



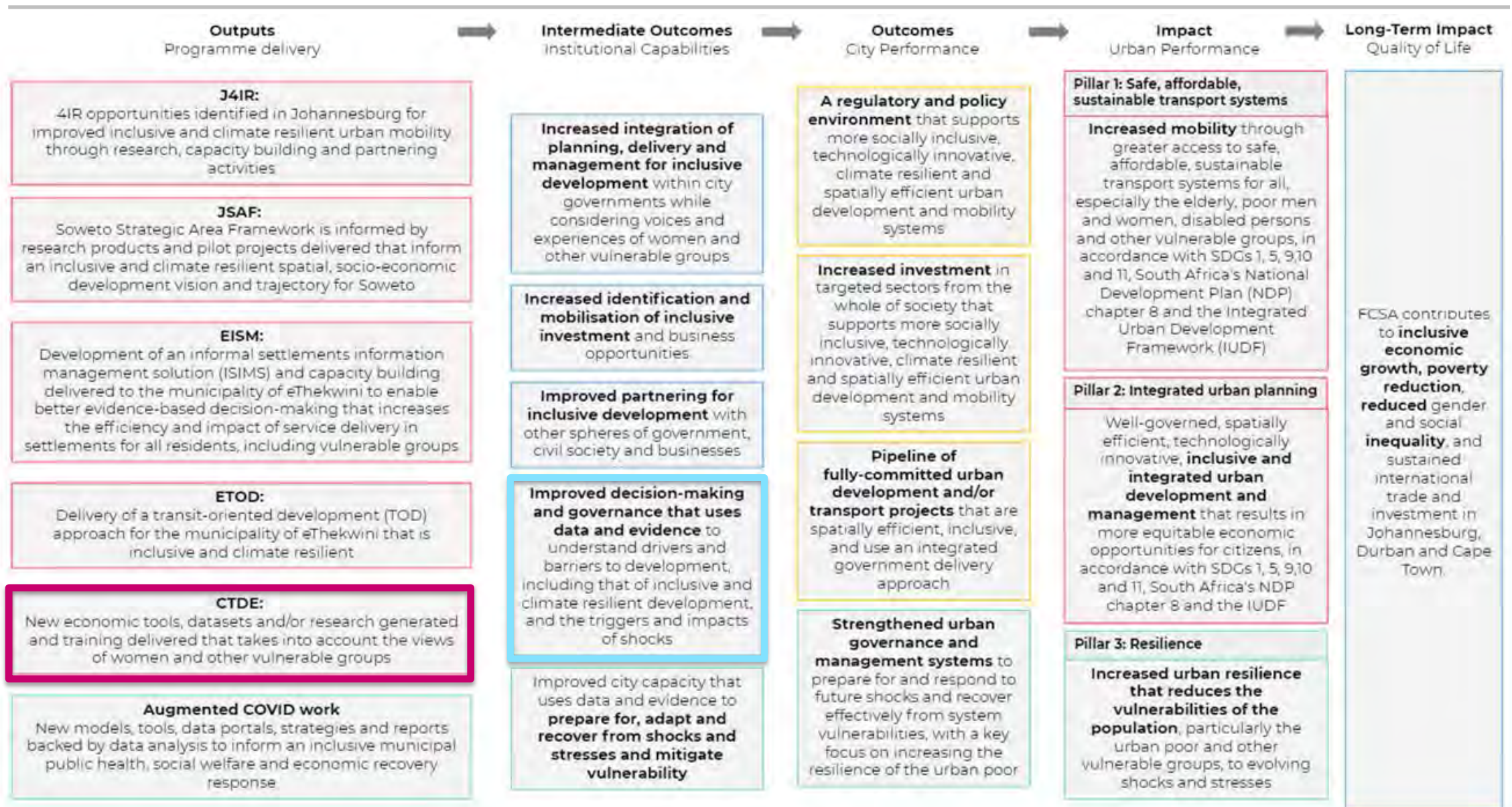
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Implementation of Data Strategy and Economics Capacity Building

Paul Court
November 2021

Making progress possible. **Together.**

Technical Assistance – Theory of Change



Project Background and Objectives

There are two components of this Project:

Data Strategy Implementation Support

- The key purpose of this project is to provide the City with strategic support in implementing key elements of the City's data strategy, that strengthens the City's technical and human capacity for evidence based decision making
- The data strategy is focused around six workstreams i.e. Governance, Culture, Architecture, Partnerships and Collaboration, Capabilities, and POPIA
- This project will also help establish the foundations for the 10-year technology transformation (CAR) in the City

Economic Analysis Capacity Building

- The economics workstream focuses on building the City's capacity to undertake high-quality economic analysis.
- This is achieved through the development of analytical tools and models; the provision of highly focused training and the demonstration of the importance of economic analysis to decision making, through identified use cases

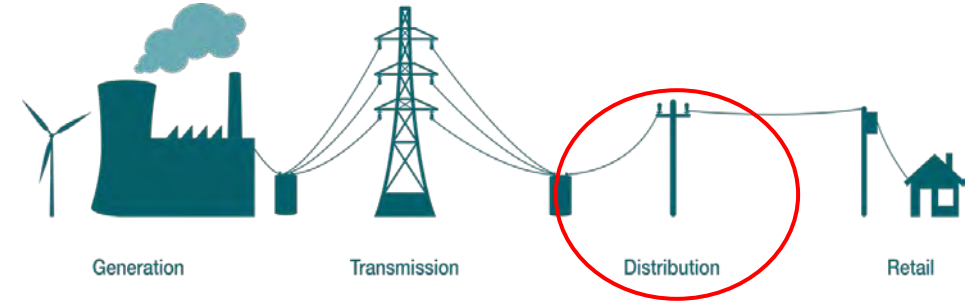
Desired Outcome and Impact

Ultimately, the Implementation of the Data Strategy and Economic Analysis Capacity Building Project aims to improve the well-being of residents through informed and data driven decision-making in policy, planning and service delivery. In particular the project aims to:

