DEPARTMENT OF ROADS AND TRANSPORT

GPG ACCOUNT BASED TICKETING

RANDPARK GOLFCLUB
SABOA CONFERENCE

15 AUGUST 2024

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01 Background

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BACKGROUND

The IFM project was assigned to the GMA in 2017

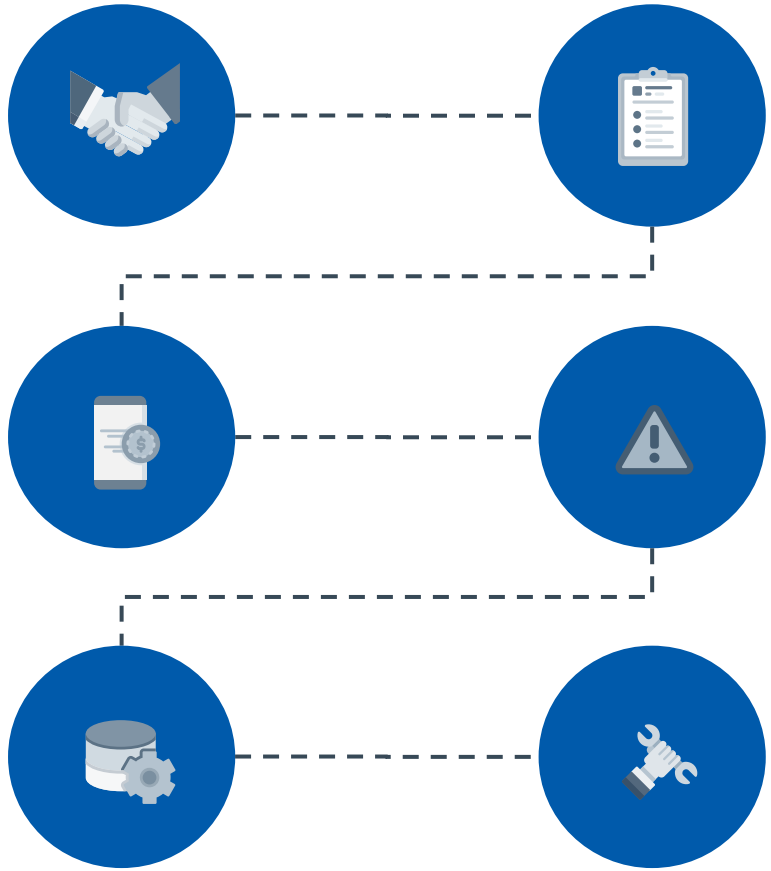
Business case developed and gap analysis conducted in 2018

Gautrain launched open loop EMV in October 2019 to comply with NDOT AFC regulations

Work on the project was halted due to various issues incl. affordability, gaps in the SLA etc.

Regulatory universe uncertainty. i.e., new proposed NDOT AFC regulations communicated by SANRAL since 2018 issued officially by NDOT in 2021

Project SLA amended and signed in October 2021; the project started moving from this point



Source: GMA, 2023

IFM PROJECT OVERVIEW

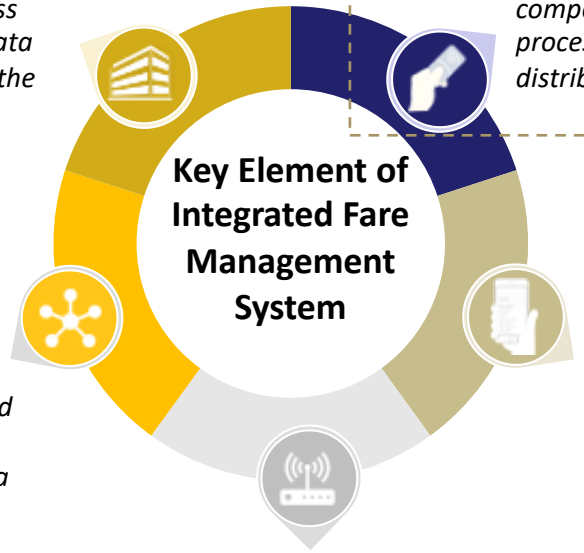
Transport Management Centre (TMC):

The TMC is responsible for managing and coordinating traffic flows across IFMS by collecting and analysing data from devices and operators across the system

Automated Fare Control (AFC)

AFC comprises of multiple integrated components that automate a ticketing process throughout ticket issuing, distribution, sales and validation.

Focus area



API:

The API enables information to be drawn from multiple operators and legacy system. It allows the drawing and interpretation of data from multiple operators and transport modes

Journey Planning:

A journey planning application enables the rider to plan a route end-to-end across multiple modes of transport. It also provides associated travel information e.g. schedules etc.

Network:

The network is the backbone of IFMS connecting the various detectors, cameras and other data collecting and processing devices together

Source: GMA, 2023

02 Account Based Ticketing (ABT) Overview

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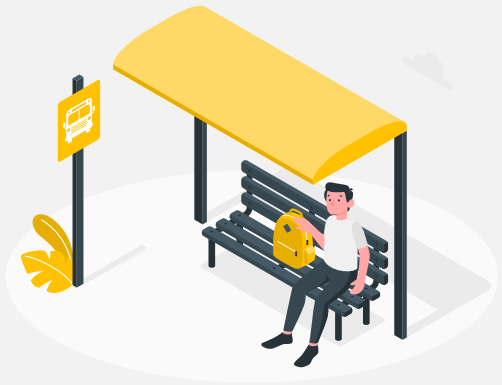
WHAT IS ABT?

A fare collection system where all travel information is held in the back office in a form of a digital account and fare media act as secure tokens to access the digital account.

Source: GMA, 2023

WHY ABT?

