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INCEPTION REPORT
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Design and Supervision of the Installation of the IT Infrastructure and Systems

RFP No.: ET-FTA-543-CS-QCBS

Submitted to

Transport Systems Improvement Project (TRANSIP)
Federal Transport Authority
Government of the Federal Republic of Ethiopia

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Abbreviations and Acronyms	
ADM	Architecture Development Method
AM	Accident Management
API	Application Programing Interface
COTS	Commercial Off the Shelf
COBIT	Control Objectives for Information and Related Technologies
COMESA	Common Market for Eastern and Southern Africa
DL	Driver Licensing
EA	Enterprise Architecture
EAC	East African Community
EU	European Union
EUC	End User Computing
FTA	Federal Transport Authority
GDPR	General Data Protection Regulations

Abbreviations and Acronyms	
GPS	Global Positioning System
GTP	Growth and Transformation Plan
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IT	Information Technology
IIBA	International Institute of Business Analysis
INSA	Information Network Security Agency
I/O	Input Output
ITIL	Information Technology Infrastructure Library
ISO	International Standards Organization
KPI	Key Performance Indicator
LAN	Local Area Network
MINT	Ministry of Innovation and Technology
MOT	Ministry of Transport
NDC	National Data Centre
NTIS	National Transport Information System
OLA	Operational Level Agreement
OR	Operator Registration
PIU	Project Implementation Unit
PM	Penalty Management
PMO	Project Management Office
PMI	Project Management Institute
PGB	Project Governance Board
RACI	Responsible Accountable Consulted and Informed
RBAC	Role based access control
RFP	Request for Proposal
RSDP	Road Sector Development Project
RTO	Regional Transport Office
QA	Quality Assurance
SA	Solution Architecture
SABSA	Sherwood Applied Business Security Architecture.
SADC	Sothern African Development Community

Abbreviations and Acronyms	
SLA	Service Level Agreement
SOA	Service Oriented Architecture
Sys-ML	Systems Modelling Language
TOGAF	The Open Group Architecture Framework
TRANSIP	Transport Sector Improvement Project
TTMS	Traffic and Transport Management System
TTTFP	Tripartite Transport and Transit Facilitation Programme
UML	Unified Modelling Language
USD	United States Dollar
VR	Vehicle Registration
WAN	Wide Area Network
XML	Extensible Mark-up Language
XSD	XML Schema Definition

Executive Summary

The Consultant has been contracted to provide consulting services to the FTA project *Design and Supervision of the Installation of the IT Infrastructure and Systems*. As a part of its services the Consultant hereby presents this Inception Report, which describes the project background, context, outcomes, objectives and scope of work. In addition the document describes project execution approach, methodology, technologies and tools that the Consultant intends employing to achieve the desired project outcomes and deliverables. The project work plan, activities schedule and resource deployment plan are included in the document.

It has been recognized that Ethiopia has achieved unprecedented economic growth and social development in recent years, making it the fastest growing economy in the African continent Growth and Transformation strategic plan followed by the Ethiopian Government envisions the country to become middle income knowledge based society in ten years. GTP has identified ICT as a potent tool for achievement of this vision. As the rest of the economy the transport sector is expanding and developing as much the ICT sector in the country. The economic development and social transformation evident in the country is unfortunately accompanied by higher road accidents and unsafe roads. In is in this context that the present project has been launched to optimize ICT application in traffic and transport management. The project is expected to support the design, development and deployment of project's eight component parts: Driver's Licensing, Training & Examination System, Vehicle Registration and Inspection System, Penalty Management System, Road Accident Management System, Operator Registration system, Central Help Desk Ticket System and relevant ICT Infrastructure and Sustainable Power Solutions.

The project is expected to be undertaken in two phases, constituting twenty seven work packages. The first phase being the discovery and design phase and the second one the implementation phase. Following *its Transform Framework* the Consultant proposes to undertake the project in four stages. The first three stages would optimally deliver the first phase of the project and stage four of the project would correspond to the phase 2 of the project. All the deliverables of the project, identified in this document, are expected to be optimally realized during the proposed four stages of the project. The document has identified the stakeholders of the project including the FTA and MOT as the sponsor and major beneficiary of the project, Ministry of Innovation and Technology, INSA, Ministry of Construction, Ministry of Education and other government entities as well as non-government organizations connected with the transport sector like driving schools and e-payment organizations.

The execution of this assignment would be driven by international best practices, standards, frameworks and guidelines as much as by the experience of the Consultant in the delivery of similar national digital transformation projects and e-governance assignments in developing countries. The section 2 of this document describes the project execution approach, methodologies, tools, technologies that the Consultant proposes to employ in the delivery of the project. This among others, includes *Agile Scrum approach* for project implementation, COBIT for program governance and TOGAF for enterprise architecture. Besides the guidance obtained from international best practices, standards and frameworks the Consultant drawing on its own experience with similar projects has presented optimal approach and methodology for each major task of the project such as *requirements capture, situational analysis, enterprise architecture development, solution design and delivery, risk management, change management, data management, vendor on boarding, quality assurance and testing, risk management, communication and others.*

The last section of this document, amongst others presents project management and governance plan, risk and communication management plan, stakeholder engagement plan, work plan, work schedule and time line for project deliverables. This section also proposes project governance structure as well as its monitoring and evaluation and definition of key performance indicators (KPI's). It is anticipated that phase 1 of the project would be delivered over a *time period of 330 days (11 months) and phase 2 over a period of 30 months*. The fourteen deliverables of the project have been defined and their realization timeline is presented. For each of the four project stages implementation plan is presented in Agile format in addition to expert resources allocation plan that identifies the schedule for their deployment in the field and at home location.

SECTION 1
INTRODUCTION AND BACKGROUND

1.1   Introduction

The Consultant has been mandated by the Federal Transport Authority (FTA), Ministry of Transport, Government of the Federal Democratic Republic of Ethiopia to undertake the project: *Design and Supervision of the Installation of the IT Infrastructure and Systems (RFP No.: ET-FTA-543-CS-QCBS).* As the first deliverable of the project this document, titled the *Inception Report* gives a detailed exposition of the background of the project; its context and rationale, aims and objectives, scope of its work and the outcomes that would emerge as the project gets underway. The document also explains in detail the methodology and approach of the Consultant in undertaking this assignment; the tools and technologies that would be employed, project management plan, project governance structure, work plan of the project and the schedule of activities that would be undertaken to attain the project objectives; identifying the project mile stones and resources that would be expected to be employed.

1.2   Project rationale and context

During the last two decades Ethiopia has achieved unprecedented economic growth and social transformation. It has achieved double digit economic growth, averaging over ten percent per year, which is one the highest for any large country globally and indeed the highest among the nations in the African continent. Economic growth and expansion has been accompanied by impressive achievements on the social front. The country has achieved or surpassed most of the millennium development goals set by the United Nations.

Growth and Transformation Plan (GTP I and GTP II), is the strategic master plan being pursued by the Government to eradicate poverty, develop the economy and transform the country into a knowledge based middle income country in the next ten years. In pursuance of this vision the GTP has identified several pillars for focused action in order to leverage the country's natural endowment and comparative advantages. Among others, GTP focuses on rapid, sustainable, and broad-based growth by enhancing the productivity of the agriculture and manufacturing sectors, improving the quality of production, and stimulating competition within the economy. The strategy being advocated by GTP includes industrialization based on agriculture and ubiquitous application of information and communication technology (ICT) to enhance efficiency and effectiveness at all levels in business, manufacturing, agriculture, commerce, trade, government and indeed in the Ethiopian society at large.

1.2.1 ICT Sector Development

The role of ICT as a potent transformative and developmental tool has been well recognised by the leaders and senior policy makers in the country. The Government has therefore focused on the development of the ICT sector, both as a substantive contributor in its own right as a sector and as an enabler to bring in efficiency in all sectors and domains. To provide the needed impetus to ICT sector development and encourage ICT adoption and diffusion in the country the Government has formulated policies and strategic plans of action including the National ICT Policy and E-Government Strategic Plan and formulated laws and regulations to ensure the ICT sector's orderly and rapid growth. In addition, a number of ICT initiatives and programmes have been undertaken. The major noteworthy initiatives include the expansion of telecom and internet connectivity and ICT infrastructure, the E-government program, electronic banking and establishment of ICT Parks to encourage ICT innovation and entrepreneurship as well as sector specific ICT initiatives in education, health, mobility and environment, amongst others.

Recognizing that telecom and internet infrastructure is the basic backbone for ICT development in the country the government has taken substantive steps to expand the telecommunication infrastructure in the country. Ethio-Telecom as the monopoly telecom operator and internet service provider in the country has invested heavily to expand the telecom and internet infrastructure in the country. Owing to these bold initiatives and large investments by government, the Ethiopian ICT infrastructure is expanding. The government has recently disclosed that Ethiopia's internet penetration has reached 20% as of April 2018 from a low level of 4 per cent three years ago. As the country is Africa's second most populous nation and owing to the huge investments being made by the government, there is a large potential user base that can facilitate ICT usage and exploitation. Some of the key trends driving Ethiopia's ICT growth and Internet penetration include the expansion of mobile network coverage and increasing mobile Internet adoption, urbanization (the increasing urbanization in Ethiopia could drive significant gains in Internet penetration), increase in smartphone devices and decrease in internet prices, growing middle income class, and increasing utility of the Internet. Even though the ICT and internet penetration rates are still low regionally and international, the year to year growth rates gives reason for optimism. The country's broadband market is also set for a boom following massive improvements in international bandwidth, national fiber backbone infrastructure and 3G/4G mobile broadband services. Despite all these positive developments, however, the full potential of ICTs and the Internet is yet to be unlocked by Ethiopian companies and consumers. The recent decision of the government to allow multiple telecom operators in

the country is expected to increase competition in the country's telecom market; reduce consumer prices, increase telecom service quality and generally give a much needed push for the development of the ICT sector in the country.

Development of the ICT adaption in the government and its diffusion in the society at large are considered important focus areas of the Government. Accordingly, the Government has over the last ten years rolled out a number of strategic programs for ICT application and associated infrastructure development including *Woreda Net the government ICT network to support E-Governance; School Net project to support E-Education and Health net*[1] to support E-health. E-Government strategic plan is now under implementation. While the development of the E-Governance has received considerable impetus during the last ten years the development of the ICT application and diffusion in the private sector and in the Ethiopian society in general need promotion and encouragement.

While the developments in the ICT sector and adoption and diffusion of ICT within the government and outside has been expanding during the last ten years there are many areas of concern and many challenges to contend with. These include the following:

- Low level of internet penetration and diffusion in rural and far flung areas
- Unreliable and poor internet and telecom services
- High cost of internet and telecom although the trend is downwards
- Lack of electric power in many locations and rural areas to drive ICT equipment
- Current ICT ecosystem in the country is still underdeveloped
- Low level of ICT expertise in the country; though many pockets of excellence exist.

1.2.2 Transport Sector Developments

Ethiopia is a land locked country with relatively underdeveloped road transport infrastructure and limited rail road transport. During the last 20 years Ethiopian economic growth has been fast and consistent. Development of the communication infrastructure of the country including rail, road, shipping and air transport is essential to realize the long term economic development and social transformation goals of the country. The Government has been following a strategic master plan for development of the communication infrastructure of the country.

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[1] The route maps of these nets would be obtained as a part of the data collection for situational / requirements analysis as an input for the regional connectivity solutions development.

The road transport infrastructure development is the responsibility of the Ministry of Transport. The Ministry has launched many road sector development projects and programs including the Road Sector Development Project (RSDP) under which a total investment of USD 4 billion has been budgeted for improvement of existing roads and development of new roads in the country. As a result of the major investments made by the Government in upgrading of roads and development of new roads the road network in the country has expanded. It is indicated that the road upgrading and development on account of the investments made under RSDP could have resulted in almost 100 per cent increase in the asphalt roads during the last five years. During the second phase of the RSDP 7500 km of asphalt roads were built including 10 major inter regional trunk roads and express ways. The Addis Ababa–Adama expressway was completed in 2014 as the first expressway in Ethiopia. In December 2015, construction began on a second expressway between Awasa and Modjo. Along with the high ways and inter regional roads the urban and semi urban road network is also expanding.

The development of the road network in the country across all regions as well as across the national borders into the rest of Africa is essential for expansion of economic activity, commerce and export trade and can contribute substantially to the attainment of economic development vision of the country. With the expansion of road network and vehicle population the challenges of high incidents of accidents and road fatalities have emerged. According to the Ethiopia Federal Police Commission published data road traffic accident deaths in Ethiopia have increased from 1802 in 2007 to 5118 in 2017; indicating a cumulative rate of growth of close to ten percent per year. Cumulatively, over this period of eleven years 36796 fatalities, 54731 serious injuries, 58987 light injuries and 141063 property damages have been recorded. Currently thousands of people are put in prison due to traffic offences leading to huge social problems both for the offender and victim's families. Moreover, due to high rate of traffic crimes, large public and private property is wasted every year. A recent research study has estimated that *due to road traffic accident Ethiopia loses around 36.3 billion birr (estimated 1.3 billion $ in current exchange rate of 28 birr for 1$). From the total lost birr; where 15 billion birr for fatality, 12.7 billion birr for serious injuries, 5 billion birr for light injuries, and 3.7 billion birr for property damage in the past eleven (11) years*[2]. With the expected expansion of road network and

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[2]

Road Traffic Accident in Ethiopia from 2007/08-2017/18
(Since Ethiopia Millennium) by Debela Deme   American International Journal of Sciences and Engineering Research; Vol. 2, No. 2; 2019

vehicle population in the country the fore mentioned challenges are likely to get accentuated in the years to come.

The Federal Transport Authority, under the Ministry of Transport, Government of Ethiopia is a regulatory organ responsible for implementation of rules and regulations related to road transport services throughout the country. While the drivers' licensing and vehicles registration services are managed and issued by the nine regions and the two chartered cities, through their 74 to 80 zonal offices .road safety enforcement is the responsibility of police. Although there are common procedures, standards and criteria for the issuance of licenses and permits there are no means to effectively enforce them within regions, and particularly across regional boundaries. It is also noted that Ethiopia is a member of the States of the Tripartite Region, which is an umbrella organization consisting of three of Africa's Regional Economic Communities, namely: the Common Market for Eastern and Southern Africa; the East Africa Community and the Southern African Development Community. The Tripartite consists of 26 member countries which have acceded to the Tripartite Multilateral Cross-Border Road Transport Agreement. Thus the policies, rules, procedures and systems related to road transport across the Ethiopian borders must be harmonised and aligned with those laid down by the Tripartite Authority.

Lack of timely information to law enforcement agencies such as the transport department officials and traffic police evidently lead to unfit vehicles getting licensed or unscrupulous elements to drive vehicles with fake licenses and many such criminal actions getting undetected eventually leading to accidents and loss of life on the roads and indeed to inefficiencies and high transportation costs. In summary the following are identified as the major challenges faced by the transport administration with regard to road safety

- High number of fatal and other road accidents in Ethiopia. Approximately 48 deaths per 100000 population, and 62 fatalities per 10,000 vehicles[3]. Primarily due to driver error (85%), vehicle defect (6%) and pedestrian error (5%)
- Inefficient and inconsistent transport services offered across the regions and city administrative areas
- Lack of transparent law enforcement on the roads because of fragmented data and information systems, which makes it difficult to enforce penalties and spot repeat offenders

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[3] Based on published data from Ethiopia Federal Police Commission & Federal Transport Authority 2017

- Poor driver's license management and insecure driver's license cards leads to fraud and many people driving with an illegal license.

- Poor state of Vehicle registration management. Fraud in inspection centers leads to road unworthy vehicles on the roads.

- Multiple different systems used throughout the country, which makes it difficult to obtain good quality and reliable information at the right time.

- Documents and permits between Sub-Saharan countries cannot at present be validated electronically and can therefore easily be forged

- Limited quality control on vehicles, drivers and operators

- Administrative burden to apply and pay for issuance of permits

- Cost of transported goods increased directly affecting the economy

In the context of the expanding and growing economy and transforming society, expanding road infrastructure and technology ecosystem, high mobility characterised by a large and expanding vehicle population and sadly high incidence of road accidents and poor licencing system described above, the project has been initiated by the Federal Transport Authority of Ethiopia with the following aim and objectives

1.3   Project Aim and Objectives

Adoption of technology and development of ICT systems to support the driver licensing, vehicle permit issuance and law enforcement to mitigate the incidence of high road accidents on the Ethiopian roads is apparently the overarching aim of the Federal Transport Authority to initiate this project. It is expected that well developed integrated systems, deployed across the country, will lead to substantial reduction in fraud and illegal drivers on the roads, making the roads safer for all. Moreover the traffic police will be able to verify information remotely and quickly in order to identify poor drivers and repeat offenders. With support from technology vehicle registration would be objective and full proof, which will minimize fraud and make for safer vehicles on the roads. In addition information exchange between twenty member states that make the Tripartite grouping would facilitate validation of vehicle driver, operator and driver documents of vehicles crossing national borders thereby increasing road safety on international roads within the region.

To reach the overall aim of the Federal Transport Authority, Government of Ethiopia to provide a safe and efficient transport environment on Ethiopian roads the current technology driven project: *Transport & Traffic Management System (TTMS)* has been launched, within the

larger *Transport System Improvement Project (TRANSIP)* of the Government. The project consists of following component parts (Table 1).

Table 1: Component Parts of TTMS Project		
S. No	**Component Name**	**Component Description**
1	**Driver's Licensing, Training & Examination System**	Integrated software application for driver training, examination, licensing, revocation of licenses, printing of secure driver license cards and acceptance of payments
2	**Vehicle Registration and Inspection System**	Integrated software application that covers the full vehicle lifecycle of a vehicle import, buying and selling, registration, full inspection, 3rd party and other insurances, annual re-registration discs and retirement, ownership change and acceptance of payments.
3	**Penalty Management System**	Software Application to cover the full penalty tracking lifecycle of fines by the police, notification to owners, warnings and cancellations. It interfaces with other systems to extract information on the driver and the vehicle. The application will cover within its scope the transgressions specified under TTTFP.
4	**Road Accident Management System**	Software application seeks to cover the full accident lifecycle of a vehicle from any accident, investigations, finalization with insurers, notifications to owners and data exchange with other systems.
5	**Operator Registration system**	Software Application will cover the full life cycle of operator registration taking cognizance of the on the ground business processes and guidelines provided under TTTFP. The application will also facilitate exchange of information about operators, drivers & vehicles validity, all transgression and related data through TRIPS between member states (23 countries in the sub-Saharan region) and between regions inside Ethiopia.
6	**Central Help Desk Ticket System**	To cover the full lifecycle of staff assistance ticket to assisting in running the systems. This is for use for in-house Staff and Police in obtaining assistance and removing blockages using the systems on a routine basis.
7	**ICT Infrastructure**	To install the relevant infrastructure to support the above five systems. This will include everything from a Federal Data Centre, to Regional Data Centres right out to Zonal Transport Offices, including WAN, LAN and infrastructure hardware and foundation software.

Table 1: Component Parts of TTMS Project		
S. No	**Component Name**	**Component Description**
8	**Sustainable Power Solutions**	To install at all Federal, Regional and Zonal Transport offices that require the drivers and vehicle systems suitable sustainable power system to assist in mitigating the regular grid power interruptions.

1.3.1 Objective of the assignment

Though the context of the TTMS and its envisaged structure, complexity and importance is well appreciated the immediate objective of the assignment is to work closely with the FTA Project Implementation Unit (PIU) to design, supervise and deliver the TTMS Project to completion on behalf of the FTA. Therefore the key objective of the assignment is to design and supervise the Transport and Traffic Management System (TTMS), which comprise Driver Licensing System, Vehicle Registration System, Penalty Management System, Road Traffic Accident Management system, Operator Registration System, Staff help desk system and ICT Infrastructure.

1.4 Scope of Work of the Project

All actions and activities that will enable achievement of project objective will understandably fall within the scope of work of the project. FTA has conceived of this assignment to be undertaken in two phases. This phasing approach adopted by FTA is well taken, evidently logical and optimal. The Consultant will follow the two phase approach and 27 work packages as advocated by FTA. Detailed work organization and work management approach to be adopted by the Consultant for the two phases of the project is dealt with in the later sections of this document. At this stage we are presenting below a schematic diagram (Fig 1) that depicts on a broad basis how the two phases relate to each other and what major work groups are expected to be executed under the two phases.

It is to be under scored that the project is a national project with coverage throughout the country. The project will be implemented in 9 regions, 80 zonal offices and 2 Cities. FTA will distribute the vehicle and license system to each region after the system is developed and ready for production deployment.
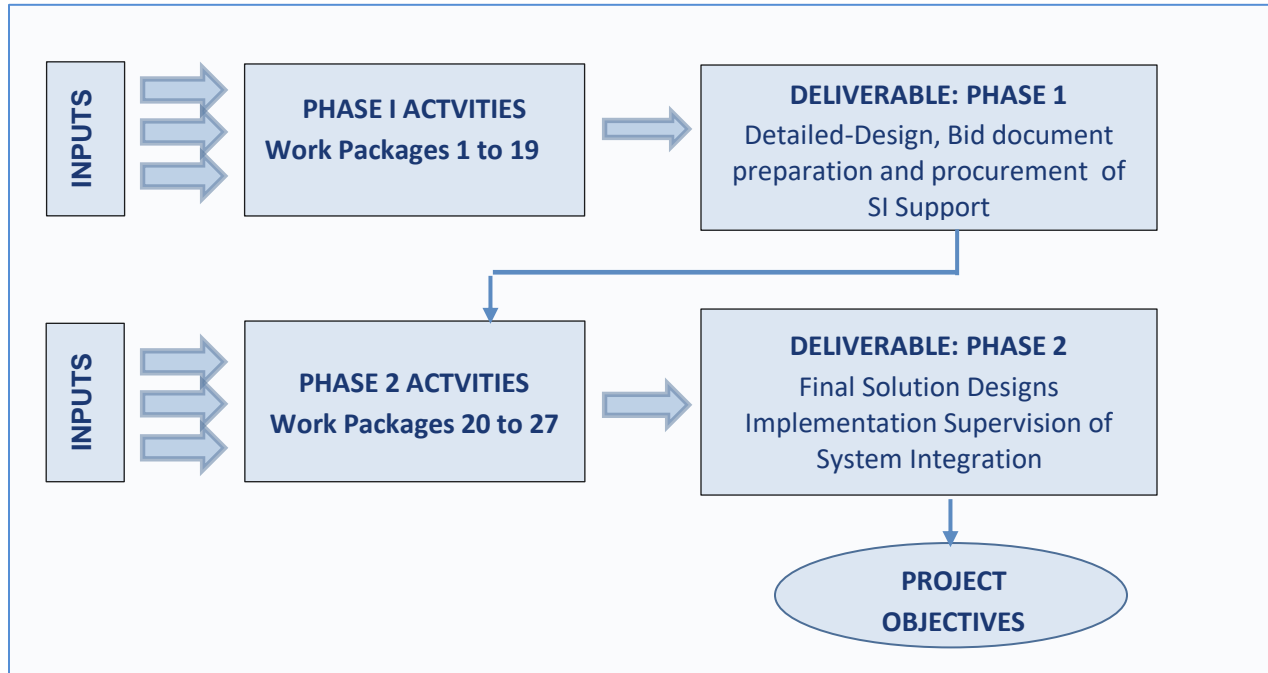
Fig 1: Project Phasing Schematic Diagram

1.4.1 Major Activity Groups

A high level presentation of main activities to be undertaken in the two proposed phases of the project is given in the Fig 2 below.
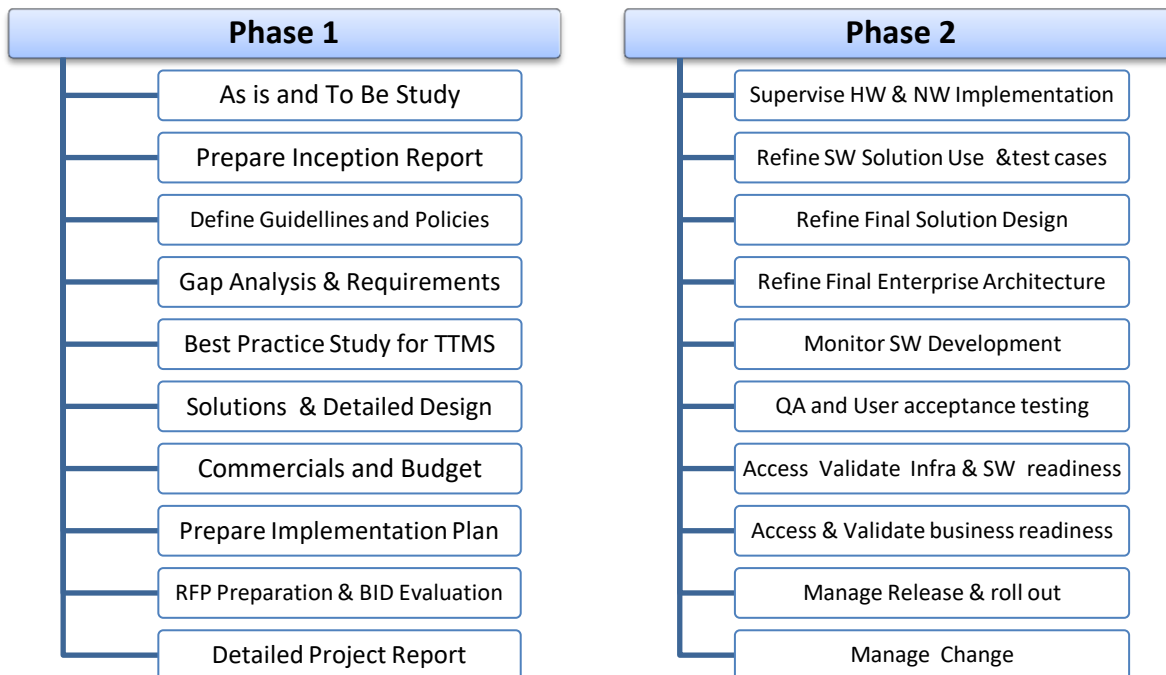
Fig 2: Major Activity groups under Phase 1 and Phase 2

The phase 1 of the project can be termed the discovery and design phase. During this phase it is expected that all actions will be undertaken that will permit the assessment of the present situation, identification of the gaps, capture of the requirements in the most detailed fashion and indeed design of the best and most optimal solutions for ICT infrastructure, policies and software applications. In addition, this phase will develop the most optimal implementation plan, estimate the budget, prepare the relevant RFPs and tender documents and support bid evaluation and vendor on-boarding.

