

DEPARTMENT OF INFRASTRUCTURE DEVELOPMENT

INTEGRATED INFRASTRUCTURE PLANNING AND COORDINATION FOR THE GAUTENG CITY REGION

MEC for Infrastructure Development
Mr. Jacob Mamabolo



GAUTENG PROVINCE
INFRASTRUCTURE DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

CONTENTS

Part A

INTRODUCTION

Part B

CURRENT INFRASTRUCTURE CHALLENGES

Part C

**SO WHAT NEEDS TO BE DONE TO RECTIFY
THE SITUATION?**

Part D

CONCLUSION



GAUTENG PROVINCE

INFRASTRUCTURE DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

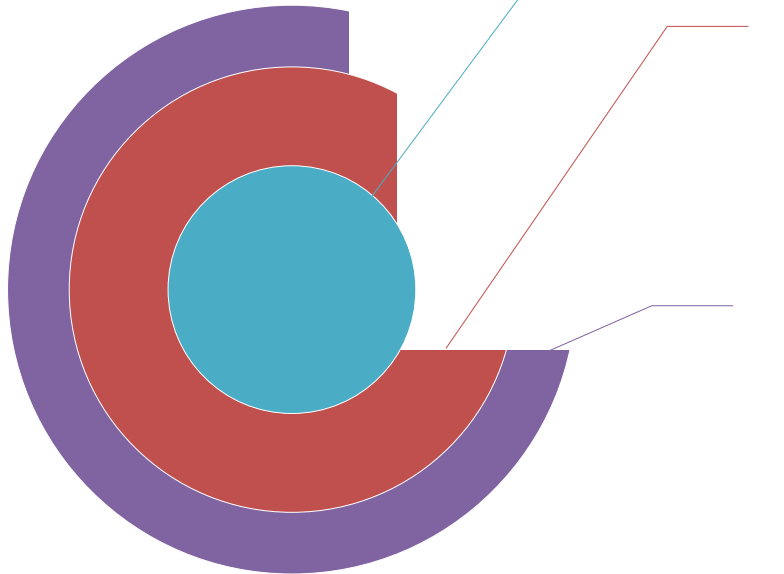
Together, Moving Gauteng City Region Forward

PART A

INTRODUCTION

GCR INFRASTRUCTURE DELIVERY CONTEXT

I would like us to explore the WHY, the HOW and the WHAT is required for accelerated integrated infrastructure delivery



Why: do we do what we do?

How: Do we prioritize in the portfolio and how do we assess success? i.e. how do we measure value?

What: Do we need to do to execute successfully?