Commuter



- BYOD
- Multiple options to load value
- Benefit from multimodal travel discounts
- Multimodal travel
- Better travel experience
- Cashless and secure

Operator

- Cashless system and secure system
- Electronic and integrated ticketing system
- Bird’s eye view of fleet operations
- Reduced operational costs
- Increased flexibility
- Efficient price setting and revenue management
- Integration to MaaS

Authority

- Integrated, single ticket system for the Province
- Cashless system and secure system
- Bird’s eye view of public transport operations
- Optimal & efficient facilitation of subsidies
- Policy implementation and monitoring
- MaaS

Source: GMA, 2023

PRINCIPLES FOR PROVINCIAL TICKETING SYSTEM

World class services

Include all public transport operators.

Be integrated, support the same open standards and support same fare media.

Give users fare media flexibility and allow BYOD. These include smart card, EMV and mobile ticketing.

Give users mobility account management flexibility such as retail channels, mobile applications, websites and contact centre.

Be cost effective for all stakeholders.

Work on all modes of public transport in the Province (minibus taxis. Buses, trains, metered taxis, e-hailing etc.)

Work with or without harmonized fare structures.

Be compliant to approved National regulations.

Source: GMA, 2023

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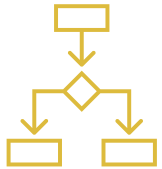
AFC AND GOVERNANCE

Governance Model

1 *Who are the key stakeholders involved?*



2 *Who is doing what?*

Application Architecture

3 *Application and Technology architecture*

4 *Fare collection systems*

Fare Collection is the Governance Model's technical translation

Source: GMA, 2023

FARE STRUCTURE

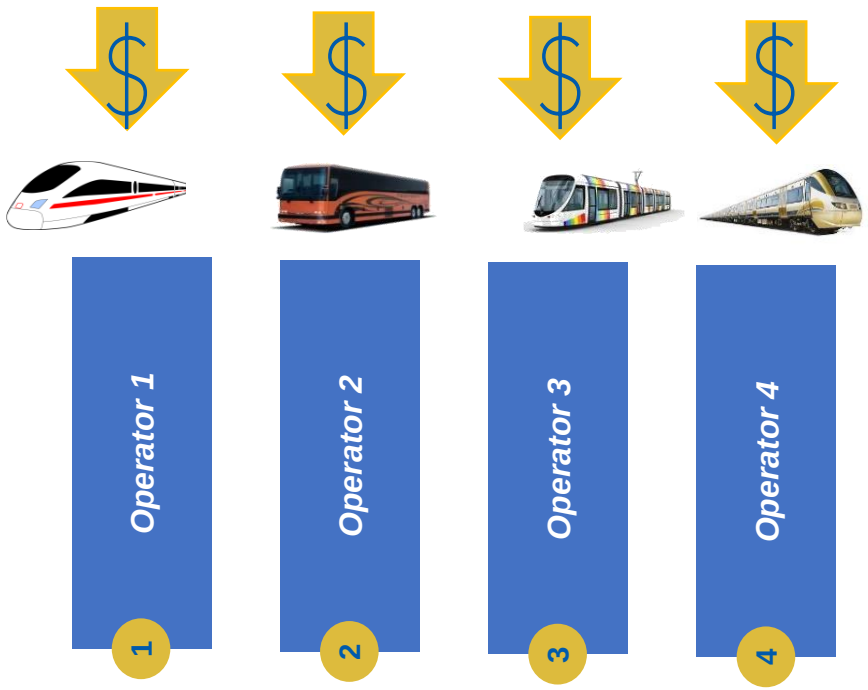
POLICY ELEMENT	PURPOSE	IMPACT	APPROPRIATENESS		GAUTRAIN PRODUCT	GENERIC TARGET MARKET	FLEX RATING
			WELFARE	REVENUE			
DISTANCE BASED	CAPACITY EFFICIENCY / AVOID MARKET DISTORTIONS	USER EXPERIENCE FAIR	LIMITED Neutral	SUPPORT Neutral	GPS P A Y G	FREQUENT / OCCASIONAL / CONVENIENCE	√√√√
					Weekly Discount	FREQ USER / WK PAID	√√
					Monthly Discount	FREQ USER	√√√
ZONAL SYSTEM	PROVIDES SIMPLICITY	DISTORT LAND-USE / UNFAIR	SUPPORT Minus	LIMITED Negative	None	None	NA
FLAT FARE	PROVIDES SIMPLICITY	LONGER TRAVEL / DEVELOPMENT PAT-TERNS NEGATIVE	SUPPORT Plus	LIMITED Negative	Gautrain Bus Service	FEED TO AND DISTRIBUTE FROM / ACCESS	√√√√
TIME BASED [PEAK / OFF PEAK]	CONGESTION MANAGEMENT	INCREASED CAPACITY UTILISATION	SUPPORT Neutral	SUPPORT Plus	Peak Red	TIME SENSITIVE	√√
					Peak Orange	LESS TIME SENSITIVE	√√√
					Off Peak Green	FLEX / OCCASIONAL USER	√√√√
CONCESSIONS	IMPROVE ACCESS	USE SURPLUS CAPACITY	SUPPORT Plus	SUPPORT Negative	None	None	NA

Adopted from http:/www.konsult.leeds.ac.uk

Source: GMA, 2023

INTEROPERABILITY REGULATION IN PRACTICE, ISO 24014

Revenue clearing and settlement



Key considerations to consider as part of ISO, 24014

- a — *Transport Authority*
- b — *Interfaces and API*
- c — *Security and keys*
- d — *Acceptance of ID by all transport means*

Source: GMA, 2023

ABT BUILDING BLOCKS

Public Transport Operator

Transaction Clearing House

- Houses all user digital accounts (mobility account)
- Houses all PTO digital accounts
- Collects all top up funds and assigns them to correct mobility accounts
- Receives all trip transactions from PTOs and settles them accordingly

AFC System

- Card/device readers that are installed on public transport vehicles, station gates and parking gates, all connected through telecommunications networks to a back office that manages the readers, all infrastructure and all transactions.