The phase 2 of the project can be termed as the implementation phase of the project, where in all the actions would be undertaken to ensure development of the designed solutions and their implementation. This will inter alia include the ICT infrastructure enhancement covering hardware and networking and data center development and deployment. In addition this phase would include software solution development, business readiness validation including capacity development, training and change management. During this phase quality assurance and software acceptance testing would be undertaken and release and roll out managed systematically as per the pre-defined release and roll out plan.

1.4.2 Detailed Work Packages

The high level work groups, mentioned previously, constitute the total scope of work of the project. These work groups are further redefined and detailed in the form of twenty seven work packages that collectively lead to the desired outputs, deliverables and objectives of the project. These work packages expected to be undertaken as a part of the project work scope would be scheduled intelligently and undertaken in an agile iterative fashion in order to lead to the desired outputs and deliverables. A summary of activities of the work packages and their corresponding outputs are shown below (Table 2).

Table 2: Work Packages scope and outputs		
Work Package	**Description**	**Outputs**
PHASE 1 Work Packages		
Work Package 1	Establish Program Plan for Phase 2	Program organizational structure, operational plan and methods defined, with resources on the ground ready to go once Phase 2 is reached
Work Package 2	Establish and estimate the WAN and LAN Network	Estimate the likely cost, workload and duration that will be required to implement the network extensions.

Table 2: Work Packages scope and outputs		
Work Package	**Description**	**Outputs**
	requirement	Detailed gap analysis prepared, all technical and functional specifications prepared
Work Package 3	Establish the most optimal Data Centre usage approach plan	Propose and define the most optimal Data Centre usage approach plan which considers all the inputs and defines different options with their pros and cons.
Work Package 4	Establish and develop the power extensibility approach options and plan.	Analyse detailed power solution options and approach plans which would enable decision on the most optimal course of action
Work Package 5	Specify and Cost all End User Computing Equipment requirements	Define specifications for all end user computing equipment required for the whole program, such that reliable quantities for each of the locations and costs are determined for all future purchases.
Work Package 6	Establish optimal approach plan under which system modules may be reused, purchased off the shelf or built from scratch	Define strategic way forward on the types and approach for application packages that will be implemented.
Work Package 7	Establish a Solution Architecture for each Software Component and ICT	Detailed Solution Architecture (Solution Architecture Document).
Work Package 8	Refine and agree on all the business and technical requirements	Consolidated set of requirements, agreed by the business, which can be used to size and design the required systems.
Work Package 9	Establish a Driving School System approach plan	Defined, approved and agreed approach plan on how the driving schools will be integrated securely into the TTMS. This will be a software application that communicates with the Driver's Licensing System as per the final work flow.

Table 2: Work Packages scope and outputs		
Work Package	**Description**	**Outputs**
Work Package 10	Vehicle Inspection systems integration approach plan	Defined approach plan on how to integrate the Vehicle Inspections centres into TTMS. This will be a software application module that communicates with the Vehicle Registration System as per the final work flow.
Work Package 11	Create a Security Architecture approach plan	Optimal Security Architecture for the TTMS.
Work Package 12	Prepare the release approach plan for the Program Delivery	Detailed Release strategy.
Work Package 13	Establish the Quality and Testing approach plan	QA and Test Strategy Document
Work Package 14	Develop Data management approach plan	Data Management guidelines approach is clearly defined
Work Package 15	Establish a Business Readiness approach plan	Defined approach plan on how to establish, implement, and rollout capability building including training and end user material to support the new systems across the country.
Work Package 16	Establish a Change Management Approach plan	Defined approach plan is put forward on how to establish, implement, and rollout change management & communication to support the TTMS Program.
Work Package 17	Establish a Business Systems Support approach and a Systems Sustainability approach plan	SLA plan and a Business Sustainability strategy from the end of the Program, including years of maintenance and support, as well as options for sustainability thereafter.
Work Package 18	Update and refine all Enterprise Architecture Models	Enterprise Architecture v2.0 to reflect the FTA inventory and need of technology, data, applications, and business artefacts and to show the relationships between these components.
Work Package 19	Provide technical Support during Procurement processes for selection of a Systems Integrator (SI) Implementation Firm	Best qualified firm which will supply top quality services at good price and minimum risk is hired.

Table 2: Work Packages scope and outputs		
Work Package	**Description**	**Outputs**
PHASE 2 Work Packages		
Work Package 20	Design and Supervise the Implementation of the Rn Production Hardware and Network	Production hardware environment ready for each solution component is ready for deployment or trial production set up made available.
Work Package 21	Refine the Requirement of each applications systems as necessary	Refined Requirement specification.
Work Package 22	Define Final Detailed Solution Architectures per Application System from Enterprise Architecture.	Solution Architecture Documents, produced describing the overall Solution Architecture of each Application Component.
Work Package 23	Supervise and Monitor the development	Solution developments supervised
Work Package 24	Full QA vetting per release	Complete QA done and approved
Work Package 25	Ensure the EUC is installed and operational per release	All End User Computing equipment (EUC) is installed and operates correctly with the new systems.
Work Package 26	Implement the necessary Business readiness and training.	All resources are in place and know how to operate the new systems.
Work Package 27	Release the Functionality as per Rollout approach plan into PRO	Implemented rollout of hardware and networks ahead of the Software Rollout per Region

1.5 Project Stakeholders

The project stakeholders include the project sponsors, project partners and participants as well as the project beneficiaries who have a stake in the project. This evidently includes the Federal Transport Authority, Ministry of Transport, Government of Ethiopia, which is the sponsor and project owner. The stake holders would also include the various other government entities that would be involved in the project at the strategic and operational levels as well as private companies and organizations that would be either partners in the project or beneficiaries, either

directly or indirectly. A high level listing of the various project stakeholders is given in the Table 3 below.

Table 3: Stake Holder Map of the Project TTMS			
S. No	**Name of the Stakeholder**	**Description**	**Major Role**
1	**Federal Transport Authority (FTA) under Ministry of Transport**	Has stake both as a sponsor as well as beneficiary	Project Sponsor
2	**Regional City Administration Transport Offices**	Executive work of the project is all done by the Transport Offices (Bureaus) which form part of the Municipalities throughout the Country at various levels, Federal, Regional / City Administrative and Zonal / Sub-city and are responsible govt. entities.	Major executive partners and beneficiaries
3	**Traffic Police**	Traffic police officers are the main stake holders on the Penalty Management and Accident Management Systems. They are also involved as law enforcement agents.	Major executive partner and beneficiary
4	**Third Party Stakeholders within the Government**	A significant degree of integration and data exchange is expected with several Government entities • Ministry of Construction • Ministry of Trade • Ministry of Education • Ministry of Transport • Customs authority	Execution partners, data source or recipient
5	**System 3rd Party Stakeholders outside the Government**	A significant degree of integration and data exchange is expected with several non-government entities • Insurance agencies • Driving schools • Payment Organization • Research Institutes • Vehicle Inspection Centres	Data Source or data recipient and potential beneficiary

S. No	Name of the Stakeholder	Description	Major Role
		Table 3: Stake Holder Map of the Project TTMS	
		• Freight and passenger transporters	
6	**Ministry of innovation and Technology MINT**	Technology Lead agency of the Government as well as the operator of data centre infrastructure of the country. Tech Policy maker and standards	Executive partner and guide on policies & standards and data centre and national government ICT infrastructure operator
7	**Other ICT Organizations**	These include important ICT stake holders in the country that will one way or another have a stake in the project • INSA: Cyber Security Agency • Ethio Telecom: Sole telecom operator • Other telecom operators likely to come on board soon.	Tech Policy, standards and infrastructure providers

SECTION 2

APPROACH & METHODOLOGY

2.1   Introduction

The approaches and methodology of the Consultant for the execution of the assignment and its various component parts are presented here under. The execution of this assignment would be driven by international best practices, standards, frameworks and guidelines as much as by the experience of the Consultant in the delivery of similar national level digital transformation projects and e-governance assignments in developing countries.

2.2   International best practices and guiding principles

In the execution of this assignment in the most optimal manner the Consultant will follow international best practices, standards and defined frameworks for each component part of the assignment. With the fielding of highly qualified team of experts for the execution of this assignment it is expected that the knowledge and skills of cutting edge technologies, standards and management techniques would come naturally to each expert in his or her field of specialization. However the Consultant will follow some basic guiding principles and approaches in this assignment as we do in all other assignments of this nature. We are summarising below some of these principles as well as providing a brief overview on some major international best practices that we propose following in this assignment.

2.2.1   Principle of Optimality

It will be endeavour of experts to seek optimality in all their actions so that the solution designed and developed or proposed or services provides are optimal to the situation at hand. In other words, to provide solutions and services that would best meet the present and potential needs of FTA.

2.2.2   Minimal Cost of ownership

In all design and solution development activities the guiding principle would be to minimise the total cost of ownership of FTA. This would apply as much to the design of software solution applications as it would to the choice of hardware systems. The total cost would be the initial procurement cost plus all the costs associated with the operation and maintenance of the system over its life.

2.2.3   Holistic Perspective

The design, development and other services would be delivered with a holistic perspective. That would mean each component design would be targeted to meet its immediate and direct needs in the most optimal manner. Yet its interactions and impact on other subsystems and components of the enterprise system as a whole would need to considered

and evaluated. This approach would also be adopted to evaluate and assess how the TTMS performs as part of the e-governance system of the Government of Ethiopia at large.

2.2.4 Scalability and Flexibility

At the heart of the application and solution design would be the need to provide systems that are scalable, modular and flexible as well as vendor agnostic. This is essential to ensure that the initial investment in TTMS is protected as the scale of operation of the system increases or new needs arise and the operational efficiency does not fall as the scale of operations increases over time.

2.2.5 Service Oriented and Micro Services Architecture

Service Oriented Architecture (SOA) would be taken as the minimum requirement for the architectural designs to be developed as a part of this assignment. The current trend to develop and deploy granular SOA or micro services architecture would be accentuated and promoted. The international best practices in SOA and micro services would be employed such as API gateway for integration and distribution configuration amongst others.

2.2.6 International frameworks and standards

With a highly qualified team of experts proposed to be employed for the assignment the international best practices, standards, guidelines and framework would be employed for the project work in different subject areas of the project. For instance for enterprise architectural work standards and frameworks like TOGAF would provide guidance (Table 4)

Table 4: Major Standards, Guidelines, Frameworks		
S. No	**Expertise Area**	**Standards, Guidelines and Frameworks**
1	Business Analysis	IIBA Guidebook, PMI Business Analysis
2	Project Management	PMI and PRINCE 2 Frameworks
3	Strategic Analysis	SWOT Analysis, Score Card, PESTLE
4	Enterprise Architecture	TOGAF
5	Quality Assurance	ISO 9001
6	Application Testing	ISO/IEC 25010:2011
7	IT Infrastructure	ITIL
8	Application Development	IEEE SE Standards. UML, Sys.ML
9	IT Governance	COBIT
10	Security Management	ISO/IEC 27001 and 27002 & SABSA

Table 4: Major Standards, Guidelines, Frameworks		
S. No	**Expertise Area**	**Standards, Guidelines and Frameworks**
11	Risk Management	ISO 3100-2018
11	Data Integration	XML, Dublin Core
12	Data Protection	ISO 27701 GDRP of EU
13	Business Continuity Management	ISO 22301-2019

2.3   Project Execution Approach

Our approach towards this engagement is expected to be built on our in-depth understanding and extensive experience with similar projects. We propose to structure our activities in this engagement as per our *Transform Framework*, which has been successfully employed in critical project engagements across the world. The approach is modular and provides a structured and flexible approach for creating and managing technology driven change initiatives. It has been designed so that it can easily be tailored to the precise requirements of any project. It is proposed to customize and adopt this generic model for this assignment. An overview of the *Transform Framework*, aligned to the context of this project is provided in the Fig 3 below.

It can be gathered from the Fig 3 that the proposed *Transform Framework* consists of four stages, which optimally cover the 27 work packages of the project and indeed covers any additional activities that may be required to achieve the project's desired outcomes and objectives. Table 5 reflects the coverage of proposed work packages and defines the outcomes at each stage. Our project execution approach will leverage various enablers to accelerate the project execution to meet the desired timelines. Quick and robust analysis would be undertaken for assessing the current systems and infrastructure in place, regulations, business processes and the capacity and change requirements, including dependencies on the current transportation ecosystem. Corresponding transformation and capability to build intelligence and execution capacity for successful implementation of the initiative must be a top priority for the stakeholders. Leveraging the existing and relevant knowledge base for the required transformation and with the help of project enablers, we expect to accelerate the transformation journey and reduce the turnaround time thereby creating value for the FTA. The transformation enablers will consist of a mix of development and training programs supported by digitally oriented tools and processes. Some of the sample project enablers that we would leverage in the course of our engagement are presented in Table 6.

PROJECT PHASE 1			PROJECT PHASE 2
Stage 1 (45Days) Preparation & Requirements Gathering	**Stage 2 (105 Days)** Design Options Detailed Design	**Stage 3 (180 Days)** Vendor Onboarding	**Stage 4 (30 Months)** Delivery Oversight

Project Start Up
- Finalize Project Plan and KPI
- Establish Governance Structure
- Finalize site visit schedules
- Identify data /info sources

As is Assessment, Requirement Capture and Policies
- Business process assessment
- Current EA view
- Study rules and regulations
- Global guidelines and cases
- Study of security policies
- Map of all FTA locations
- Data flow and workflow mapping
- Functional & NF requirements
- IT infrastructure requirements
- Develop policies /guidelines

Discover & Propose solutions
- Develop usage options for ICT infrastructure and power
- Develop options for applications COTS Vs Built
- VR/DL integration options

Detailed Design
- Develop solution architecture & specification
- ICT infra & EUC design and specification
- Data integration app plan
- Security architecture
- Define implementation app
- Refine Enterprise Architect
- Change Management app

Provide Technical Procurement Support
- Prepare the bidding document
- Participate in the pre-bid conferences.
- Answer all Clarification questions from respondents.
- Provide technical assistance during evaluation and negotiation during contract award
- Support FTA in Identifying potential risks and challenges in relation to procurement & recommend mitigation measures

Project Implementation & Support
- Development oversight
- Quality Assurance
- ICT infra development review
- Provision EU Computing
- Readiness review
- Program governance monitoring
- Project closure

Stage 1 Deliverables
- Inception Report
- Requirement Guidelines and Policies

Stage 2 Deliverables
- Approved solution Options
- Approved solution architecture , implementation approach
- Approved Enterprise Architecture Version 2.0

Stage 3 Deliverables
- Approved Bid Documents
- BID Support completion Report

Stage 4 Deliverables
- Refined roll out plan
- QA correct equipment report
- Final detailed design solution applications ICT infra, DC, power
- SW release report, test report.& EUC test report

Fig 3: TTMS Transformative Framework

Table 5: Transform Framework Stages and Work Package Coverage and Outcomes				
Phase	**Stage**	**Stage Description**	**Work Package coverage**	**Major Outcomes / Deliverables**

PHASE 1	Stage 1	Preparation & Requirements gathering	WP 02, 03, 04, 08, 11 and 18	• Inception Report
				• Requirements, including
				  ▪ DL, VR, PM, AM ,OR & HD Business Functional & Business Non-Functional requirements
				  ▪ Access to Information Manual
				  ▪ Security Policy and Guideline
				  ▪ Data Centre Requirements
				  ▪ WAN / LAN Requirements
				  ▪ Security requirement
				  ▪ Power Requirements
				• Other Guidelines and Policies

	Stage 2	Design Options and Detailed Design	WP 01, 02, 03, 04, 05, 06, 07, 09 10, 11, 12, 13, 14, 15, 16, 17 & 18	• Approved solution Options • Approved Solution Architecture • Implementation Approach • EA Repository & Report • Approach Plan for Phase 2
	Stage 3	SI On-boarding	Work Package 19	• Approved Bidding Document • Bid Support Completion Report
PHASE 2	Stage 4	Delivery Oversight	WP 20, 21, 22, 23, 24, 25, 26 and 27	• Final Roll out/ Release plan • Final detail design IT Infra, Network & Power • SW release, Final Design Document • QA/ Test Reports in Production Environment • EUC QA Report

Table 6: Enablers and tools for project execution	
S. No	**Project Enablers**
1	Requirement Gathering Template
2	Policy, Regulatory & Legal Analysis Checklist
3	Requirement Review Checklist

4	Hardware and Software Assessment Checklist
5	Solution Architecture Framework
6	Enterprise architecture assessment questionnaire
7	Quality Control Framework
8	System Performance Assessment Checklist
9	Capacity Building and Training Enablers (Reference Kits)
10	Weekly and Monthly Communication reporting Dashboard Templates

2.4   Project Implementation methodology

Agile Scrum methodology shall be employed to execute the project during the first phase of the project. Agile methodology is considered well suited to TTMS during this phase where in requirements assessment and design is the primary focus. However, during Phase 2 of the project, which is focused on the application development and deployment DevOps would be employed in conjunction with Agile. DevOps methodology shall be employed for development and deployment of the applications during test as well as production. This methodology involves following an automated and iterative approach to build and test the development and deployment in quick cycles. This approach is expected to minimize uncertainties and give way to a more stable development and deployment environment with quick feedback from stakeholders.

Agile Scrum methodology to be employed during the first Phase of the project that involves following a flexible iterative approach to executive each stage of the project until the objectives and targets for each work stream / stage have been attained. This approach is particularly, suitable for the prevailing environment in Ethiopia. We are giving below salient aspects of this execution methodology and presenting a pictorial representation in the figure that follows:

- Entire project requirement would be broken into multiple work packages with related use case groups,
- Each work stream would be treated as individual project, following multiple Agile sprints
- Multiple work stream may get executed in parallel
- Scope identification/prioritization, grouping of requirements for work packages will be at the beginning of the engagement with discussion with FTA.
- Each Sprint within work stream will have multiple periodic demos for user experience.

- Demonstrations after each sprint ensures buy-in from the 'Business' and 'IT' early in the development life cycle.
- Allows for the incorporation of the Business stakeholders' feedback and review comments during construction phase.
- Focused areas of development in terms of business functionality and criticality.
- Provides opportunity for each logical group to be better than the previous one as development processes could be optimized and better customized to suit the client's need. Risk of changing requirements at a later stage is reduced
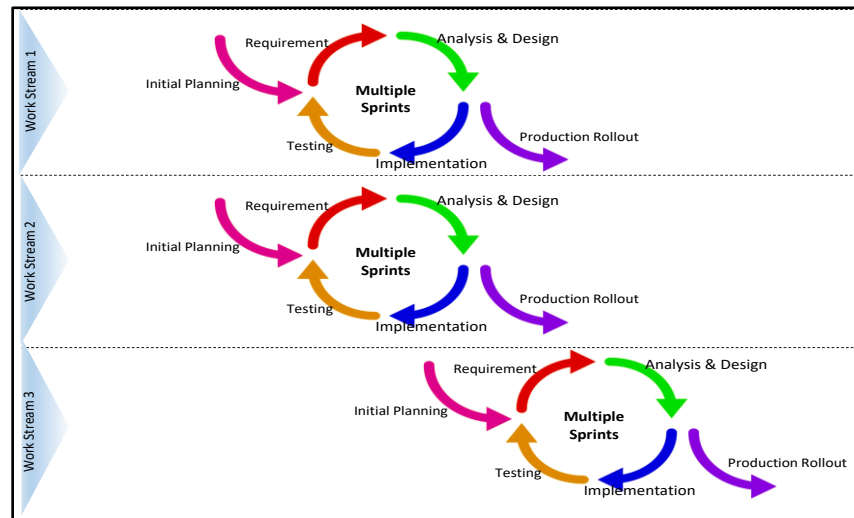
Fig 4: Agile SCRUM Project Execution Methodology

2.5   TTMS Enterprise Architecture

Enterprise Architecture is an important planning & implementation framework for a project of this nature. Enterprise Architecture is analogous to overall planning of enterprise and taking a holistic view of entire ecosystem, stakeholders, their concerns and viewpoints. For a project of this magnitude, a robust enterprise architecture framework and its successful implementation is essential for individual solution architectures to fit in the bigger scheme of things smoothly. The Consultant will employ TOGAF as the EA framework for TTMS project. A representative structural representation of the TOGAF framework is presented herein under (Fig 5). The framework presented provides an overview of the architecture structure and relationship between the various components of the EA. This framework is expected to be the guide that the Consultant's project team would follow over the course of implementing the project. A few key but non-exhaustive reasons for selecting TOGAF as EA framework for TTMS project are as follows: -

1. It is a widely used and validated EA framework applied successfully across many complex projects around the world.

2. It is structured with components parts like business architecture, technology architecture, information systems architecture and others that are logically integrated.