GCR INFRASTRUCTURE DELIVERY CONTEXT

Supply Side Factors



Many Stakeholders



Different Asset
Classes



Constrained
Economic Growth

Provincial Departments

Provincial Municipalities

SOEs & Municipal Entities

Private Sector

Infrastructure Landscape is Complex

Demand Side Factors



Population Growth



Ageing
Infrastructure



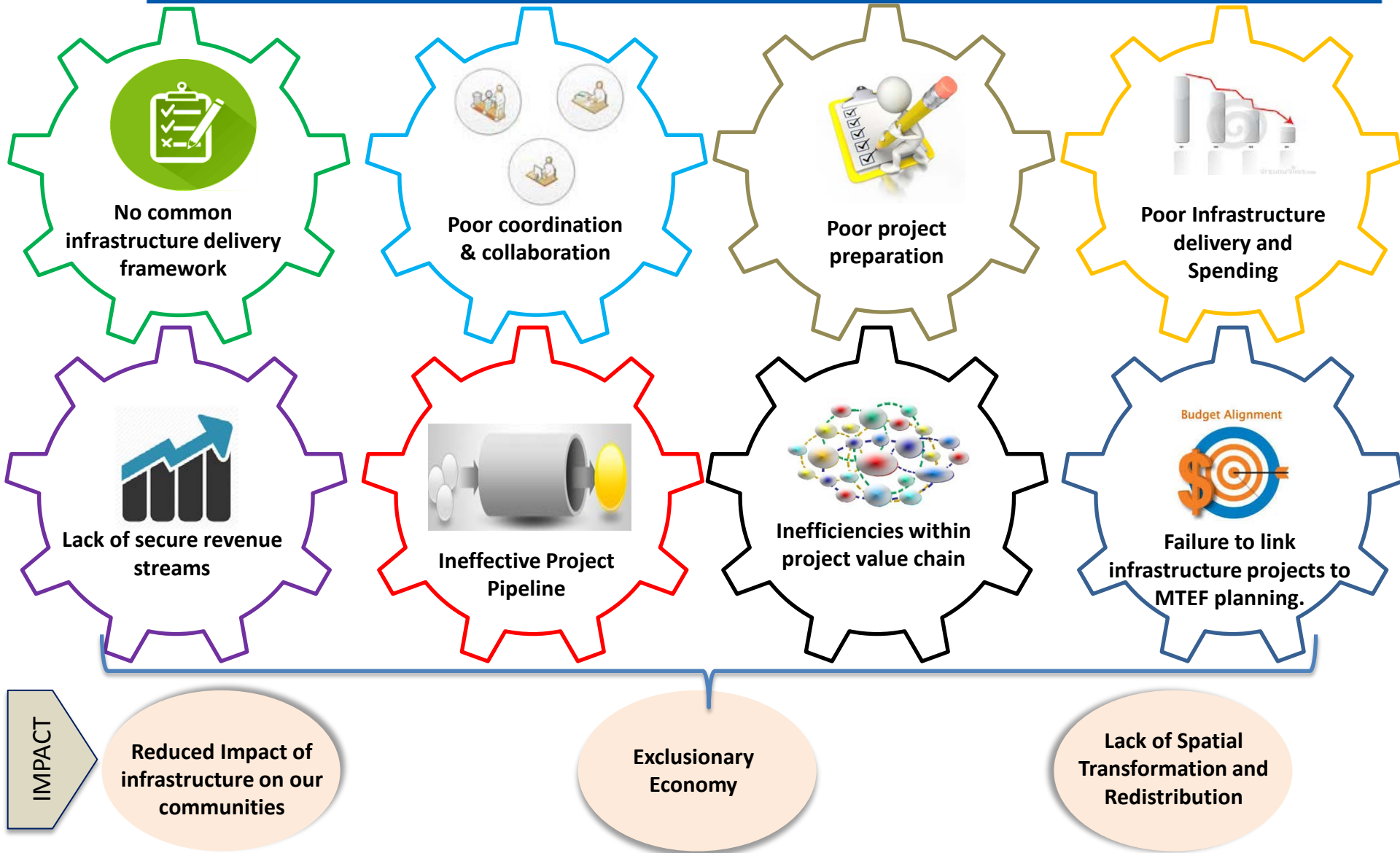
Globally
