is richly and invisibly interwoven with sensors, actuators, displays, and computational elements, embedded seamlessly in the everyday objects of our lives, and connected through a continuous network	Conserving the natural resources and environment	Green technology
Smart Green Buildings	A series of smart and intelligent buildings	New energy ecosystem that connects smart green buildings to a smart grid that optimizes energy usage	Technology and Infrastructure
Environment Monitoring technologies (Drones)	Technologies that ensure that environmental laws and regulations are being followed.	Conservatives are using drones to keep an eye on the environment.	Specialized Technology
Geo-Spatial Measurement Technologies	Air-Pollution systems used to detect increased air pollution levels.	Testing the air around the smart cities and detecting pollution followed by implementation	Specialized Technology



Communications

Smart Technology	Description	Use Case	Architecture Layer
Information and Communication technology	Economic growth through advancement in key technological areas	Economic Development	Technology and Economic Infrastructure
Cloud Storage Services	Economic Data is stored in the cloud	The data is made available to the city budgeting agencies and the general public	Specialized Technology
LED Street lights	Lightbulbs that conserve energy and save on electric bills	Smart bulbs that turn on and off when necessary	Infrastructure, Technology

e-Democracy

Smart Technology	Description	Use Case	Architecture Layer
Open Data Based Application	Applications that contain information on the political system.	Encourage voter participation.	Specialized Technology
Digital Democracy Application	Applications that provide the citizen with information about government.	Provide information on health, public administration, local economy, education, culture and sports.	Specialized Technology



Chatroom Applications	Applications that provide a platform for the discussion of issues affecting the city and its citizens	Avenue for communication of issues, making of contribution, resolving cases and general communication.	Specialized Technology
Represent Me App	Application used to stimulate political debate.	Engage young people in political decision making	Specialized Technology
Digital Performance Dashboard	Platforms that summarize the popularity, consistency, effectiveness and other performance metrics for politicians and their parties.	Helps promote democracy, transparency, and accountability	Specialized Technology



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