3. It provides a common language to document, study, design and validate enterprise architecture

4. TOGAF is an open architecture, which allows flexibility of plug and play use of other frameworks such as Agile methodology as per the requirements of the project (We are using Agile methodology for delivery in addition to TOGAF framework for managing the enterprise architecture)

5. TOGAF Architecture Development Method (ADM) is widely used, simple to learn and follow the process of drawing the entire solution right from the beginning to implementation and rollout.
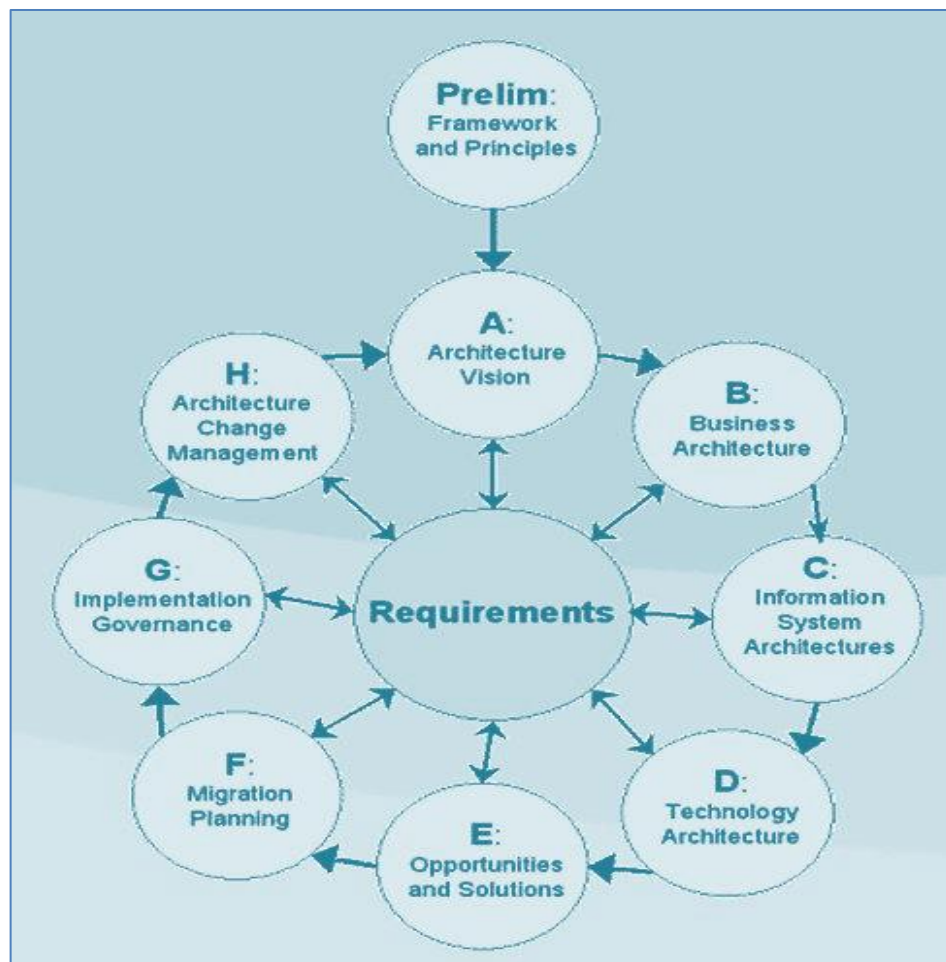
Fig 5: TOGAF Enterprise Architecture Framework

2.5.1 Salient features of TTMS Enterprise Architecture Design

Following are few salient features of the TTMS project that we will keep in mind while devising the Enterprise Architecture: -

1. **Integrated Systems** – The system and its modules will be completely integrated with each other. For example, while accessing the records for an accident or penalty, the vehicle registration and driver registration data should be accessible over internet, through various communication channels such as web or mobile app, as desired, seamlessly and in real time.

2. **Data Security** – The end-to-end traffic and transport management and access to entire data in real time, beckons the need of secure and controlled access of data to the privileged user only. System should be built with Role Based Access Control (RBAC) and object level security for authorized access to required datasets.

3. **Decoupled** – The enterprise architecture of the TRANSIP and subsequently TTMS system is envisaged to have an integrated yet decoupled model, where each module such as Driver Registration, Vehicle Registration, Accident Management, Penalty Management is a stand-alone service & deployment based on Micro Services Architecture. Following such an architectural design will help provide independent lifecycle to each module, and also integrate them for real time data access.

4. **Expandable** – The system will follow a clean database and an expandable architecture to be able to add more modules and/or more user cases in future. The business logic and use cases should be as much configurable as possible to keep the core system as mere facilitation and build the business logics as configurable rules. This allows flexibility in changing/upgrading the business rules with time and also to provision new rules to the system, as required. Further, the Micro-services architecture will help build new modules as and when required. For example, if there is a need in future to build an accident insurance module, it can be easily built without changing the existing modules and can be integrated in the entire TTMS system.

5. **Infrastructure** – A project of this nature involves various departments and institutions from federal level to various regional /city levels. The smooth functioning of such a project also depends on the robust infrastructure, on which it is rolled out. The robust infrastructure for TTMS project will have two components: -

a. **Central infrastructure** – This will contain the server deployment, disaster recovery, redundancy, high availability, high I/O speed, network and bandwidth related infrastructure.

b. **Local infrastructure** – The TTMS applications will be used from remote parts of the country, including FTA, 9 Regional Transport Authorities, 2 City Administration Transport Authorities, Traffic Police, other ministries and authorities from other countries as per international tri-partite agreement. The network connection, LAN, WAN, Power supply, accessing devices (Computers and hand held devices) also fall in the purview of providing right infrastructure for smooth operations of the TRANSIP / TTMS project.

The TRANSIP/TTMS project will be an IT platform enabling communication and information exchange from federal level authorities to local and regional bodies meant for enforcement of traffic and transport related policies. The objective is to build a set of integrated systems spanning the entire country that facilitate real-time information exchange to reduce fraud, crime and accidents. Following will be the stakeholders of such a platform as envisaged: FTA – Federal Transport Authority of Ethiopia is a government organization, overseen by Ministry of Transport (MoT). It is a nodal agency, a regulatory body for road transport and road traffic systems within Ethiopia. It is the key stakeholder of entire TRANSIP IT platform and will have admin access to configure user cases, create and edit business rules and to allocate roles and responsibilities to regional bodies.

1. Regional and City Administration Transport Offices – There are 9 regional transport offices and 2 City administration transport offices mainly responsible for vehicle registration and driver's license issuance. These regional agencies will need to be enabled with IT platform as well as ICT infrastructure, to make them use the TRANSIP system for updating the license and vehicle data online in the system.

2. Traffic Police – The enforcement modules especially Accident Management and Penalty Management will be used by Traffic Police at all levels i.e. Federal, Regional and Zonal levels.

3. 3rd Party stakeholders – Various other ministries, who would need limited data access from TRANSIP system such as Ministry of Trade, Ministry of Transport, Ministry of Education would come under this. Also, third parties such as Insurance agencies, payment agencies, driver training schools etc. will be a stakeholder of the system requiring continuous or batch access of data.

4. Ministry of Innovation and Technology – MINT will provide space and datacenters for hosting & deployment as well as provide the overall national IT policies and standards that would define the operating environment for TTMS

5. ICT Stakeholders – Telecom company & Information Network Security Agency (INSA) will provide the broadband and network related facilities.

6. Member countries of Tripartite Region – In order to facilitate cross-border road transport and to establish harmonized and integrated operator registration system, all 26 member countries of Tripartite Multilateral Cross-Border Road and Transport agreement are stakeholders.

2.5.2 TOGAF ADM application in TTMS

TOGAF ADM recommends iterative architecture development divided into 8 phases from phase A (Architecture Vision) to phase H (Architecture Change Management). We will follow all the phases of TOGAF EA Framework to govern our delivery approach. We have mapped deliverables and stages of TTMS project with various phase of TOGAF ADM to bring consistent structure and standard nomenclature to the project deliverables. We will use the following mapping of deliverables with ADM phases (Table 7)

Table 7: Project Phases Vs Architecture Development Phases		
Project Stages	**Project Work Packages**	**ADM Phases**
Stage I - Preparation and Requirement gathering	Inception, Requirement Gathering (WP08)	Preliminary, Architecture Vision (A) and Business Architecture (B)
Stage II - Design options and detailed design	WP 01, 02, 03, 04, 05, 06, 07, 09 10, 11, 12, 13,14,15, 16,17 and 18	Application and Data Architecture (C), Technology Architecture (D), Opportunities & Solutions (E),
Stage III - Vendor On-boarding	Preparation of Bidding Documents, Technical support on RFP (WP19)	Migration Planning (F)
Stage IV – Program Management	WP 20, 21, 22, 23, 24, 25, 26 27	Implementation Governance (G) & Architecture Change Management (H)

2.5.2.1 Preliminary Phase & Architecture vision

As governance becomes an increasingly visible requirement for big & complex projects like TTMS, spanning through multiple organizations, it is important to identify all relevant stakeholders, their viewpoints and concerns. The EA repository and access to its information is planned and implemented in this phase. Architectural principles are outlined. All stakeholders are identified. It is also important to setup an architecture governance board with key identified point of contacts from each stake holder department. TOGAF framework also advocates setting up the governance board to identify broad architecture principles and set the directives to be followed through the implementation of the project.

The benefits of Architecture Governance include:

1. Increased transparency of accountability, and informed delegation of authority
2. Controlled risk management.
3. Protection of the existing asset base through maximizing re-use of existing architectural components.
4. Proactive control, monitoring, and management mechanisms.
5. Process, concept, and component re-use across all organizational business units.
6. Value creation through monitoring, measuring, evaluation, and feedback.
7. Increased visibility supporting internal processes and external parties' requirements; in particular, increased visibility of decision-making at lower levels

Stakeholders & Architecture Governance Board

The Consultant has been able to identify the stakeholders of TTMS and propose a governance board for this project during the inception phase: This project stake holder mapping has been done based on the information already collected and is hereby presented in the attached Annexure to this document.

iServer Enterprise Architecture Repository

A mature Enterprise Architecture must have a robust and easy to use Enterprise Architecture repository. The EA repository helps store various artefacts such as ADM content frameworks, meta models, architecture documents & models. It also helps all the stakeholders and architecture governance board to periodically review the progress of the project. EA tools are software applications designed to support enterprise architects and other business and IT stakeholders with strategically driven planning, analysis, design and execution. Following are the salient features of this robust Enterprise Architecture repository tool: -

1. **Ease of access** - Enterprise Architecture toolset would be collaborative with easy access to the repository for all stakeholders to be able to check on the progress of the project based on their respective roles.

2. **Easy to use modeling interface** – The tool/platform would be intuitive modeling interface, which also supports range of EA standards out of the box including TOGAF, Archimate and UML.

3. **Minimal Training** – The platform must be intuitive enough for new users to learn quickly and get familiar with the tool in minimum time and efforts.

4. **Unified tool for EA and SA** – We prefer same tool for Enterprise Architecture as well as Software/Solution Architecture, to reduce inconsistencies, manage all information at central repository and streamline deliverable amongst various stakeholders.

5. **Speed of Hosting** – The tool/platform should be quickly deployable without much complexity and should be easily manageable.

6. **Visual & Business friendly presentation** – The tool/platform should have visually appealing and intuitive presentation outputs in deliverables.

7. **Interoperable** – The tool/platform must support interoperability by providing import/export options in popular formats such as XML, Microsoft Word, Microsoft PowerPoint formats amongst others. The tool should also be interoperable with Microsoft Office and Microsoft Visio.

After due consideration of various available Enterprise architecture (EA) tools/repositories we have identified iServer from Orbus Software for Enterprise Architecture modeling and repository. We will employ iServer 2017 using Visio Pro as both the Enterprise Architecture as well as Solution Architecture toolset. We recommend iServer for a number of reasons: -

1. Out of the box support for TOGAF9 as well as Archimate3.
2. Unified toolset for both SA and EA with proven capabilities
3. Availability of central repository with role-based access control for better management and monitoring of the entire project.
4. Built on top of widely popular Microsoft applications such as MS Visio and MS Office.
5. Easy to use and minimal training requirement brings new users and the team up to speed in day to day use f the toolset very quickly.

6. Out of the box support for UML.

7. Standard choice for software modeling and solution architecture

8. Option of Export/Import to maintain consistency and interoperability with various other tools and systems

9. Strong architecture views, reporting modules and access to dashboard to key stakeholders and business owners to monitor progress.

We will use iServer initially to be deployed on cloud hosted by Orbus professionals to enable cloud-based EA repository. Towards the end of the project iServer would be deployed on premises The Cloud based EA repository will have the following benefits: -

1. Cloud based EA repository will facilitate remote usage and access of repository.

2. The EA repository will not be limited in access by local network limitations and outages.

3. The best practices of setting up a repository will be brought by Orbus professionals.

4. The system will be free from hardware maintenance, backup and redundancy management and bandwidth management as these aspects will be taken care of by the provider.

2.5.2.2 Business Architecture (Phase B)

The business architecture will derive its scope and deliverables from the objective of Modernization of Nationwide Vehicle Registration, Driver's Licenses, Penalty Management and Road Accident Information systems, which will enhance the function and data exchange of the sector as well as enhance law enforcement capacity. The business requirement architecture covers the following activities:

Establish a Driver's Licensing, Training & Examination System

This covers the full driver's lifecycle to be managed by both the Transport office staff and Driving schools' staff, of a new student driver, through training, examinations and into the system as a daily road user. It also covers upgrades to license types, revocation of license, printing of secure Driver's License Cards, accepting payments and electronic notifications to the drivers of any changes.

Establish a Vehicle Registration and Inspection System

This covers the full vehicle lifecycle of a vehicle from import through customs, buying and selling, registration, full inspection, 3rd party and other insurances and vehicle's daily use. Thereafter, annual re-registration discs and eventual retirement from use and modifications and changes to the vehicle. It also includes special motor registration requirements specified by the

Ministry of Urban Development and Construction (MUDC), printing of secure Vehicle Registration documents and accepting payments and electronically notifying owners of any changes.

Penalty & Accident Management Business Requirement:

1. Optimization of the Penalty Management Business Processes (both in Office and in Remote Locations)
2. Optimization of the Accident Management Business Processes (both in Office and in Remote Locations)

Penalty Management Core Requirements

1. Development of driver's penalty management system.
2. Assign points to driver for server traffic violation.
3. Penalty management must cater for speeding fines.
4. Penalty management must include transgression penalty under TTTFP
5. Penalty management must cater for parking fees.
6. Penalty management must cater for uninsured vehicles fines.
7. Penalty management must maximize offline working capability.
8. Installation of monitoring equipment's at key locations.
9. Share penalty points drivers incur to driver, police, insurance & legal institutions.
10. Penalty management must cater for drink driving fees
11. Penalty management must cater for roadworthy vehicle fines
12. Penalty management must cater for overload vehicle fines
13. Send SMS & E-mail as confirmation of penalty incurred, penalty point's addition or expiry.
14. Integrate all operational data into a data warehouse.

Accident Management Core Requirements

1. The ability to input accident data
2. The ability to share & update data in secure manner
3. When accident happens then both vehicle & driver should be verified for being legal
4. Management accident system must maximize offline working capability
5. Must be able to capture GPS location of vehicle by using mobile at the spot of accident.
6. Integrate all operational data into data warehouse
7. The ability to manage and analyze data.

Operator Registration Business Requirements

This covers the sharing & exchange of data and information amongst all 26 member states who are party to the Tripartite Multilateral Cross-Border Road Transport Agreement (TTTFP). All transgression and related data of Operators, Drives & Vehicle validity will be shared between regions. Following will be identified & concluded for Operator Registration System during Business Requirement phase: -

1. The Operator Registration System will comply with functional requirements for TRIPS as specified in URS-009 Tripartite Transport Registers and Information Platform System (TRIPS) Specification.

2. All interfaces and exchange specifications will comply to URS-008 of TRIPS, which is Standard Specifications for the Cross Cutting Functionality and Interfaces of the National Transport Information System (NTIS).

3. Annex 10 of URS-009 provides interface XSD schemas for each of the interfaces to TRIPS. This will be complied while analyzing requirements and defining API and User interfaces for the system.

4. Best practices from other member countries such as Malawi and their systems will be studied to take advantage of their experiences and learnings.

5. Interviews & Interactions with project team of TRIPS and TTTFP will be scheduled to understand the interfaces, specifications and use cases in detail for designing such a system.

Central Help Desk Ticket System Requirements

Central Help Desk system will be an internal system to oversee smooth transition and operation of the above five systems namely DL, VR, AM, PM and OR systems. It will facilitate full lifecycle of staff assistance for the above-mentioned systems. This will include ticketing and assistance in running the systems. Gathering the Business Requirements for Helpdesk system will entail the following: -

1. Interaction with Driving License Registration system staffs for understanding their need of an internal helpdesk system and their required and requested features.

2. Interaction with Vehicle Registration system staffs for understanding their need of an internal helpdesk system and their required and requested features.

3. Interaction with Federal and Traffic Police staffs for understanding their need of an

internal helpdesk system and their required and requested features.

4. Interaction with other third-party actors such as Insurance, Payment Operators, Telecom & stakeholder ministries for their inputs, features and access to such an internal Helpdesk and management system.

5. Design of complete workflow of ticketing, assistance & language translation requests with FTA authorities and PIU.

2.5.2.3 Data & Application Architecture (Phase C)

In the context of Business Architecture and Security Architecture, we will define the data architecture as a blueprint for managing data assets by aligning with organizational strategy to establish strategic data requirements and designs to meet these requirements. Business processes, business organizational structures, and business goals are important for the data architecture, along with security and compliance. Data architecture will consist of the following: -

1. **Data Architecture Behavior:** Collaborations, mindsets, and skills among the various roles that affect the enterprise's Data Architecture.

2. **Data Architecture Activities:** Forms, deployments, and fulfilment of Data Architecture intentions.

3. **Data Architecture Outcomes:** Models, definitions, and data flows at various levels, usually referred to as Data Architecture artifacts.

4. **Data Architecture Repositories:** Data models, Database designs, Data storage, Data security, Data redundancy, Data flow and Data communication

The objective of the Application Architecture is to develop the target Application Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns and identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Application Architectures. New application building blocks being introduced as part of this effort will need to be defined in detail during Phase C. Existing application building blocks to be carried over and supported in the target environment may already have been adequately defined in previous architectural work; but, if not, they too will need to be defined in Phase C.

Data Management Plan

Data Management will define how we will store and manage our data assets during FTA TTMS project. It will include the standards, policies & procedures including access to information guidelines and overall management of TTMS enterprise's data. It will also provide the guidance to ensure that data is accessible, available, consistent, secure, auditable and maintains high quality. It will: -

- Identify sources of legacy data along with metadata definition

- Develop data migration strategy & plan

- Identify data quality benchmarks to be followed

- Identify & implement data modelling techniques

2.5.2.4 Technology Architecture (Phase C)

In this phase, we will develop the Target Technology Architecture to enable the Architecture Vision, target business, data, and application architecture to be delivered through technology components and technology services. The objective will be to identify the technology stacks, locations, applications, standards, design patterns and frameworks to achieve the business and data architecture phase outcomes. Primarily, we will focus on: -

1. Technology installation locations
2. Sizing, costing and capacity planning of technology applications
3. Installation, governance & migration impacts
4. Maintainability, Performance & Availability

2.5.2.5 Security Architecture (Cross cutting concern)

In complex inter-organizations projects for an entire country such as TTMS, which also deals with volumes of data of citizens and vehicles in form of Driving License data and Vehicle Registration data, security becomes an important cross-cutting concern. We propose the following methodology for implementing Security Architecture as a cross cutting concern across all phased of architecture development: -

1. Identify all the risks associated with business objectives, goals, strategy & attributes
2. Identify the required controls to manage the risk
3. Define a program to design and implement those controls
4. Implement conceptual architecture to implement the controls and mitigate risks
   a. Governance, policy and domain architecture
   b. Operational risk management architecture

   c. Information architecture

   d. Certificate management architecture

   e. Access control architecture

   f. Incident response architecture

   g. Application security architecture

   h. Web services architecture

   i. Communication security architecture

5. Devise hardware architecture in accordance with conceptual architecture

   a. Platform security

   b. Hardware security

   c. Network security

   d. Operating system security

   e. File security

   f. Database security, practices and procedures

2.5.3 Enterprise Architecture Review and Refinement

The Consultant would undertake a detailed and exhaustive assessment and review of the existing set of EA Repository Models in the light of the international best practices and standards including drawing inspiration and guidance from the TOGAF. Highlights of assessments would include IT and Network Architectures as part of EA models. For instance the EA assessments could follow the framework proposed in the international EA Assessment Framework (illustrated in Fig 6).
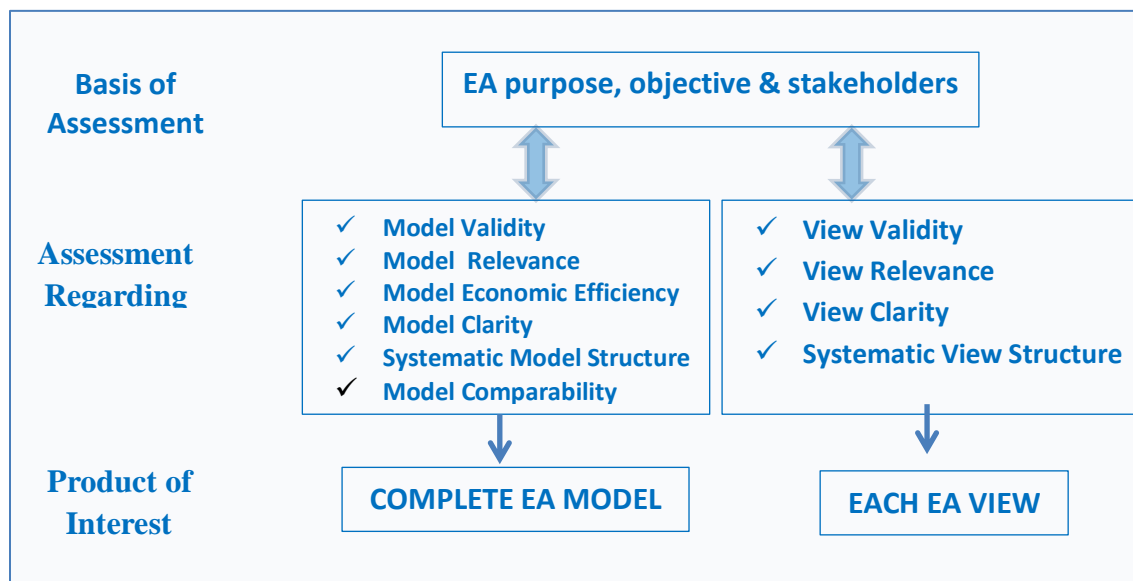
Fig 6: EA Model Assessment Framework

The EA models would also be assessed and evaluated on the level of their maturity (illustrative maturity parameters for a five stage maturity model shown in Fig 7)
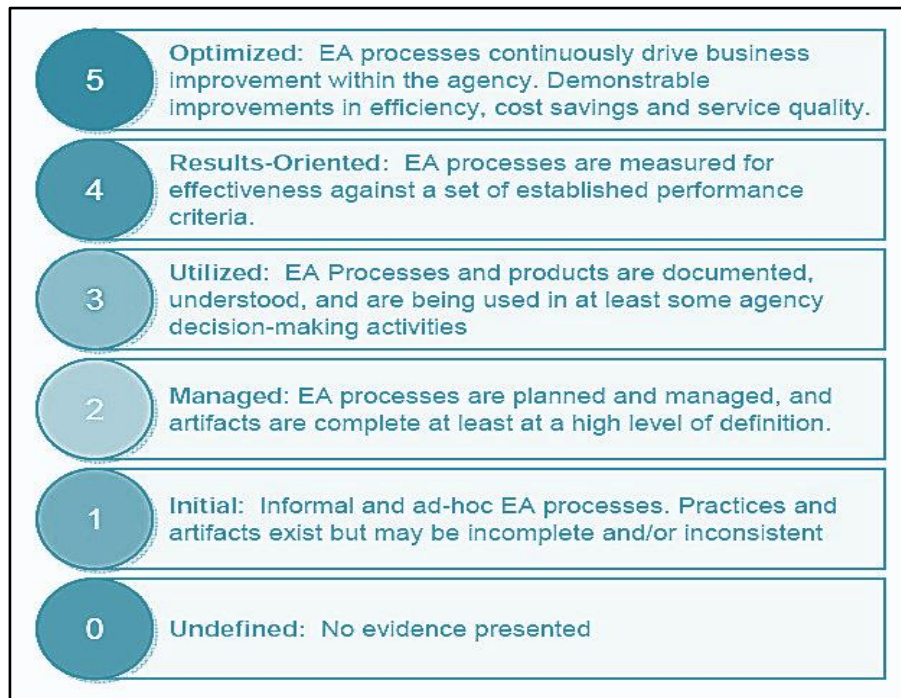
Fig 7: EA Model Maturity Framework

2.6   Change Management and Organizational Development

TOGAF recommends projects to be described in terms of business outcomes and not only technical deliverables. This helps business to appreciate what was being delivered as often the IT architects lose sight of the ultimate business goal. A carefully defined and well-articulated change management framework and methodology is essential ingredient in capability based planning, which strategically frames all phases of the architecture development in the context of business outcomes, clearly linking the IT vision, architectures, the implementation and migration plans with the strategic & business outcomes. Following this approach we propose development of a concise change management strategy document during stage 2 of the project.