Public Transport User

Account Top-up Channels

- Kiosks, retailers, web and mobile applications that public transport users use to load value in the digital travel accounts

User Account

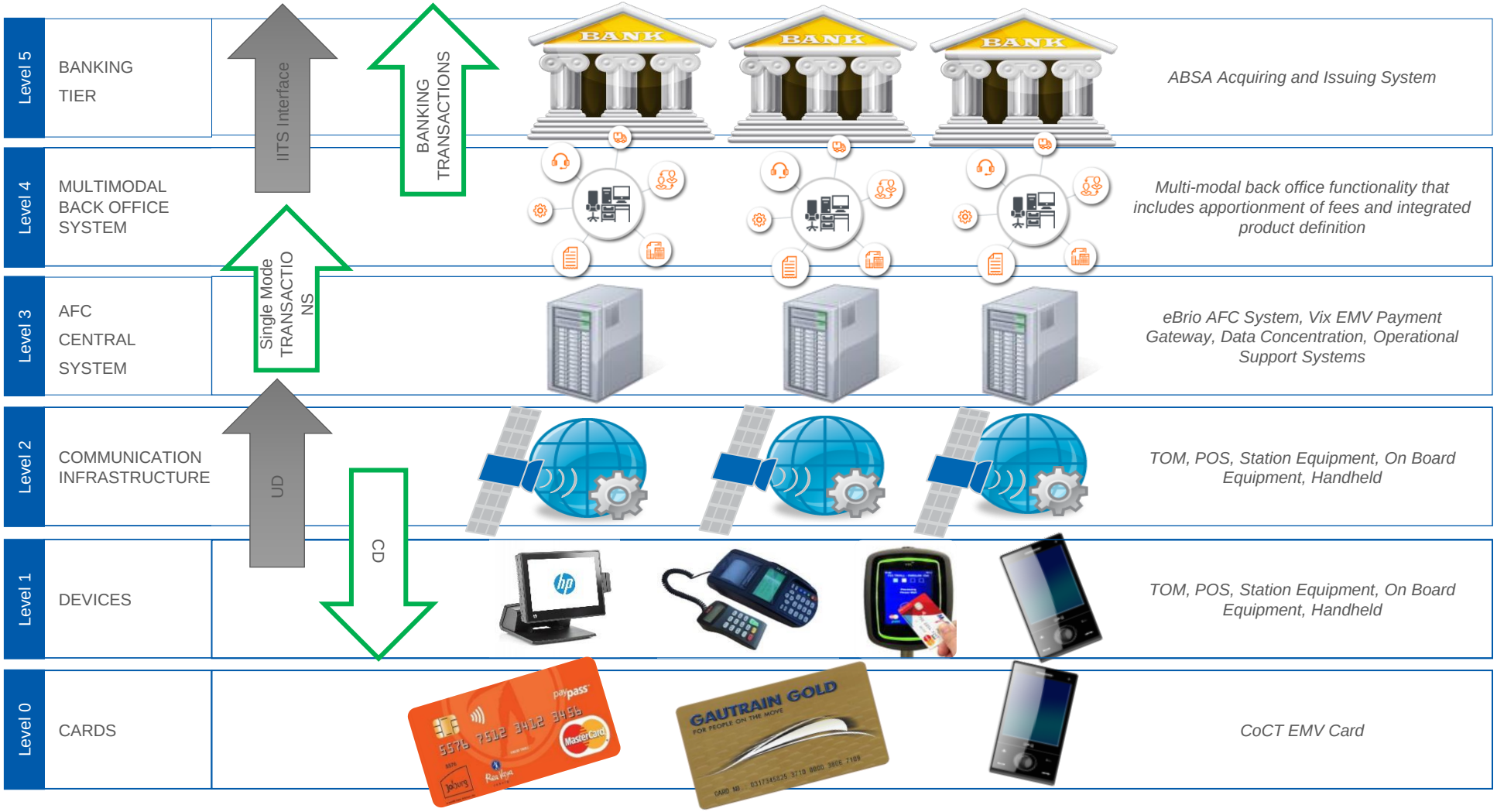
- Digital account for public transport users

Fare Media (Token)

- Smart cards and smart devices that act as travel tokens. Public transport users use these media to pay for their trips. Token is a unique identifier.