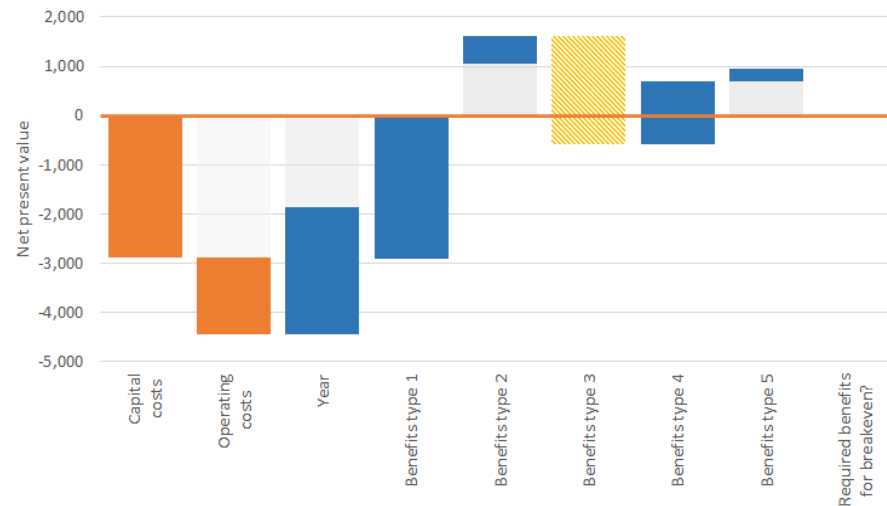
- Improve the City's ability to appraise the effectiveness of capital spending projects, thereby maximising societal benefits and minimising direct and opportunity costs
- Understand the impact of tariff setting decisions on households' consumption choices and their willingness or ability to pay for services, ensuring the sustainability of City service provision while minimising negative impacts on households
- Undertake more efficient asset management to ensure a high standard of service delivery
- Better understand spatial patterns and household characteristics to plan for the growth of different types of land uses and to develop more inclusive human settlements

Project Scope/Outputs

- Y1: Data and Economic Activity deliverables (*The Ground Work*)
 - Data Architecture and Principles Best Practices
 - Master Data Governance Best Practices
 - Master Data Governance Roadmap/Framework
 - Best Practices on Data Inventory and Taxonomy
 - Development of Taxonomy and Governance Framework
 - Use Case Decision-making Framework
 - Data Literacy Programme
 - Skills Development Plan
 - Development of Socio-Economic CBA template and user guidelines
 - Development of a leading indicator of economic activity
 - Model to proxy household income/wealth
 - Analysis and mapping of household ability to pay



- Y2: Thematic data use cases:
 - CKAN
 - Electricity Asset Management
 - Informal Settlements
- Y2: Thematic economic use cases:
 - CBA of MyCiti (BRT) Phase 1
 - Development of Ability to Pay Tool
 - Spatial Economics Roadmap
 - CBA of Permanent Desal Plant



The form is titled 'Confirmation of Residential Address'. It includes fields for 'The City of Cape Town confirms that on', 'Nesakhlo Buzumba', 'ID number', 'Ward', 'Block', 'A', 'Informal settlement', 'Street', 'Longitude', and 'Latitude'. There is a photo of a person and a satellite map showing a residential area with a red box highlighting a specific location. The form is from the City of Cape Town (ISIXEKO SASEKAPA, STAD KAAPSTAD).

Data Strategy Use Cases

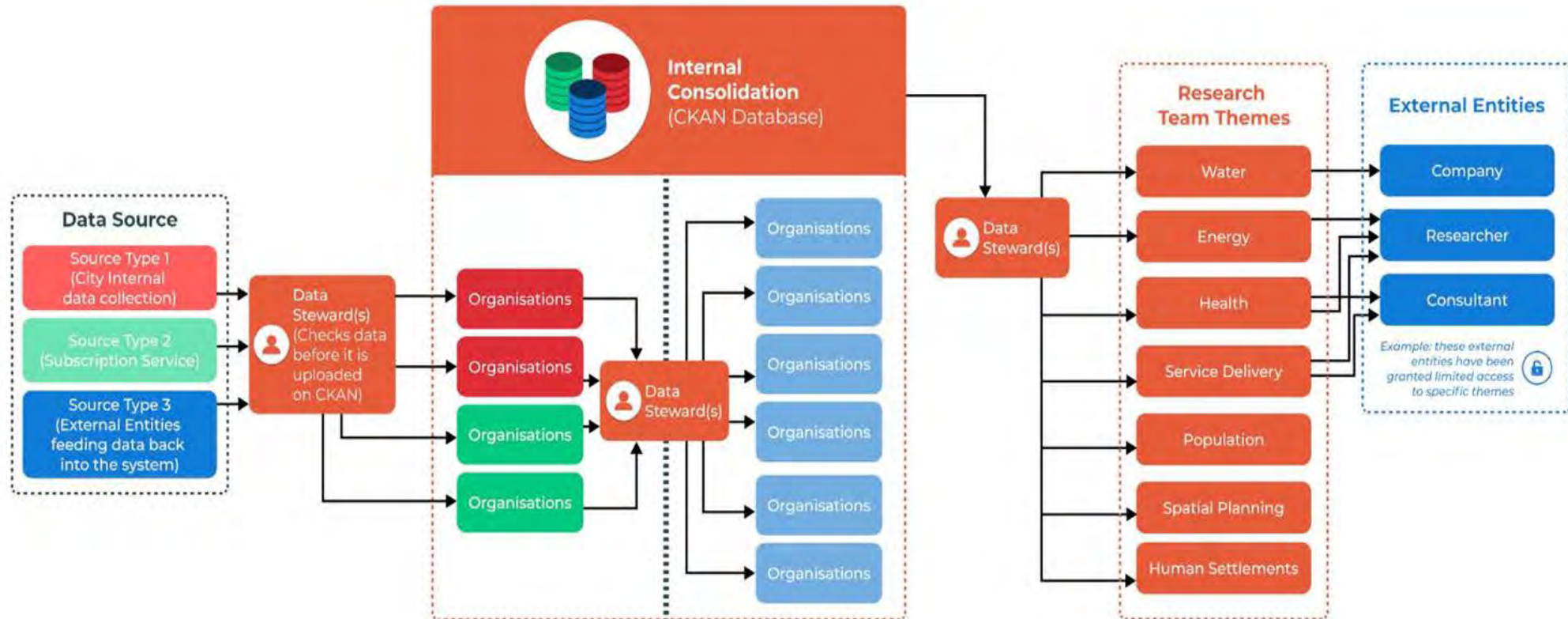
Description and status

Data Sharing Platform (CKAN)



What is CKAN?

