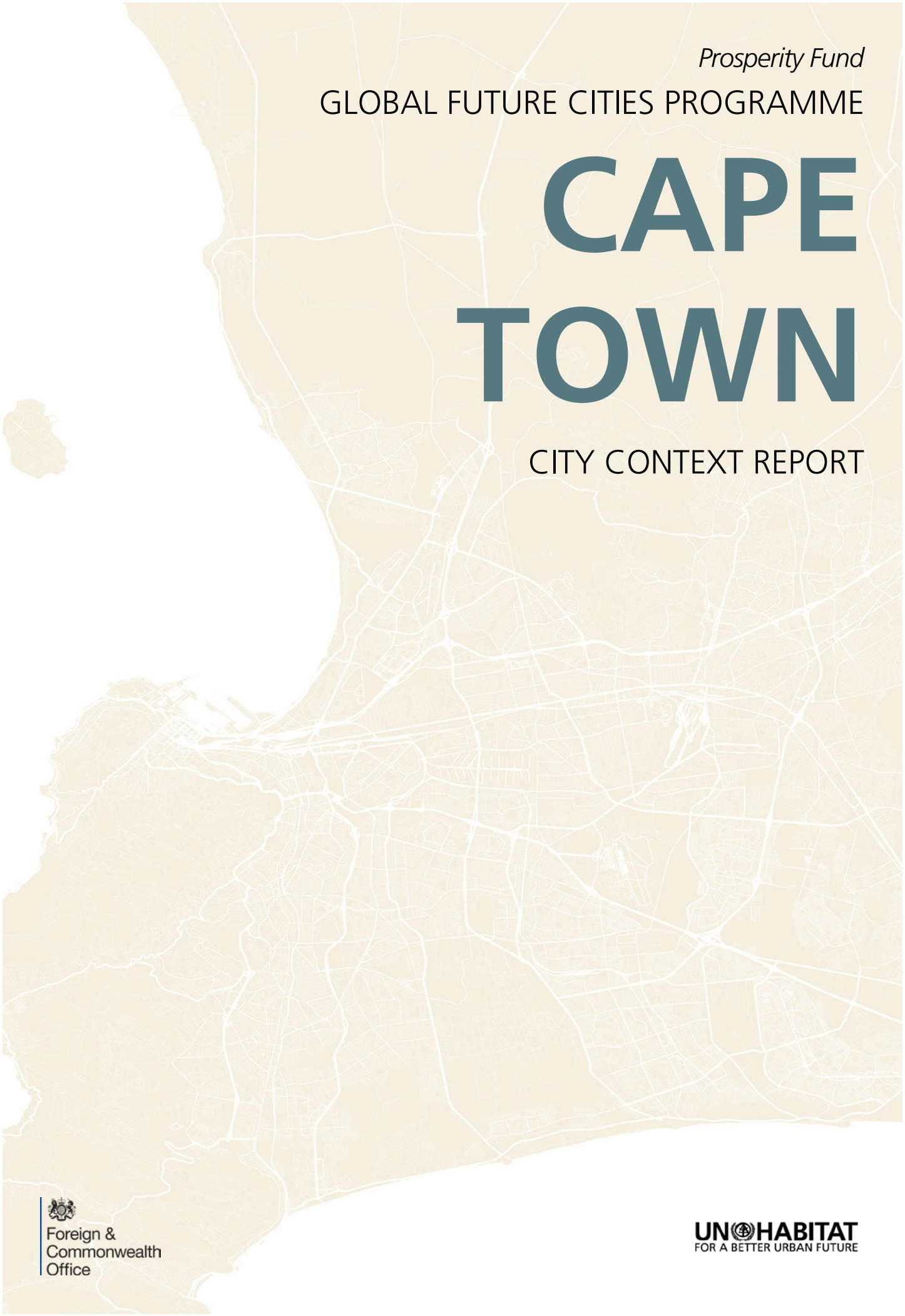
Prosperity Fund

GLOBAL FUTURE CITIES PROGRAMME

CAPE TOWN

CITY CONTEXT REPORT



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December 2018

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Global Future Cities Programme
CAPE TOWN
City Context Report

UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME
P.O. Box 30030, Nairobi 00100, Kenya
www.unhabitat.org

Funded by: United Kingdom Foreign and Commonwealth Office (UK FCO)
Lead executive agency: UN-Habitat: Urban Planning and Design Lab
Academic partner: International Growth Center (IGC)
Professional partner: United Kingdom Built Environment Advisory Group (UKBEAG).

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GLOBAL FUTURE CITIES PROGRAMME

Introduction

ABOUT THE GLOBAL FUTURE CITIES PROGRAMME

In 2015, the UK government created a new Cross-Government Prosperity Fund worth £1.3 billion from 2016-2021, in order to help promote economic growth in emerging economies. Its broad priorities include improving the business climate, competitiveness and operation of markets, energy and financial sector reform, and increasing the ability of governments to tackle corruption.

Emerging Economies still face considerable challenges such as uncontrolled urbanisation, climate change and high and persistent inequality which can lower long-term growth prospects. The Prosperity Fund supports the broad-based and inclusive growth needed to build prosperity and reduce poverty, but also make development overall more sustainable through the strengthening of Institutions and Improvement of the global business environment.

The Global Future Cities Programme (GFCP) is a specific component of the Prosperity Fund which aims to carry out targeted interventions to encourage sustainable urban development and increase prosperity whilst alleviating high levels of urban poverty. The programme will also create significant short and long-term business opportunities in growing markets, forecast to be regional growth hubs, including for UK exporters who are world recognised leaders in urban innovation.

The overall strategy of the Global Future Cities Programme is to deliver the Programme in two phases; a strategic development phase (2018), followed by an implementation phase (2019-2021). UN-Habitat, in collaboration with the International Growth Centre (IGC) and the UK Built Environment Advisory Group (UKBEAG), has been mandated by the UK Foreign and Commonwealth Office (UK FCO) to develop and undertake the strategic development phase. This in turn, will inform and shape the implementation phase, and collectively provide further evidence for the overall programme.

The Programme builds upon a coherent series of targeted interventions in 19 cities across 10 countries, to support and encourage the adoption of a more sustainable approach to urban development. In general, the proposed interventions aim to challenge urban sprawl and slum developments, thereby promoting more dense, connected and inclusive cities that in combination contribute to prosperity, achieving the Sustainable Development Goals (SDGs) and implementing the New Urban Agenda (NUA).

The Global Future Cities Programme builds upon three integrated pillars, that will address key barriers to prosperity, in selected cities:

- **Urban planning** – technical assistance for spatial restructuring (Public space, Heritage and urban renewal, Urban strategies and plans, Data systems for integrated urban planning);
- **Transportation** – technical assistance to support cities to develop integrated transport systems (Multi-modal mobility strategies and plans, Data systems for multi-modal mobility);
- **Resilience** – technical assistance to develop strategies to address the impact of climate change and ensure development is sustainable (Flood management plans and systems).

In order to capitalize on the proposed interventions and to ensure sustainability and impact in a longer-term perspective, the programme has a strong focus on technical support and institutional capacity development.

In many of the interventions, there is a particular focus on the potential of embedding smart/digital technology and data analysis platforms in urban governance and management processes. Integrating smart technologies is recognized as an instrumental area that significantly can improve the efficiency in the provision of key infrastructure services, enhance urban resilience, support evidence-based plans and strategies and promote integrated planning approaches across sectors.

INTERVENTION DEVELOPMENT AND VALIDATION

Based on initial scoping studies and government-to-government engagement carried out by UK FCO, the UN-Habitat team worked with partner local authorities and wider stakeholders to corroborate their city development strategies, and to confirm, enhance and develop the intervention proposals.

In each city, a Local City Specialist, supported by the national and regional country offices of UN-Habitat

and in liaison with the FCO local posts, took the lead in identifying stakeholders in a series of bilateral meetings, interviews and focal group discussions. This has collectively gathered information and provided more detailed knowledge and information on the City's visions and goals.

Based on this initial phase, a Charrette (planning workshop) involved high-level decision-makers from the public and private sectors together with civil society representatives. This facilitated discussion on the proposed and possible alternative interventions, related individual interests, technical opportunities and constraints, as well as political objectives. The outcome of the Charrette provided clarity on where stakeholders stand in relation to the strategic potential of the discussed projects and it allowed for the mobilisation of support.