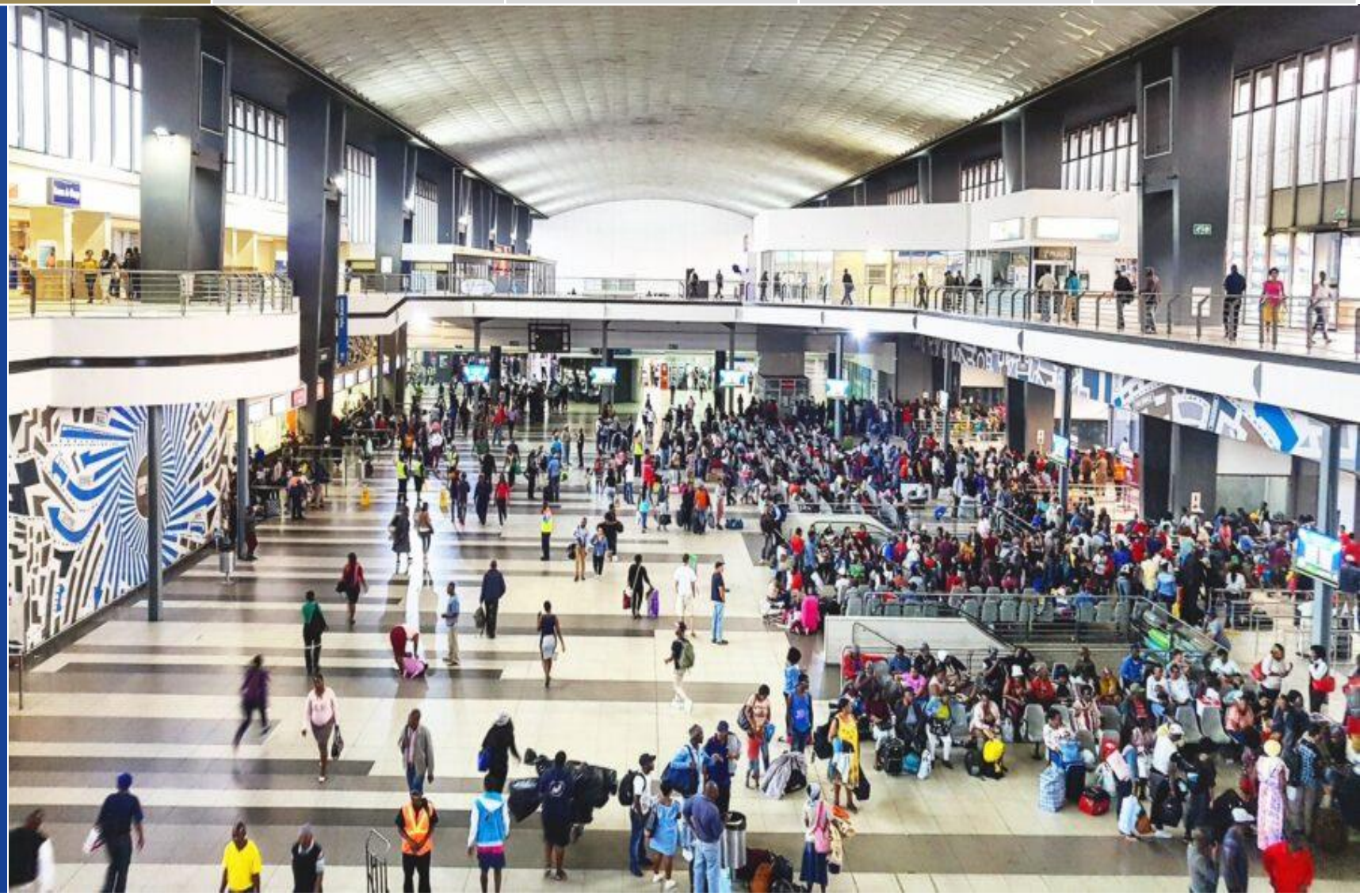
Source: GMA, 2023

ABT ARCHITECTURE AND BANKS



Source: GMA, 2023

03 Proposed Implementation Approach



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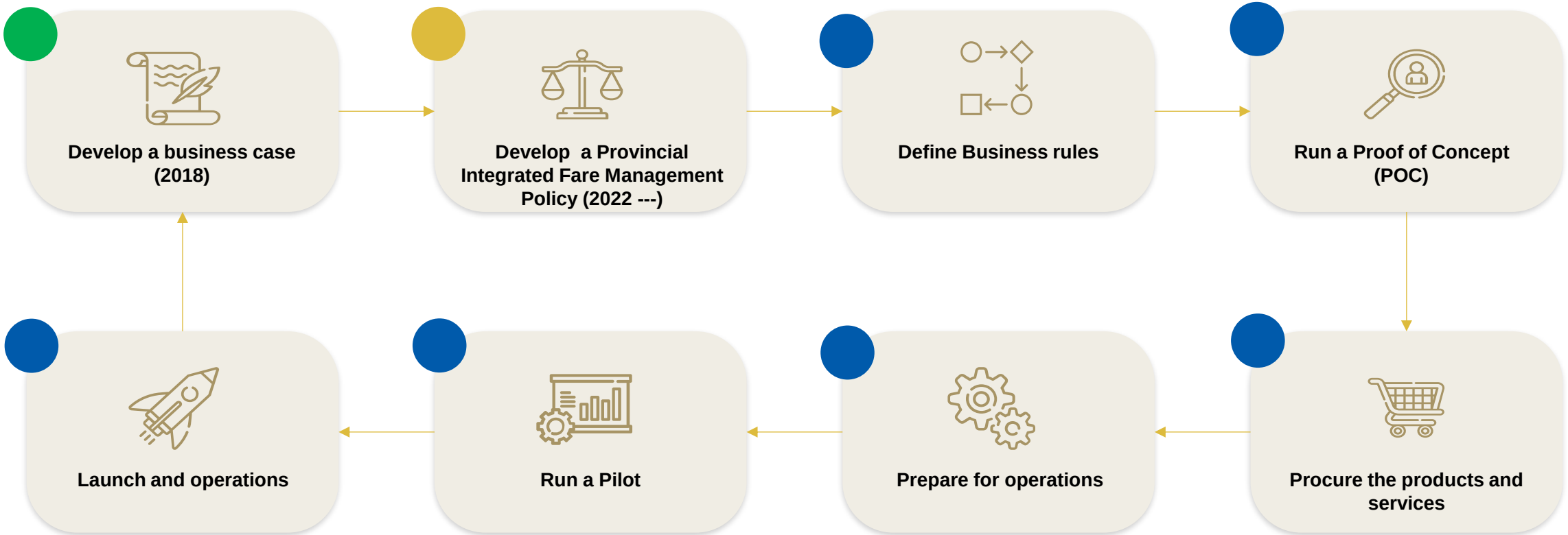
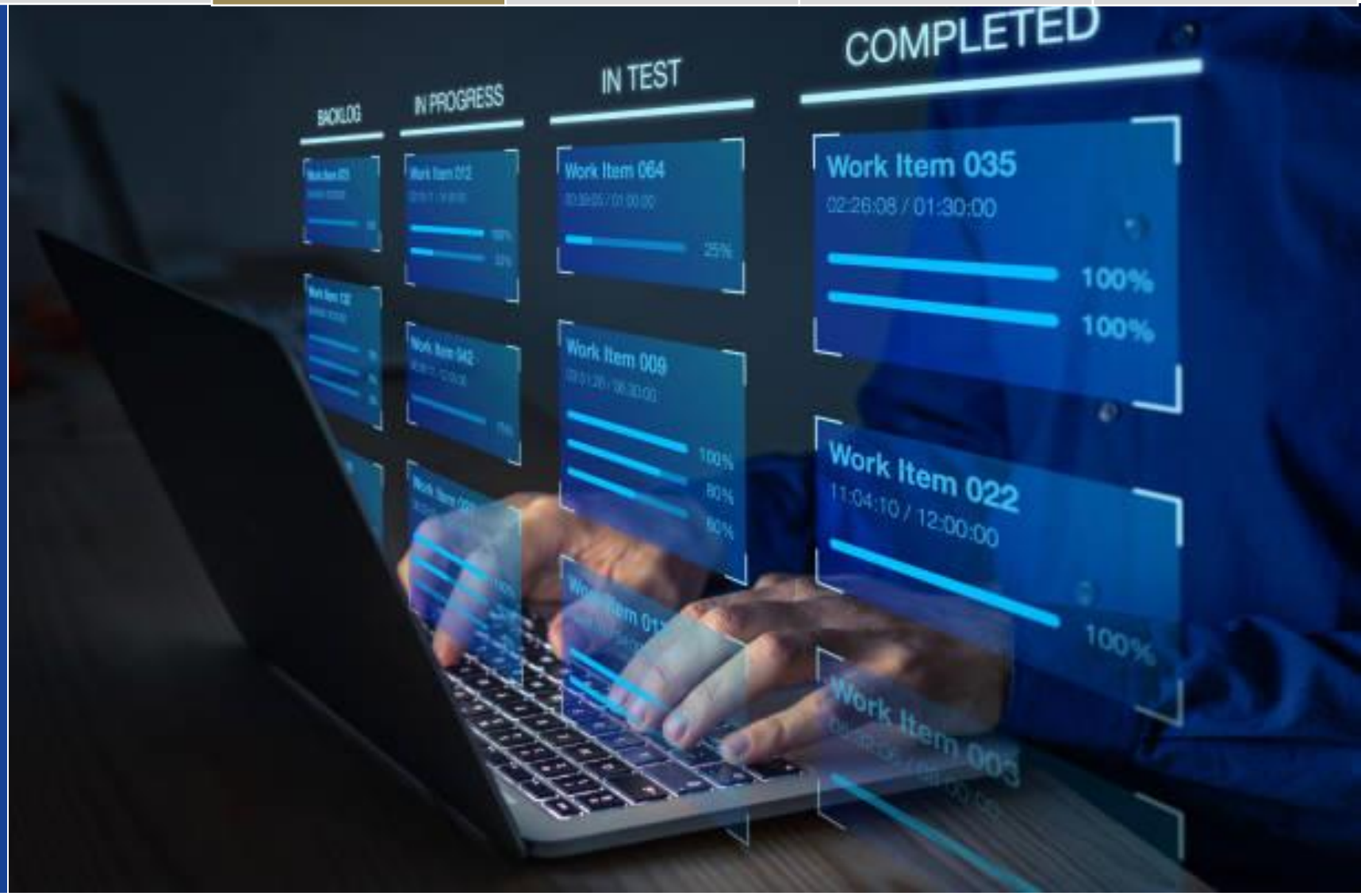
SUGGESTED APPROACH TO DELIVER ABT