Competitive City



PART B

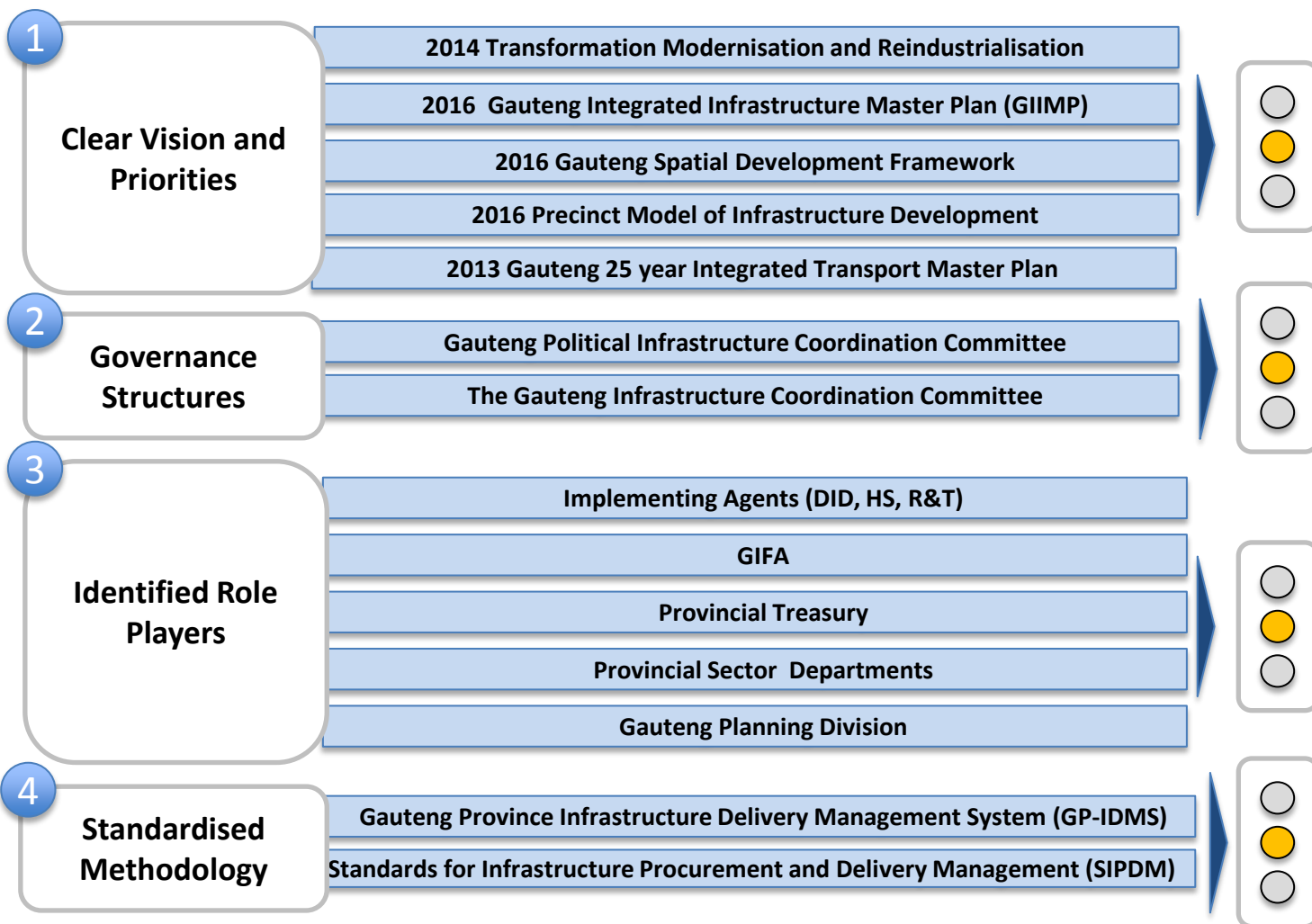
CURRENT CHALLENGES AND STATUS QUO

CURRENT INFRASTRUCTURE CHALLENGES IN GCR



BUILDING BLOCKS ESTABLISHED IN GCR TO ADDRESS CHALLENGES

- The buildings blocks across **four dimensions** have been developed and are in place
- A big challenge has been **co-ordinating implementation** across the four dimensions