At the same time, the Charrette allowed for the technical teams to proceed with the development of a Terms of Reference, outlining the specific scope and activities of each intervention. A final Validation Workshop assured consensus on the proposed projects and document's endorsement by the authorities.

Parallel to preparing the Terms of Reference, an evaluation of the interventions was initiated, aiming to address its feasibility within the local strategic context, identify potential impact on prosperity barriers and to explore the optimal delivery models. This process resulted in a set of City Context Reports as well as an analysis of the technical viability of the interventions. The analysis aimed at both informing the development of the Terms of Reference and the future implementation phase of the Programme.

THE CITY CONTEXT REPORT

Objectives

A City Context Report is provided for each city of the Global Future Cities Programme. It serves as a tool to frame the proposed Programme interventions within the characteristics and pre-conditions of each city.

The Report targets a variety of stakeholders in the Programme: administrators, city managers, policy makers, legislators, private sector actors, donors, and local as well as international researchers and knowledge generators. The Reports also provide UKFCO the contextual setting of each proposed intervention, and can in addition, be used by the Service Providers as an entry point for the implementation phase.

By addressing the specific challenges facing each city, the Report illustrates how the interventions can work towards inclusive prosperity and sustainable urban development. The benefits of each intervention, however, cannot be achieved without certain enabling conditions to ensure its success. Therefore, critical aspects for the delivery of the proposed interventions and its success from a long-term perspective are outlined. Using thematic

best practices and evidence from global learnings and research, contextualised recommendations are provided on the conditions necessary for the intervention to be viable and to reach a maximum impact.

Essentially, the City Context Report serves to ensure that all actors within the Global Futures Cities Programme are aware of the specific conditions to be considered in the delivery of the proposed interventions, on a case-by-case basis.

Set-up and Scope

The first part of the City Context Report (General Overview) provides an overview of the Global Future Cities Programme and introduces the city from the perspective of the urban challenge which the proposed intervention intends to address.

The second part of the Report (Urban Analysis) more critically and technically analyses a selection of factors which need to be considered or to be in place for the intervention to succeed, addressing its feasibility, potential impact on prosperity barriers from a long-term perspective.

The third part of the Report (International Alignment and Technical Recommendations) presents short–and mid-term expected outcomes as well as long-term potential impacts. It further elaborates the contribution of the intervention to the achievement of the SDGs and the implementation of the New Urban Agenda as well as the programme objectives of the Prosperity Fund.

As the City Context Report is tailored directly to the Programme interventions, the analysis does not aim to comprehensively present all aspects of urban development. It does not elaborate on long term planning and transformation strategies, the effectiveness of policy or urban legislation, nor the entire municipal financial system. As such, it also excludes urban policy recommendations.

However, the Report has the scope to illustrate the general capacity of the city for project delivery, and in this regard, make recommendations to support implementation of the interventions and reaching set goals. The City Context Reports will be part of knowledge management for the Programme to generate local information and data on the cities as well as identify gaps in knowledge, systems or governance.

Methodology

Urban Analysis

The City Context Report provides a general analysis of the spatial, financial and legal conditions in the city that can either facilitate or hinder the implementation and the long-term sustainability of the proposed interventions in transport, resilience and urban planning.

This framework follows UN-Habitat's three-pronged approach, recognising the three essential components for a successful and sustainable urbanisation: 1. urban planning and design; 2. urban economy and municipal finance; 3. urban legislation, rules and regulations.

Firstly, the spatial analysis describes the existing urban context specific to the intervention. Urban mobility systems, vulnerability of the built environment, spatial form and trends are considered as possible challenges in urban management that the intervention can address.

Secondly, the financial analysis aims to identify the mechanisms in place by which the intervention could be sustainably financed in the long-run. This section outlines the city's municipal capacity, existing regional, national and international financial ecosystem and existing financing mechanisms at the municipal level.

Thirdly, from a legal perspective, the Report critically analyses how the intervention could be facilitated or challenged by the vision of the city and its governance hierarchy. Enablers and obstacles resulting from any relevant legislation, as well as sectoral frameworks (e.g. strategies, policies, planning frameworks and development plans, detailed plans of relevance) are also described.

This approach aims to offer implementing partners, stakeholders and donors a general context of the city and, with it, demonstrate the appropriateness of the intervention from a spatial, financial and legal point of view, while at the same time informing about potential barriers and enablers for its implementation.

Potential Impact to the Program Objectives and the SDGs

The Report also outlines the potential impact of the interventions, based on the specific activities and outputs proposed. Impact can arise from a complex interaction of context-specific factors, rather than as result of a single action, which makes it difficult to empirically quantify longer-run effects that go beyond the identification of program outputs. An empirical, comprehensive impact assessment is therefore not part of the scope of this report.

Nevertheless, the report outlines potential benefits that are only achievable under certain preconditions and activities. Thereby, short-, medium- and long-term outcomes are defined with reference to a project-cycle approach, which considers all the project phases from

Planning and Design through *Building*, to *Operating and Maintaining.*

Short-term outcomes are directly achieved through the implementation of the technical assistance support, within the 2-3 years scope of the Global Future Cities Program.

Mid-term outcomes are only realised once the intervention is executed through either capital investment, implementation of pilot projects or the actual enactment of legal documents, plans or masterplans, within a possible timeframe of 3 to 7 years.

The broader long-term impact of the interventions is linked to the sustainability of the interventions in a 7-15 years timeframe and relates to the operation and maintenance phase of the project cycle.

The City Context Reports further connect potential impacts to the Programme's objectives, taking into account also the Cross-cutting issues at the core of UN-Habitat's mandate from the UN General Assembly. Consequently, the Programme's objectives are summarized into five principles:

- Climate Change;
- Gender Equality;
- Human Rights;
- Youth;
- Sustainable and Inclusive Economic Growth.

Cross-cutting issues are addressed with explicit reference to the 2030 Sustainable Development Goals (SDGs) and the New Urban Agenda, in an attempt to ensure that the proposed interventions are in line with the design, implementation, review and success of the 2030 Agenda for Sustainable Development. Consistent with UN-Habitat's mandate, the SDG 11 Sustainable Cities and Communities is linked with the urban dimension of the other 16 goals as an essential part of the localisation of the SDGs. In this way, interventions can support localisation processes, to support local ownership and ensure SDG integration in sub-national strategies and plans.

Technical Recommendations and International Best Practices

The interventions proposed in the various cities of the Global Future Cities Programme were grouped into clusters according to their thematic entry-point, as an elaboration of the thematic pillars of Urban Planning, Transport and Resilience.

These clusters are:

- Public space
- Heritage and urban renewal
- Urban strategies and plans
- Data systems for integrated urban planning
- Multi-modal mobility strategies and plans
- Data systems for multi-modal mobility
- Flood management plans and systems

Combining the international experience in urban policy and project implementation of UN-Habitat and the leading academic research of IGC, each cluster was analysed to offer evidence-based recommendations for a successful Implementation and a maximised impact of the intervention. Specific reference was given to implemented plans and international best practices.

The recommendations inform the Planning and Design phase which coincides with the timeframe of the Global Future Cities Programme, and always aim for long-term sustainability of the interventions.

Fig. 1. Table Mountain from City Bowl, Cape Town (Source: pixabay.com)

Cape Town

GENERAL OVERVIEW

Cape Town is the legislative capital of South Africa[1], hosting the Parliament, and is the provincial capital of the Western Cape. At the last national census in 2011, the population of Cape Town was 3,740,025.[2] Based on the latest revision of the UN World Urbanization Prospects, Cape Town's population is currently estimated at 4,430,367,[3] indicating an average annual population growth of 2.4 per cent, much higher than the national one over the same period, 1.5 per cent.[4] Like many South African cities, Cape Town is characterised by low urban densities of 1,629 people per square kilometre (city size: 2 461 km2) at nett density of 17 dwelling units per hectare.

Although a report compiled by the United Nations found that Cape Town is the most equal city in South Africa[5], like other cities in the country the city is struggling to deal with its apartheid spatial legacy, which is characterised by high levels of unemployment and highly inefficient urban form.

The wealthy neighbourhoods are concentrated in the western part of the City. The City Bowl is Cape Town's oldest part and its thriving commercial business district with a grid-like street pattern founded by the Dutch East India Company (VOC) in 1652 as a freshwater and produce supply station for Dutch ships sailing to East Africa, India and the Far East.