Source: GMA, 2023

04 Progress To Date



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PROGRESS TO DATE

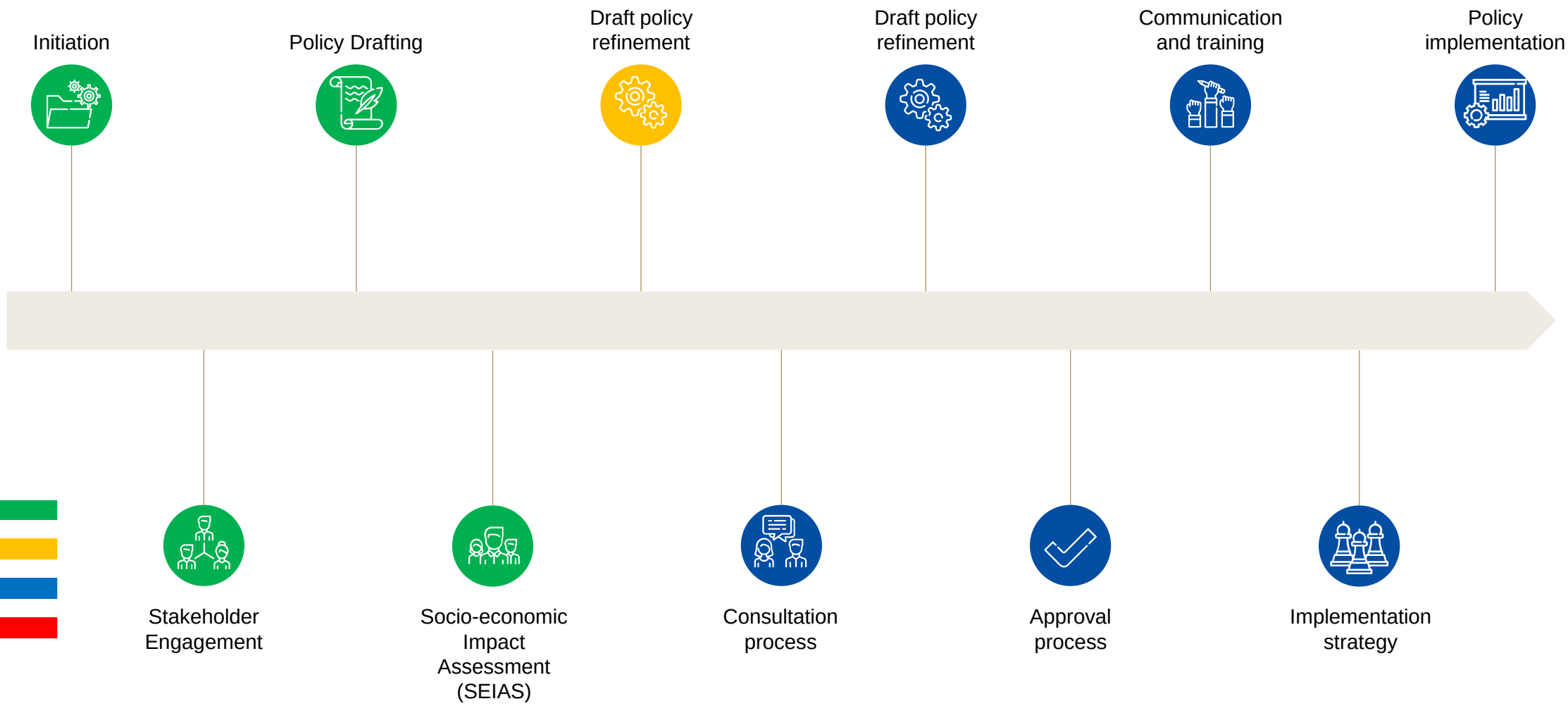
Developed a Business Case (2018)