TTMS project will involve stakeholders from various departments including Federal Transport Authority, Regional Transport Authorities, Traffic Police, Insurance, Driving Schools amongst others. It becomes very important to engage with all stakeholders, right from the requirement gathering phase leading to solution design phase, implementation and effective installation. We propose change management approach as follows: -

1. Involve representatives from all departments during requirement gathering
2. Open to suggestions and feedbacks during the solution design phase
3. Information & Validation of solution design with relevant stakeholders
4. Apprise of the new proposed system to all representatives and internal sensitization on upcoming change
5. Define formal training and workshop methodology post roll-out
6. Issue resolution and feedback collection in post-rollout and post-production stages.

Change Management will be driven at all levels namely Enterprise Change Management, Organizational Change Management & Individual Change Management.

2.6.1   Enterprise Change Management Capability

Enterprise change management is an organizational core competency that provides competitive differentiation and the ability to effectively adapt to new systems and solutions. The end result of an enterprise change management capability is that individuals embrace change more quickly and effectively, and organizations are able to respond quickly to market changes, embrace strategic initiatives, and adopt new technology more quickly and with less productivity impact. This capability does not happen by chance, however, and requires a strategic approach to embed change management across the enterprise. To enable change at the enterprise level, we will do the following: -

1. *Design the best-fit approach*: The staff may be cautious that a large scale attempt to implement new initiatives may lead to months spent trying to achieve the objectives of the implementation. A *thinking big and implementing small approach* would work well to manage expectations and keep costs under control.

2. *Focus on the benefits*: "Quick wins" will be the key in our approach to generate confidence that change is possible and to galvanize stakeholders. These will be as simple as changing the distribution of a report, or enhancing the presentation of certain KPIs using charts, trend analysis or linking to other metrics.

3. *Build involvement of customers*: Our approach of introducing stakeholders to the program objectives and approach will help to create a vision of what success looks like. We will hold workshops with stakeholders using the proof of concept to get their insight and feedback and incorporate these into revised packs.

4. *Sustainability and moving forward*: The investment required for the transformation of the organization is significant and half-completed projects are often shelved due to

conflicting demands. We will work with key influencers to lead and encourage your organization to complete the work expected to build a better organization.

2.6.2 Organizational Change Management

Organizational change management provides us with the steps and actions to take at the project level to support the hundreds or thousands of individuals who are impacted by the project. Organizational change management involves first identifying the groups and people who will need to change as a result of the project, and in what ways they will need to change. Organizational change management also involves creating a customized plan for ensuring impacted employees receive the awareness, leadership, coaching, and training they need in order to change successfully. Driving successful individual transitions should be the central focus of the activities in organizational change management. An organization change management capability means effective change management is embedded across all stakeholder organizations such as FTA, RTOs & City administrations, Traffic Police, Driving Schools, MCIT, ICT stakeholders, 3rd party stakeholders and members of Tri-partite agreements. To enable effective change management at enterprise level, we will do the following: -

1. Identify & document organization's roles, structures, processes and leadership competencies
2. Document the accountabilities & responsibilities of organizations towards the TTMS project
3. Identify Change Owner point of contacts in organizations, who will percolate the new processes down the entire organization.
4. Identify quantifiable metrics to measure change management effectiveness and adoption in all stakeholder organizations
5. Open feedback loop and be quick and empathetic to identifying and resolving disputes.

2.6.3 Individual Change Management

It is natural for humans to resist change. However, we are also quite resilient creatures. If supported properly through times of change, we can be wonderfully adaptive and successful in embracing change. Individual Change management is broadly defined as "the process of helping people understand the need for change and to motivate them to take actions, which result in sustained changes in behaviour and attitude"

Individual change management requires understanding how people experience change and what they need to change successfully. In TTMS project, our approach will be to percolate all change management processes down to individual level for effective installation and roll-out of new systems. This includes actual workforce, who would be using the new TTMS systems day-in day-out and would to deviate from their existing processes and practices. Thus, managing change at individual level is most critical for the success of a project like TTMS. It also requires knowing what will help people make a successful transition: how to coach people to demonstrate new behaviour, and what makes changes "stick" in someone's work. We propose the following approach for change management at individual level: -

1. Prepare well documented and exhaustive training materials, which are as illustrative as possible. A properly documented training material serves as a great reference to help and support on using new systems and solutions.

2. Engage the workforce in training them their respective functions. For example, police personnel enforcing traffic regulations need to be trained well enough on penalty management solutions and mobile apps. Vehicle registration personnel need to be trained on their respective subsystems.

3. Be open to questions, concerns and queries from the individuals and promptly resolve their queries.

4. Identify the trainers, and train them exhaustively on the systems & solutions. These trainers can further train the new workforce on new systems.

5. Prepare the reference and help materials such as User Manuals, Standard Operations Procedure Documents, System Help Documents and Process workflows Manuals. so that team can refer to them for any self-education and learning.

6. Setup a help and support centre and equip the same with adequate experienced support staffs to take the support cases from the workforce.

2.7   Security Architecture development approach

The security architecture development for TTMS covering the strategic security policies, procedures and systems would be driven by the international best practices and standards as much as by the prevailing situation on the ground with regard to the risks and threats that exist or may be anticipated to emerge in future. The project team would consult and collaborate with INSA and MINT to review and assess the security environment, security policies and the National Information Security requirements documents. In doing so, the Project Team would identify the security requirements as a part of the policy documents, aligned to the TTMS scope

and needs. In general our security architecture assessment and design would be driven by the following minimal security guiding principles (Table 8).

Table 8: Security Guiding Principles	
Principle 1	Security by design
Principle 2	Simplicity
Principle 3	Defence in depth
Principle 4	Least privilege
Principle 5	Default deny
Principle 6	Fail secure
Principle 7	Do not trust external systems

Our overall framework for establishing the security architecture approach plan, shown below (Fig 8) will be aligned to the requirements for the project. The core components of the framework are Governance, Risk Response and Compliance. The IT security governance includes activities that define the basic security governance as a part of broader enterprise security policies and strategies. Risk Response consists of the assessment of the risk and the impact of the each risk factor and most importantly development of the risk response policies, strategies, response tools and systems and their control. The last component related to compliance involves monitoring risk responses, update risk profile on a perpetual basis and design and development of a compliance reporting framework that covers the compliance reporting and monitoring, analytical tools for risk monitoring and response and importantly enhancement of awareness and training across the enterprise.

As an international standard practice IT security process consists of seven steps. The first step of this process is to perform risk assessment, which would involve identification of the risks to systems, data resource and TTMS IT infrastructure; second step would be establishment of IT security policies as well as risk tolerance level and impact assessment of each threat. This is followed by risk analysis and the organizational response to the identified risks including preventive actions and policies and procedures to preempt risky actions from internal and external actors. Lastly and importantly is the establishment of monitoring and control policies, systems and procedures.

After carefully deliberating on all available and mature security architectures, we found Sherwood Applied Business Security Architecture (SABSA) to be the most mature and comprehensive security architecture for Enterprise Architecture modeling. SABSA is most mature and widely adopted security architecture and can be easily integrated into TOGAF framework. SABSA also covers all domains and viewpoints (Fig 8) Therefore we propose use of SABSA for this project.
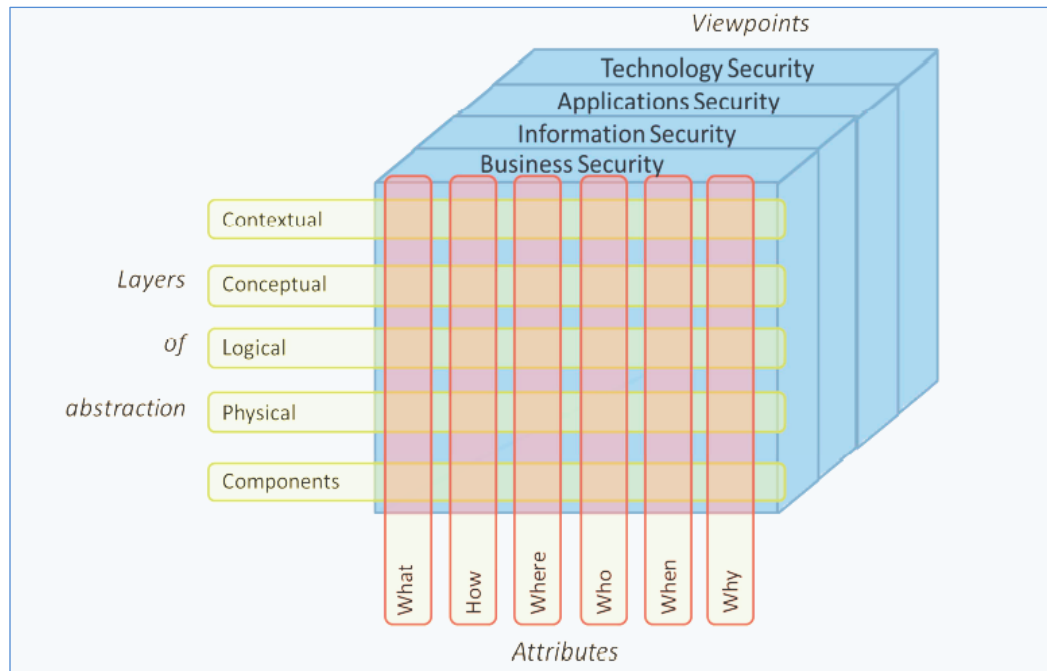
Fig 8: SABSA Security Architecture Development

2.7.1 SABSA lifecycle and phases

The architectural guidance of SABSA is supported by the SABSA lifecycle model, which has four basic phases. These phases are:

- Strategy and planning
- Design
- Implement
- Manage and measure

2.7.1.1 Strategy and planning

This phase focusses on the definition of the results that the security architecture should provide. The methodology addresses the design of the contextual security architecture and the design of the conceptual security architecture. The two architectures are positioned by the

SABSA framework to be the first architectures to define. The remaining architecture layers depend on the outcome of these two layers, so they should be addressed first.

2.7.1.2 Design

In the design phase, the architecture is created. This creation is done using a structured process outlined in the methodology. Designing security architecture in the SABSA methodology covers three layers of abstraction of the SABSA model:

- The logical security architecture
- The physical security architecture
- The component security architecture

2.7.1.3 Implementation

After the design is completed and validated, the architecture designed in the previous step is implemented. This implementation is also described in the SABSA methodology. Information for implementation and starting the information security architecture program is provided where guidance for several topics related to implementation is outlined:

- Getting sponsorship and budget
- Building the team
- Using workshops to define the goals
- Program planning and management

2.7.1.4 Manage and Measure

The management of security policy is addressed, as well as the management of risk, assurance management and operational security management. In the methodology "management" is covered by the management of security and the management of architecture in the broadest sense, covering ITIL operational management in the context of security as well. Measurement of security is covered in the assurance as well. Additionally, metrics are addressed throughout the methodology. The most significant guidance on metrics and measurement is provided in the section covering how to measure the business attributes profile created in the conceptual security architecture

2.7.2 SABSA Integration with TOGAF

The SABSA lifecycle is generic by nature. It can be well integrated with other architectures, specifically with TOGAF. This helps in aligning architectural development efforts between different architectures, thereby supporting interoperability (Fig 9)
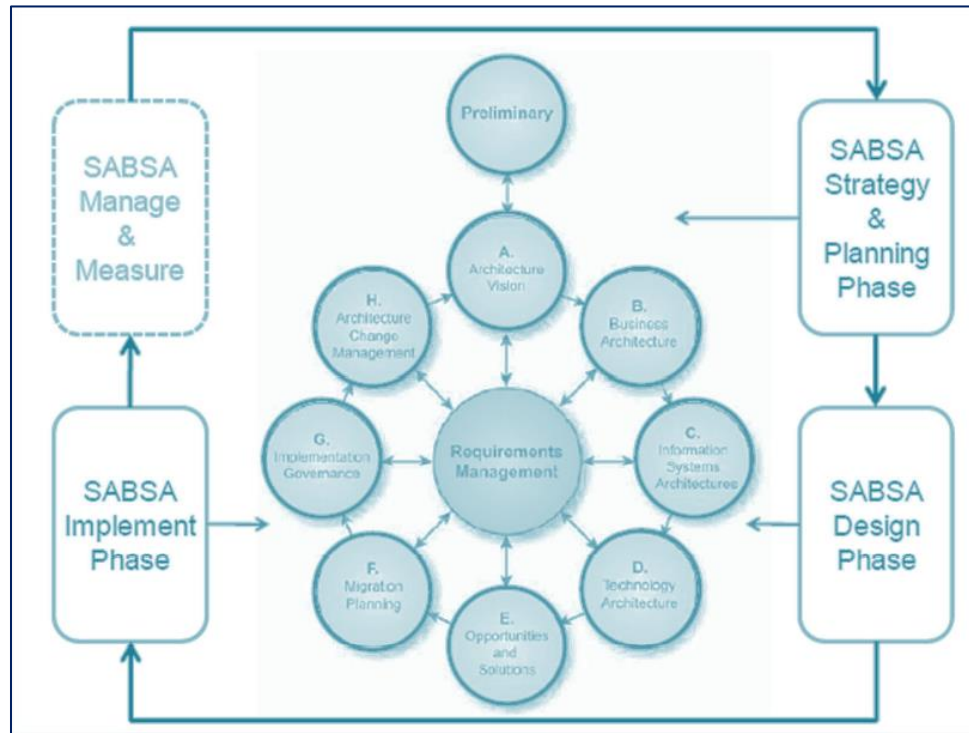
Fig 9: SABSA integration with TOGAF

2.8   Guidelines, Policies, Rules and Regulations

TTMS would be operated and governed by defined policies, rules and regulations. The matrix of policies, rules and regulations would be formulated, on one hand, based on the operational needs of the system and on the other hand these would have to be aligned with broader national and international guidelines, policies and laws. We shall undertake an extensive study and review of the rules, regulations and policies that may directly or indirectly impact the TTMS design and operations. These could for instance, include the transport sector policies, rules and regulations as much as policies, standards, rules and regulations related to ICT, e-governance and information management. In this regard detailed consultations will be held with the ICT and transport sector stake holders including MINT, INSA and Ministry of Transport.

The project team would study and review all the relevant policy documents on transport and ICT and e-governance, IT security, data protection as well as standards established by the government for operations and governance of the transport sector and the ICT sector in the country. This will for instance include E-Governance policies, National ICT Policies, E-Government Interoperability standards and other ICT standards established by the

Government of Ethiopia. The team will also conduct detailed review of the documents related to COMESA-EAC-SADC Tripartite Agreement on Cross-Border Road Transport and model laws and regulations, standards, system specifications laid out by Tripartite Transport and Transit Facilitation Program (TTTFP).

2.9 Requirement gathering approach

Accurate and exhaustive gathering of business requirements, both functional and nonfunctional, is essential. Requirements of each proposed application would be based on the extensive business analytical work to be done by the business analysts in their respective domains. The international best practices in business analysis would be employed to undertake the business analysis employing one or more of the following business analysis techniques as recommended under the IIBA framework (Table 9)

Table 9: Business Analysis and Requirements Gathering	
1	SWOT Analysis for Strategic Business Analysis
2	Operational Business Analysis
3	Tactical Business Analysis
4	PESTLE Business Analysis
5	Business process analysis, mapping and modelling
6	Workflow Analysis
6	Data Flow Modelling
7	Business Information gathering by structured questionnaires
8	Focus groups and brain storming sessions
9	Structured individual discussions with managers
10	Structured group discussions with managers
11	Unstructured discussions with business managers
12	Review of relevant guidelines, policies, standards and laws
13	Decision Making Process Analysis

In addition to the overarching business analysis the team would analyse the business processes in details in order to

- Establish the To-Be design for each business process mapped
- Identify the requirements for any data sets created owing to the new process
- Establish the process owner and stakeholders for the new process
- Identify the new outcomes if any from the process

The existing ICT infrastructure including the data communication networks, data center resources, electric power supply analysis and relevant ICT infrastructure and end user computing resources at the various office and locations of transport offices and others would need to be assessed in order to identify the EUC, LAN and WAN gaps that currently exist at each operational office (including transport offices, zonal, regional and city offices). In addition detailed gap analysis of power at each operational office would be necessary.

2.10 Quality Assurance and Testing approach

As a part of the TTMS program Quality Assurance and Testing strategy and approach would be well defined and articulated; taking guidance and inspiration from international best practices and standards such as ISO 9001. A strategic approach to Quality Assurance would be followed that would ensure that well defined testing strategies and tools are employed, testing automation methods are employed where ever feasible and performance metrics are predefined and indeed the necessary human resources are available to undertake the necessary tasks. The following activities are highlighted

- Identify types of testing to be undertaken
- Identify tools to be used for testing
- Develop RACI matrix for testing and QA
- Prepare QA and testing Strategy and plan

Our approach to QA and testing is best illustrated in the Figure 10. As can be gathered from Fig 10 there are three main areas of importance in this approach. One, the quality assurance policies and metrics, testing processes, test environment capabilities, performance test strategy, configuration management and others; second, automation tools and technologies and performance testing system, test requirements management process flow, tools usage structure and automation framework; thirdly the approach concerns the human resources management for quality assurance and testing, which will amongst others include skills and competences required and definition of the roles and responsibilities.
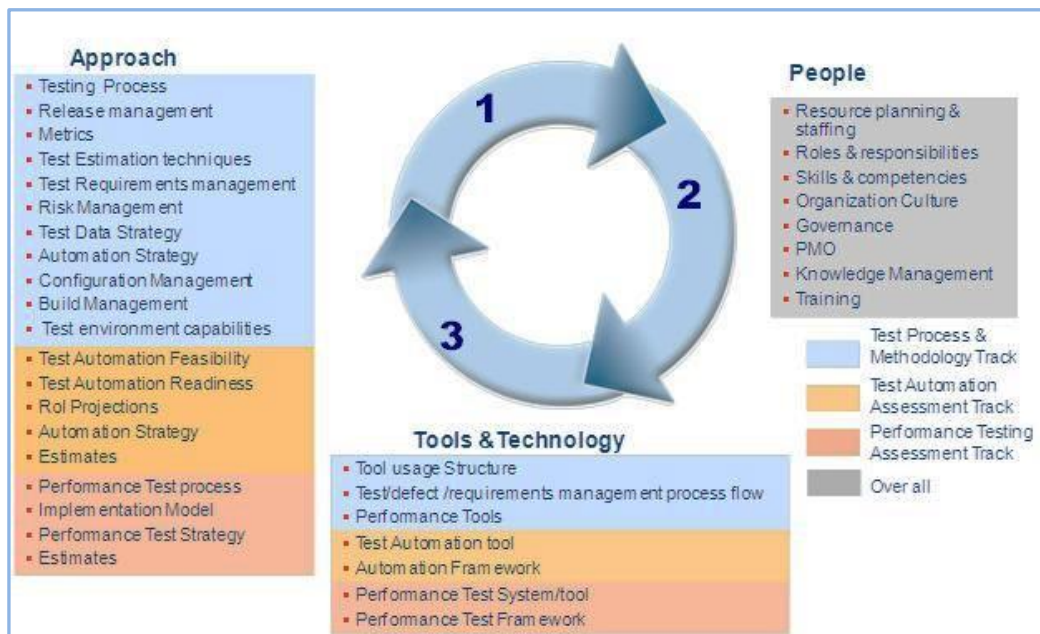
Fig 10: Illustrative approach to Quality Assurance and Testing

2.11   Data Management Strategic Approach

Data Management defines how an enterprise manages its data assets. It includes the standards, policies & procedures and the organization that guide overall management of an enterprise's data. It also provides the guidance to ensure that data is accessible, available, consistent, secure, auditable and maintains high quality. Our strategic approach to data management is illustrated in Figure 11 that provides a high level framework for enterprise data management. This amongst others would include the following:

- Identify sources of legacy data
- Metadata definition
- Develop data migration strategy & plan
- Data governance policies
- Data protection policies and procedures
- Human Resources to support data management
- Data Security policies and procedures
- Data accessibility
- Identify data quality benchmarks to be followed

Data Management Framework					
Data Accessibility	Data Availability	Data Quality	Data Consistency	Data Security	Data Auditability
Organizational Skills		Policy Guidelines & standards		Processes and Practices	Data quality metrics
Roles and Responsibility	Training & Education	Data Definition & Taxonomies	Enterprise Data Model	Planning & Prioritization	Issue Management	DQ Metrics	DQ Metric
Accountability model	Organization Change Management	Data Access & delivery	Data Change Management	Stakeholder Communication and engagement		DQ Business Improvement Metrics	Monitoring & Reporting
Meta Data Management	Meta data Management Tools	Supporting Technology	Data Profiling and Cleansing	Data Enrichment	

Fig 11: Data Management Framework

2.12 Approach to solution design and architecture

The solution architecture design that best fits the requirements of FTA would be guided by some general principles and best practice standards. The considerations that would go into the solution determination apply as much to COTS option as it would to the option for customized application development. In all cases the chosen solution architecture should fit well within the Enterprise Architecture on a broad basis and should meet the functional and non- functional requirements. The other important factors to be taken in to account would be financial implication of each solution such as the budget and total cost of the solution to FTA over the life of the system. Then there would be operational considerations, management and governance issues. Each solution option would need to be evaluated from six different viewpoints as indicated in Table 10. This includes business view, technical view, operational view, functional view and implementation view. The design factors would include alignment with the Enterprise Architecture, expected life, finances, which includes budget and financial implications, resources required and time scale. In accordance with this conceptual understanding the following major actions would be taken by the project team to optimize solution design choice.

Table 10: Solution Architecture Views / Dimensions and Design Factors		
Views / Dimensions	**Design Factors**	
Business View	Enterprise Architecture	Finance
Data View	COTS / New System	
Functional View		
Technical View	Expected Life	Degree of Automation
Implementation view	Resources	
Management and operational view	Timescale	

- Analyze various solutions existing in the market which can cater to the identified requirements defined through studies by the Consultant.

- Evaluate various applications which exist and analyze the options for a COTS product Vs Build, based on the product cost, customization required, capability of customization, and scalability.

- Develop options for solution requirements of based on work load, estimated time and cost to deliver the solutions

- Carry out an analysis of the all the possible power solutions and detail out the costing, availability and redundancy options, which would work if a grid power failure happens and for any other possible scenario

- Based on the long-term requirement analysis for the solution undertaken in the previous stage, we will identify the options with high and easy scalability.

- Prepare approach plan options that include utilizing current system modules

- Develop evaluation KPIs for each option.

- Prepare recommendation for the TTMS solution option which would have most favorable combination of following parameters:

  - Have optimum chances of implementation success
  - Minimum cost (minimize total cost of ownership)
  - Can be successfully implemented in the least possible time frame
  - Is scalable and flexible and based on latest technology
  - Is sustainable with assured after deployment support

Following the finalization of the solution option and approach, the solution architecture, process and policy framework as well as solution software design for each component be made. In addition to the software application solutions the ICT infrastructure including the LAN and WAN and data center development would be evaluated and assessed and best options would be chosen. A scheme for optimization within the designed ICT infrastructure will be defined. Cost estimation for the approved and planned solutions and their associated hardware requirement will be prepared and presented as a sustainable model.

2.13 Vendor On-boarding Approach

The vendor onboarding covers development of procurement strategy, prepare RFP documents and provide technical support during procurement process for selection of the most qualified system Integrator Implementation firm. Our approach for preparation of bid documents and vendor on boarding is five stage process consisting of requirements gathering, stakeholder engagement, prepare and release of Request for Proposal (RFP) and evaluate the responses and finaly negotiation and contracting.   The following approach and methodology for preparation of the Request for Proposal (RFP) and vendor selection

- *Study the procurement rules and methodology*

  The Consultant would study   the procurement rules and methodology of the Government of Ethiopia/World Bank as a first step to creation of the RFP. The procurement processs for both services and goods would be driven by the procurement guidleines, rules, regulations and procedures for world bank funded projects[4]. A special study of the contractual conditions would be undertaken to construct main clauses of the General Conditions of Contract (GCC) and Special Conditions of Contract (SCC) relating to Limitation of Liability, Warranty, Indemnity, IPR, etc. This would help in aligning the SCC's / GCC's with the prevalent rules of the World Bank / Government contracts.