The city expands southwards along Atlantic Seaboard towards the Southern Peninsula but its growth is constrained by the mountain range to the east (including the famous Table Mountain) and the ocean to the west.

Cape Town continues further east to the low-density neighbourhoods of the Northern Suburbs, Helderberg and the Eastern Suburbs.

Low-income neighbourhoods are mainly concentrated in Mitchells Plain and Khayelithsa, a large township consisting of mostly government housing projects and informal areas. This zone is also known as the Cape Flats, and was created by the Nationalist Party in the 1950s to enforce spatial Apartheid through the Group Areas Act of 1950.

The city has a high environmental profile but increasing urbanisation and climate change make it extremely vulnerable. The city faces big environmental challenges, affected by flooding problems as well a limited access to water.

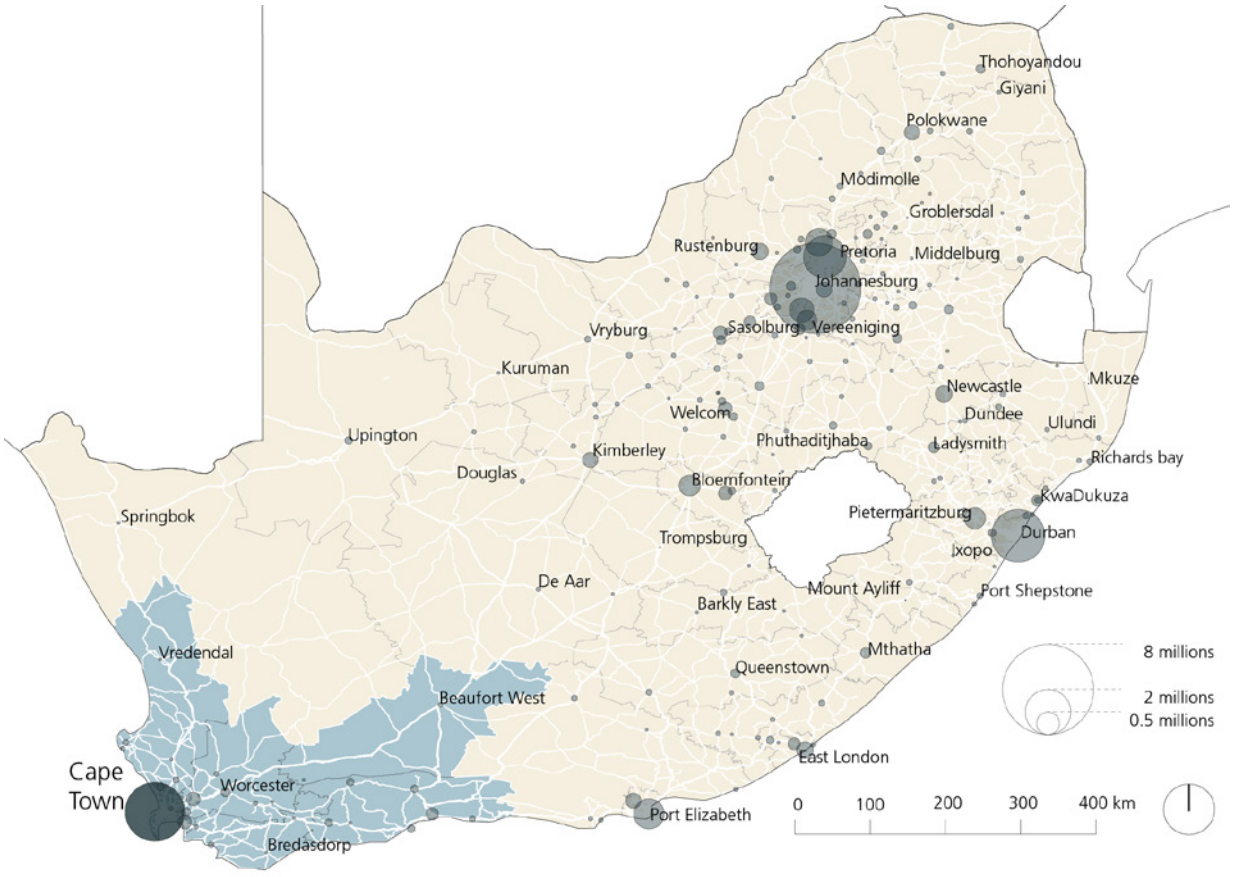

Fig. 2. Western Cape Province, Cape Town, South Africa district capital by population

Fig. 3. Western Cape and municipalities by population, and Cape Floral Kingdom Protected Areas highlighted

PROBLEM STATEMENT

In the past two decades, City of Cape Town Metropolitan Municipality (CCT) has made remarkable progress in certain aspects of human development, including access to water, electricity, basic education and healthcare. However, a large number of Capetonians still live chronic stresses such as high unemployment, poverty, crime and lack of availability of affordable housing.

The City aims to be a forward-looking, resource-efficient and integrated city that delivers quality services to its residents. To realise this aim, the city needs to plan appropriately to respond quickly and effectively to challenges. Data plays a critical role in how evidence-based decisions are made and how evidence-based policies, strategies, plans and implementation programmes are developed.

The City of Cape Town Organisational Development Transformation Plan (ODTP) and Integrated Development Plan (IDP) commits the city to enhanced service delivery objectives through methods including a customer-centric model and an operations system that is led by strategy and driven by data and evidence. However, there is insufficient technical capacity within the city to inform key decisions around the planning for and design of newer and more integrated data systems (in particular big data systems), architecture and infrastructure, including data storage and computing processing for the analysis of big data.

SUPPORTING THE IMPLEMENTATION OF THE CITY OF CAPE TOWN'S DATA STRATEGY

The main objective of the intervention proposed by the Global Future Cities Programme is to support and supplement the City of Cape Town's Data Strategy, part of the Evidence-Led Decision-Making Programme (Integrated Development Plan 2017-2022)[6], transforming City data into meaningful and relevant business information which can effectively support decision-making.

More specifically, the intervention intends to:

- Develop application case study, data quality standard and metrices to improve data collection at various sources
- Improved data sharing within CCT and with external partners for accurate, evidence-based strategic planning uses related to each case study
- Develop data models, tools and applications, techniques, capacity and systems for ongoing evidence building and analysis to support decisions linked to each data and application case study
- Investigate more integrated outcomes in response to the application study fields/ themes that will need co-ordinated planning and implementation in order to effectively and efficiently manage the city's capital, operational and natural resources

- Improve data security. The resilience assessment (100RC) of the City of Cape Town identified a cyber security attack.[7] Data security is a top priority as the City seeks to further advance its 'open data policy'.

Key outputs of the intervention will be:

Data Capabilities

- Institutionalise data analytics capabilities to support a data driven and evidence-based organization, including enhanced economic analysis.
- Develop capability for Predictive and Prescriptive, to deliver actionable results, insights and enhanced outcomes and impacts.

Data Architecture

To build a sustainable and enabling structure that is Forward Looking and able to support the growing need for new environments (both internal and external) for data sharing and analytics, both within CCT and for external users.

Data Governance

To ensure better quality, more reliable and trustworthy data and the protection the data assets of CCT.

Data Application Use Cases

Propose data use and application case study data governance mechanisms in line with the overall Data Strategy proposals. Areas of focus should be:

- Informality
- Transport
- Resilience (Health and Safety)
- Human Settlements
- Urban Planning
- Asset Management

Main Stakeholder

Data Coordinating Committee (Dcc)
Organizational Policy And Planning Department

Possible Project Partners

University of Cape Town, University of the Western Cape (and other relevant academic partners)
Transport and Urban Development Authority (TDA)

Thematic Cluster

Data System for Land Management and Urban Planning

Keywords

Data Systems, Planning, Sustainable Mobility, Resilience, Economy

URBAN ANALYSIS

Spatial Analysis

URBAN FORM AND SPATIAL STRUCTURE

Historical Context

Cape Town's growth was structured initially around its transport infrastructure, namely the rail lines and road network towards the south. In the first half of the 20th century, the city grew incrementally to the east and intensified within the southern corridor. By the 1950s, however, Apartheid forced black and coloured residents to move into segregated dormitory townships on the periphery of the city and this became the main driver of the city's spatial form. Densities decreased and the city saw a rapid sprawl, which persisted in the post-Apartheid era.