Developing a Provincial IFM Policy

Incorporated AFC requirements in subsidized bus contracts

Source: GMA, 2023

IFM POLICY DEVELOPMENT



Source: GMA, 2023

IFM POLICY VS AFC REGULATIONS

	AFC Regulations (NDOT & SANRAL)	IFM Policy (GDRT & GMA)
Applicability	All public transport operators in RSA	All public transport operators in Gauteng
Key requirements	1. All public transport operators that implement electronic ticketing from now on must integrate to SANRAL TCH and send all transactions to SANRAL TCH. 2. All public transport operators that have an existing electronic ticketing must upgrade it to integrate to SANRAL TCH and send all transactions to SANRAL TCH. 3. EMV is optional	Provides background on the public transport system in the province. Analyses other implementations of ABT and single ticket systems in the world. Suggests implementation of ABT, suggests that APIs will be critical in the implementation of ABT. Provides some IFM principles. Speaks of best fare policies. Intends to enable and guide the integration of the various modes of public transport that are currently available, to ensure ease of travel for commuters through the integration of the networks, timetables and fares
Timelines	3 years	To be Determined
Costs	Unknown	To be Determined
Fare media	Smart cards only (Cipurse)	Bank cards, smart cards or a mobile device (Open-loop EMV & Cipurse)
TCH	SANRAL	Provincial TCH
Funds	SANRAL bank account	GDRT bank account
Directives	Clear directives	To be Developed
Guidelines	Provided through one-on-one discussions with NDOT consultant	To be Developed

Source: GMA, 2023

NEW BUS CONTRACTS

1. The Operator must use the EFVE Ticketing System and electronic equipment that meets the specifications of the CA.

2. The EFVE system should enable passengers to pay their bus fares using various automated methods, such as contactless smart cards, mobile payments, or electronic tickets.

   a. **Onboard Fare Validation**
   b. **Smart Card and Ticketing**
   c. **Payment and Account Management**
   d. **Back-End Management Software**
   e. **Security and Fraud Prevention:**
   f. **Integration and Interoperability**

3. The EFVE system should enable passengers to pay their bus fares using various automated methods, such as contactless smart cards, mobile payments, or electronic tickets.

Source: GMA, 2023

05 Primer to ABT POC

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ABT Proof of Concept

Challenge to be solved

How can the implementation of an Account Based Ticketing (ABT) system benefit the Provincial economy

Concept: Scale the POC to include more public transport operators and users as more money becomes available.

Utilising key feeder and distributions systems of the Gautrain to implement an ABT Proof of Concept

1

Gautrain MidiBus Service

Implementation of an **ABT system** for **Midibus services** which will **op**timise and **enhance fare collection and operational processes** while **reducing contractual subsidy**

Partnership with taxi associations

2

GauExpress E-Hailing Service

Implementation of an **ABT system** for e-hailing services dedicated to Gautrain passengers to enhance **customer experience and fare integration**

Partnership with meter taxi associations

Source: GMA, 2023

Overview of MidiBus

Routes

The Gautrain Midibusses operate on 9 routes from the Centurion, Hatfield and Marlboro Gautrain stations

Vehicles

The Gautrain Midibus service currently operates 25 vehicles

Midibus Fare

The Gautrain Midibus service charges a flat rate of R12.00

Operators

- Tshwane Taxi Industry Shuttle Services (TTISS)
- Alexandra Transport Solutions (ATS)

Source: GMA, 2023

MidiBus Operating Model

Contracting Mechanism

- Gautrain Midibus service is enabled through a **Service Level Agreement** between the **GMA, Bombela Operating Company (BOC), Bombela Concession Company (BCC) and the contracted Taxi Associations**

Operational Subsidy

- **Gautrain Financial Assistance (GFA)** subsidy is **paid monthly** to contracted Taxi Associations
- GFA is **determined annually** and covers **operational expenses** & includes **performance incentive**

Route Management

- Gautrain Midibus service currently operates from **3 Gautrain Stations (Centurion, Hatfield & Marlboro)**
- Gautrain Midibus service will **expand** to includes routes **from Park, Midrand, Sandton and Pretoria Gautrain stations**

Ticketing System

- The Gautrain Midibus services uses a **paper-based ticketing system**
- Tickets are purchased from **Midibus kiosks**
- Driver **collects tickets** before each trip and **reconciles tickets** after the trip

Fare Management

- The Gautrain Midibus service use a **standardised fare of R12.00**
- The standardised fare is **reviewed on an annual basis**
- Fares are standardised for all routes and a **not dependent on distance, time or train usage**

Data Management

- Midibus data is **not synchronised** with other **Gautrain service data**
- Paper tickets are **reconciled manually**
- Data is **compiled in excel** by BOC

ABT Focus Areas

Source: GMA, 2023

2

Overview of GauExpress

The objective of this model is to integrate the metered taxi transport services with the Gautrain system by providing the following:

- High level on-demand service and convenience for commuters;
- Physical presence at Gautrain stations and an ability to be E-hailed;
- Accessibility for passengers with special needs (PwD);
- Marketing and communication designed to encourage widespread use;
- Electronic hailing system to enable passengers to request a service ; and
- Provision of paratransit services.