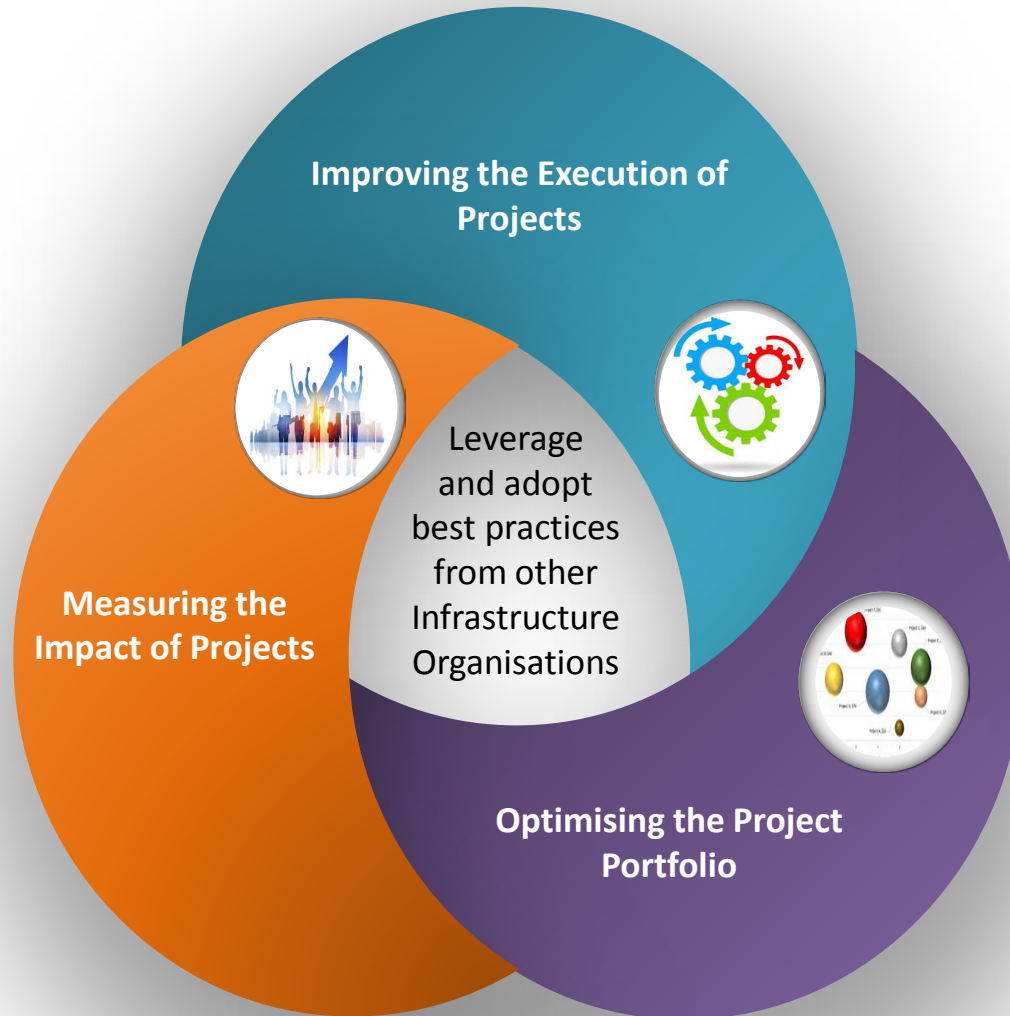
Yet, delivery of impactful, efficient and sustainable infrastructure remains elusive



PART C

**SO WHAT NEEDS TO BE DONE TO
RECTIFY THE SITUATION?**

SO WHAT NEEDS TO BE DONE TO RECTIFY THE SITUATION?



Improving the Execution of Projects

- ✓ Front End Planning (FEP)
- ✓ Adherence to IDMS and SIPDM
- ✓ Lean Construction

Optimising the Project Portfolio

- ✓ Define the Right Infrastructure Portfolio
- ✓ Prioritize projects
- ✓ Value projects (i-labs)

Measuring the Impact of Projects

- ✓ Utilise utility curves to determine the impact of projects
- ✓ Conduct regular impact assessment

FRONT END PLANNING/ FRONT END LOADING

Improving the Execution of Projects



Reduces total project design and construction costs by as much as 20% (versus authorization estimate)

Reduce total project design and construction schedule by as much as 39 % (versus authorization estimate)

Improves project predictability in terms of cost, schedule, and operating performance)

Front End Planning is the process of developing sufficient strategic information with which owners can address risk and decide to commit resources to maximize the chance for a successful project (CII 1995)

Risks involved at different levels of the project are identified

Synchronisation with the budgeting process as early stages of projects usually are not aligned to MTEF

Results in a participative approach that develops capacity in all parties

Ensures Project preparation must entail analysis of feasibility and appropriateness

Economic, political and social returns are adequately assessed

Impacts

Increases the chance of the project meeting environmental and social goals

Benefits

FRONT END PLANNING/ FRONT END LOADING



Front End Planning

Key Activities

- ❑ **Organization:** Team selection and preparing a pre-project plan
- ❑ **Data Generation:** Review and analyze technology, project sites and preparation of scope and conceptual estimates and schedules
- ❑ **Alternative Project Selection:** Evaluation and analysis of project alternatives
- ❑ **Project Definition:** Establishment of project guidelines and execution plan
- ❑ **Decision**

Key Tools

- ❑ **Project Definition Rating Index (PDRI):** Best tool available for measuring the completeness of scope definition in construction projects
- ❑ **Alignment Thermometer:** This tool is used as a survey tool to check a team's alignment or "temperature" at periodic intervals during front end planning
- ❑ **Front End Planning Toolkit:** A toolkit that provides the entire library of front end planning information with their phase gate project management process