Current Urban Form

Sprawl and connected disparities have continued as a general trend despite the more favourable political and planning environment. Low-density, predominantly white neighbourhoods still occupy the most favourable locations, while black townships of relatively high density are placed at the outskirts of the city.

The biggest challenge, common across South African cities, is the spatial separation between areas of high population density and areas of jobs opportunities' concentration, which causes huge numbers of people to commute daily, at a high cost and a challenge for the transport infrastructure.

Employment density is concentrated within the city centre and along the Voortrekker Road corridor in the north, while the majority of the city's residential areas are located in the southeast, the Cape Flats.

The segregated low-density city structure and the concentrated nature of economic and employment opportunities result in issues such as long average travel lengths, low accessibility by poorer communities, greater use of private vehicles and a sharp rise in traffic congestion.

Congestion and Land Value Gradients

Traffic, constituting a heavy impediment on travels, causes intense competition among households and firms to be located in proximity to employment. Consolidation of high-end firms, coupled with rising traffic congestion, is resulting in steepening land value gradients from the centre to the periphery, which in turn aggravates income segregation.[8]

Furthermore, commerce and business tend to choose sites with location-specific characteristics, such as accessibility and proximity to other businesses, despite their higher price. At the same time, industrial uses, which require larger amount of space, are pushed to industrial parks on the periphery of the city, where land prices are lower. This concentres amenities, good accessibility and safety in economic nodes, while large-scale mono-functional plots further aggravate fragmentation and declining urban environment in the outskirts of Cape Town.[9]

The city has tried to improve public transport to moderate this trend, focusing on Transit Oriented Development (TOD) strategies,[10] in order to achieve market-driven push towards medium- and high-density residential areas. In 2016, following the TOD Strategic Framework adopted by the city, urban development was included among the function of the transport authority, Transport for Cape Town (TCT). This was then established as the City's Transport and Urban Development Authority (TDA).

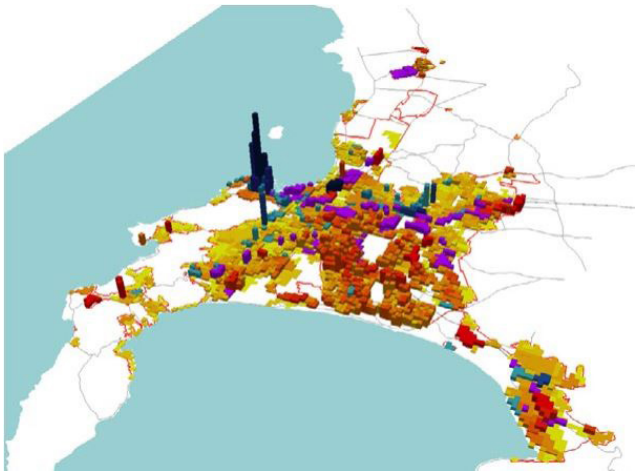

Fig. 4. Commercial (in blue), and industrial (in purple) employment density - (Source: State of Cape Town Report, 2016)

Fig. 5. Cape Town's City Bowl Source: (Niina Rinne, UN-Habitat ©)

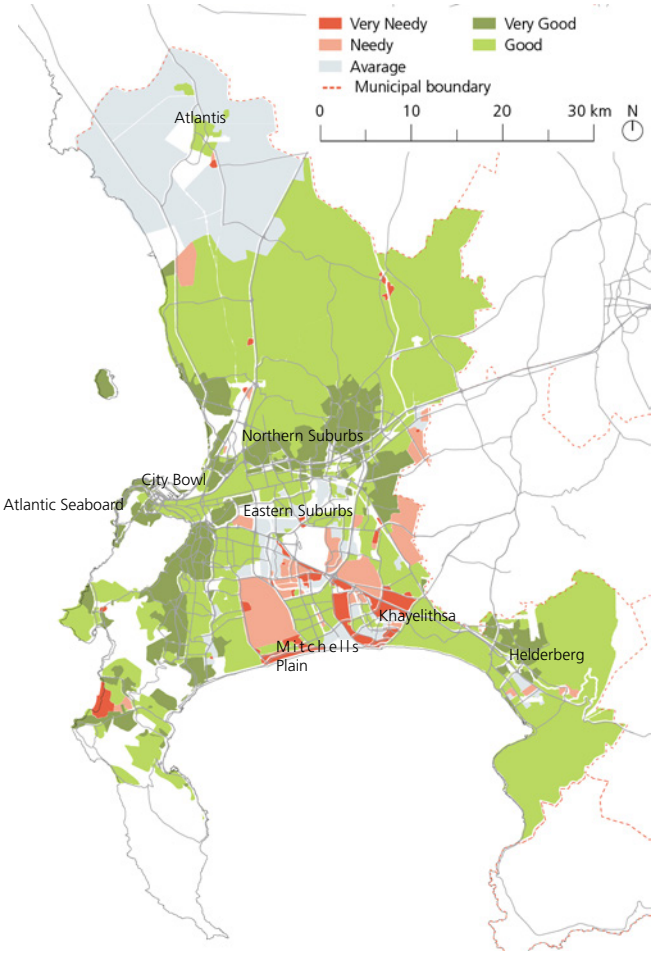

Fig. 6. Cape Town's Socio-Economic Index (Source: Cape Town MSDF 2018-2023)

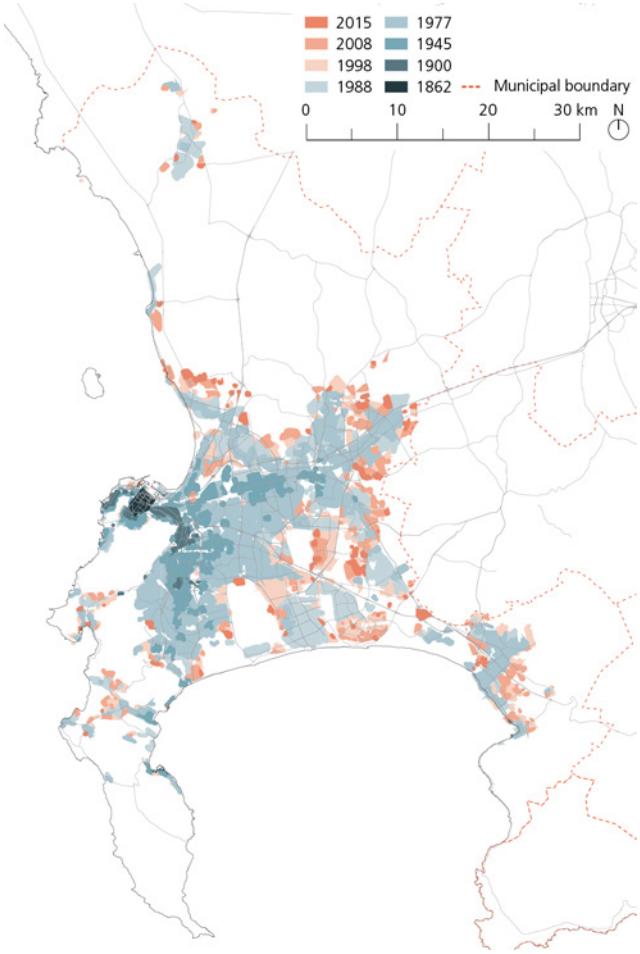

Fig. 7. Cape Town's historic growth (1862-2015) (Source: Cape Town MSDF 2018-2023)

MOBILITY SYSTEM

Cape Town is the most congested city in South Africa[11], mainly because of a lack of substantial investment in public transport, and consequent overreliance on private cars. Cars are the most dominant mode of transport in Cape Town, making up 53 per cent of all traffic. Public transport serves around 38 per cent (mainly train and minibus-taxi, with a minor component served by BRT and buses).[12]

The public transport system is extensive but poorly structured. Local authorities are increasingly involved in the planning process but service provision for each mode of public transport has been left almost entirely to the various operators. This also reflects on the ticketing systems, which are different for the various services. Some 95 per cent of the whole public transport user group is constituted of poor households, who spend an average of 43 per cent of their income on it – more than four times the acceptable international average.[13]

Rail System

The passenger rail system in Cape Town is run by Metrorail for the National Passenger Rail Authority of South Africa (PRASA). Tickets are bought via cash only at selected stations.