  The procurement guidelines of both the Government of Ethiopia and the World Bank advocate open competition as the basis for project procurement. In most cases, International Competitive Bidding (ICB), properly administered is recommended by the World Bank as the most appropriate procurement method for goods and non-consulting services. Therefore, for the procurement of IT systems including hardware and services

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[4] Guidelines for Procurement of Goods, Works and Non Consulting Services under IBRD loans and IDA credits and grants by World Bank Borrowers July 2014
The World Bank procurement regulations- Goods, Works, Non-Consulting and
Consulting Services- May 2016

for the FTA project would be undertaken under International Competitive Bidding. Various alternative bidding procedures recommened in the World Bank guidelines would be examined and most appropriate method chosen. However, considering the likely large contract size and complexity of the IT systems and services to be procured for the TTMS project two stage bidding process may be the most approriate method.

- *Develop Terms of Reference*

  In technology procurement RFP's, multiple different approaches can be adapted for designing the solution of key components. The choice of components and technology often dictates the Terms of Reference of any technology procurement RFP. In order to address this issue we shall create options and approach analysis to obtain approval from FTA. This will help in clarification and reduction in turnaround time required to create the Terms of Reference. The RFPs will be developed to fully meet the requirments while staying within the available budget. The TOR shall define clearly the objectives, goals, and scope of the assignment and provide background information (including a list of existing relevant studies and basic data) to facilitate the consultants' preparation of their proposals. The RFP will include detailed technical specifictions and bill of materials.

- *Instructions to vendors and data sheet (ITC)*

  The ITC shall contain all necessary information that would help vendors prepare responsive proposals, and shall bring as much transparency as possible to the selection procedure by providing information on the evaluation process and by indicating the evaluation criteria and factors, their respective weights, and the minimum passing quality score.

- *Vendor Shortlisting*

  The Consultant will assist FTA in vendor shortlisting. An approach and option analysis by us may bring out the need of floating of Expression of Interest (EOI) for issue of RFP and award of contract to the prospective bidders. A General Procurement Notice would be submitted to enable World Bank to arrange for its publication in *UN Development Business online (UNDB online)* and on the Bank's external website. To obtain expressions of interest (EOI's) a request for expressions of interest (REOI) for each contract for SI firms will also be advertised in the national gazette, provided that it is of wide circulation, or in at least one newspaper, or technical or financial magazine, of national circulation in Ethiopia.

- *Bid Evaluation Structure*

The Consultant may assist FTA bid evaluation if requested. The best evaluation structure would be to establish Technical Evaluation Committee or Evaluation Committee for evaluation of all the three stages in the bidding process. Our team shall undertake the bid process management and under each stage shall present the bidder details to the Evaluation Committee and shall prepare a report for each stage of the evaluation comprising pre-qualification, technical proposal and commercial offer. Consultant shall also be responsible for receiving bidders queries, compilation and response to the bidders in consultation with the Evaluation Committee. Wherever necessary our team will assist and support the Evaluation Committee in negotiations if required. The evaluation would be conducted in accordance with the forementioned World Bank Guidelines.

- *Contract Negotiation and Award*

Consultant will assist in contract negotiation and finalization. We will endeavor to create an outcome-based service-oriented contract with outcomes that are measurable. With the help of the Evaluation Committee our team shall create an approach to link the payment milestones with definitive and tangible outcomes. The payment terms shall be crafted in a manner to maintain a balance between adequate cash flow for the vendor to successfully run the project and at the same time minimize risk for FTA.

2.14 Release Plan Approach

A well laid out and comprehensive Release Plan would be developed using the Agile Methodology. Agile planning approach to release management would take into account the intangible and flexible factors in application and systems development—as part of this approach, teams will plan iterative sprints across incremental releases. The following features are particularly highlighted

- Proposed release(s) for the program covered holistically
- Plans for each release
- Subsequent iterations for the release(s)
- Plan for each iteration
- Feature development within an iteration
- Individual tasks necessary to deliver a feature
- Development of user stories for each use case
- Effort estimation of each module based on agile approach
- Development of detailed work plan for sprint release

2.15   Deployment Plan Approach

Continuous automated deployment will be followed using DevOps methodology. Sprints in Agile will be tightly integrated with shorter deployment cycles as per strategies defined during the release plan approach. The DevOps methodology will have following features: -

- One click push button or continuous build deployment
- Increased release velocity
- Reduced defects
- Quicker feedbacks from stakeholders
- Better stable development and production environments
- Easier migration to production or movement of datacenters
- Better management of deployment metrics such as usage, memory, access & exceptions
- Better code access security
- Streamlined development streams with seamless integration between them.

2.16 Business readiness approach

As a part of the project mandate the team would review the state of readiness of FTA for the TTMS. This would include both the human capacity development as well as the development of organization for successful implementation of TTMS. Where as the change management approach that we propose has been presented in a previous section of this document the development of the skills as a basis for successful implementation of TTMS cannot be overlooked. Business Readiness Approach plan would be developed by the Consultant in alignment with the Release Strategy and Approach plan and Change Management Approach Plan. The well-defined Business Readiness approach plan to be put forward would define how to establish, implement, and rollout capability building including training and end user material to support the new systems. This will include Train the Trainers Plans and End User Training plans, which will contain plan on building End User Manuals, Training Materials and Guidelines on how to use the systems with the aim of minimizing the use of international resources for this work. Consultant will supervise the implementation of the plan and monitor the state of readiness in preparation for progressive system roll out.

2.17 Risk Management Methodology

Complex programs like the subject TTMS project would be subjected to various risks arising out of factors within the organization and outside. Risks need to be identified and provided for at the beginning of the project. As is our usual practice we will develop and implement Enterprise Risk and Issue Management (ERIM) program for FTA that is flexible and evolves in a strategic manner to improve risk and issue management capabilities. In this regards, we will continuously drive the program to ensure ongoing identification of risks and thereon, undertake planned issue management approaches (as discussed and finalized with FTA) for strategically important business decisions or processes. In order to ensure effectiveness of the program, the approach for Risk Management is undertaken in three key steps, Risk Identification, Management and Closure (Fig 12).

Identification	Management	Closure
• Project leads are made responsible for confirming risks before raising issues • Project members are to log risks directly into the PGMA Risk Register	• Risk assignees are responsible for updating their risks in a timely manner (min weekly) • PGMA facilitates monthly Risk Review session and is responsible for following up overdue risks with Risk Assignees • Red rated risks ae reported to the client and governance team	• Risk Assignees are responsible for marking resolved risks as 'recommended for close' • Formal closure is agreed in the governance forum • PGMA formally closes the risk in the Risk Register

Fig 12: Risk Management Approach

During the early stages of the project, a master document – risk register/log is created. This document captures all the risks identified, help track issues, and address problems as they arise. The risk register is owned and maintained by the Project Manager. The Risk Register will be shared between FTA, Project Management and SI / vendor team allowing those involved in the project to be kept aware of issues and providing a means of tracking the response to issues. It is used to flag new initiative risks and to make suggestions on what course of action to take to resolve any issue.

2.18   Communication Management Approach

Successful project delivery requires the effective planning, creation and implementation of appropriate communications to those who are impacted by the project or can have an impact upon it. Well planned and effectively executed communications activities can reduce resistance to the project, build acceptance of the project objectives and goals and assist with benefits realization. We develop a Communication Framework that defines the overall objectives, key messages, media, principles, key stakeholder groups and style of project communications. This provides a platform for informing and obtaining feedback from the various project stakeholders about the project activities and their impact through establishing an efficient and effective flow of communication. This provides a means by which the commitment and involvement of the stakeholders can be built and maintained. The proposed Communications Framework will recognize the complexity of the communications process and the connections between the desired level of a communication's impact, the media used and leadership involvement. As a part of the communications framework we will develop a Communications Plan that defines the specific activities required to implement the overall Communications Framework at every phase of the project. The plan is implemented and managed throughout the life of the project.

On biweekly basis, we will be developing a summary of project progress and status update for distribution by e-mail to key stakeholders. On monthly basis, we will be conducting a briefing on the project status and progress update to the project steering committee Communications Management aims to use core message platform, on which all communications are undertaken, to ensure information symmetry across the stakeholders at client side (officers, vendors, etc.). The process ensures that key stakeholders are identified and kept apprised of project progress and that key events/activities are shared with the right audience at the right time. In this regards, Integrated Communications Management designed by us ensures client wide visibility of all team communications (keeping in account the privacy and confidentiality status of the communications) and eliminate redundant or inconsistent team communications. In this regards, the following exercise is undertaken to understand the communication needs and requirements of all stakeholders. For the purpose of effective communication, three key criteria's, namely, Change Occurrence, Critical Need (on case by case basis) and Major Announcement/Event are defined as the triggers for undertaking the activity for communication planning. Based on the triggers, a detailed Standard Operating Procedure (to be defined) with FTA is undertaken that includes actions (target audience, channel, etc.) to be undertaken based on nature of communication.

2.19 Project Management and Governance Approach

TTMS project governance and management would be guided by international IT Governance standards and best practices primarily the COBIT Framework. IT governance is invariably shown to be driven by business and overall management imperatives, which in turn drives the need to develop an enabling technology environment. The concepts and guidelines of COBIT as applied to the TTMS Project management would dictate the establishment of defined organizational units for different work areas, defines process for monitoring and controls as well as KPI and, targets to aid in the perpetual control and monitoring of the project activities.

Two over riding requirements would be the clarity on the goals and objectives as much as on the metrics at various levels within the project. As the fore mentioned concepts and guidelines on technology governance are applied to the TTMS program management a vision and structure of the project governance will emerge. This will be discussed and deliberated on as the TTMS project implementation progresses. Project governance framework vis a vis TTMS project would emerge from the development an optimal project management operating model. The following shall be the key activities for project management operating model

- Development of Project Management standards and processes to be adopted for all work packages (in alignment with PMI standards and project management methodologies and relevant leading project management practices);
- Integration and alignment of work packages with project objectives and FTA business objectives; Identification and management of dependencies amongst the various work packages;
- Financial planning, budgeting & cost control at the work package and project level;
- Assessment and mitigation of project risks/issues;
- Analysis and management of stakeholders' expectations;
- Facilitation of change and ensuring sustainability of business benefits achieved, by planning and administering effective Communication and Change Management activities at the work package and project level;
- Providing functional and technical subject matter advisory to the steering committee and the work packages at specific milestones;
- Performing Quality Assurance reviews to ensure adherence of the work package outputs to project management standards and processes;

2.19.1 Project Management Cloud Platform

To facilitate project management activities including planning, execution, monitoring and control we propose establishing a project management cloud software tool that would permit the project team leaders, project manager, Scrum Masters, Products Owners Head of the PIU, Project Governance Board members and other authorized managers and supervisors connected with the project to undertake project management and governance related tasks on the proposed cloud platform. The platform, among others, would permit project management tasks at both macro and granular level. Task scheduling, collaborating, monitoring and reporting would be possible. Dashboard would be a part of the platform to permit real time examination of the status of any work sprint and of the project as a whole. Since the project team members and during the Phase 2 the connected SI vendors would be globally spread out the cloud platform would facilitate online team collaboration monitoring and reporting. We are currently examining the various optional cloud based project management software that would be best suited for us. The options include Jira Software, Trello, Asana and Project Manager. A decision on the project management tool to use will be taken soon.

SECTION 3

Project Governance and Management Structure and Plan including Schedule and Outcomes

3.1   Project Governance & Management

The project governance and management approach mentioned in the previous section of this document is the basis for governance and management structure of TTMS project being presented here. COBIT will be the guiding framework to be employed for developing the TTMS governance and management structure, processes and procedures. The framework defines the component parts of governance and management in IT enterprises and projects including their organizational structures, processes, policies and procedures, information flows, skills, infrastructure, culture and behaviors. Moreover it is important to recognize the basic principles that underpin COBIT framework, which are stakeholder / business needs as the main driver, integrated approach, holistic perspective and most importantly distinction to be made between governance and management. It is important that distinction be made between governance and management.   Whereas management would cover within its ambit all actions and activities, both strategic and operational, that relate to management of the project resources and activities leading to   outcomes and objectives of the project governance refers to monitoring, controlling and guiding the management itself. In a sense it can be said governance process is more strategic in nature than management.

3.1.1   Project Organization Structure

The project has to be organized in a manner to cover all the operational activities of the project from their inception to completion. In addition to technical and operational activities it would include definition of organizational units and actors responsible for managing and controlling the operational activities to ensure that activities, work sprints and work packages lead to the predefined outputs, efficiently and effectively. Operational Managers would be themselves organizationally responsible to senior managers. In the case of TTMS this would mean that the lower level operational managers (team leaders) would be responsible to the Project Manager, who himself would be responsible to the Project Governance board. Thus a three tier project organizational structure is proposed. At the top level of this structure would be the Project Governance Board that provides strategic directions to the project team, monitors and controls the project performance. The middle layer would be that of the Project Manager who is both a strategic and operational manager. He lays down the strategic guidance, makes the project plan, monitors and controls the work of experts and team leaders and their team members. At the bottom would be operational teams headed by Team Leaders, with specific task responsibilities. The proposed Project Organizational Structure is presented in Fig 13 given below:

Fig 13: Project Organizational Structure
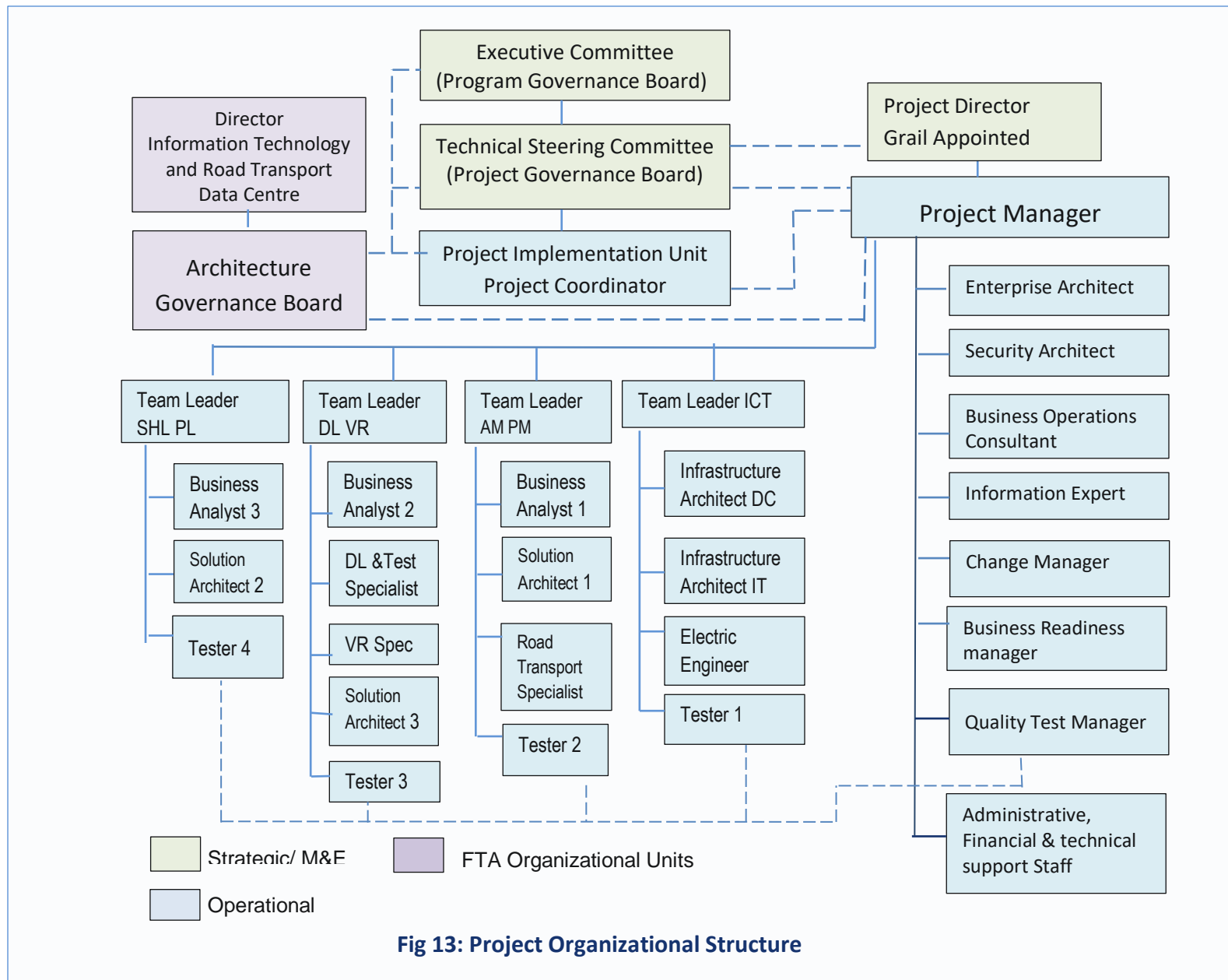
Besides the four operational teams, each headed by a Team Leader, there are seven other experts that provide cross cutting functional support to the four operational teams. For instance the Quality and Test Manager would be functionally responsible for the four testers assigned to the four operational teams. There are in the proposed structure five positions that have direct project management responsibility. These positions are Project Manager and the four team leaders. We are also proposing the position of Project Director, who provides management oversight, strategic directions, monitoring and evaluation of the project and who along with the project manager may be invited to participate in the Project Governance Board meetings.

3.1.1.1 Project Governance Board

To avoid organizational confusion we propose that the existing Technical Steering Committee be designated as the Project Governance Board (PGB). This would ideally consist of not more than fifteen members with Deputy Director of FTA as the Chairman. There would be three members from MOT / FTA including the Head of the Project Implementation Unit (Project Coordinator), who will act as the Secretary to PGB. The Project Manager and Project Director from would be members by invitation. They would attend the PGB meetings only by invitation. The suggested composition of the PGB is as follows:

- Deputy Director General of FTA: Chairman of the PGB
- Head of PIU FTA: Secretary to PGB
- Ministry of Transport / FTA one member
- Ministry of Construction: one member
- Ministry of Education: one member
- Ministry of Trade: one member
- Customs Authority: one member
- Regional Transport Offices: two members
- Zonal Transport Office: two members
- Addis Ababa Transport office: one member
- Federal Traffic Police one member
- Grail Project Manager (as invited member)
- Grail Project Director (as invited member)

3.1.1.2 Program Governance Board

A distinction has to be made between a project and a program. Whereas a project is limited in scope and duration a program is generally of a longer duration constituting within

itself more than one project. In our context TRANSIP can be considered as a program, which has within its ambit many projects besides this project. To provide a more comprehensive view of the project we have included in project organizational structure the Program Governance Board also. It is suggested that the existing Executive Committee within FTA could be designated as the Program Governance Board for TRANSIP program, which would also include this project. Whereas the Project Governance Board would focus on only one project the Program Governance Board would look at the program as a whole, providing to it strategic directions and oversight. The chairman of the Program Governance Board could be the Director General of FTA with senior level members from stake holder organizations. The membership should not exceed ten members.

3.1.1.3 Architecture Governance Board

Architecture Review Board or Architecture Governance Board (AGB) is advocated by TOGAF as an organization entity within an enterprise to ensure that information technology employment within an enterprise is optimal to the needs of the enterprise and remains so as the enterprises' business needs expand and change over time. Two features of the Architecture Governance Board need to be underscored. One, that the AGB is a permanent organizational entity within the overall structure of the enterprise. Second, that AGB is dynamic in nature. That is to say it develops, matures and expands over time or in response to the changes in the business needs of the enterprise. In our context the enterprise is the FTA. So, when we talk of AGB we are talking about AGB for FTA not for any particular project. A review of the TOGAF literature would reveal that in most cases AGB gets initiated in an enterprise when there is a realization at the highest level in an enterprise to optimize technology adoption within an enterprise or when a new CIO is appointed or when a new large IT project is undertaken by the enterprise. In that sense our project can be seen as a catalyst for establishment of the AGB for FTA. AGB once established within FTA will not only consider our project but will also look at the other IT projects that FTA may undertake now or in the future. For the fore mentioned reasons we have highlighted AGB in the presented organizational structure in a different color and reporting to the Director of Information Technology within FTA.

While the Project Governance Board would be primarily engaged in the monitoring of the project management in order to ensure that the project objectives and outputs are obtained in the most effective and efficient manner the Architecture Governance Board would oversee the development of Enterprise Architecture and ensure its development on a dynamic and perpetual basis; not only while the project is operational but also on a sustained basis after the project is

successfully concluded. The Project Governance Board will evidently get dissolved as the project is successfully completed, whereas the *Architecture Governance Board* will continue its operations on a sustained basis as an ongoing organizational entity within FTA.

TOGAF advocates the establishment of the Architecture Development Board to ensure that IT is optimally aligned with the needs of an enterprise. The framework goes further to define the mandate of the Architecture Governance as follows:

- Establishment and operation of best practices for the submission, adoption, re-use, reporting, and retirement of architecture policies, procedures, roles, skills, organizational structures, and support services
- Establishment of the correct organizational responsibilities and structures to support the architecture governance processes and reporting requirements
- Integration of tools and processes to facilitate the take-up of the processes, both procedurally and culturally
- Management of criteria for the control of the architecture governance processes, dispensations, compliance assessments, SLAs, and OLAs
- Meeting the internal and external requirements for the effectiveness, efficiency, confidentiality, integrity, availability, compliance, and reliability of all architecture governance-related information, services, and processes

The above statements do in a way define the mandate of the proposed ADB. As the project gets underway the Project Enterprise Architecture processes, policies, standards, organization structure, procedures, SLAs, OLAs, controls, compliance and monitoring systems would get institutionalized and optimized. These would be pursued perpetually in order to ensure optimal use of IT within FTA not only for this project's systems but for IT deployment within FTA as a whole.

Architecture Governance Board Composition

As mentioned in the sections above the AGB is by its nature an internal organizational entity of the enterprise its members are therefore internal senior level business and technical executives of the enterprise. Rarely are external members invited to join the AGB of an organization. These could be for example independent senior level management or technology experts. In the context of FTA the Architecture Governance Board members could be drawn from its various business departments and some of its members could be drawn from the parent Ministry of FTA: Ministry of Transport. The suggested membership for AGB is as follows:

1. General Manager of FTA as Chairman
2. Dy. General Manager Transport Sector
3. Dy. General Manager Road Safety
4. Dy. General Manager Corporate Services
5. Director of Information Technology Directorate as Secretary
6. Director Regional Transport Offices Directorate
7. Director of Information Technology Ministry of Transport
8. Director Capacity Building & Change Management Directorate

3.2   Project Management and Governance plan

Project management and governance approach has been broadly articulated in the previous section. COBIT framework as the guiding standard to be used for TTMS project management and governance, in a way encapsulates the sound management concepts and practices as applied to technology based projects and organizations. Clarity of goals, targets and KPI at various levels within the organization or within the project hierarchy are essential requirements. As mentioned previously the work execution approach that we intend following would be driven by Agile- Scrum methodology- which consists of implementation of project work packages in the form of intelligently designed work sprints, each of which may be successfully implemented with one or more iterations as may be needed. This project work execution is further described in the section on work plan that follows and pictorially represented in the Agile Work Plan, annexed to this document.

Sound project management processes as defined in the various international project management best practices and standards, particularly PMI and Prince 2 methodologies would be applied to effectively and efficiently manage each sprint within each work package and indeed to integrate the outputs of work packages in order to attain the project's goal and objectives. Project Management Process cycle, applied at any level or context conceptually consists of the following five steps:

Initiation → Planning → Executing → Monitoring & Control → Closure

This generic process cycle would be applied to managing at various levels, whether it is a work package, sprint within a work package, project phase or project itself. As Agile Scrum methodology is being followed by us in first phase of this project we have defined the Sprints required for execution of the work packages. For each work sprint the Scrum Team including

Scrum Master, Product Owner and team members have been defined in the Agile Project Plan annexed to this document. While the Scrum teams would be independent organizational groups with a great deal of flexibility in executing the work sprints and realization of the sprint outputs, there are predefined KPI, guidelines and procedures that must be followed. For instance at the planning stage costs, resources, inputs, outputs, stakeholder involvement, risks and performance metrics would be defined. Similarly at the execution stage the change request procedure would need to be laid out and at monitoring and control stage the performance assessment, quality assessment using defined metrics would be done and variance reports generated. In the annexed Agile Work plan many of the fore mentioned metrics have been included.