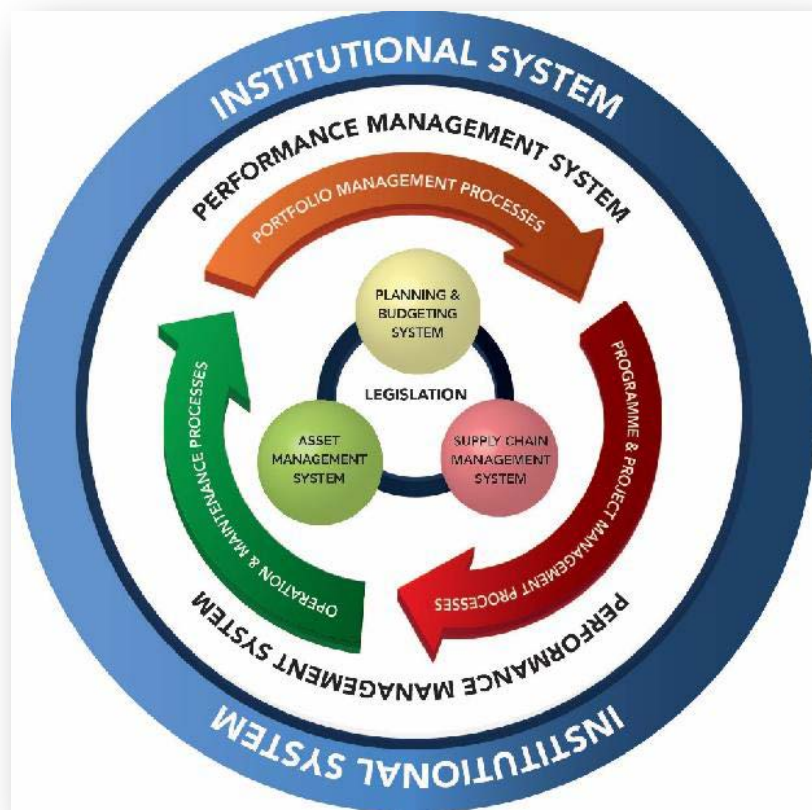
This is very similar to the Project Readiness Matrix that DID has adopted

This is basically the IDMS Model that GPG and DID has adopted



ADHERENCE TO IDMS AND SIPDM

Government's Infrastructure Delivery Management System (IDMS) is comprised of three core systems



1

Planning and Budgeting

- Defining infrastructure needs and how needs will be met in a cost effective way



Delivery Process 1: Portfolio Management

2

Supply Chain Management

- Coordinated and governed supply chain activities across the project delivery lifecycle that enable value for money



Delivery Process 2: Project Management

3

Asset Management

- Sustainable management of the total cost of ownership of the immovable asset register and planning strategic asset utilisation



Delivery Process 3: Ops and Maintenance



ADHERENCE TO IDMS AND SIPDM

Planning and Budgeting

Supply Chain Management



Asset Management

Standard for Infrastructure Procurement and Delivery Management (SIPDM)...

- Provides a guideline for the **supply chain management system** for infrastructure delivery
- Framed around the five focus areas proposed by the National Planning Commission for the design of a procurement system and draws upon the work of the 2015 Public Sector Supply Chain Management Review
- Issued as an instruction in terms of Section 76(4)(c) of the Public Finance Management Act of 1999 (Act No.1 of 1999) for implementation **by 1 July 2016 – Progress and alignment will be auditable.**

STANDARD FOR INFRASTRUCTURE PROCUREMENT AND DELIVERY MANAGEMENT

Improving the
Execution of Projects

The **control frameworks** are **governed** by gates which are control points at the end of a process where a decision is required before proceeding to the next process. Gates to enable quality management / auditing to take place.

Infrastructure Delivery Gates

G0: Accept initiation report

G1: Approve infrastructure plan

G2: Approve delivery and procurement strategy

G3: Accept strategic brief / pre-feasibility report

G4: Accept concept/feasibility report

G5: Accept design development report

G6: Accept production & manufacture,
fabrication and construction information

G7: Certify delivery or completion of works

G8: Accept liability for the works

G9: Accept close out report and make final
payment

Framework Agreement in Place?