Historically, rail Is the backbone of the transport system. However, in the past few years there has been a steep decline in the number of its users. This is commonly linked to the deterioration of the service,[14] due to lack of investment and maintenance, together with a spike in vandalism against both vehicles and key infrastructure.[15] This decrease in rail services utilisation is visible in a corresponding increase of road-based travels, mainly minibus-taxi and bus services which target a similar income group.

BRT

MyCiti is a bus rapid transit service with feeders, which started its operations in 2010. It is managed by the city and uses a contactless card system for the purchase of its tickets.

It Is mainly operating along two corridors, connecting the CBD with the northern area along the west coast, and with Khayelitsha and Mitchells Plain in the south. Despite this service being relatively new, it is already subject to increased pressure due to the progressive decay of the rail system and CCT has extensive plans to strengthen it.

Contracted and Non-contracted Bus System

The network of bus services in Cape Town is entirely contracted to private companies. Golden Arrow Bus Services is the main operator, with a fleet of 1,010 buses, followed by Sibanye, with 50.[16] Companies use cash payments but are introducing a smart card system.

Non-contracted buses, mainly minibus-taxi services, have grown rapidly and are the most widespread public transport service in Cape Town. It is estimated a total of more than 10,000 vehicles to be operating within the city. CCT requires operators to belong to a registered association but schedules, fares and routes are completely unregulated, employing a post-boarding, cash only, ticketless fare system.

Non-motorised Transport

There are 442 km of cycle lanes across the city, some of which are dedicated cycleways.[17] Some cycleways are clearly demarcated to indicate their location as well as the presence of cyclists to motorised transport. Currently an estimated of 17 per cent of the population or more than 500,000 people, only have access to non-motorised transport and cannot afford public or private transport.[18] Some 9 per cent of journeys in the city are covered by walking or cycling.

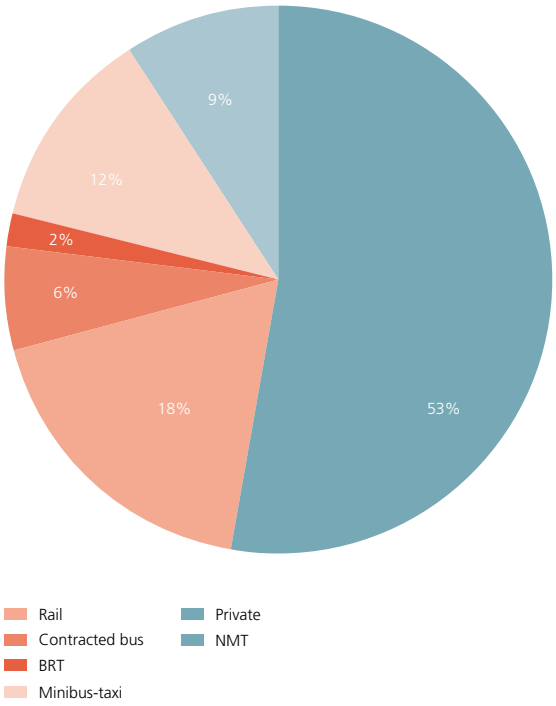

Fig. 8. Modal split between private, Public Transport (by mode) and NMT (Source: TDA, Comprehensive Integrated Transport Plan 2018-2023)

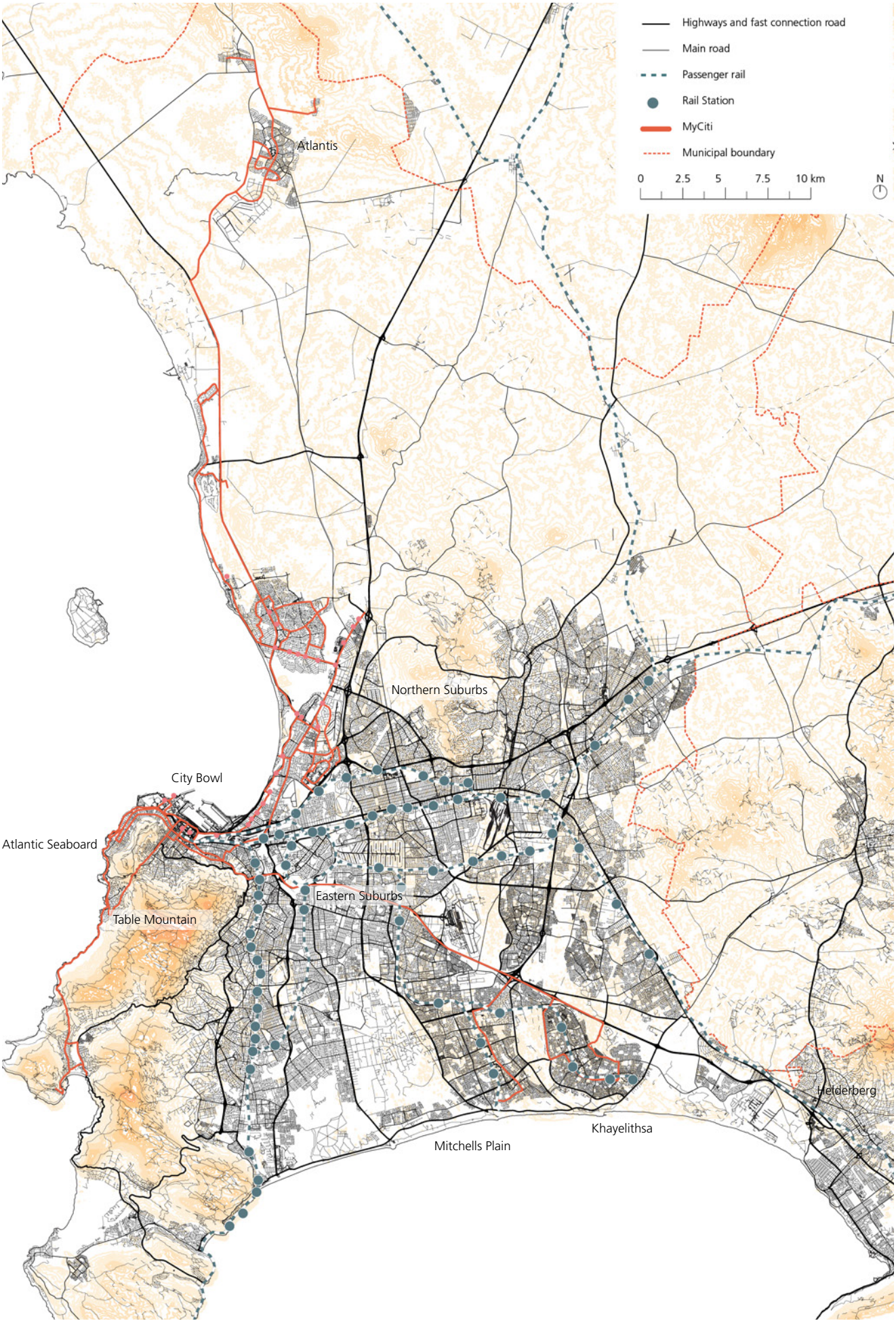

Fig. 9. Main transport corridors.

Challenges and Strategies

The transport inefficiencies are largely due to the Apartheid spatial planning, with many residents living far from places of work and leisure. Transport challenges include the peak-hour traffic, the failure of the public transport system, particularly of the Metrorail service, and the lack of integration between the different public transport modes.

The Comprehensive Integrated Transport Plan 2018-2023 recognises three key transport trends in Cape Town that need to be addressed:

- the deterioration of the rail service in Cape Town, with its resultant steep decrease in usage and increase in road usage
- the increasingly-unsustainable cost of transport for low-income households
- the growing disjuncture between transport and land use

The delivery of integrated transport is based on the Integrated Public Transport Network (IPTN) Plan 2032. With a multi-modal approach, the IPTN aims to improve the public transport network premised on BRT and an expanded rail network. Other key modes include quality bus and minibus-taxi and they will be complemented by improved NMT provision.

The city seeks to achieve an integrated, interoperable and intermodal transport across different modes, and to lead developmental transformation through TOD, which will enable residents to live car-independent lifestyles and enhance access to opportunities.