3.2.1   Project Management Processes and Procedures

With the initiation of the project and mobilization of resources the project work plan approved by FTA becomes the root guiding document for detailed work planning down to the organization of the sprint teams. In addition to Work Plan, Risk Management Plan and a Communication Plan is made, which is dealt with in some detail in the sections that follow. The Agile Scrum work plan that we have attached here would guide the Project Manager. He in collaboration with the four Team Leaders will review the fifty odd sprints mentioned in the plan to make any necessary changes as may be considered necessary. Each Team Leader is assigned work sprints related to his work responsibility. Who in turn will form Scrum Teams for the different sprints under his vertical.. For cross cutting areas like Enterprise Architecture Development, IT security, Policies and Guidelines development and Change management the Project Manager himself forms the Scrum Teams. Each Scrum Team would be composed of

- Scrum Master
- Product Owner
- Scum Team members

Scrum Master is the keeper of the process, facilitator of the team work, an advocate for the team, and its protector. He removes obstacles, facilitates team communication, mediates discussions within the team and negotiates with those external to the team. On the other hand the *Product Owner* represents the view point of the customer and has the authority to make decisions about the product. This person owns the product backlog and is responsible for communicating the vision to the team, and defining and prioritizing backlog items. The Product Owner works with the team on a daily basis to answer questions and provide product guidance.

In most cases the Team Leader would be the Scrum Master but in some cases may perform the role of the Product Owner. Similarly Project Manager may also undertake the role of Scrum Master or Product Owner in some cases. It is also possible for Team Leaders and Project Manager or Team Leaders not to assign any specific role to themselves. The Project Manager and the Team Leaders are totally at liberty in the organization of Scrum Teams.

The Agile Scrum methodology provides considerable liberty and flexibility to scrum teams in the management of their project activities. However, there is a broad process framework for Scrum team operations which is shown in the schematic diagram given below
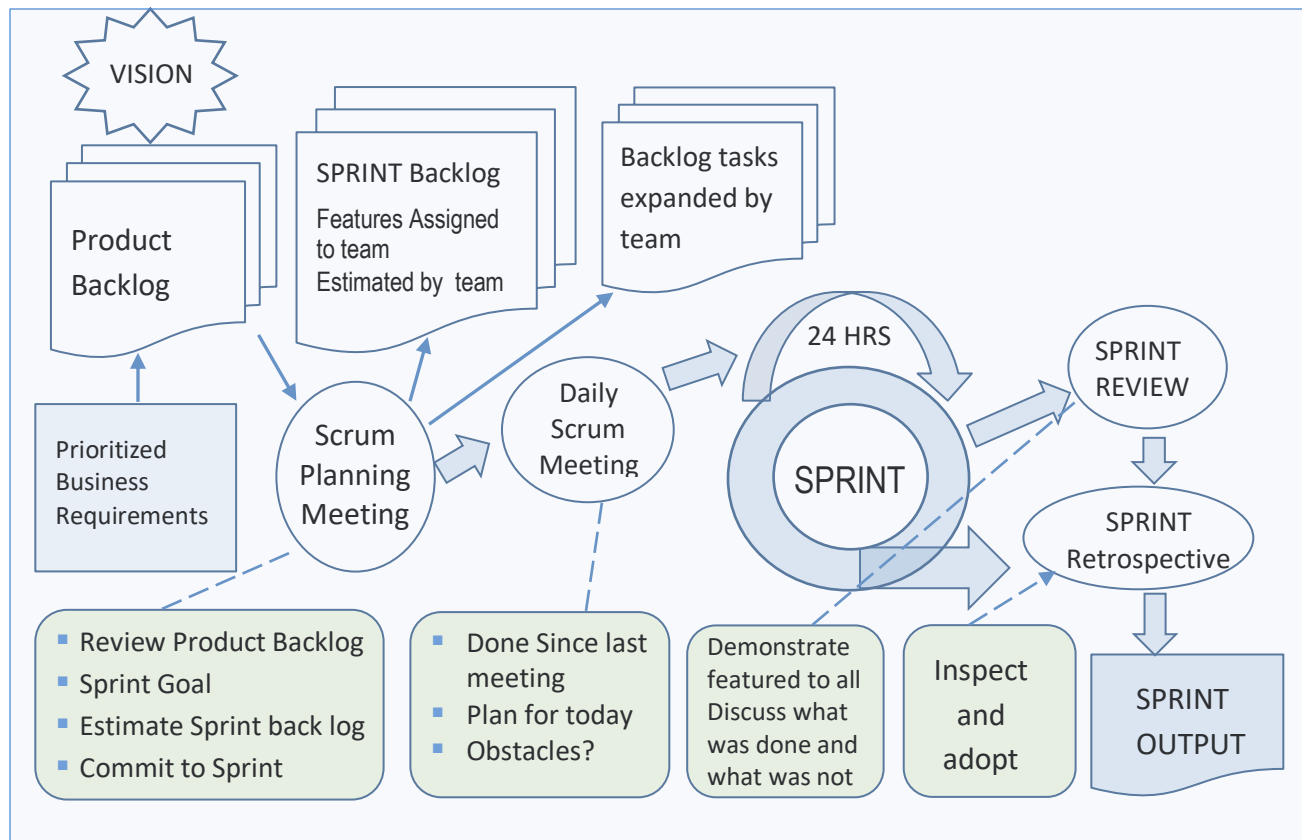
Fig 14: Agile Scrum Project Management Process Schematic

The Fig 14 presents a high level representation of the major processes and procedures in the management of Scrum projects. After the formulation of Scrum teams a meeting of the Scrum team takes place for the purpose of planning the sprint. The planning meeting reviews the product backlog, establishes the sprint goal and takes commitment from each Scrum team member to the sprint goal. Product backlog is derived from the defined business requirements articulated by the Product owner, who represents the interest of the customer on the team. Daily Scrum meeting of team members is both a ritual and a necessity to review the work on a daily

basis. Towards the end of the *sprint a review meeting* takes places, to which the stakeholders are invited to demonstrate what has been achieved and what has not been achieved. Feedback is taken from the stake holders, which is noted by the product owner. This is followed by Sprint Retrospective meeting, which is not attended by the stakeholders, to determine what they did well that they wish to continue doing, what they struggled with, and what recommendations they have for change going forward. An action plan is created and these items are implemented over the course of the next sprint.

3.2.2 Scrum Monitoring, Metrics, Tools and Templates

At the project level as a whole the goal and KPIs established for this purpose are used to monitor the project and assess the performance of the project as a whole say over a period of phase or a quarter. This is dealt with in details in the section 3.2.6 *Governance, Monitoring and Control.* However, it is also essential to monitor the work at the level of each scrum team and to evaluate the performance of each team at the ground level. For this purpose various methods, procedures and tools will be employed. These are briefly described in the table given below:

S. No	Metrics	Description	Tools and Templates
	Table 11: Scrum Agile Project Metrics, Tools and Templates		
1	Daily Scrum and Sprint Retrospective	These are meetings undertaken by the Scrum team for internal control and evaluation as described in the text above.	No specific template is prescribed
2	Task Boards	Task board is used by the team to track the progress of the tasks for each feature. The minimum columns used are To Do, Doing, and Done. Teams will have their daily scrum meeting at the task board, and move items across the board when stating what they did yesterday, what they plan to do today, and what obstacles they are grappling with. (Example of Task Board in Fig 15 given below)	Since our team may be geographically disbursed we propose using Jira Agile Project Management platform that provides remote electronic Task Board for Scrum team members situated anywhere in the world.
3	Burndown charts	Burndown chart shows the trend line of the amount of work left to	Jira platform expected to be used will have the

Table 11: Scrum Agile Project Metrics, Tools and Templates			
S. No	**Metrics**	**Description**	**Tools and Templates**
		do in the sprint. The x-axis is the number of days in the sprint, and the y-axis is the number of hours for all the tasks that were defined in the sprint-planning meeting.	facility to generate burndown charts for any work sprint.
4	Team velocity	Velocity measures how many user stories were completed by the team, on average, in previous sprints. It assists in estimating how much work the team is able to accomplish in future sprints.	Jira platform proposed to be used has the capability to generate team velocity charts for project monitoring

Table 12: SCRUM Trask Board				
User Story	**To Do**	**In Process**	**To verify**	**Done**
User story 1 (10 points)	T1 T3 T5 T9	T2 T4	T6 T8	T7
User Story 2 (8 points)	T5 T6	T4 T7	T3	T1 T2

3.2.3   Project escalation procedure and matrix

The subject project is expected to be managed using Agile Scrum methodology during its first phase and additionally to employ the DevOps methodology during its second phase. These methodologies are primarily based on team work and high degree of inter team cooperation. However, it is quite likely that occasions will arise when there would be need to escalate an issue related to project management to the next higher level in the management hierarchy. The need for escalating a project management issue to a higher authority only after all avenues of resolving an issue at its existing level has failed. This is important since team cohesiveness and loyalty may be called into question if an issue is hurriedly escalated to a

higher level, when in reality the issue could have been resolved with a little perseverance and tact at the level at which the issue arose in the first place. Often issues are escalated to the relevant higher level though an official email to the higher authority and copied to all the persons and project units involved in the issue. We are presenting below an escalation matrix

Table 13: Project Escalation Matrix				
Escalated Issue	**Escalator**	**Level 1**	**Level 2**	**Remarks**
Project Level Issues				
Delay in Project deliverables	FTA- PIU	Project Manager	Project Director	The triggers for escalation to level one or from Level 1 to Level 2 will need to be decided and agreed by the Project Manager and FTA-PIU
Deliverables quality issues	FTA- PIU	Project Manager	Project Director	
Delayed Response on submitted deliverables	Project Manager	FTA-PIU	Director-FTA	
Project Resource Deployment issues	FTA- PIU	Project Manager	Project Director	
Project Personnel Performance issues	FTA-PIU	Project Manager	Project Director	
Administrative & security issues	Grail-Country Manager	FTA-Project Procurement / Admin Manager	FTA- Project Director	
Financial and Payment issues	Project Manager	FTA- Project Procurement Manager	FTA- Project Director	
Change in the scope of work	Project Manager	FTA- Project Procurement Manager	FTA- Project Director	
Team Level Issues				
Performance issues of any team member	Team Leaders	Project Manager	Project Director	The triggers for escalation to level one or from Level 1 to Level 2 will need to be decided and agreed by the Project
Lack of or non-availability of resources	Team Leaders	Project Manager	Project Director	
Performance issues of any team	FTA-PIU	Project Manager	Project Director	
Performance of any Scrum Team member	Scrum Master	Product Owner	Team Leader	

Table 13: Project Escalation Matrix				
Escalated Issue	**Escalator**	**Level 1**	**Level 2**	**Remarks**
Performance of any Scrum Team	Product Owner	Team Leader	Project Manager	Manager and FTA-PIU
Lack of resources in any Scrum Team	Product Owner	Team Leader	Project Manager	
Administrative and security issues for Scrum Team	Team Leader	Grail Country Manager	Project Manager	

3.2.4 Project Constraints and Assumptions

As with any complex project, identification of the constraints and opportunities facing the subject project is important for development of any meaningful and optimal plan and governance systems. It is equally important to recognize the assumptions that we may be, either consciously or subconsciously, making in the development of the project plan and its execution approach. As is well known any organization or indeed any project would be subject to factors that shape its working environment, be it political, legal, social or operational. In most cases the project managers and stakeholders will have little or no control over these factors that shape its working environment. In addition there are many given limitations within which the project must operate. For instance, the project's given budget or other resources may not change in the short run or project's scope of work or time lines may not be changeable. These factors can be termed as the constraints that we have to content with and must be planned for.

On the reverse there may be many trends and developments that may be considered as positive towards the project and may indeed facilitate the working of the project and achievement of its objectives. These factors, developments and trends can be considered as the project facilitators. Moreover, in the process of development of the project plan and its governance structure, described in the following sections, we have also made some assumptions that may in some cases critically impact the project if they turn out to be incorrect and in many others the impact may not be very serious. Thus, articulation of the project assumptions is as important as identification of the project constraints and facilitators. The assumptions made in a project also in a significant way impact the risks that the project is likely to face. With regard to the subject project we have summarized in the tables below the constraints that the project is facing and major assumptions that have been made. We have

also indicated against each constraint the management actions that we plan to take to manage the constraint optimally.

Table 14: Project Constraints		
Nature of Constraint	**Description**	**Proposed Management Actions**
Environmental Constraints		
Socio-Political Constraints	The socio-political system currently operating in the country and likely to be in existence during the tenancy of the project	The social and political environment taken cognizance of and project plan and execution has been accordingly made
Legal and Regulatory constraints	The laws and regulations of the country particularly the ones related to transport and technology sectors provide the background within which the project must be undertaken.	The legal and regulatory environment relevant to the project will be taken full cognizance of and considered and indeed the project outputs would be closely aligned with the relevant laws and regulations of the country.
Business Constraints		
Scope of the Project	The scope of the project lays down the limits to what is to be covered and not covered within the project. The scope of the project defined in the project design does in fact lay down the parameters and boundaries of the project	The project plan developed by us and project management activities would all be undertaken keeping the scope of the project in mind. However if a scope change becomes necessary action will be formally taken by either FTA or the Project Management.
Budget and cost of the project	The budget of the project determines the financial resources that are available for the project. Under normal operations it is not possible to go beyond the budget.	All project activities would be planned and executed within the financial resources available. Thus strict monitoring of the costs would be undertaken over the life of the project to ensure that project budget is not exceeded.

Table 14: Project Constraints		
Nature of Constraint	**Description**	**Proposed Management Actions**
Quality of Project Outputs and deliverables	Once the project plan is developed and agreed and execution commences project quality parameters and standards are defined. These quality targets therefore become the requirements that the project has to achieve	All project activities will be planned and executed within the quality parameters and standards predefined and agreed. Under normal circumstances there would be no compromise on the quality of the project outputs and deliverables.

As any other project, the project management and execution plan presented here is based on some assumptions that we have made. Some of these assumptions would appear to be self- evident and straight forward whereas some others may appear to be doubtful and risky. Therefore the major assumptions that we are making could also in a way determine the risks to which we may be subjected. Major assumptions made by us are summarized in the Project Assumptions log (table 15 given below).

Table 15: Project Assumptions Log				
S. No	**Assumption**	**Validity**	**Impact**	**Remarks**
1	The operating environment of the project would remain stable during the life of the project	High	High	Stability of the operating environment would mean that project tasks can be undertaken without interruptions due to developments external to the project
2	Project Management would be able to provide manpower, financial and technical resources as per the requirements and scheduled as per project needs without delay.	High	Medium	This assumption is a valid assumption and remains the responsibility of Project Management
3	The stakeholders involvement with and support to project activities would remain high	Medium	Medium	Stakeholder support and involvement would among others include facilitation of

S. No	Assumption	Validity	Impact	Remarks
	during the life of the project			project tasks, participation in project activities and provision of comments, advise, guidance and response without delay.
4	The counterpart resources and facilities including expert staff and office space will be provided by the FTA will be provided as required without delay.	High	Medium	This will include provision of physical resources and counterpart staff that is required to work alongside project experts for realisation of the project outputs
5	Access will be provided to project experts to the existing relevant IT installation for the purpose of study and assessment without delay	Medium	Medium	This would include national data centre or such other installations which may have relevance to project work
6	All the relevant policy and technical documentation including previous reports and study documents would be made available to the project experts for the purpose of study and analysis	High	Low	This would include all technical and policy documents that are relevant to the project including documents with restricted distribution

Table 15: Project Assumptions Log

Notes:
- Validity of an assumption is the likelihood of the assumption being realised. Thus an assumption with high validity is most likely to be true and valid assumption with limited risk of proving wrong. Conversely , an assumption with low validity is most probably a risky assumption to make with low probability of being true in actual real life situation
- The impact of the assumption shown in the column four of the table relates to the impact of the assumption on the project operations in case the assumption turns out to be wrong. In the table three levels of impact High, Medium and Low is given
- The project assumption log presented above may be updated by the project management at periodic intervals

3.2.5   Change Request Management

Over the course of the project there would be in all probability many occasions when the need for change might be felt, even though all efforts would be made that the project is implemented as planned. Requests for change might arise at the level of Scrum teams who might have reasons to ask for relaxation on quality parameters, additional resources or ask for additional time. There may also be requests for change from the project management or indeed from the FTA or from any other stakeholder to for example change the scope of work to include additional tasks there were not included previously. Any requested change could have impact in terms of resources, time for completion outputs and deliverables of the project. Therefore any requested change must be carefully considered and a mechanism should be in place for submission and consideration of change requests. We are presenting below change request form followed by the rules that we propose following in the processing of requests for change.

Table16: Change request template						
Change Requested by				Date		
Submitted to				Request No		
Change Description						
Change Justification						
Change Impact (Tick mark as appropriate) Describe impact in details	Scope		Describe the impact in details			
	Quality					
	Timeline					
	Costs					
	Others					
Status (tick mark)	In Review		Approved		Rejected	
Processed by						
Approved /Rejected by				Date		
Signatures						

The change management process would consist of the submission of the change request by change originator to his or her supervisor, who will check the scope of change and its impact. If the requested change is purely technical with no implication on the project scope, output quality, timeline or costs the change request would be forwarded to the project manager who along with head of PIU will form a technical committee to consider the requested change and take a decision to either approve or reject the request. However, if the change request has major implication on the scope of work, project budget or project time line or quality of project deliverables the head of the PIU in consultation with the project manager will refer the matter to the Change Management Committee, which will consist of Head of PIU, Project Manager, Procurement Manager of the PIU, one other expert / senior office from FTA and one other officer/ expert from the project team. The recommendation of the Change Management Committee will be forwarded to the Project Governance Board for a final decision on the request to approve or reject the request (the decision to be ratified by the World Bank).
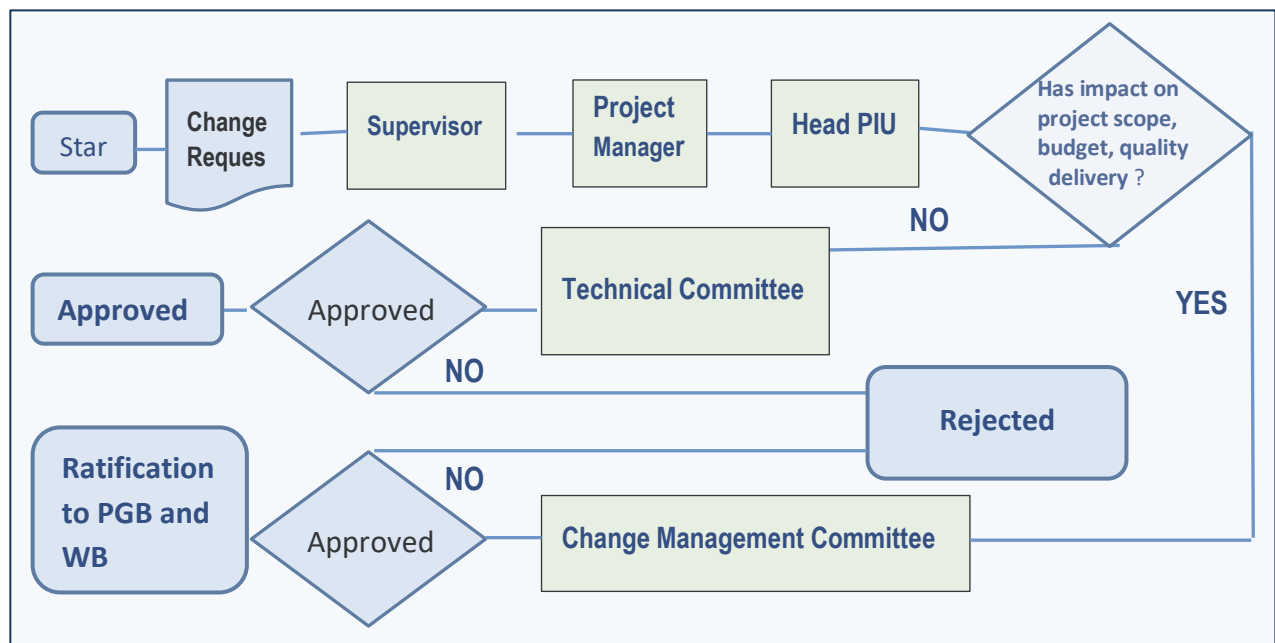
Fig 15: Flow chart Change Request Management

3.2.6 Risk Management Plan

As mentioned in the previous section of this document the risk management approach would consist of identification of the risks, management and mitigation measure and closure of the risk factor as the risk factor is suitably mitigated or if the risk factor disappears. The approach advocated here also involves establishment of a risk register that would be open to all managers all but would be maintained and owned by the Project Manager. The template for the risk register that we propose to use is given here under:

Table 17: RISK REGISTER
ID	**Description of Risk** (including any identified 'triggers')	**Impact on Project** (Identify consequences)	Assessment of	Assessment of	**Grade** (combined Likelihood and Seriousness)	**Change since last Review**	**Date of Review**	**Mitigation Actions** (Preventative or Contingency)	**Responsibility** for mitigation action(s)	**Cost**	**Timeline** for mitigation action(s)	**Work Breakdown Structure**
1	COVID-19 pandemic spreads in Ethiopia and India (Operational environment of the project changes unfavourably)	International and local travel restricted. Government work restricted. Studies & data collection difficult. Some expert resources not available	H	H	A	No change	4/16/20	Online and remote work to be accentuated Replacement experts to be employed Local resources to be increased	Project Manager	NA	4/25/20	
2	Stakeholder response and data sharing delayed	Delay the work of the project	L	N	N	No change	4/16/20					
3	Temporary unavailability of any resource for any work sprint	Delay work completion	L	N	N	No change	4/16/20					

Rating for Likelihood and Seriousness for each risk			
L	Rated as Low	E	Rated as Extreme (Used for Seriousness only)
M	Rated as Medium	NA	Not Assessed
H	Rated as High		

Grade: Combined effect of Likelihood/Seriousness					
		Seriousness			
		Low	Medium	high	EXTREME
Likelihood	low	N	D	C	A
	medium	D	C	B	A
	high	C	B	A	A

Recommended actions for grades of risk	
Grade	**Risk mitigation actions**
A	Mitigation actions, to reduce the likelihood and seriousness, to be identified and implemented as soon as the project commences as a priority.
B	Mitigation actions, to reduce the likelihood and seriousness, to be identified and appropriate actions implemented during project execution.
C	Mitigation actions, to reduce the likelihood and seriousness, to be identified and costed for possible action if funds permit.
D	To be noted - no action is needed unless grading increases over time.
N	To be noted - no action is needed unless grading increases over time.

Change to Grade since last assessment			
NEW	New risk	↓	Grading decreased
—	No change to Grade	↑	Grading increased

Project Manager, on the identification of risk will update the risk register. He will also follow up the mitigating actions until risk is fully mitigated. Any stakeholder or project participant including the project team members can report a risk to the Project Manager, who will update

the Risk Register and take appropriate actions. Risk register will be open to all authorized stakeholders and project team members and will be accessible on line.

3.2.7 Project Communication Plan

Our communication and reporting plan would be guided by the communication approach methodology presented by us in the previous section. This approach involves frequent and indeed perpetual communication with stake holders to keep them informed of the project progress. Key stakeholder register already developed by the project would be used as a recipient list for distribution of *Summary Project Progress Report* on a bi weekly basis. Each Team Leader and the Enterprise Architect would submit a brief status report to Project Manager as an input to the biweekly Summary Project Progress Report. A template for this report is presented in the Table 19. Monthly briefing meetings would be conducted to brief the Project Steering Committee / Project Governance Board on the status of the project, progress made and the challenges being faced if any. No specific template is recommended for this meeting. The Project Manager would present the draft presentation to the Head of PIU, who may recommend any changes before final presentation.

Apart from routine communication and reporting there would be need for event based communication with stakeholders and potential beneficiaries. That is, for example communication regarding some specific event, like launching of a project application. These event based communications require specific messages targeted to specific audiences. Similarly there would be need for persuasive messaging with specific audiences as a part of the change management strategic action plan that will be developed during stage 2 of Phase 1. The change management plan would include definition of targets, message design and communication means.