- World's leading open-source data portal platform
- Makes it easy to publish, share and work with data
- It's a data management system that provides a powerful platform for cataloguing, storing and accessing datasets with a rich front-end, full API



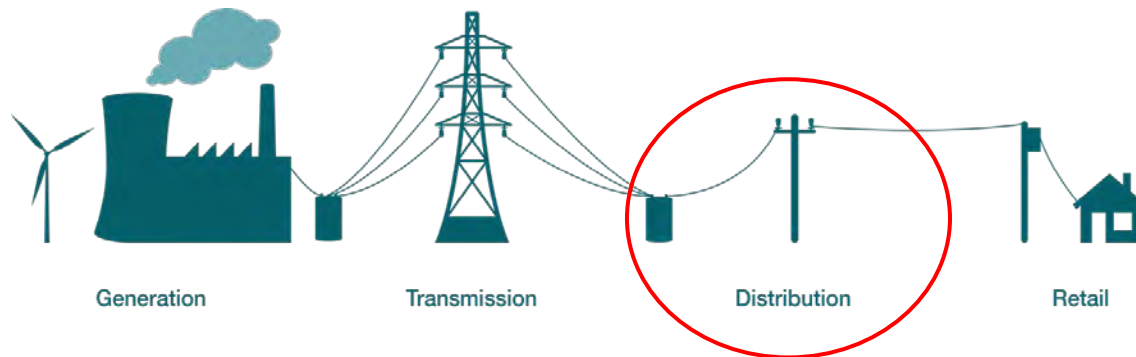
Impact of CKAN

- CKAN was used extensively during COVID-19
- This has led to an internally maintained and supported data portal that is able to facilitate sharing of data and insights both internally and externally. The CKAN process includes two distinct steps:
 - CKAN set up under Covid-19 and being actively used in the FCSA use cases to share data and analysis
 - Creating a user experience design with OPM and Research users, as well as a public tier-based hierarchy that is used by researchers:
 - Supporting the collaboration with JPAL and EPRU
- Significant potential for CKAN data portal moving forward:
 - The infrastructure is in place for data sharing internally across the whole CCT organisation, however to be phased-in
 - Data sharing with external users, and for the enriched data and insight to be shared back into the city within the relevant permissions, user needs, and organisational hierarchy.
- The ability for third parties to submit data directly into City systems offers a huge opportunity for the City to better meet its goals at the same level of effort and investment.

Asset Management Use Case

Work within the Electricity department is focused on a single asset class, namely **Medium Voltage Substations (MVSS)** with Ring Main Units (RMUs). MVSS are commonly referred to as **minisubs**.

- MVSS are found in the **distribution** network only after high voltage has been transformed to medium voltage.
- Their primary function is to **'step' a voltage level**, either **up or down**
- MVSS are then responsible for transforming medium voltages down to low voltage. These are levels that can be used by **residential consumers** to power every day appliances.



- The City's current **6272 minisubs** are a key feature of its **distribution network**.
- MVSS usually serve large numbers of customers at once and are an integral part of the distribution network.

Asset Management Use Case

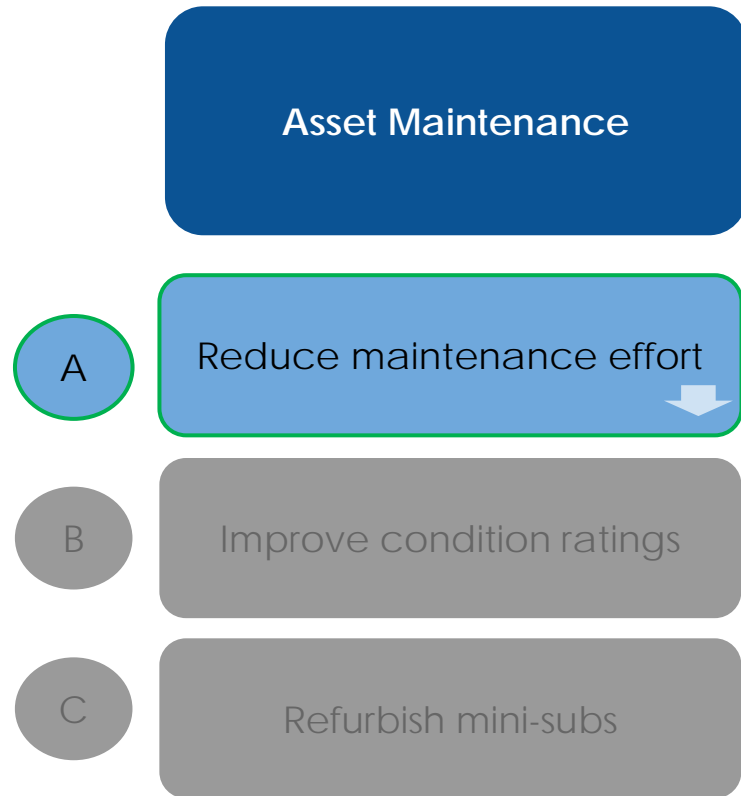


The importance of MVSS in the electricity network means that:

- Electricity department must have **spatial accuracy** in order to avoid cables being struck during incidental work which might lead to power outages, injury or even loss of life.
- Similarly, the nature of electricity means that the department is often expected to **fix outages within minutes** rather than hours, which requires more and better integrated use and management of electricity asset data.
- The **cost implications** of maintenance is significant - minisubs average between R400 000 to R800 000 depending on size