ENVIRONMENTAL CONTEXT AND RESILIENCE

Natural Assets

Cape Town has a wide range of natural and biological assets. Table Mountain and Cape Point, heritage areas, coastal areas and other important cultural landscapes contribute to a generally high quality of life and a growing tourism economy. The city is located in the Cape Floral Kingdom, listed by UNESCO as a heritage side, which is deemed one of the richest critical biodiversity areas in the world. However, the impact of urbanisation and climate change is jeopardising these environmental resources. Most of Cape Town's ecosystem is assessed as endangered or critically endangered.[19]

Weather events and resource management

Climate change effects have contributed to the more frequent and intense extreme weather events happened in the city. Flooding seen as something to be expected once a century has occurred three times in Cape Town in the last 15 years.[20] Extreme events are expected to become more frequent, with increasing infrastructural costs and economic losses.

Drought is also becoming a major problem, as the severe water shortage culminated in the spring of 2018 with a water crisis. Contrary to what this crisis may suggest, the city has one of the best water conservation and water demand management in the world,[21] but the lack of diversity in supply expose it to the extreme shocks that climate change entails. The current drought is more severe than a once every 50 years' event,[22] which is the level planned for by the Department of Water of the city.[23]

As such, certain natural assets in the city are identified in the Spatial Development Framework that need protection and where the impacts of development need to be carefully managed. These biophysical assets include biodiversity conservation areas, ecological support areas, coastal areas, agricultural areas of significance, and other sites and landscapes with scenic, recreational or place-making qualities.

Fig. 10. Biophysical assets (Source: Cape Town MSDF, 2018-2023)

SPATIAL STRATEGIES

CCT seeks to transform itself into a more inclusive, integrated and vibrant city that addresses the legacies of Apartheid with regard to the built environment. The 2018 Cape Town Municipal Spatial Development Framework (MSDF) seeks to spatialise the visions of the City's Integrated Development Plan.

Contrary to the previous MSDF (2012), concentrating development in two northern expansions, the current one seeks to concentrate investment along the existing corridors within the city. As mentioned before, the plan revolves around land use intensification based on TOD, tightly interconnected with the implementation of Cape Town's Integrated Public Transport Network 2032.

Development Corridors for Spatial Transformation

Different nodes and corridors form the basis of the spatial form and structure of the city to support land use intensification areas and the TOD principles on a citywide scale. The definition of these corridors, shown in figure 11, goes along with the location of existing and planned rail and BRT stations. Areas within 500m from said stations, are defined as Transit-accessible precincts, which should naturally attract investments.

The growth management has identified four primary Spatial Transformation Areas:

- Urban Inner Core - priority area including commercial nodes and industrial areas, the airport, ports, primary freight infrastructure, integrated public transport network corridors and transit accessible precincts
- Incremental Growth and Consolidation Areas - areas where the city is committed to servicing existing communities and where new development will be subject to infrastructure capacity
- Discouraged Growth Areas - areas under natural and agricultural protection or lacking of social and physical infrastructure
- Critical Natural Asset Areas - contributing significantly to the city's future resilience such as protected natural environments and conservation areas

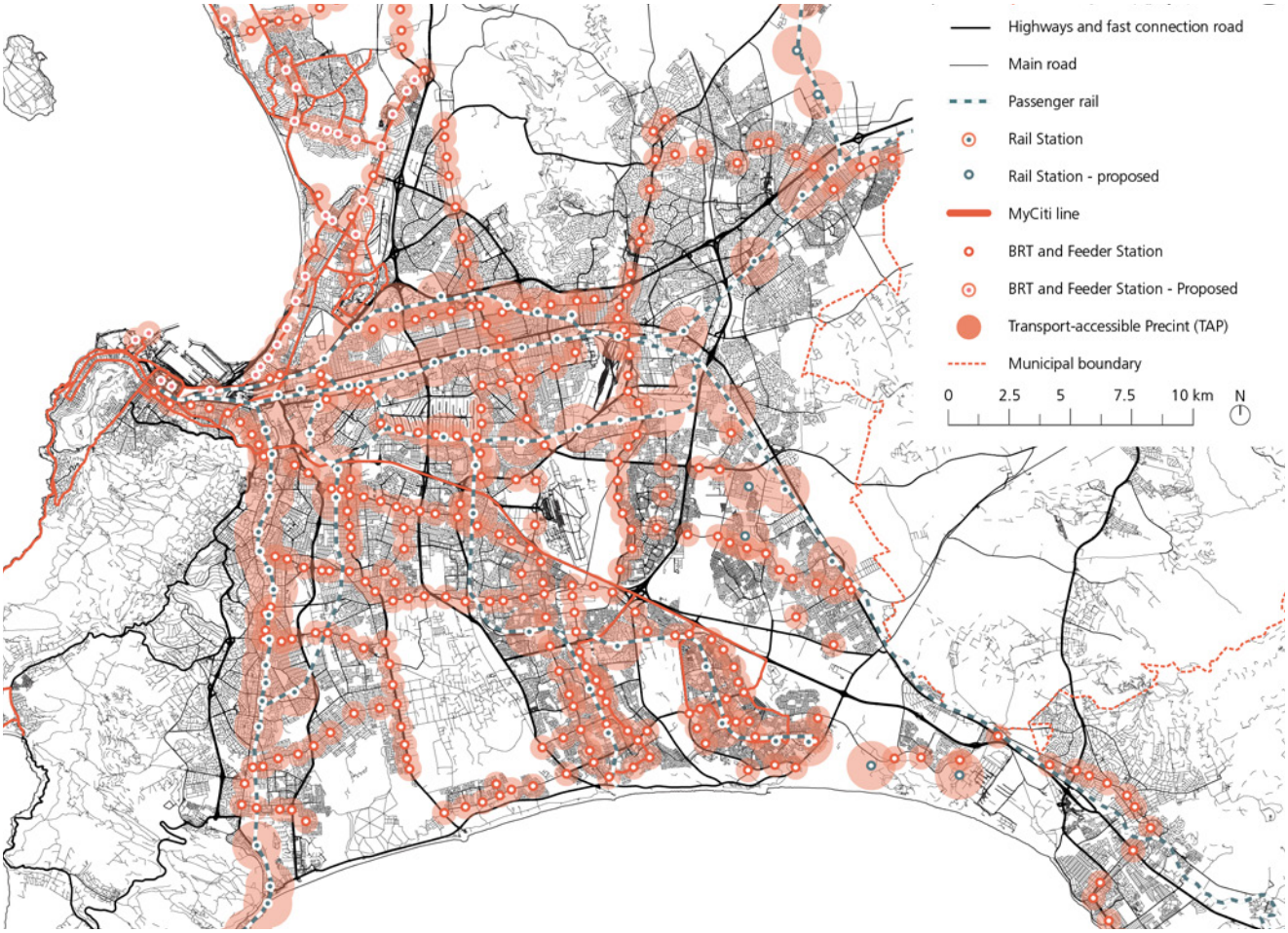

Fig. 11. Development corridors and existing and Transport-accessible Precints (Source: Cape Town MSDF, 2018-2023)

Financial Analysis

MUNICIPAL FINANCIAL CAPACITY

The total budget revenue of Cape Town for 2016-17 fiscal year stood at 41.4bn South African Rand - ZAR (approx. 2.9 billion USD). Given the population of Cape Town is estimated to be around 3.81m as of 2018,[24] this roughly equates to a budget of 761 per capita USD.

Consistent with most municipalities in South Africa, Cape Town relies mainly on own-source revenue to finance its operations.[25] Cape Town generated 80.1 per cent of its revenue from its own sources, which represents strong financial independence.

The pie chart figure 12 provides a breakdown of the own sources. Importantly, about 23 per cent of this revenue is generated from property taxes, indicating a strong ability of capturing land value. In line with other municipalities in South Africa, service charges from utilities also count for a large share of total revenue.

Besides, Cape Town's expenditure is principally on operations, and less so on capital investments. Operating Expenditure accounts for 34.545 billion ZAR or about 2.42 billion USD (84.2 per cent) while the capital budget is of 6.489 million ZAR or 455 million USD (15.8 per cent). This hints to a difficulty in financing new capital expenditure investments.

The pie chart in figure 13 provides the outlay of major expenditure areas. Planning and Development accounts for 2.4 per cent of the spending, which could potentially be used to finance a data centre.