Yes

FG1: Confirm reasons not to open
competition

FG2: Approve documents

FG3: Confirm budget

FG4: Authorise issue of order

Upload on Financial Management
System

No

Procurement Gates

PG1: Grant permission to start
process

PG2: Approve strategies

PG3: Approve procurement
documents

PG4: Confirm budget

PG5: Authorise next phase of
process

PG6: Approve tender
evaluation recommendations

PG7: Accept offer and award
contract

PG8 (A B C D E F): Approval of
actions associated with the
administration of the contract



Stage Gate



Procurement Gates

Improving the
Execution of Projects



DID IDMS DELIVERY PROCESS OVERVIEW- GATES

Prov. Infrastructure
Strategy

DP1 – Portfolio Management

Implementation Planning

Develop / Review U-
AMP

SMDP 1(a)

Develop / Review C-
AMP

SMDP 1(b) SMDP 1(c)

Develop / Review
Const. Proc. Strategy

Develop / Review
IPMP

Programme Management

Authorise
Implementation

SMDP 2(a)(b)

Monitor & Control
Implementation

SMDP 2(d)

Programme Review
& Close Out

DP2 – Project Management

Implementation Planning

Prepare
Packages

Define
Packages

Dev &
Review IPIP

SMDP 3(a)

SMDP 4

Design Dev

Detailed
Design

SMDP 5

Compile
MFC Info

SMDP 6

Works

Constr./Deliver
Works

Handover
Works

SMDP 7

SMDP 8

Close Out

Contract
Closeout

Admin Close
Out

SMDP 9

Focus for MEC Dashboard

DP3-Operations & Maintenance

Recognise & accept assets

Mobilisation for FM

Operations

Maintenance

Demobilisation

Accept the physical asset at
handover

Mobilise user and custodian staff
to manage assets

Conduct Facility Mgmt

Conduct Preventative
Maintenance

Enter asset information into
Asset Register

Ensure that facilities
management services are in
place and operational

Conduct Engineering Infra

Conduct Property Mgmt

Conduct Cond As Survey

Conduct Re Life Cycle Cos

De-mobilise user and
custodian Staff as well as
asset

Recognise Asset into
Accounting System

Conduct Breakdown Repairs

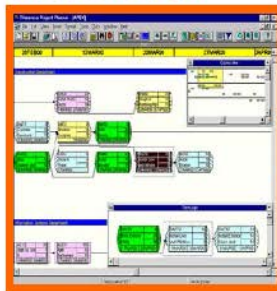


APPLYING LEAN CONSTRUCTION PRINCIPLES

Lean Construction is neatly summarised in the Last Planner[®] system

What should we be doing?

What can we do?



Master Schedule



Pull Planning

Criteria	Inputs				Resources			
	Contract	Design	Submittals	RFIs	Materials	Personnel	Equipment	Weather
X	X	X	X	X	X			
Possible delay caused by oversized footing.								
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X

Look Ahead Plan & Constraint Analysis

What did we learn and how can we improve?

What did we do?

What will we do?



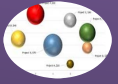
Percent Plan Complete

1 WEEK PLAN												
PROJECT: PHILLIP												
ACTIVITY												
Est	Act	Mon	Tu	Wed	Thurs	Fri	Sat	Sun	PPC	REASON FOR VARIANCES		
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	Owner stage 4 work		
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	Owner stage 4 work		
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	Owner stage 4 work		
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Weekly Work Planning

PORTFOLIO SELECTION, PROJECT SELECTION AND PROJECT VALUE

Optimising the Project Portfolio



Solving the optimization problem:

1. **Brute force enumeration:** Almost always infeasible.
2. **Cost-benefit ranking:** Reasonable first cut, but not entirely optimal, and unable to tackle dependencies.
3. **Automated tools:** Solving the so-called MIP (mixed integer program) using branch-and-bound techniques. "Ask a tool to do it"—akin to using the Solver in Excel.

How do we define the right portfolio of projects?

How do we prioritize between projects?

How do we value a project?

How do we compare between asset classes?