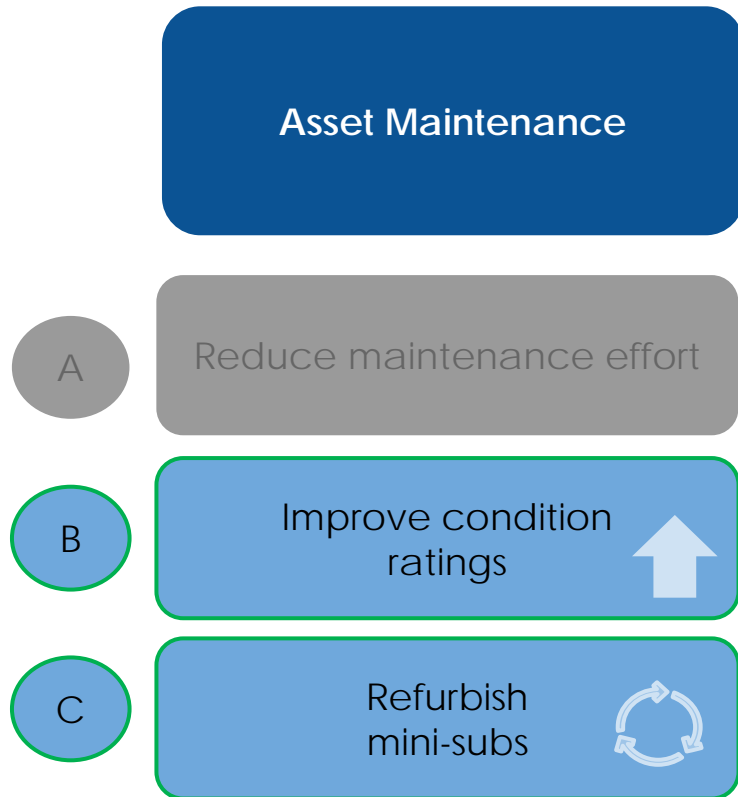
Asset Management Use Case – Reduce Maintenance Effort



Improving Asset Maintenance - financially and resource effort (Corrective and Preventative)

- **Question 1:** What **spatial areas** consume the **highest proportion of corrective maintenance** effort relative to the asset base owned by the City? (financial and resource benefits). For mini-substations. Are there spatial areas where we can **identify the volume of maintenance** (especially corrective and emergency maintenance) being **disproportionately higher, due to events** (such as theft or vandalism)?
- **Question 2:** Can **interval-based inspection** and, possibly, preventative maintenance **frequency** be **safely and legally reduced** (through people, process or technology)? If so, for which types of mini subs? What is the impact of such a reduction (positive or negative impacts and financial and resource, service delivery benefits).
- **Question 3:** Similarly, can unplanned, corrective maintenance effort and cost (asset faults/thefts/vandalism) be **safely reduced** (through people, process or technology)? I.e. How do we **“cool down” the spatially identified volumes** identified in A.2 above?

Asset Management Use Case – Improve Condition Ratings



Asset Condition Rating improvement:

- **B: Question 4** Could there be a **better rating system** to improve the **accuracy and quality of data**. How can this improve the value of data.? (positive improvement through data capability enhancement, and consequently positively impact on data quality and the consequential decision making)

Refurbishment as a mitigation possibility:

- **C: Question 5:** What spatial areas should not have new mini-sub installed, but **rather older/refurbished units**? (high theft / vandalism locations / limited resources). How does this serve as a **mitigation strategy** to the maintenance effort and cost in A?

Informal Settlements Use Case

Problem statement:

- Connect household level survey data to the IS spatial data set
- Survey data does not get captured in a consolidated way, and therefore gets repeated

What is required:

- A system to capture and store social survey data electronically and link it directly to the spatial data set
- The City is able to produce Confirmation of Residential Address certificates from social surveys
- Reliable and accessible social data that informs planning, delivery and social accountability

Confirmation of Residential Address

The City of Cape Town confirms that on: 2016-09-10 11:59:51 AM
Nkosinathi Matomela ID number: 7512065274088

was recorded resident in Structure: KIL_A1 Block: A
Informal Settlement: Kikayo situated in Philippi
Latitude: -34.017283 S
Longitude: 18.566599 E