Integration Challenges

- Conflict arising from operators that are excluded
- Lack of buy-in from other e-haling platform service providers
- Lack of funding
- Outdated database (from 2018) might affect the stakeholder engagement process
- The e-haling services will remain unregulated if the NLTA Amendment Bill is not approved

Source: GMA, 2023

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2

Operating Model OF GauExpress

Technology

- GPS tracking with telematics
- Smart mobile phones
- E-hailing mobile application with payment gateway in partnership with the existing E-hailing Service Providers

Service

- Service availability: weekdays and weekends (05:30-21:30)
- Service area: 15 km radius from the stations,
- On demand Service with Persons with Disability (PwD) product
- Trips offered:
  - Single trip- single use (A-B)
  - Shared use (A-B)
  - Shared ride-multiple trips (A-B-C)

Station facilities

- Dedicated holding areas with pick-up & drop-off points
- Appropriate signage

Vehicles

- Types: Sedans (5 seater) & SUV's (5 seater)
- Quality of vehicle: New vehicles, roadworthiness (CoF), etc
- Number of vehicles: 10 per station except ORTIA
- Vehicles shall be parked at station in the evening

Drivers and licensing

Drivers requirements:
- Drivers license & PDP
- Customer care training
- No criminal record
- Compliance with other technology application service provider

Registration and licensing
- The contracted metered taxi entity shall apply and obtain operating licenses at the GDRT

Marketing & Communication

- Branding of vehicles using Gautrain
- Marketing of GES on electronic media, Gautrain media and external media

Source: GMA, 2023

User Journey For The ABT Pilot

"How the implementation of Account-Based Ticketing (ABT) transforms commuting experience and benefits both the commuter and the public transportation system."

Decision to use	Set up account	Travel using ABT operator	Arrival at destination
• Commute begins with the inconvenience of waiting in long lines to purchase tickets from vending machines	• Account-Based Ticketing, a new system that allows passengers to link their payment accounts directly to their transit cards/ tokens or smartphones • Account is linked to preferred payment method	• Selection of transport mode/ operator • Taps fare media on the on-board reader/ AFC • Account-Based Ticketing automatically deducts the fare from her linked account, ensuring funds are available • Real-time trip information and updates on her account balance.	• Arrival at destination and commuter journey is complete • Commute time has decreased and greater optionality in ABT • Transit agency benefits from reduced ticketing infrastructure costs, as vending machines and paper ticket production become less necessary • Real-time data analytics help the transit agency optimize routes and schedules, improving overall efficiency

Benefits realisation

The benefits extend beyond individual commuters to the public transportation system as a whole, as it becomes more cost-effective, data-driven, and passenger-friendly

Source: GMA, 2023

06 ABT Proof Of Concept

PURPOSE

The purpose of the POC is to implement and test the feasibility of multimodal ABT in Gauteng, with the aim of:

- Learning from the process
- Define and refine the policy and business rules
- Define and refine guidelines for all stakeholders
- Update the ABT business case
- Define and refine requirements specifications and scope of the province-wide ABT system
- Encourage build buy-in from all stakeholders
- Pave the way for a province-wide ABT system

Source: GMA, 2023

APPROACH

a

Use Gautrain midibuses because they are owned and operated by minibus Taxi Associations. This also provides a controlled environment to test the system.

b

The Gautrain has 3 modes (trains, buses & minibus taxis) and parking, users with EMV cards can use all Gautrain services including midibuses using 1 card. The multimodality of the system can be tested within Gautrain services.

c

Scale the POC to include more public transport operators and users as more money becomes available.

Source: GMA, 2023

PROJECT SCOPE

1. **Procure services of a ABT service provider**

2. **Implement the ABT system on multiple modes of public transport (including Gautrain services & external services)**

3. **Run the POC for 24 months**

4. **Produce a close out report**

Source: GMA, 2023

ABT POC

Option 1	EMV only
Option 2	Cipurse only
Option 3	Cipurse and EMV
Option 4	Swift card only
Option 5	Swift card and EMV
Option 6	Swift card, Cipurse and EMV

VISA mastercard EUROPAY International

cipurse™

Notes:

- EMV means contactless open loop EMV
- Cipurse means implementation of the Cipurse standards as per SANRAL guidelines

Source: GMA, 2023

ABT POC OPTIONS ANALYSIS

	1	2	3	4	5	6
Fare media	EMV only	Cipurse only	Cipurse & EMV	Swift card only	Swift card & EMV	Swift card, Cipurse & EMV
Requirements	EMV only readers and backend	Cipurse only readers and backend	Cipurse & EMV readers and backend	Extension of Gautrain legacy AFC to midibuses and other operators	Extension of full Gautrain AFC to midibuses and other operators	Extension of full Gautrain AFC to midibuses and other operators + Cipurse
Advantages	• Completely new system • No Thales or BCC integration • EMV link to Gautrain • Low costs	• Completely new system • No Thales or BCC integration • Compliant to NDOT • Caters for the non-banked • Low costs	• Completely new system • No Thales or BCC integration • EMV link to Gautrain • Caters for the banked & non-banked • Compliant to NDOT	• Caters for the non-banked • Seamless travel on Gautrain	• Caters for the banked & non-banked • Seamless travel on Gautrain • All Gautrain options and products are available	• Caters for the banked & non-banked • Seamless travel on Gautrain • All Gautrain options and products are available • Compliant to NDOT
Disadvantages	• Caters for the banked only • Requires bank integration & PCI-DSS compliance • May have limited transit related features • Excludes Gautrain Swift cards • Not compliant to NDOT	• Excludes Gautrain Swift cards • Pay 5% on all trips • No mobile support	• Excludes Gautrain Swift cards • Pay 5% on all Cipurse trips • Requires bank integration & PCI-DSS compliance	• PVN • Thales integration and configuration costs • Not compliant to NDOT • No EMV	• PVN • Thales integration and configuration costs • Requires bank integration & PCI-DSS compliance • Not compliant to NDOT	• PVN • Thales integration and configuration costs • Requires bank integration & PCI-DSS compliance

RECOMMENDED OPTION

Option 3 (without SANRAL TCH integration)

VISA mastercard EUROPAY International

cipurse™

Option 3 Benefits

- It is an option that the GMA can execute within a controlled environment with its midibuses
- It can be scaled to include more public transport operators and users
- It caters for both the banked and un-banked
- The NDOT AFC regulations are not approved yet, however the system can be easily connected to the SANRAL TCH at a later stage when compliance is due