1. Optimize the portfolio to give the "best" fit across all the parameters without compromising on control limits
2. Optimize the portfolio based on a single ranked variable

1. Build utility curve for each parameter within each project

1. Build a solution using the Delphi method/ wisdom of the crowds

PRECINCT MODEL OF HIGH-IMPACT INFRASTRUCTURE DEVELOPMENT

Optimising the Project Portfolio



CITY HEART

Premier City Park

Cultural + Community Events Plaza

Active Edges with cafes, bars + restaurants

Breakout spaces for surrounding businesses

Place of contemplation, reflection & celebration

GREEN PRECINCT

Green streets with shady trees

Communal outdoor spaces

Green city park

Green Walls + Roofs to reduce heat loads on buildings

Optimise solar access

Low energy consumption



VIBRANT DESTINATION

Mixed Use: Ground Floor retail + Commercial surrounding park

Terrace bars / cafes overlooking streets

New residential community

Activated & connected laneways with high quality streetscape

Safe & secure environments

LIVEABLE WALKABLE CENTRE

Pedestrian links with easy access to shops + public transport

Traffic calmed streets with safe crossings

Easy access to cycle routes

Improved car parking planning



SOCIO ECONOMIC IMPACT

Job creation

Entrepreneur support

Reduce inequality

Economic opportunity

Centralisation vs fragmentation

Densification

A PRECINCT IS A SPACE ENCLOSED BY WALLS OR OTHER BOUNDARIES OF A PARTICULAR OR BUILDING OR ARBITRARY & IMAGINARY LINES DRAWN AROUND IT



KEY IDEAS

CHANGING SPATIAL LEGACY



NEIGHBOURHOOD CONNECTIVITY



VIBRANT STREETS



PRECINCT MODEL IMPLEMENTATION

Pillars of Precinct Management

High Impact Infrastructure

RESOURCES

Adequate Resources

- Human
- Financial
- Immovable assets

INFRASTRUCTURE

Efficient and Responsive design

- Accessible
- Safe
- Vibrant

COMMUNITIES

Effective Communication

- Inter-connected
- Social cohesion
- Symbiotic

Precinct Development

Maintenance Hubs

Township Economy

Value Optimisation

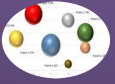
Immovable Asset Base

Bedrock understanding of Social, Spatial and Economic Impact

COLLABORATIVE PLANNING

Successful precinct management requires integrated planning between all pillars

Optimising the Project Portfolio

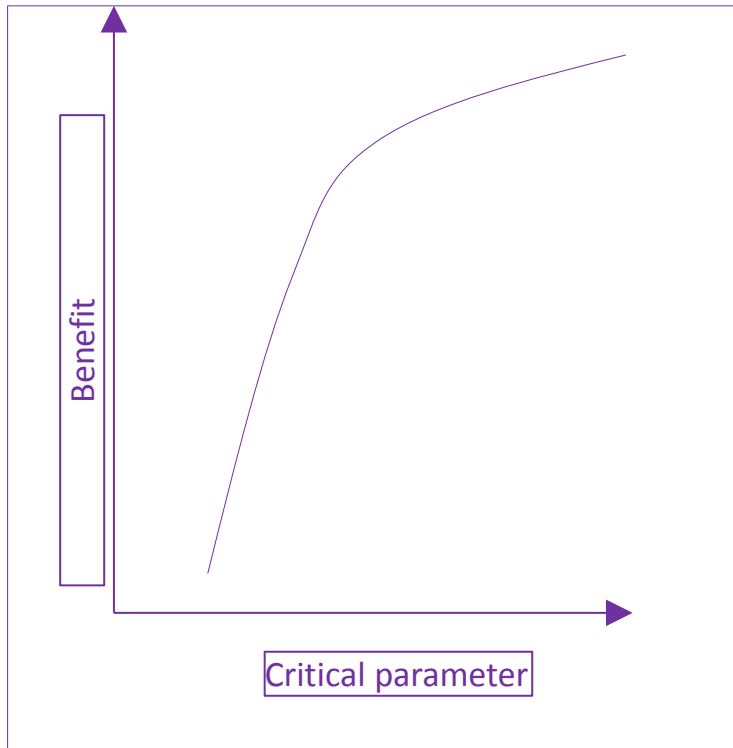




PROJECT IMPACT ASSESSMENT

Appropriate infrastructure utility curves, are crucial not only in terms of optimising portfolios and prioritising projects but also to determine the value (and ultimately the impacts) of Projects

Essentially the utility of anything decreases as we get more of it



Therefore the value of more needs to be adjusted

- The current state of infrastructure needs to be assessed
- The value of additional infrastructure needs to be estimated based on the current context
- e.g. adding additional wagons to train that isn't full has limited value
- A utility curve must be developed for each parameter and possibly for each parameter within each project
- The curve is in itself iterative as projects selected would alter the current position on the curve

i-Labs (Infrastructure Labs)