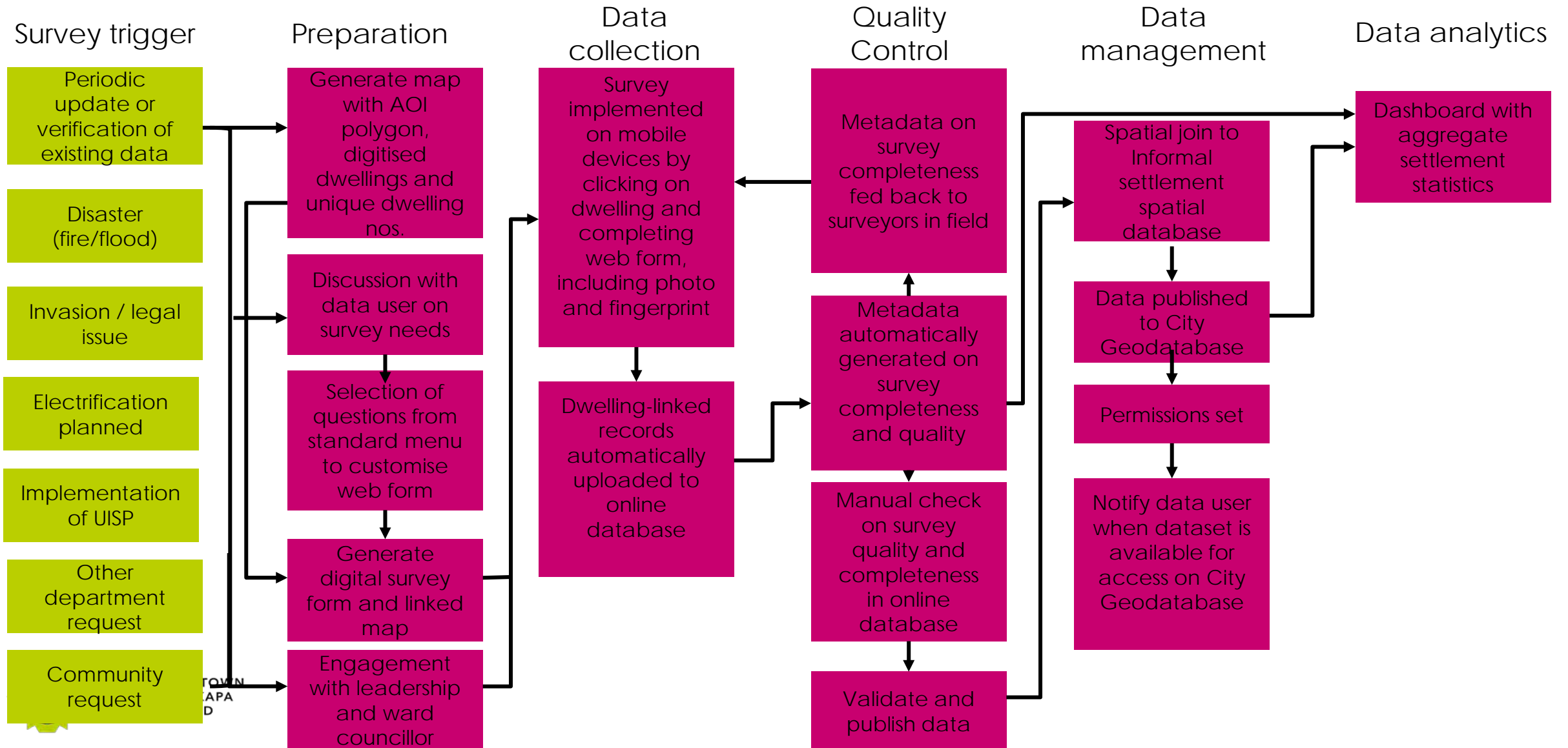


To update your information please contact:
Informal Settlements Residents Register
PH: 021 463 3435
EMAIL: isr@cityofcapetown.gov.za

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Working together positively. Together.

'To-be' social survey data collection process



What will social survey data be used for?

- Occupancy recognition programme
- Registering electricity connections
- Disaster recovery assistance
- Housing Beneficiary identification
- Aggregating to settlement level for services planning and other analysis

Elements of the solution

- Current data structure in IS GIS database remains unchanged
- Surveys must be able to be undertaken on Trimble devices, tablets or, as a last resort, paper forms.
- Data is uploaded from the field to a centralised database
- Survey forms are linked to dwelling polygons from the outset
- Survey form has in-built validation rules
- Surveyors are provided with real-time feedback on completeness
- Quality controller gets real-time feedback on survey progress and surveyor performance.

What decisions will be informed by the solution?

- Housing beneficiaries can be easily identified
- Disaster relief beneficiaries can be easily identified
- Better data will inform better services planning and services provision
- Decisions around the City response to particular settlements will be based on a proper understanding of the resident profile