Inter Project Team and stakeholder communication constitutes the bulk of communication that must occur for effective project management and operations. This would for instance include weekly sprint status reports submitted by Product Owners to Team Leaders and Project Manager and bi weekly Project Progress Report submitted by the Project Manager to be distributed to stakeholders, change request communication raised by a Product owner or Team Leader to Project Manager or indeed a major announcement by the Project Manager or Head of PIU for all project team members and stakeholders. Project Communication Plan is presented here under (Table 18)

Table 18: Communication Plan					
Name	Description	Source	Recipient	Frequency	Remarks
Project Status Report	Informs project progress, highlights challenges if any	Project Manager	Head PIU Stakeholders	Biweekly	By email, also uploaded
Project Progress Presentation	Presents Project Status. Activities in progress and planned. Challenges and risks	Project Manager	Head PIU, PGB/ Steering committee	Monthly	Personally or remotely
Sprint Status Report	Informs Sprint Progress and status	Product Owner	Project Manager & TL	Weekly	Electronically
Sprint Completion	Informs completion of sprint, deliverables and variance report	Product Owner	Project Manager & TL	When Sprint closed	Electronically
Change request	Requests change in Sprint cycle, execution process etc.	Product Owner	Project Manager &TL	As & when needed	Electronically
Change in organization, process and policies	Requests or informs changes in organization, work flow, process etc.	Project Manager	Stakeholders	As & when needed	Electronically as a part of Change Strategy
Announcement	Any major messages to inform occurrence or impending occurrence of an event, policy or procedural change	Project Manager of Head of PIU	All stakeholders and Project Team members	As and when needed	Electronically and uploaded on the Project Management Portal
Major risk and challenge announcement	Informs major risks and challenges expected and mitigation measure	Project Manager	Stakeholders Team members, Head PIU, PGB	As and when needed	Electronically and uploaded on the Project Management Portal
Stakeholders feed -back and suggestions	Stakeholders give feed- back to Project Team and suggestions	Stakeholders	Head PIU & Project Manager & TL	As and when needed	Electronically
Outreach Messaging	Outreach messages to facilitate changes implementation & operation of new systems	FTA PIU Project Manager	End users Policy Makers Beneficiaries Stakeholders	As and when needed	Electronically and print media

Table 19: Project Progress Report Template	
Project Report No	
Project Report Date	
Period Coverage	
Project Name	
Submitted to	FTA Project Implementation Unit

Sprint Activities Progress and Status (Initiated, Completed and In Progress)				
S. No	Sprint Description	Product Owner/ TL Engagement	Status	Remarks
			In Progress	On schedule
			In Progress	Behind Schedule
			In Progress	On schedule
			Completed	Ahead
			Completed	On schedule

Challenges and Problems and Proposed Mitigation	
Challenge / Problem/Risks	Proposed Mitigation/ Actions

Major Upcoming Activity Sprint	
S. No	Description of the Activity Sprint
1	
2	

Prepared by…………………………………..   Date………………………………..

Approved for Distribution by …………………..   Date ………………………………..

Approved for upload to Project Management Portal   Date uploaded …………………………………

3.2.8 Stakeholder Engagement Plan

Stakeholder register developed by the project would comprehensively map the stakeholders of the project. Different stakeholders could have different roles to play in the project. Stakeholders would have well defined role or roles and indeed some of them would have multiple roles. Based on their roles the stakeholders are categorized as follows (Table 20)

	Table 20: Stakeholder Mapping		
S. No	**Stake Holder Category Name**	**Category Role**	**Stakeholders**
1	Beneficiaries	Business Requirements definition, accept changes & facilitate implementation	Federal Transport Offices, Regional, Zonal and local transport offices. System End users, General driving public, driver training and testing centres, vehicle inspection centres.
2	Project Enablers & Policy Makers	Provide strategic and policy guidance and the provision of operational platform and services to enable project operations	MINT, Ethio Telecom INSA and Other Telecom operators, Payment gateway operators, banks and financial institutions Ministry of Transport /FTA
3	Project Active Participants	Business Requirements definition, Participate in systems development and deployment, make changes and facilitate implementation and sustainable operation.	MUDC, Ministry of Trade, Custom Authority, Ministry of Education, Transport offices-Federal, Regional, Zonal and local Payment gateway operators, TTTFP SI Teams
4	Project Supervisors	To participate in project supervision and guide its implementation	FTA/ Ministry of Transport Project Steering Committee /PGB members

On a very broad basis the stakeholder engagement strategic plan would consist of increasing the involvement of all categories of stakeholders, whether internal or external, and thereby increasing their awareness of the project, its goals, objectives and its operations. For this purpose integrated stakeholder communication approach would be employed that targets specifically designed messages to the various categories of stakeholders. Frequent messaging, meetings and presentations to key stakeholders would be necessary to increase their awareness and involvement and to maintain their interest and level of engagement throughout

the project period. In other words the aim should be to increase stakeholder engagement to a level that the stakeholders perceptually take ownership of the project. As a part of this stakeholder engagement strategy the inputs and comments received from the stakeholders, whether at policy and supervisory levels or at the operational level should be seriously considered for adoption and indeed should be adopted if feasible and desirable. Two way communication between the Project and stakeholders would be promoted. The high level of stakeholder engagement would facilitate the project operations on the ground through quick and accurate data provision, easy implementation of changes and sustainable and effective use of new systems even after the project comes to an end. The stakeholder engagement plan would consist of the following strategic actions:

- Map and categorize stakeholders
- Increase stakeholder awareness through persistent communication.
- Increase stakeholder involvement through targeted messages for various categories of stakeholders.
- Keep stakeholders informed of project progress though frequent reporting.
- Encourage two way communication, to and from the stakeholders, by seeking feedback and comments and quick response to comments and suggestions.
- Project team and SI team members will work closely with the staff of active participant stakeholders to increase involvement, enhance stakeholder skills and perceptual ownership.
- Meetings and presentations of project progress on a monthly basis to key stakeholders and implementation of policy level and operational advice and suggestions.
- Presentation of Project Performance Reports to FTA and PGB for the purpose of monitoring and control of project operations.
- Change Management Approach plan and strategy to be developed in close cooperation with the stakeholders.
- Organizational and process changes to be made in participating stakeholder institutions with the active involvement of the stakeholders concerned in accordance with the business readiness plan and strategy.
- High level of involvement of stakeholder personnel to be promoted during systems development and implementation.

3.2.9   Governance, Monitoring and Control

Governance in organizational settings is distinguished from management practice by the fact that governance is primarily concerned with the monitoring and control of the organizational management in order to safeguard the interests of the organizational stakeholders. Governance would therefore in a broad sense concern itself with evaluating the performance of management in reaching the organizational goals and objectives and indeed the effectiveness and efficiency of organization's strategic and operational management. In the context of our project it would mean that the governance processes to be undertaken by the Project Governance Board, already described in the previous section of this document would consist of monitoring the performance of the project management in terms of their attainment of the project goals and objectives and the efficiency with which the defined goals, objectives and outputs have been attained. Therefore, the process of Governance- management monitoring and control requires the existence of well-defined goals, objectives, output and targets and metrics for evaluation. These metrics are often termed the Key Performance Indicators (KPI).

3.2.9.1 Key Performance Indicators

Irrespective of the level at which monitoring and evaluation takes place the key parameters to be evaluated would be the following:

Effectiveness: Whether or not the activity, sprint, work package, phase of the project or the project as a whole has been effective in reaching its output target, objective or its goal.

Efficiency: This parameter measures the efficiency with which the resources have been used. This would evidently include the financial resources and budget employed and used, manpower resources used or any other resources that might have been used

Timeliness: Another parameter for evaluation would be timeliness. This will measure the degree to which the schedule has been maintained.

Sustainability: It certain instances it would be necessary to generate outputs that are sustainable in the long run. In such situations indicators must exist to measure the level of sustainability.

For each of the four evaluation parameters mentioned above we must find indicators that can be used as a proxy measure. For the indicators to be useful the indicators (KPI) should have the following attributes

- **Specific:** Provides a clear description of what you want to measure,
- **Observable**: Focus on action or change
- **Measurable**: Indicator should be objective and measurable

For our project we propose establishing KPI's at the level of the Project, Project Phase and indeed for each TOGAF architectural development phase.

S. No	Parameters	Indicators (KPI)
	**Table 21: Key Performance indicators for the Project as a whole**	
1	Effectiveness	• Proportion of project deliverables approved by FTA and World Bank • Proportion of systems and infrastructure designed, installed and functional as per predefined parameters at the end of the project • Proportion of transport offices and stakeholders report satisfaction with the installed systems and infrastructure. • Proportion of the systems meeting or exceeding predefined quality /performance parameters • Stakeholder- users and technical staff report satisfaction with the training/ capacity development work of the project
2	Efficiency	• Government's systems ownership cost as a proportion of project budget • Expert manpower input as a proportion of planned expert input.
3	Timeliness	• Proportion of systems made operational within or ahead of the planned target dates. • Proportion of the project deliverables realised within or ahead of the planned target dates
4	Sustainability	• Proportion of the organizational and process changes made in stakeholder organizations sustained at the end of the project • Proportion of the user organizations reporting increasing trend in the usage of the developed and deployed systems at the end of the project • Proportion of the stakeholders reporting continuing use of new skills acquired through project at the end of the project

Table 22: Key Performance indicators for the Project Phase 1		
S. No	**Parameters**	**Indicators (KPI)**
1	Effectiveness	• Proportion of phase 1 deliverables approved by FTA and World Bank • Proportion of systems and infrastructure designed as per predefined parameters at the end of the phase 1 • Proportion of transport offices and stakeholders reporting satisfaction with project outputs at the end of phase 1 • Proportion of the stakeholders reporting satisfaction with the SI firms chosen for implementation during phase 1
2	Efficiency	• Phase 1 cost as a proportion of project budget • Expert manpower input as a proportion of planned expert input during phase 1
3	Timeliness	• Proportion of the phase 1 deliverables realised within or ahead of the planned target dates

No KPIs are being proposed for Phase 2. There would be developed as Phase 1 gets underway and approach plan for Phase 2 has been developed. As the project is designed within the TOGAF it would be logical and practical to define KPIs for each ADM phase. These ADM phase KPIs would be more granular than the higher level KPIs for the project or project phase and would seek to evaluate the ADM phase in question. Table 23 presents KPIs for all the ADM based phases.

Table 23: Key Performance indicators for ADM phases		
S. No	**ADM phase**	**Indicators (KPI)**
1	Preliminary	• Project Initiated and Planned & approved • High level ADM planning done & approved • Phase outputs realised within the target date • No cost overruns reported
2	Architectural Vision	• Enterprise architecture frame set up • Detailed plan developed and approved • Change management approach plan approved • Phase outputs realised within the target date • No cost overruns reported
3	Business Architecture	• Baseline & target Business Architecture DL&VR approved • Baseline & target Business Architecture VR&PM approved • Baseline & target Business Architecture SHLPL approved • Baseline & target LAN and WAN architecture approved • Approach plans driving schools & vehicle inspections approved • Power baseline and target architecture plan approved • Phase outputs realised within the target date • No cost overruns reported
4	Data Architecture	• Baseline and target DC architecture plan approved • Data management baseline and target approach plan policies and procedures approved. • Phase outputs realised within the target date • No cost overruns reported
5	Technology Architecture	• Approved application design for DL, VR, AM, PM and SHLPL • End user computing devices specified and costed • WAN, LAN and DC design approved • Phase outputs realised within the target date • No cost overruns reported
6	Opportunities and Solution	• Approved approach plan QA, Security • Approved updated EA and approach plan • Approved security architecture model • Phase outputs realised within the target date • No cost overruns reported

S. No	ADM phase	Indicators (KPI)
		Table 23: Key Performance indicators for ADM phases
7	Migration Planning	• Approved business readiness approach plan • Approved business release approach plan • SI and Vendor firms selected
8	Implementation and Governance.	• Systems and infrastructure designed, installed and functional as per predefined parameters • Proportion of transport offices and stakeholders report satisfaction with the installed systems and infrastructure. • Systems meeting or exceeding predefined quality /performance parameters • Proportion of systems made operational within or ahead of the planned target dates. • Proportion of the project deliverables realised within or ahead of the planned target dates. • Proportion of the organizational and process changes made in stakeholder organizations sustained at the end of the phase and the project • Proportion of the user organizations reporting increasing trend in the usage of the developed and deployed systems at the end of the phase and the project. Note: This phase of the ADM will coincide with the last phase of the project. The KPIs for this phase will be largely similar to the Project KPIs. The KPIs for this ADM phase will be refined as the implementation approach plan is developed and finalised during the Phase 1 of the project

3.3   Work Plan and Schedule

The work plan for the project presented here is guided by the project execution approach and strategy articulated in the previous section of this document. The plan is developed based on our Transform Framework, which was also presented in the previous section. Accordingly, we propose to undertake the project in the two defined phases (Phase 1 and Phase 2), consisting of four stages. Phase 1 covering stages one, two and three and Phase 2 covers stage four. This broad work organization is presented in the Table 24.

Table 24: Proposed Work Plan Organization				
Phase	**Stage**	**Stage Description**	**Duration**	**Work Package coverage**
Phase 1	Stage 1	Preparations and requirements gathering	45 days	WP 02, 03, 04, 08,11 and 18
	Stage 2	Design Options and detailed design	105 Days	WP 01, 02, 03, 04, 05, 06, 07, 09 10, 11, 12, 13,14,15, 16,17 and 18
	Stage 3	Vendor on boarding	180 Days	Work Package 19
Phase 2	Stage 4	Delivery Oversight	30 Months	WP 20, 21, 22, 23, 24, 25, 26 and 27

The proposed work organization is expected to optimally lead to the outcomes desired and the project objectives. The major activities to be taken up under each stage of the project and the desired deliverables of the project have been listed previously and are described here under. The time duration of phase 1, constituting stages 1, 2 and 3 is about 330 days and that of the Phase 2 is thirty months.

3.4   Project Deliverables

The outcomes and deliverables of the project have been broadly explained in the previous sections of the document. It is expected that in the two phases of the project fourteen (14) major deliverables are expected to be achieved. In most cases each of the defined deliverables cover many other outcomes within it. Indeed, on the whole it is expected that the fourteen deliverables cover all expected outcomes defined under each of the 27 work packages of the project.   A summary of these 14 deliverables and their constitution is presented in the Table 25.

Table 25: Consolidated Project Deliverables and their Constitution		
Deliverable No	Deliverable Description	Remarks
Phase 1: Deliverables		
D1	INCEPTION REPORT	This includes Inception Report, Work Plan, Resource Plan and schedules,
D2	REQUIREMENTS DEFINITION, GUIDELINES AND POLICY	All relevant Policies and guidelines prepared and defined. Requirements defined. Consolidated set of requirements, agreed by the business, which can be used to size and design the required systems
D3	DISCOVER & PROPOSE SOLUTION OPTIONS	Among others this includes strategic way forward on the types and approach for application packages. Defined, approved and agreed Approach plan on how the Driving Schools will be integrated securely into the TTMS and defined approach plan on how to integrate the Vehicle Inspections centers into TTMS.
D4	SOLUTION ARCHITECTURE DESIGN	Detailed Solution Architecture (Solution Architecture Document)
D5	IMPLEMENTATION APPROACH	This among others includes quality and testing Approach, data management approach and business readiness approach and Program plan for phase 2
D6	REFINED ENTERPRISE ARCHITECTURE	Detailed Enterprise Architecture include security architecture and all architectural views
D7	BIDDING DOCUMENTS	This among others includes detailed design report with final EA Solution Architecture, System Requirements, Tech Specs and detailed BoQ and budgets
D8	PROVIDE PROCUREMENT SUPPORT	Includes responses to bidders, support evaluation and SI selection

Table 25: Consolidated Project Deliverables and their Constitution		
Deliverable No	**Deliverable Description**	**Remarks**
Phase 2: Deliverables		
D9	DELIVER AN OPTIMAL ROLL OUT PLAN	Finalize roll out plan after extensive consultative process
D10	SUPPORT EQUIPMENT SUPPLY	This includes overview on equipment supplies as per approved specifications and quantities.
D11	ACCESS POINT INFRASTRUCTURE	End User computing equipment is installed and operates correctly with the new systems. Implemented rollout of hardware and networks ahead of the Software Rollout per Region
D12	DATA CENTER INFRASTRUCTURE SETUP	Design Document for Data Center Installation Final Installation report of Data Center Conduct performance tests and report
D13	SOFTWARE DEVELOPMENT, BUSINESS READINESS AND RELEASES	This includes software development supervision, quality testing and implementation of the necessary business readiness support and training of staff. Software released as per plan
D14	PROJECT MANAGEMENT AND SUPERVISION	This includes Contract Performance Report. Project Management Report for the SI Vendors, Contract Completion Report for the SI and Monthly Progress Report and other management reports

3.5   Work focus Phase 1 and Phase 2

Major activities under the two phases and four stages will cover all the 27 defined work packages of the project. The activities to be undertaken during the two phases and four stages of the project are briefly described below:

Stage I-Preparation and Requirement gathering In this stage resource mobilization will be done followed by requirement definition, guidelines and policy development. This stage of the

project covers key activities highlighted under WP 02, 03, 04, 08, 11 and 18 of the RFP and will have clearly defined outcomes / deliverables.

Stage II- Design options and detailed design– In this stage design options for the proposed system will be developed and one of the design options will be finalized for detailed design. This stage of the project covers key activities highlighted under WP 01, 02, 03, 04, 05, 06, 07, 09 10, 11, 12, 13, 14,15, 16,17 and 18 and will have clearly defined outcomes/ deliverables.

Stage III- Vendor On-boarding Stage– In this stage we will prepare RFP and assist FTA in vendor on-boarding activities including assisting evaluation of bids & providing technical inputs while drafting contract This stage of the project covers key activities highlighted under work package 19 of the project and will have clearly defined outcomes/ deliverables.

Stage IV- Program Management– In this stage we will provide QA inputs at various stages of application implementation including test plan creation, conducting UAT and application rollout. This stage of the project covers key activities highlighted under WP 20, 21, 22, 23, 24, 25, 26 and 27 of the RFP and will have clearly defined outcomes/ deliverables.

3.6   Major Activities Description

Major activities to be undertaken during the four project stages are described hereunder. This includes activities related to project start up, planning and requirements gathering, design options identification and analysis, detailed design, vendor on-boarding and program management.

3.6.1   Project Startup and preparation

The project team shall be mobilized. The team will comprise of all the identified technical resources in the proposal along with subject matter experts from various relevant domains. The team shall initiate the project through a kick off meeting, where it will highlight the key project objectives, duration of the project, success factors, governance structure, progress reporting mechanism, sample progress dashboard and key requirements from FTA during the project implementation.

3.6.2   Study and review of policies, laws and regulations

As a first step towards better appreciation of project goals and imperatives we would understand, examine and assess the current Ethiopian transport and ICT ecosystem. Concomitantly it would be necessary to review the current and proposed policies, laws and regulations related to transport and ICT sectors in Ethiopia. This will, amongst others, include review of the following policy guidelines and regulatory instruments, including the following:

- Driver License Registration (Proclamation 1074/2018)
- Vehicle Registration (Proclamation 681/2002 & 468/97)
- Penalty Management (Proclamation 395/2010)
- Ethiopian National Electronic Signature Law, 2015 (Draft).
- Ethiopian Computer Crime Proclamation, 2016 (Draft).
- Ethiopian National Data Protection Law, 2009 (Draft).
- Ethiopian National Electronic Transactions Law, 2009 (Draft).
- Ethiopia National ICT Policy and Strategy, August 2009.
- Ethiopian National Information Security Policy, September 2011.
- Model laws developed under the Tripartite Transport and Transit Facilitation Program (TTTFP): including the following
    - Cross Border Road Transport Model Law;
    - Road Traffic Model Law; and
    - Transport of Dangerous Goods by Road Model Law

We will also meet representatives from relevant governmental institutions to gather information about relevant policies, regulations & proclamations. Besides the departments and officials of the Ministry of Transport and FTA we will also consult with officials in INSA, MINT and others relevant institutions.

3.6.3 Business Requirement Definition

The team shall undertake a detailed study of the current business processes, work and data flow connected with vehicle registration, driver licensing, penalty management and road safety, road information management and operators registration under the TRIPS model requirements. Decision making and operational processes in the relevant organizational units like the Transport Offices and Bureaus would be examined. In addition consultations and data collection with regard to the existing ICT infrastructure including WAN and LAN and data center resources would be undertaken.

3.6.4 Situational Assessment and Gap Analysis

As a follow up to the study of the existing policies, laws and regulations relevant to the project and to the Ethiopian traffic and transport management, the project would provide an audit and review of legislations currently enacted or under consideration with a view to identify the actual and perceived legal and regulatory barriers and uncertainties facing the technology uptake and development of transport system in the country. It will also assess the awareness and ability of the relevant organizations to implement and administer traffic and transport related

laws and application of technology in the transport sector. Additionally, a crucial aspect of the work at this stage would be to review international best practices in the field of traffic and transport management. The study will conduct a thorough review of case studies purposively selected jurisdictions and international model laws. These case studies would be useful to fully determine gaps existing in the present Ethiopian legal framework with respect to traffic and transport management.

3.6.5 Understanding Technology Infrastructure and Systems

Consultant will undertake a detailed study and review of the existing technology ecosystem with a view to assess the level of technology maturity and ICT application particularly in the areas relevant to traffic and transport management. This will include study of the status of data communication and internet, ICT infrastructure and systems within the government, particularly within the relevant transport related institutions and departments, systems for financial management, level of awareness and skills for ICT use in the relevant departments of the government and among the general population at large. Specifically, the following major activities will fall within the scope of work of the project in the area of technology systems.

- Assess the current state of ICT Structure and Systems to support traffic and transport management including e-payment transaction platforms and evaluate their level of readiness and maturity

- Study and evaluate the international best practices and standards on traffic safety technologies and systems and set up bench marks for Traffic management in the country. Determine the base line state of maturity and gaps currently existing.

- Review and analyze the current online payment scenario in Ethiopia and assess the e-payment maturity level. The assessment should include payment channels offered for both banks based as well as non-bank-based transactions, infrastructure set up, legal & regulatory framework and international security standards adopted by all financial (banks) as well as non-finance (Telco/insurance companies) institutions offering the payment service.

- Study the Ethiopian financial switch and the interbank payment initiatives, asses the additional requirements for developing the full-blown payment gateway infrastructure.

- Determine the level of skills, awareness and use of internet-based technologies among the general public and the institutions.

3.6.6 Stakeholder Consultations for Business Process Analysis

Extensive consultations and studies would be undertaken with various relevant stakeholder organizations in order to document the business processes currently being followed including business processes for licensing of different transport entities, work flow and data modeling. *As is Process* would be compared to *To Be Process* to determine the gaps that currently exist. This will be done by the following methods:

- **Document Analysis:** Reviewing the document of existing systems will help devise AS-IS process document as well as drive Gap analysis for scoping the projects.

- **Interviews:** One to one discussions with the relevant stakeholders will generate necessary data to define TO-BE process and requirements, operationally as well as technically. Starting with stakeholders from FTA, it will be helpful to understand top level processes and requirements. In addition operational managers will help understand the operational processes in depth.

Stakeholder Analysis for Driver Licensing & Vehicle Registration we will have interactions with the following: -

- **Driver Training Schools** - We will take interviews of mangers and trainers of Driving Schools to understand the process they follow for the admission of students, training them for theoretical and practical knowledge and taking test examinations. Along with this the understanding of IT infrastructure and software being used to maintain the data and processes.

- **Driver Licensing Vehicle Registration Centre** - This is the place where physical Driver's License and Vehicle Registration certificates and Number plates are issued to the customer. It is crucial to understand the operations at this place. All the data of the DL issued is stored here. It is crucial to unify all the regional centers and have same processes to ensure a central database is created and data can be accessed by concerned authority.

- **Vehicle Inspection Centers** - The processes that are being followed by various vehicle registration centers will be understood by conducting interviews of mangers and individuals who are inspecting the vehicles. Software that is being used for inspection and data storage will be analyzed and improvement scope will be identified.

- **Customs Office** - The vehicles imported will need to go through customs, which can help in sharing details to vehicle registration offices. If, the systems can be integrated, lot of data duplication between them can be prevented.

▪ **Business Heads / Managers of DL/VR** - These meetings will help understand top level requirements for the project and also the operations for issuing a new Driver's License and vehicle registration certificates.