HIGH-LEVEL TECHNICAL REQUIREMENTS (OPTION 3)

a

The system must support both EMV and Cipurse

b

The backend must be cloud based

c

Readers that support EMV, Emulated EMV, Cipurse card, Mobile Cipurse app, temporary biodegradable paper ticket

d

Provide a mobile application for commuters (iOS and Android)

e

Provide a web or mobile application for drivers, owners and associations

f

All the interfaces must be customized to the project's requirements

POC SERVICE PROVIDER SCOPE (OPTION 3)

- Design the ABT system for 25 midibuses that operate on the Gautrain
- The system must be scaled in phases to cover multiple modes of public transport (subsidized buses and minibuses) up to 100 vehicles
- Setup and manage commuter accounts
- Setup and manage PTO accounts
- Collect revenue on behalf of PTOs
- Settle PTOs
- Provide reporting to drivers, owners and commuters
- Provide all the necessary telecommunications
- Provide a completely managed service
- Provide all possible top-up channels

ABT POC HIGH-LEVEL PROJECT RISKS

No.	Risk	Mitigation
1	No buy in from from some PTOs	1. Identify and engage and secure all PTOs 2. Develop a clear execution plan 3. Develop clear and detailed guidelines for Gauteng and educate all participating PTOs 4. Secure signed agreements with all PTOs
2	Rejection during operation	All implications of implementing ABT must be communicated upfront, including cost implications
3	Technical breakdown of the system	1. Procure a managed service 2. The system must have CCR 3. Consider driver devices 4. Consider biodegradable single trip tickets 5. Consider all possibilities and put measures in place for all

06 Proposed next steps

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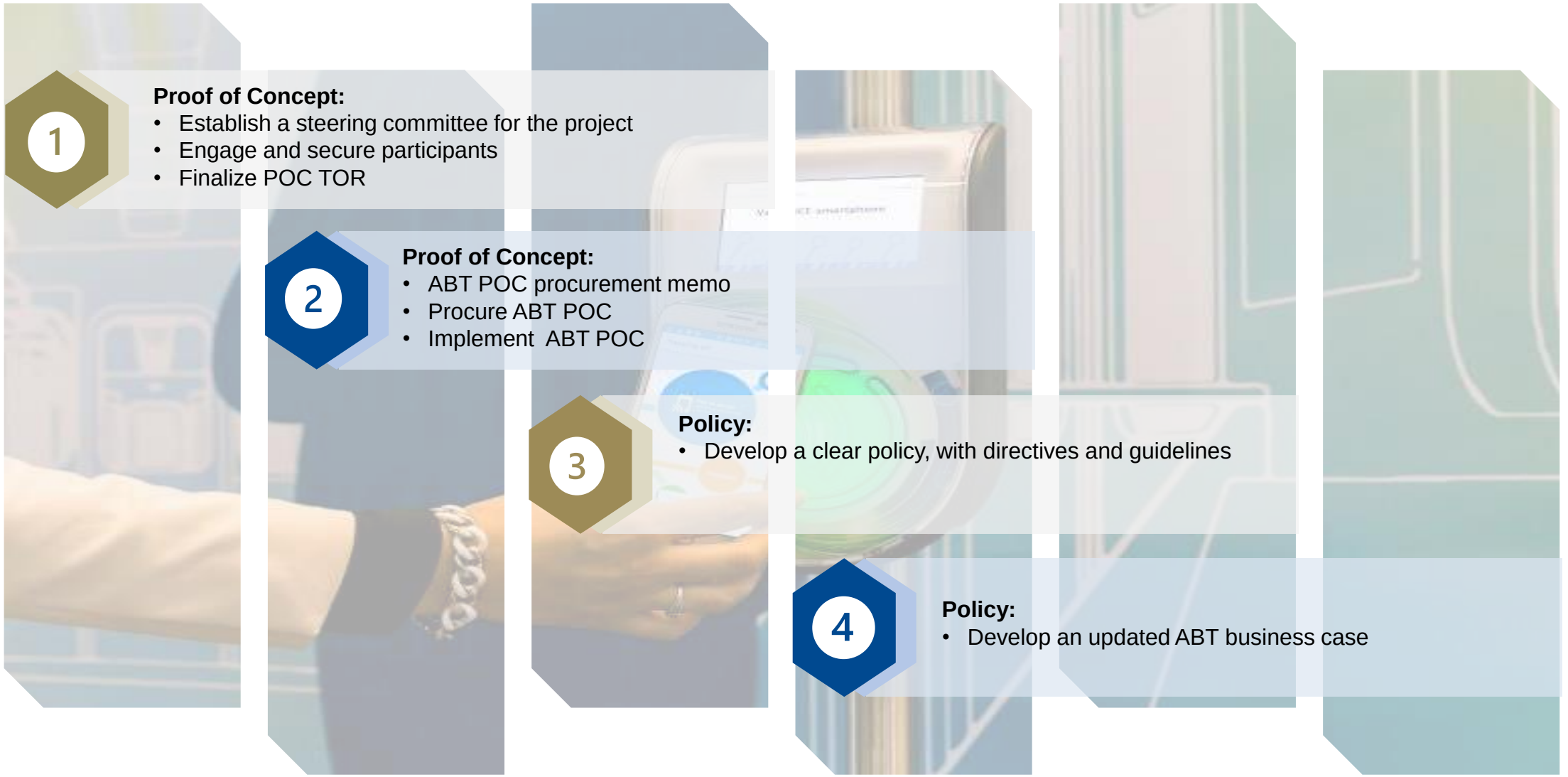
NEXT STEPS



1

Proof of Concept:
- Establish a steering committee for the project
- Engage and secure participants
- Finalize POC TOR

2

Proof of Concept:
- ABT POC procurement memo
- Procure ABT POC
- Implement ABT POC

3

Policy:
- Develop a clear policy, with directives and guidelines

4

Policy:
- Develop an updated ABT business case

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END PRESENTATION