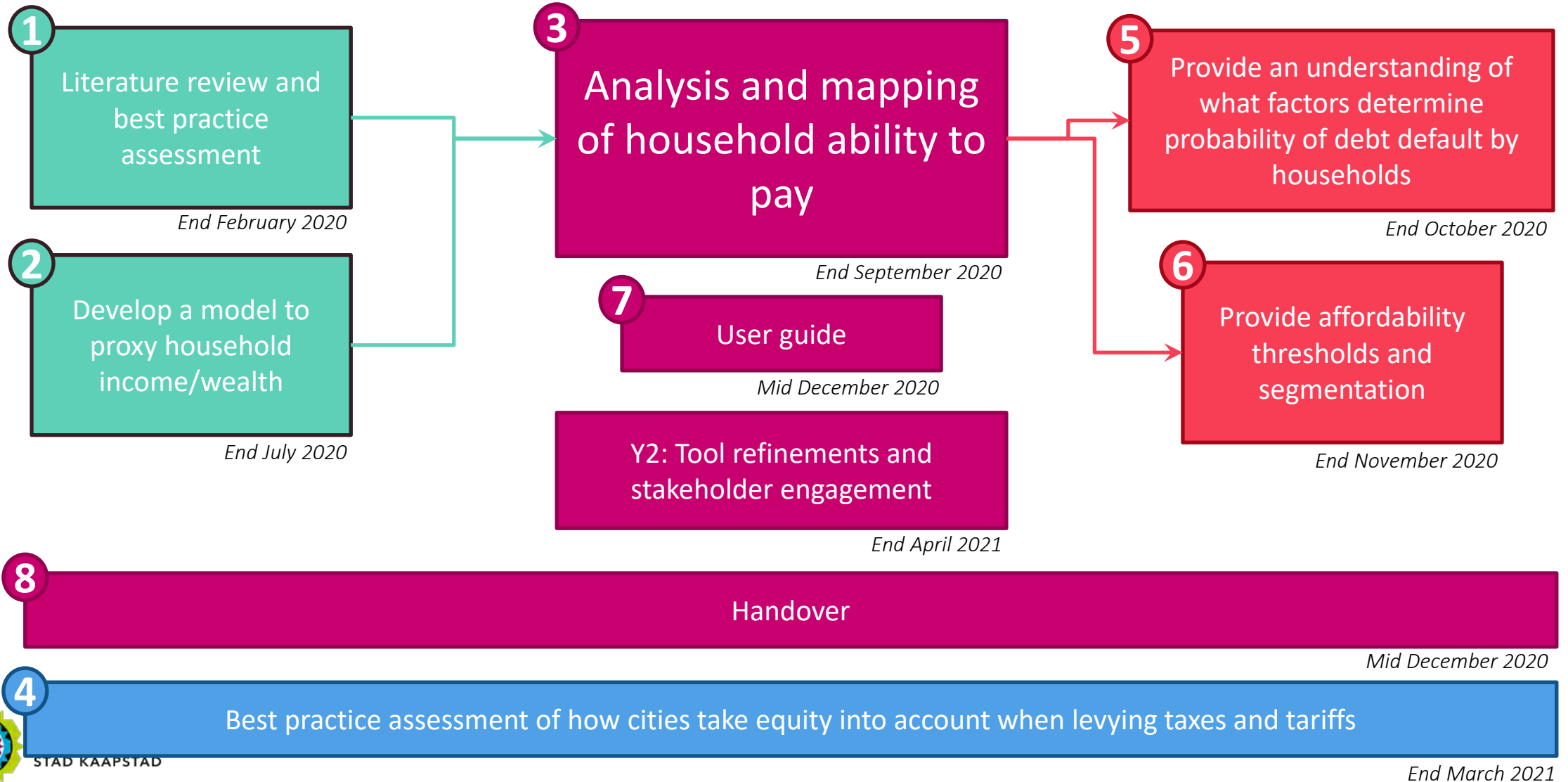
Links to the City Inclusion Framework

- Opportunity City – officially recognising informal settlement residents helps with their access to services and the formal economy (appreciating social/spatial mobility for IS dwellers)
- Social data will enable specific types of socio-economic vulnerability to be visible and therefore be addressed
- Spatialised social data will provide insights into livelihood strategies
- Data needs to be used in a way to address persistent vulnerability and inequality ('do no harm')

Economic Analysis Use Cases

Project Description and Status

Ability to Pay Project – Project Outline




Spatial Economic Gap Analysis

The Spatial economics workstream saw the completion of the following tasks, with associated deliverables / outputs

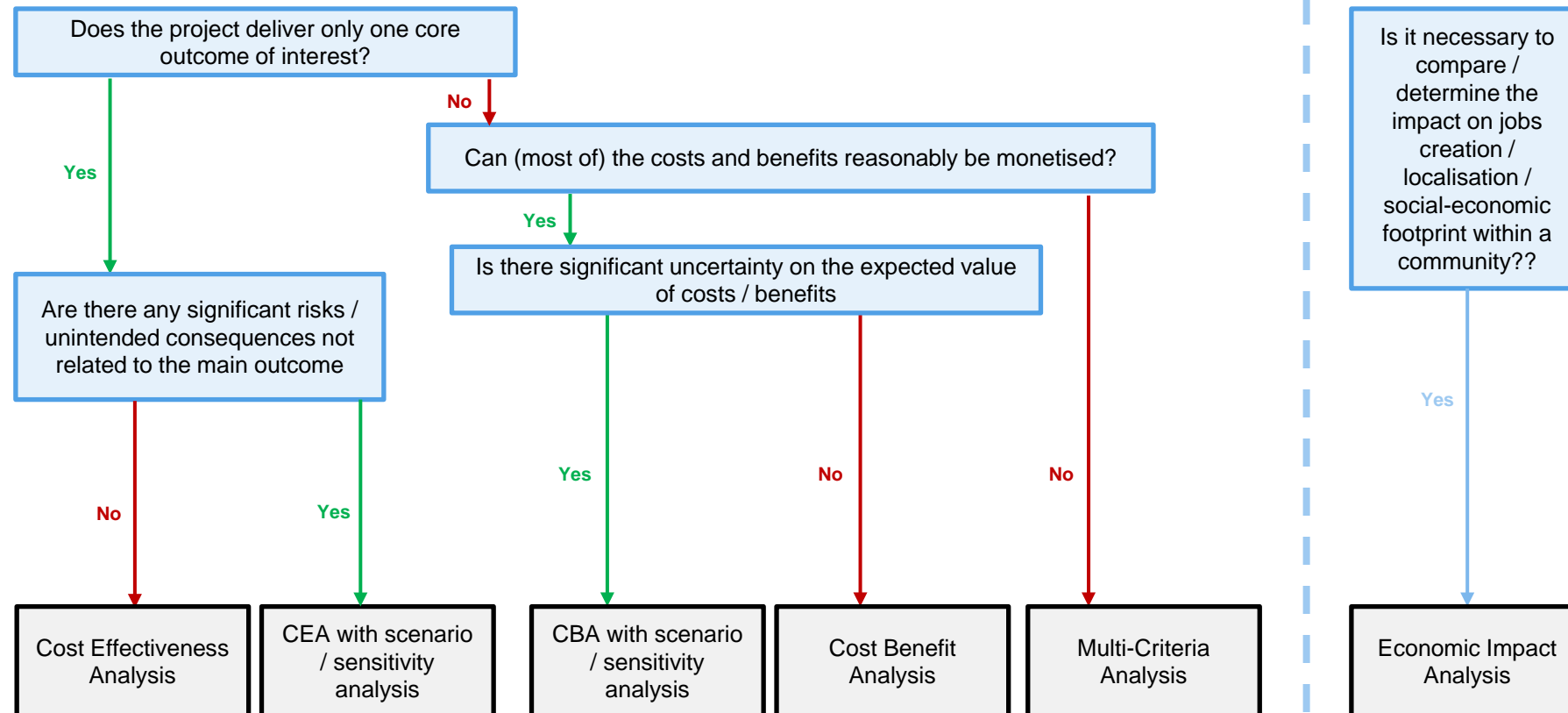
1. Interviews and two workshops with key CCT departmental stakeholders to determine “as-is” spatial tools/techniques, limitations and gaps
2. Literature review of international best practice
3. Summary of recent spatial economics studies in Cape Town

Some key recommendations from Spatial Economic Road Map

1. Improve baseline **real estate knowledge**, including of informal real estate markets
2. **Programmatic investment in capabilities** such as UrbanSim and LUTI - incremental tooling, ad hoc studies and consulting services without capabilities enhancements will not significantly improve the City’s capabilities.
3. Focus on the **data improvements** & “quick wins”
4. **Governance** recommendations - COP & guidelines
5. **Decision tree** & suitability matrices