This is quite low expenditure compared to other areas such as trading services (48 per cent) or governance (19 per cent). On the other hand, most capital expenditures are invested in utility services (54 per cent) and transport (22 per cent).

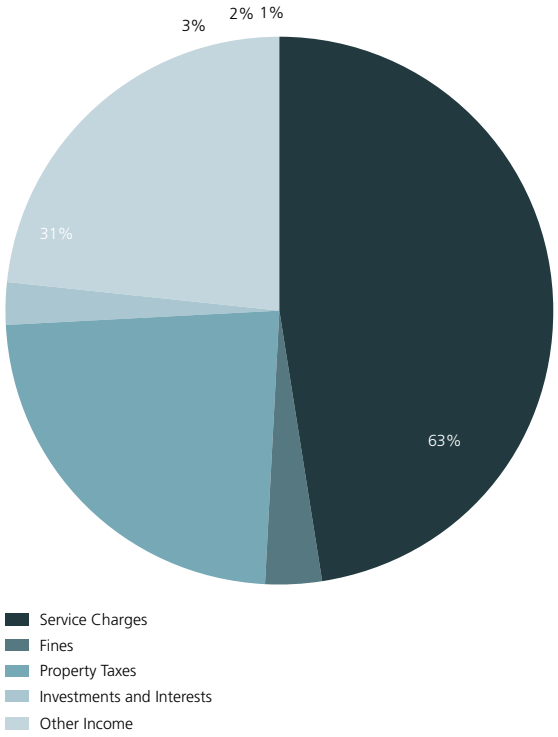

Fig. 12. Breakdown of local resources of revenue (July 2016 - June 2017)

FINANCING MECHANISMS FOR DATA

The implementation of the City Data Strategy may require sources of financing for capital expenditures as well as for long maintenance. Sources of financing for these types of systems are usually derived from internal revenue from the municipality as it is difficult to raise associated fees and taxes. Other sources of financing can come from national transfers or grants from international financial institutions, such as the World Bank or the African Development Bank, which also have an interest in funding such activities.

Empowered by the Municipal Finance Management Act, Cape Town has the capacity and precedent to borrow domestically and internationally. Most recently, the city is negotiating of a €80 million (USD 91 million) loan from Germany's KfW Development Bank to upgrade its wastewater plants.[26] Moreover, Cape Town is one of two municipalities in South Africa which has issued municipal bounds. This further shows a diversity of financing options.[27]

Better data and data analysis capacity can result in higher revenue streams due to the fact that efficiency improvements can be made in the system. For example, Cape Town is looking to use the financial data from the system to help assess how it can better generate own-source revenues as well as to evaluate some of its tariff structures. Any increases in revenue for the city can be reinvested in the system. Besides, the city has specifically

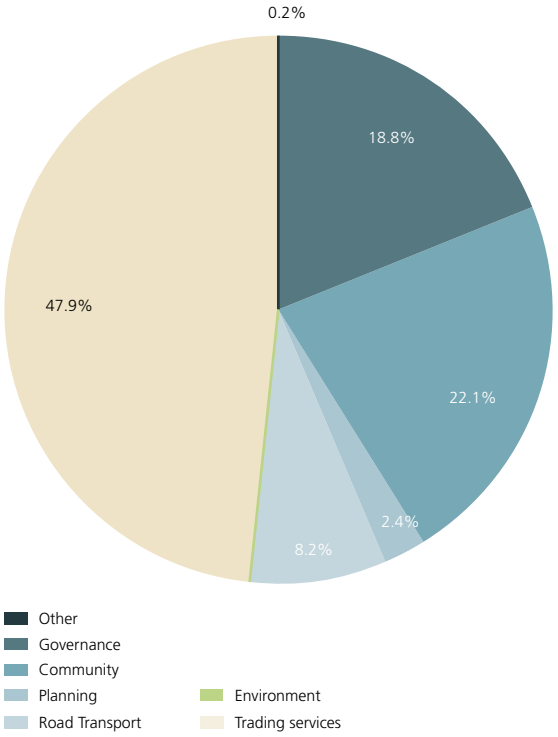

Fig. 13. Key expenditure areas

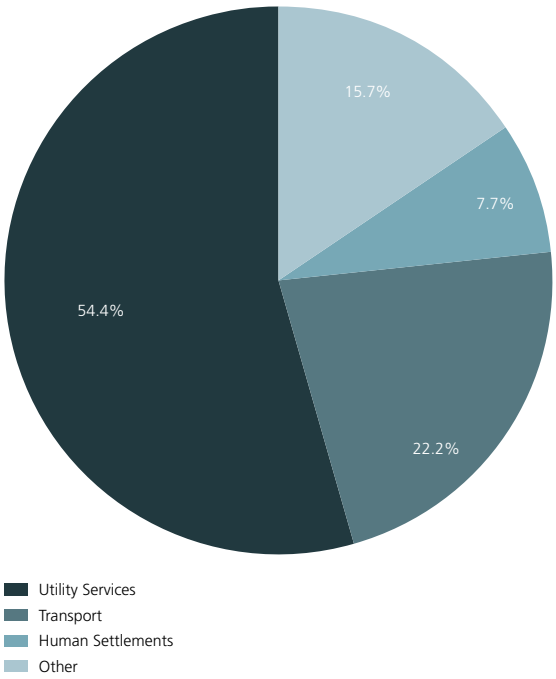

Fig. 14. Capital Expenditure

highlighted that one of the uses for the data will be to investigate the opportunities for the application of land-based financing instruments in the city. If these are then implemented as a result of the intervention, there is an opportunity to tap on increased municipal revenues.

In terms of securing the longevity of the investment, there is scope to bring in the private sector. The private sector can bring in the expertise to analyse and therefore utilise and ultimately potentially monetise the data. Additionally, this engagement can enhance improvements in efficiency in the system which can result in revenue gains.

Cape Town has the legal capacity and the precedent to enter into PPPs.[28] The Municipal Finance Management Act (2003) and the Section 86A of the Municipal Systems Act (2000) provide the legal ability for municipalities in South Africa to enter into PPPs.

Based on these laws, the Minister of Finance and the Minister for Provincial and Local Government set up uniform guidelines – known as Municipal Public-Private Partnership Regulations - for municipalities to follow while undertaking a PPP agreement.

They can deviate from these guidelines only if the National Treasury preapproves it. Broadly, these guidelines establish a framework for the need for feasibility study, standard procurement measures, amendment to a PPP agreement and broader contract management.[29]

There are, however, specific cost challenges that should be noted, should the city decide to engage with the private sector. The city needs to ensure that the system and technologies that are recommended are indeed to its advantage and not vested interests of the private sector. If not, this could result in extremely high costs for the city that they may not be able to repay. Further, the city will need to ensure it is the owner of the information and the system otherwise the private sector company involved may create a monopoly or monetise the data to the detriment of the city or the citizens.

Legal Analysis

GOVERNANCE STRUCTURE

As defined by the Municipal Structures Act, No. 117 of 1998, CCT is a Category A municipality with exclusive municipal executive and legislative authority in its jurisdiction.[30] This provides a clear division of responsibilities within different layers of government in all spheres except transport where there is higher overlap of competences.

CCT is governed by a 231-member City Council which has both legislative and executive authority of the city. The Council elects the Mayor who oversees the executive branch.[31]

There is presence of decent coordination mechanisms between the CCT and the Provincial Government of the Western Cape, and CCT and the central government of South Africa. However, these are non-statutory, and it appears that there are no set publicly disclosed standard operating procedure in relation to data sharing.

The central government's Department of Cooperative Governance and Traditional Affairs is tasked with supporting and coordinating with municipalities across South Africa.[32]

There is also a statutory autonomous association of all municipalities which plays an active role in intergovernmental relations. For example, it is often invited to the Presidential Coordination Council (PCC) to coordinate with provincial and central government officials. Moreover, the Western Cape Governments Premier's Coordinating Forum (PCF) is mandated to coordinate between the provincial and the municipal governments.[33]

LEGAL CONTEXT FOR SPATIAL PLANNING

While there are national plans that guide municipal development, the city drafts key local spatial and development plans, including statutory plans, which indicates a significant level of devolution of planning in South Africa.