Benefits of i-Lab

I-Lab is ideal to maintain a “birds-eye” view in order to **align cross-cutting issues** and **ensure coordination**

Crucial tool in all three aspects- optimisation of projects, project prioritisation and impact assessment

Allows for concurrent **output realisation** (doing several things at once and in a coordinated manner reducing delivery time)

Incremental Data and Information sharing- **information is embedded and shared as soon as it is available** (progressively builds a set of protocols for prioritisation and sequencing medium-term projects)

Encourages integrated infrastructure project Management

i-Labs

An Infrastructure -Lab is...

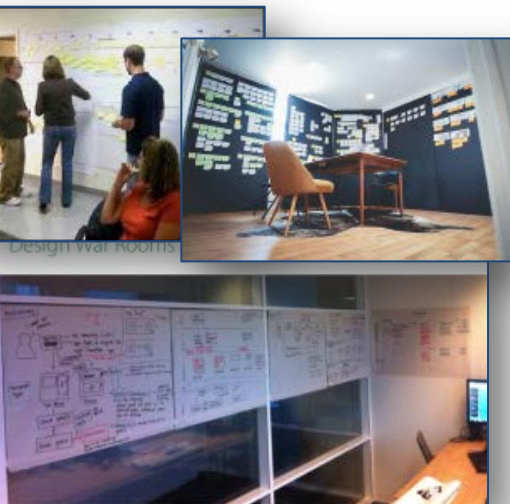
A collaborative space which fosters a dynamic knowledge sharing environment.

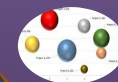
An environment that enables problem solving which contributes significantly to the reduction of infrastructure project cost, lead time and risks.

Key Activities Within an i-Lab

- Working Sessions
- Data and Content production
- Skills training
- Brainstorming Sessions
- Project Reviews
- Prototyping Sessions
- Communication Strategies
- Academic /Sector Specialist round-tables

Design War Rooms





IDMS Project Readiness Matrix

Gauteng Province Infrastructure Delivery Project Readiness Matrix

Thank you for your commitment in using the Project Readiness Matrix. This is a tool that must be used to assess the readiness of planning and delivery teams in the Infrastructure delivery lifecycle to progress key infrastructure delivery activities from one phase to the next.



Project Manager Details

Name		
Function / Department		
Phone Number		
Email		

Overall Status

0%

DP2-Project Management	Applicable Deliverables	Responsibility	Timing	Complete	Comments
Please indicate status of the following activities					
Implementation Planning Phase					
Gate - Strategic Decision Making Point 3(a) - Preparatory and Briefing of Prefeasibility					
Objective:					
Ensure land is available and useable for infrastructure delivery					
Received high level brief from client (project scope, accommodation schedule, indication of site, Request for Service)	PEP V1a				
Confirmation that need listed in the U-AMP and C-AMP?					
Sufficient and realistic funding allocated within M-TEF period	PEP V1a				
Sufficient and realistic ECE allocated within the current Financial Year	PEP V1a				
Source of funds identified (funding category Equitable Share vs. Conditional Grant)	PEP V1a				
Confirmation identified land proclaimed as a township	PEP V1a				
Confirmation that land is ready and suitable: - Land is zoned for proposed use - Land has bulk service provisioned - Identified restrictions on the land title deed - Identified need for additional geotechnical and - Identified heritage components					

START HERE_INSTRUCTIONS

Encourages integrated infrastructure project Management

Crucial tool in all three aspects: optimisation of projects, project prioritisation and impact assessment



PART D

CONCLUSION

CONCLUSION



Leverage Expertise and Resources




- Lessons have been learnt during the journey of transforming the infrastructure sector in the GCR
- Leveraging the expertise, skills and resources of partners both in the public and private sector is crucial to achieve goals

- Need to enhance the manner in which portfolio optimisation, project prioritisation, project valuation and asset classes are prioritised
- Strengthen the use of existing technologies to ensure data driven policy and decision making across the infrastructure value chain



Project Prioritisation



Strengthen Project Execution



- Strengthen the manner in which projects are executed
- Front End Planning is crucial for infrastructure projects
- Utilise utility curves, i-labs and Project Readiness Matrix to enhance value of projects



Thank You