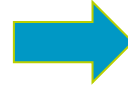
Low Complexity	Descriptive	Explanatory & Explanatory	Predictive
 <p data-bbox="78 1282 264 1310">High Complexity</p>	<ul style="list-style-type: none"> ● ECAMP ● Urban Development Index ● Green infrastructure network tool ● EGMS ● UGMS ● LUM 2020, LUM 2040* ● Vulnerability Viewer 	<ul style="list-style-type: none"> ● Spatial Costing Tool ● EGMS ● PPM (benefits tracking) ● Inclusionary housing calculator ● SAP LUM Module ● PPM (benefits tracking) ● Social facilities rationalisations tool-CSIR 	<ul style="list-style-type: none"> ● Climate Change Hazard Model ● EMME ● Population Projection Model (CPOP1) ● Population Estimate Model (CPOP2) ● NEDUM / LUTI model

Economic Project Appraisal: Decision tree on type of appraisal

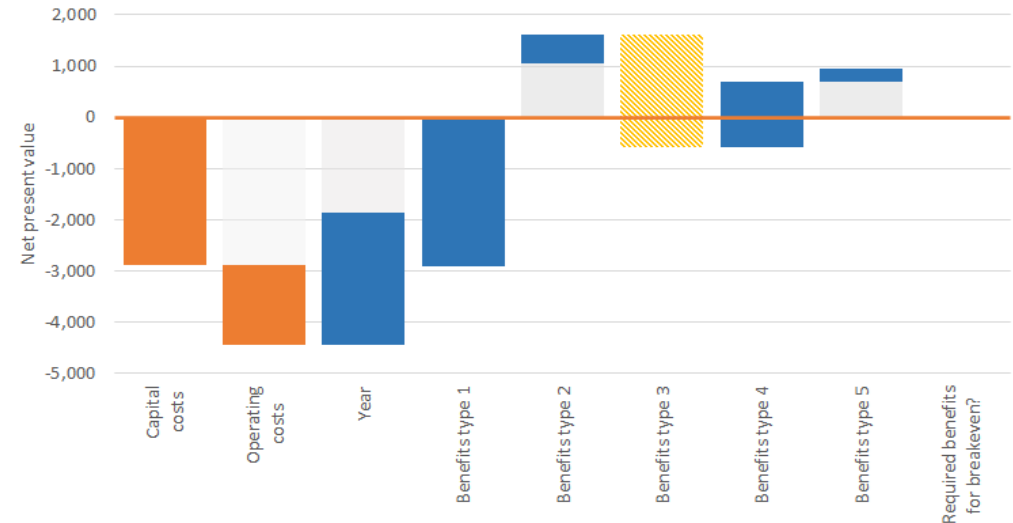


Project Appraisal: Key Outputs

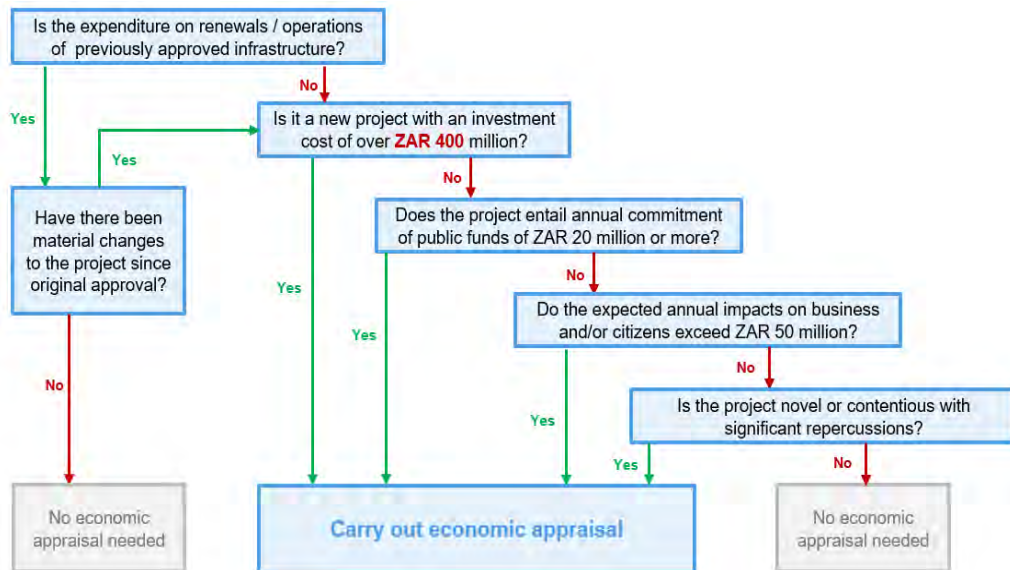
- Production of CBA templates and user guides, continuing to refine HOW to do economic appraisals
- Held a series of workshop “simulations” with the CCT economic analysis team to embed use of the tools developed