Similarly, for **Accident Management & Penalty Management**, the current system in the country is not uniformly developed across the country. In some cities and regions it is manual and in others it is partially digitized. Stakeholder Consultations and analysis for Accident Management & Penalty Management will have interactions with the following: -

▪ **Traffic Controller Department** - To understand the current process of penalty collection we will meet stakeholder from traffic controller department. We would meet the following for our interactions of AM&PM module.

- Head of Traffic Police Department
- Traffic Police
- Traffic Controller
- IT Representative from department

▪ **Penalty Collection Institutions** – To understand next step of collected flow for partially digitized city/region penalty collection system we would meet stakeholders from these institutes. This will include consultation workshops with the following: -

- Branch Representative
- Operator
- IT Representative

▪ **Data Management Centre** - For few city/region who are following partial digitized system of penalty management we would like to understand there system of data management. Following interactions would be useful

- Operator
- IT Representative from the Centre

▪ **Federal Transport Authority (FTA**) - To understand role of FTA in current penalty management we will be meeting representative from FTA.

▪ **Federal, Regional & Zonal Police** - These consultations will help us to understand role of both department in case of road accident and how they help to resolve the case. It will help us to understand the connectivity between traffic police and further investigation process.

▪ **Road Safety and Traffic Management Department** - To understand country laws & regulations set by government we will be meeting stakeholders from this department.

▪ **National/Third Party Insurance Company** - Interviews with insurance agency stakeholders will help us to understand current practices followed for vehicle insurance and integrate it with proposed system of unified accident and penalty management system.

3.6.7 ICT and Network Infrastructure assessment

The Project Team shall study and assess the existing data center infrastructure and their operational capacity and reliability for possible operational hosting of TTMS on these platforms. Similarly the team would study and evaluate the power and network infrastructure currently existing vis a vis requirements for TTMS at nine operational locations, two city administration and the 80 regional or zonal offices. Additionally, the team will assess the existing rules, regulations and policies for operational management and governance of the technology infrastructure and resources. The following major activities would be undertaken in this regard

- Evaluate and assess the National Data Centre (NDC) and all the Regional / City Government Municipal Data Centers. Additionally, assess the future programs and projects for expansion and development of these data centers. For this purpose study visits and detailed evaluation of these data centers would be undertaken including in depth discussions and consultations with technical personnel at the NDC as well as at the Ministry of Innovation and Technology. Relevant technical and policy documents on the data centers and ICT infrastructure would be reviewed in depth.

- Consult with government institutions that are currently users of the NDC and other data centers to assess the current use pattern and load and challenges faced to cross check the evaluation and assessment exercise.

- Inspect all Data centers to identify their current hosting space and capabilities, and map the current hosting infrastructure ICT (Network, Servers, Storage, etc.), Physical (Building, Air-condition, Security, Power, Redundancy, etc.) vis a vis the desired requirements

- Assess the existing power requirements, frequency and duration of power outages per transport office and other relevant operational offices and in order determine the minimum power requirements and document the challenges encountered due to power interruptions and fluctuations.

- Obtain clearances and organize site visits to the Ministry of Innovation and Technology and the National Data Centre (NDC) to assess the current network setup and future strategy plans and programs, if any

  - Undertake extensive consultation with Ethio-Telecom to:

    - Assess the existing last-mile-connectivity network extensions and bandwidth capacity

    - Assess the desired last-mile-connectivity network extensions and bandwidth capacity

    - Plot the exact location coordinated of Transport Offices in conjunction with the respective connection points

- Conduct detailed Gap Analysis covering all functional and technical aspects pertaining to ICT infrastructure, Power Requirements and Networks (LAN and WAN) for the Transport Offices.

- Gather a list and specifications of all available End User Computing equipment that can be used in the Program

- Analysis of the existing system modules in current applications, if any, including assessment of their functionalities and the data integration points

3.6.8 Discover and propose solution options

Once the detailed analysis of the existing infra such as DC, Network, hardware and software is done we will start benchmarking the requirements as detailed in the scope and map it to the existing infra for optimization. Each solution requirement will be discussed and agreed with FTA and then defined in a matrix with a priority check list. Framing of policy and regulations for the solutions such as operator registration, vehicle registration and driver license registration will be done in consultation with the associated stake holders. Technology scan for the COTS solution or development based solution for the requirements given for Driver license registration, Vehicle registration system, Accident management, Penalty management and operator registration and Helpdesk management system will be done employing international best practices.

3.6.9 Detailed Design

Following the finalization of the solution options and approach, the solution architecture, process and policy framework as well as solution software design for each component will be

made. In addition, a scheme for optimization within the existing infrastructure will be designed. Cost estimation for the approved and planned solutions and their associated hardware requirement will be prepared and presented as a sustainable model. For example once the vehicle registration or driver license registration process has been digitized and deployed enrollment will be through an FTA online system on a reasonable registration fee. Once the cost estimates and budgets are approved by the FTA and other stake holders we will submit a detailed project report, which will cover all relevant aspects of the proposed solutions, technical architecture, associated equipment count and their technical specifications, policies, cost estimates and implementation plan.

3.6.10 Vendor On-boarding

The Consultant will help vendor on-boarding, development of the bid documents including the technical specifications to be included there in and other content of the bid documents following the strategic approach for vendor on-boarding described in the previous sections of this document. In this respect the World Bank procurement guidelines would be followed. In addition services would be provided for tender evaluation, vendor selection and contracting.

3.6.11 Program Management

The key outcome of this activity would be to ensure that solution designed during the phase 1 of the project is implemented effectively and delivers the envisaged benefits to the targeted stakeholders within the defined timelines. For this purpose the team will facilitates all IT initiatives through standards-based approach encompassing a benefits oriented mechanism. This will include provision of supervisory services to ensure development and establishment of the TTMS infrastructure and applications in accordance with the design and plan developed during the previous stages of the project and duly approved by FTA for implementation

3.6.11.1 Project Implementation Strategy and Plan

At the outset of this phase a well thought out implementation plan and strategy would be formulated. This plan would schedule the project activities on a realistic time line. The roll out of the TTMS development and deployment would take place in accordance with this strategic implementation master plan agreed to by the Systems Integrator (SI) and approved by FTA.

3.6.11.2 Development Oversight

Working closely with the SI vendor the project team would supervise and oversee the development and configuration work related to the various modules of the TTMS. Among others, the project team will

- Co-ordinate with SI and prepare detailed release plan for all modules
- Preparation of test plan, finalization of formats for test scripts & test case scenarios.
- Monitor development and/ or configuration of modules in TTMS

3.6.11.3 Quality Assurance

Quality assurance is an important part of work of the project team. As a part of the project implementation plan the quality assurance framework and policies as well as the targeted performance parameters and specifications would be predefined. Amongst others the following activities would be undertaken by the project team

- Component / Sprint release management
- Finalization of deployment procedures which includes team identification and approval process
- Review test cases and test scripts for testing
- Review functional testing results of all user interfaces and test case scenarios in each module.
- Review code review and query optimization results
- Review data validation results for API integration on staging environment
- Assist and review load and stress testing results to optimize system performance
- Assist and review penetration testing results and authentication mechanism testing
- Assist in integration testing within each module and external systems
- Coordinate with FTA officials for conducting UAT
- Review UAT observations and assist SI in getting these implemented in application

3.6.11.4 ICT Infrastructure and Data Centre Development

The project team would supervise the deployment of the ICT infrastructure including LAN and WAN as well as the Data Centre infrastructure as per the design developed during previous stages of the project and duly approved for implementation by FTA. Amongst others, it would include the following:

- Review design document of infrastructure setup
- Provide assistance in hosting & network setup
- Supervise equipment supply and prepare the QA correct equipment Report
- Review the final detailed design and prepare the installation report
- Review the Final LAN and WAN detailed design & prepare the installation report
- Review the DC final detailed design and prepare the installation report
- Supervise testing of equipment and networks as per the QA plan

3.6.11.5 Power Supply Development at Transport Offices

A part of the work of the project team at the Transport Offices especially at the Regional Centres relates to the assessment of the supply of electric power to ensure smooth functioning of the ICT systems in these offices. The project team would supervise the installation of power infrastructure, including possible solar power systems, at these locations as per the findings and approved design prepared during the previous stages of this assignment. Amongst others this would include the following:

- Supervise the installation of the alternative power systems including possible renewable or solar systems at transport offices as per approval design and plan.
- Test the working and performance of the installed power systems
- Prepare and submit the installation and test reports to FTA

3.6.11.6 Provision of End User Computing Related Services

All end user computing equipment would be procured in accordance with the specification determined and approved during the previous stages of the project. The project team would assist FTA with the following major activities.

- Assist FTA in installation of end user computing devices that may include as per FTA requirements – Laptop , desktops and other installation of OS and / or other application required to run the developed application
- Supervise SI in testing of application on the EUC environment for identified users in order to ensure there are no issues in performing regular tasks by FTA officials

3.6.11.7 Readiness review and development

As a part of the project mandate the team would review the state of readiness of FTA for the TTMS. This would include both the human capacity development as well as the development of the FTA organization

- Review and oversee end user training conducted by SI
- Prepare and submit change management organization development plan to FTA
- Review data migration results and data digitization output samples
- Perform Change management workshops for identified personnel

3.6.12 Work Schedule and Resource Plan

The work schedules and times line for the various work sprints constituting the program and resource plan covering the schedule deployment and duration of each project expert resource are given in the attachments to this document

Attachment 1: TTMS Project Plan General Guidelines, Assumptions and Notes

This attachment provides general guidelines on the project plan and our assumptions

Attachment 2: Agile Project Plan (PDF format)

The project plan in PDF format is not provided as it is not easily readable in that format due to its large size. The plan is provided in Excel format as Attachment 8

Attachment 3: Listing of Major Stakeholders with assigned abbreviations Excel Format

This attachment provides the listing of major stakeholders and abbreviation attached to each for the purpose of facilitating stakeholder communication and engagement.

Attachment 4: ADM Deliverables (inputs and outputs) In Excel Format

This attachment lists the project deliverables and outputs during each ADM phase of the project as per the comments / advice of World Bank

Attachment 5: ADM Gantt Chart Phase 1 &2 in Excel Format

This gives a pictorial representation of ADM phases on a timeline

Attachment 6: Project Resource Allocation Plan in Excel

Provides expert allocation plan during phase 1 of the project

Attachment 7: Stakeholder Detailed Map (Pdf format as well as Excel format)
This attachment gives a detailed listing of all stakeholders of the project with their role in the project.

Attachment 8: Agile Project Plan in Excel Format.
This can only be viewed properly in electronic format on account of the large size of the file

Attachment 9: Phase 2 Activities Gantt Chart (in Pdf format)
This attachment provides an overview of the comparative activities of the Consultant vis a vis that of the SI firm to be selected during phase 1 of the project. This is only an indicative chart, which will be refined and finalized during the phase 1 of the project.

Attachment 10: TOGAF templates
This TOGAF recommended templates that will be used by the project will be would be uploaded into the EA repository. These templates would be used with some modifications as may be necessary.

Attachment 1

	TTMS Project Plan General Guidelines, Assumptions and Notes	
1	Project Start Date	20 Feb 2020
2	Entire project plan has been mapped to different ADM phases as per TOGAF 9.2 framework	
3	Agile methodology has been used within the ADM phases to run simultaneous sprints	
4	Each sprint has been kept of equal tenure of 14 days with specified product owner, scrum master, reviewer & deliverables	
5	Intra sprint iterations have been assumed to be handled by the product owner and scrum master internally	
6	Phase 1 of the project has ADM phases - Preliminary, Phase A(Architecture Vision), B(Business Architecture), C(Data Architecture), D(Technology Architecture), E(Opportunities & Solutions), F(Migration Planning)	
7	Phase 2 of the project has ADM phases - G(Implementation & Governance) & H(Change Management)	
8	Common Systems architecture such as Security Architecture are considered as cross-cutting concerns	
9	SABSA framework has been used for security architecture	
10	Detailed sprint level planning has been done only for Phase 1. Phase 2 detailed sprint level planning will be done in Sprint 55 during Migration Planning phase	
11	Stakeholders for various activities under every sprints and their dependencies have been identified and listed under activities	
12	Input, Output, Timelines and task list for each sprint has been planned and projected in the overall plan	
13	The task list, input and output might undergo minor modifications according to the task-owner during the execution of the sprint and the project plan should be updated accordingly.	
14	The project plan is a living document and will be updated as we proceed through the execution of the project.	
15	Among others, the already established EA and TTTFP Documents would be used as inputs to Enterprise Architecture development.	

Attachment 7: TTMS Stakeholders TOGAF Mapping							
No	**Stakeholder Name**	**Impact (L,M,H)**	**Influence (L,M,H)**	**What is Important to the stakeholder**	**How could the stakeholder contribute to the project**	**Strategy for Engaging the stakeholder**	**Remarks**
A. Infrastructure - Federal Institutions							
1	Ministry of Innovation and Technology (formerly MCIT)	Medium	High		• Provision of National Level Strategy and policy documents and guidelines • Provision of NDC facilities. • Wereda-net facilities. • Advice and give technical support on the progress of the project and related to Telecom and NDC usage.	• Signing MOU • Participating in Project Governance Board • ICT Technical committees	
2	INSA	High	High		• Making available Security Policy & standards • Ensuring the security standards are met	• Participating in Project Governance Board • ICT technical committee	
3	Ethio-Telecom	High	High		• Facilitating last-mile connectivity • Facilitate connectivity in general	• Participating in Project Governance Board / Steering Committees • ICT technical committees	

	Annexure 7: TTMS Stakeholders TOGAF Mapping						
No	**Stakeholder Name**	**Impact (L,M,H)**	**Influence (L,M,H)**	**What is Important to the stakeholder**	**How could the stakeholder contribute to the project**	**Strategy for Engaging the stakeholder**	
B. Infrastructure- Regional Institutions							
4	Addis Ababa City ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
5	Deredawa City ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
6	Oromiya Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
7	SNNP Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
8	Amhara Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
9	Tigrai Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
10	Gambela Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
11	Benshangul gumz ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
12	Hareri Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
13	Afar Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	
14	Somali Region ICT Agencies	Medium	High		Provision of Infrastructure services	Participating in PGB	

	Annexure 7: TTMS Stakeholders TOGAF Mapping						
No	**Stakeholder Name**	**Impact (L,M,H)**	**Influence (L,M,H)**	**What is Important to the stakeholder**	**How could the stakeholder contribute to the project**	**Strategy for Engaging the stakeholder**	**Remarks**
C. Regional Transport Offices							

15	Addis Ababa City Transport Office / sub-city Offices	High	High	• Reforming and modernizing their work
				• Upgrading their digital skills
				• Upgrading their operational skills
				• Facilitating information exchange between different regions
				• Enabling quick service provision to their constituents (public and businesses)
				• Facilitate their operational and strategic decision making based on modern ICT systems.
					Facilitate the Implementation of:
					  • Driver Licensing System
					  • Drivers Training Schools, Inspection Centres System
					  • Drivers testing and DL card printing
					  • Vehicle registration System
					  • Operator Registration system
					  • Revenue collection (payment gateway)
					  • Penalty Management System
					  • Accident Management System
					• Make operational, organizational and process changes
					• Participate in the project sponsored training programmes
					• Actively participate in the implementation of the developed systems and provide feedback.
						• Signing MOU
						• Involvement in PGB
						• Involved with project implementation at ground level
						• Participate in the training programmes
						• Seek feedback at frequent intervals
							Internal

16	Deredawa City Transport Offic	High	High				
17	Oromiya Region Transport Office	High	High				
18	SNNP Region Transport Office	High	High				
19	Amhara Region Transport Office	High	High				
20	Tigrai Region Transport Office	High	High				
21	Gambela Region Transport Office	High	High				
22	Benshangul gumz Transport Office	High	High				
23	Hareri Region Transport Office	High	High				
24	Afar Region Transport Office	High	High				
25	Somali Region Transport Office	High	High				

Annexure 7: TTMS Stakeholders TOGAF Mapping							
No	Stakeholder Name	Impact (L,M,H)	Influence (L,M,H)	What is Important to the stakeholder	How could the stakeholder contribute to the project	Strategy for Engaging the stakeholder	Remarks
D. Federal Transport Authority							
26	Vehicle Competency Assurance Directorate (FTA)	High	High	• Simplifying follow up of the implementation of rules & regulation related to VR. • Modernizing Vehicle import permit work process • Modernizing certification of different institutions work process	• Coordinating business owners team • Insuring business requirements are well defined. • Facilitating regional VR implementation. • Implementing vehicle Import permit system. • Implementing certification system • Payment gateway	• Involved in PGB • Involved as process owners	Internal
27	Drivers Competency Assurance Directorate (FTA)	High	High	• Simplifying follow up of the implementation of rules and regulation related to DL. • Modernizing certification of different institutions work process	• Coordinating business owners team • Ensuring that the business requirements are well defined. • Facilitating regional DL implementation. • Implementing certification systems • Payment gateway	• Involved in PGB • Involved as process owners	Internal

		Annexure 7: TTMS Stakeholders TOGAF Mapping					
No	Stakeholder Name	Impact (L,M,H)	Influence (L,M,H)	What is Important to the stakeholder	How could the stakeholder contribute to the project	Strategy for Engaging the stakeholder	Remarks
28	Road Safety Regulation Directorate	High	High	• Simplifying follow up of the implementation of rules & regulation related to road traffic enforcement • Modernizing & ensuring the availability of safety related information for analyses	• Coordinating business owners • Ensuring the business requirements are well defined. • Facilitating federal & regional Penalty Management and Road Accident Data Management systems implementation.	• Involved in PGB • Involved as process owners	Internal
E. Traffic Police Offices							
29	Federal Traffic Police	High	High	• Modernizing and facilitating road side verification and enforcement • Better service to public • Better operations • Better operational and strategic decision making	• Provide feedback • Facilitate implementation of the developed systems	Involved in PGB	External
30	Addis Ababa City Traffic Police	High	High			Involved in PGB	
31	Deredawa City Traffic Police	High	High			Involved in PGB	
32	Oromiya Region Traffic Police	High	High			Involved in PGB	
33	SNNP Region Traffic Police	High	High			Involved in PGB	
34	Amhara Region Traffic Police	High	High			Involved in PGB	
35	Tigrai Region Traffic Police	High	High			Involved in PGB	
36	Gambela Region Traffic Police	High	High			Involved in PGB	
37	Benshangul Tarffic police	High	High			Involved in PGB	
38	Harer Traffic Police	High	High			Involved in PGB	
39	Afar Traffic Police	High	High			Involved in PGB	
40	Somali Region Traffic Police	High	High			Involved in PGB	

No	Stakeholder Name	Impact (L,M,H)	Influence (L,M,H)	What is Important to the stakeholder	How could the stakeholder contribute to the project	Strategy for Engaging the stakeholder	Remarks
Annexure: TTMS Stakeholders TOGAF Mapping							
F. Private Institutions							
41	Drivers Training Institute	High	High	• Able to get applicants information • Able to send applicants information securely	• Conducting training with the new curriculum • Conducting medical examination and first hand Registration of candidates. • Make available connectivity • Preparing the necessary resources required for the system implementation	Round table discussions Seek Feed Back and implementation Support Make process and procedural changes	External
42	Vehicle Inspection Centres	High	High	• Able to get vehicles information easily • Able to send vehicles inspection information securely	• Implementing inspection with the new system • Make available connectivity • Preparing the necessary resources required for the system implementation	Round table discussions Seek Feed Back and implementation Support Make process and procedural changes	External
G. Other Govt. Institutions							
43	Ministry of Education	Low	High		Integrate education system to TTMS for Verification of education certificates	- Involving in Steering Committees - Round table discussions	External
44	Customs Authority	High	High	Smooth & accurate tax collection Smooth declaration data exchanging platform	Integrating custom system to transport system - Allowing data exchanging	- Involving in Steering Committees - Round table discussions	External

Annexure 7 : TTMS Stakeholders TOGAF Mapping							
No	Stakeholder Name	Impact (L,M,H)	Influence (L,M,H)	What is Important to the stakeholder	How could the stakeholder contribute to the project	Strategy for Engaging the stakeholder	Remarks
G. Other gov't institutions							
45	Civil Service Commission	Low	High		Allowing an IT structure which enables to acquire qualified personnel's with sufficient number, which will help to efficiently support the sustainable implementation of the project throughout the country	- Participate in PGB	External
46	Electric Power Corporation	Medium	High		• Facilitate integration of power interruption solution to the national grid. • To give special attention to make available power for remote zonal traffic offices	Participate in establishment of power solutions at traffic and traffic police offices for smooth operations of the systems	External
47	Ministry of Urban Development and Construction (formerly MOC)	Medium	High		• Ensure requirements of the ministry on the construction machine registration module is adequately provided • Ensure the implementation of the construction machine registration module • Provide technical support on the Ministry's part for the project	Participate in PGB	External

Attachment 9

Gantt Chart Phase 2 (Showing comparative major Grail and SI Activities)

S.N	Activity Description	Year 2021			Year 2022				Year 2023		
		Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3
1	Execution Plan by SI firms	▓									
2	Review of the SI execution plan & roll out planning	▒									
3	Equipment supply and installation by SI Firm		▓	▓	▓						
4	Supervision of equipment supply & Installation & QA correct equipment Report		▒	▒	▒	▒					
5	Power Final Designing and final design report		▒								
6	Power equipment supply and installation by SI firm		▓	▓	▓						
7	Power installation verification testing & Reporting		▒	▒	▒	▒					
8	WAN & LAN Final Design document		▒								
9	WAN & LAN Installation by SI Firm			▓	▓	▓	▓				
10	WAN & LAN installation supervision, testing & Reporting			▒	▒	▒	▒	▒			
11	Data Center Final design document		▒								
12	Data Center installation by SI Firm			▓	▓	▓	▓				
13	Data Center Installation verification, testing and			▒	▒	▒	▒	▒			

		Year 2021			Year 2022				Year 2023		
S.N	**Activity Description**	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3
	reporting										
14	Driver licensing application final design	█									
15	Driver licensing SW app development and implementation		█	█	█	█	█				
16	Driver licensing SW release & roll out by SI				█	█	█	█	█		
17	Driver Licensing SW develop testing and release reporting			█	█	█	█	█	█		
18	Vehicle Registration licensing application final design	█									
19	Vehicle Registration Software app development and implementation by SI firm		█	█	█	█	█				
20	Vehicle Registration application release & roll out by SI				█	█	█	█			
21	Vehicle Registration testing and release reporting			█	█	█	█	█	█		
22	PM and AM application final design	█									
23	PM &AM app development & implementation by SI		█	█	█	█	█				
24	PM &AM release & roll out by SI				█	█	█	█			
25	PM &AM develop testing and release reporting			█	█	█	█	█	█		
26	Operator Registration final	█									

		Year 2021			Year 2022				Year 2023		
S.N	**Activity Description**	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3
	design document										
27	Operator Registration app development & implementation by SI		▦	▦	▦	▦	▦	▦			
28	Operator Registration release & roll out by SI			▦	▦	▦	▦	▦	▦		
29	Operator Registration develop testing and release reporting		▨	▨	▨	▨	▨	▨	▨		
30	Central Help Desk Ticket System design	▨									
31	Central Help Desk Ticket System development & implementation by SI		▦	▦	▦	▦	▦	▦	▦		
32	Central Help Desk ticket release & roll out by SI				▦	▦	▦	▦	▦		
33	Central Help Desk Ticket System develop testing and release reporting				▨	▨	▨	▨	▨		
34	Software applications admin and operational manuals								▨	▨	
35	Software applications verification and work flow report									▨	▨
36	Software applications test and QA reports									▨	▨
37	End users Computing QA Report								▨	▨	▨
38	Business Readiness								▨	▨	

Gantt Chart Phase 2 (Showing comparative major Grail and SI Activities)

S.N	Activity Description	Year 2021			Year 2022				Year 2023		
		Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 1	Qtr. 2	Qtr. 3
	Assessment and Report										
39	Capacity Building, Training and Training Supervision									▓	▓
40	Change Management Activities								▓	▓	
41	Project Supervision and management reporting	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
42	Contract Performance Reporting			▓	▓	▓	▓	▓	▓	▓	▓
43	Contract Completion Reports								▓	▓	▓

Note: This chart may not include all the activities. The final phase 2 activities chart would be prepared as a part of the Work Package No1 to be undertaken in Phase 1 and would be finalized in consultation with the SI firms, after they have been selected and on board

▓ Grail Activities

☐ Systems Integrator Firm Activities