Standardising CBA outputs / summary charts



Decision trees for when to undertake a CBA



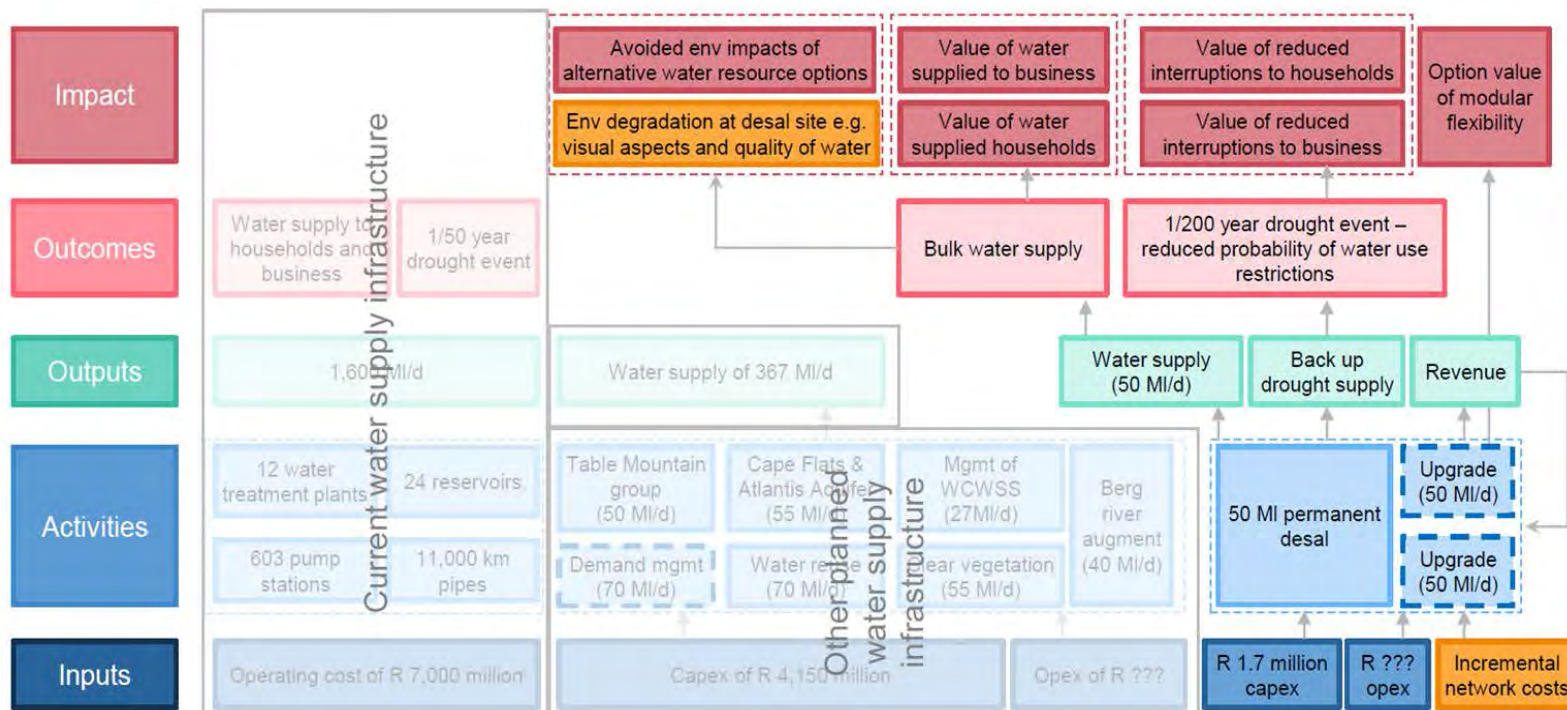
- Delivered a review of processes to decide WHEN an economic appraisal should be undertaken
- Provided a high-level review of what constitutes a “good” result of an economic appraisal, and how to interpret net-present-value and benefit-cost-ratios in a decision making context, including the risk of only focusing on economic outcomes

Ongoing Project Appraisal work - Desalination use case

Major focus now on the second economic appraisal application

- Building on the first collaborative project appraisal on MyCiTi Phase 1 completed in Q1 2021
- Now undertaking analysis of proposed permanent water desalination plant
- A CBA “steercom” established to provide guidance, data collection, and regular collaboration comprising economics, water, and policy representatives
- Theory of change developed, and a review of “how to” value water resilience provided to translate international best practice to Cape Town context
- Data collection and testing in progress
- Sensitivity analysis and Montecarlo simulations being undertaken

Updated theory of change for desalination theory of change



What makes a good CBA

- A case could be made that projects without an impressive benefit-cost ratio may still be worth undertaking for a variety of reasons such as strategic importance, there is a high level of difficulty in estimating monetised values for benefits and costs, and for cultural or equitable purposes.
- Projects should not be approved solely on the basis of BCR ranking, as these are never based on complete and perfectly predictable information
- Additional criteria should be used alongside BCRs in decision making – and some of these may be “negatively correlated” with the BCR (e.g. delivery of strategic and social equity outcomes)
- Policymakers should be aware of the potential equity issues when using BCRs as high income and / or highly productive areas such as central business districts or affluent areas are likely to post high BCRs than other locations
- There is currently a large gap in the evidence surrounding what constitutes a good BCR and whether they are dependant on sector and / or location

Key Reflections

Challenges and opportunities

- There is a lack of data expertise/capacity throughout the organisation execute on data packages of work
 - Opportunities and mitigation: leverage off existing governmental organisations who overcame these challenges i.e. UK government; Enhance the role of the Data Co-ordinating Committee
- Lack of consistent data standards and stewardship
 - Introduce data owners, stewards, and custodians organisation-wide
- Weak integration due to legacy systems, and lack of API use
 - The technology programme (CAR) can improve integration and interoperability as well as the use of the API
- Lack of fine grained, spatially disaggregated economic data
 - Making increasing use of mobile data and large administrative datasets, i.e. tax data
- Exclusive focus on financial feasibility and limited awareness of importance of estimating broader economic impacts
 - Development of project manager guidelines, increased training

Key learnings

Insights into the interests of line departments needs in light of the needs of the data strategy implementation:

- Make choices to ensure greatest impact
- Don't stretch too wide with models, build from the ground up
- The need to balance rigorous analysis with quick implementation of projects – don't add to red-tape
- Benefits of combining economics and data science
- The need to address key data gaps, particularly at low levels of spatial aggregation
- Incorporating change management and creating awareness
- Enhancing the role of the Data Co-ordinating Committee
- Improving certain parts without the whole, may do more harm than good
- Digital vs Data vs Tech
- Impact metrics
- Adaptive demand-driven implementation approach

Key risks

- Sustainability of the data strategy:
 - Executive prioritisation
 - Capacity and skills within the organisation
 - Overcoming data silos
 - Data integration
 - Sustain the momentum of the technical assistance
- Economic risks:
 - Not getting the balance right between evidence based decision making and timely implementation of projects
 - Low buy-in from project managers
 - Insufficient data