At the national level, the key plan is the Integrated Urban Development Framework which is drafted by the Department of Cooperative Governance and Traditional Affairs and sets up a broad policy framework for urbanisation in South Africa. As is required by the Municipal Systems Act of 2000, CCT has to develop an Integrated Development Plan (IDP) which is the key statutory plan. The current one covers the 2017-2022 period which establishes the broad priorities of focus for the city.[34]

Further to this, CPT drafts the Municipal Spatial Development Framework (MSDF) with the current version approved in April 2018.[35] The annual Service Delivery and Budget Implementation Plan (SDBIP), also drafted by CCT, turns the IDP into tangible projects.[36]

OPEN DATA LANDSCAPE

There is a significant focus on open data and the usage of data for planning and transport and some infrastructure to that end by CCT. This provides a strong precedent for further strengthening of smart data at city level.

At the national level, South Africa is part of the Open Government Partnership since September 2011 which includes encouraging the use of data for public innovation.[37]

Moreover, the City of Cape Town has an Open Data Policy,[38] put into effect in 2014, which mandates the city to establish a single integrated online 'open data portal for information and data generated by the organisation that is free and accessible to members of the public.[39] Presently, there are 37 datasets available.

The most extensive use of data for transport planning is the CCT's Transport Development Index (TDI). TDI identifies the cost of public transport for different user groups, usually based on their income bracket.[40] Theoretically, this data is supposed to be used for more inclusive urban planning.

WhereIsMyTransport, in partnership with CCT, has mapped Cape Town's transport systems, including the 7,500 licensed minibus taxis. The information is available for usage as an open source for developers and users through a smartphone application.[41] However, the data is not in real time.[42]

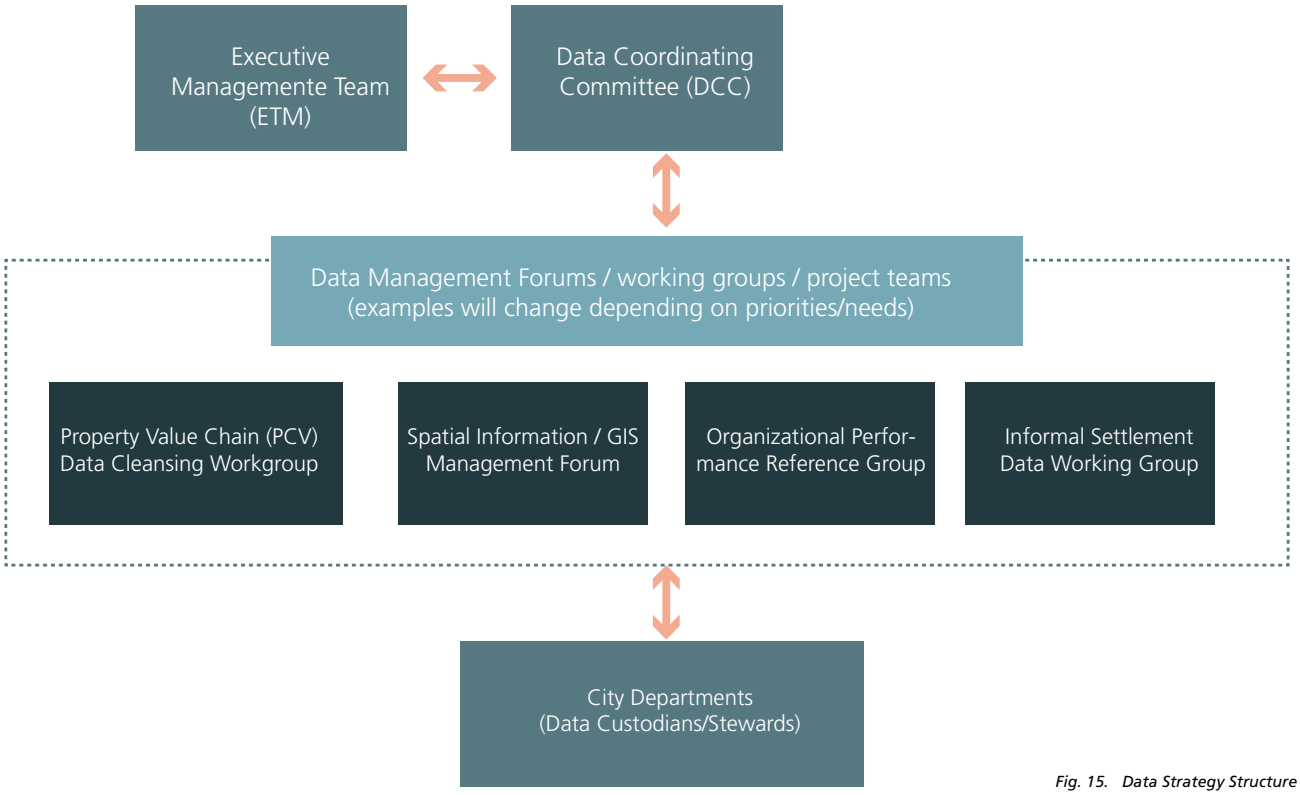

Fig. 15. Data Strategy Structure

There is also greater priority for expanding data collection and usage capacity in the city. The priority number (2) of the Integrated Urban Development Framework 2017-2022 calls for 'leveraging technology for progress across the City.' To this end, Transport and Urban Development Authority (TDA) is establishing an Integrated Information Management System (IIMS) which would include an integrated data warehouse with real-time analytics and strategic reporting capabilities.[43]

DATA GOVERNANCE

Cape Town's IDP, under its Evidence-Led Decision-Making Programme,[44] identifies digital tools as key assets required to support business processes, planning, management and compliance and outlines a Data Strategy to make the large volumes of data generated and held by the city accessible and available to inform decision-making and planning.

This project aims to address current gaps in data tools and analysis, building the city's capacity to analyse, package and distribute data as a basis for decision-making

The Data Strategy identifies a siloed approach to the collection, storage and use of data by various departments which the CCT, along with absence of a single agency of ownership as hindrance to achieving smart usage of data.

To address current gaps it has been established a Data Coordinating Committee (DCC) responsible for governance and strategy, together with the introduction a Chief Data Officer, responsible for advising on the organisation on data governance and data management. specifically concerning the following three areas:

Improved governance: The development of a CCT data strategy; the establishment of clear accountability, roles and responsibilities for the management of information. Technology: Ensuring the development of Information Technology platforms and tools to support and enable the management and integration of City data and information and data (also addressing issues of usability) Content: Setting in place policies, guidelines and Standard Operating Procedures (SOPs) for the management of City data and information content

This committee has overseen the development of the Data Strategy and is providing oversight to the plan of action to address the current challenges the city is experiencing.

INTERNATIONAL ALIGNMENT AND TECHNICAL RECOMMENDATIONS

Potential Impact

The potential impact analysis outlines the main benefits that can be potentially attained through the Global Future Cities Programme in Cape Town, in the short-, medium- and long-term. Nevertheless, as impact can arise from a complex interaction of context-specific factors, rather than as result of a single action, an empiric impact assessment is out of the scope of this report.

The short-term work refers to the outcomes that can be achieved through the implementation of the technical assistance support within the 2-3 year scope of the Global Future Cities Programme. Mid-term outcomes are only achievable once the intervention is executed at the city level either through capital investments or the legal validation of key polices and plans. Long-term impact of the interventions is linked to the sustainability of the interventions in a 7-15 year timeframe and is related to the project cycle phase of operation and maintenance.

SHORT-TERM OUTCOME

In the short term, the Global Future Cities Programme's support to the implementation of the City of Cape Town's Data Strategy will positively impact the municipal technical and managerial capacity whilst increasing citizens' access to information and communications technology.

With its first components, the intervention will build capacity within the municipality (Data Capabilities) and provide better data availability (Data Architecture and Governance). The improved accessibility to statistics on demographic, economic, environmental and social issue will allow an evidence-based decision process. At the same time, it will be possible to achieve an enhanced analysis with monitoring and evaluation of plans, policies and strategies.

Moreover, through the Data Application Use Cases, the Municipality will have the potential to identify and develop specific data-based innovative projects to address urgent urban issues.

In the mid-term, the intervention will strengthen the data governance of CCT, enabling the capacity to produce, process and exchange data from different sources, both public and private. These will lead to a better coordination and cooperation between different municipal departments and levels of government, as well as enable the private sector to be more effectively engaged and involved.

Furthermore, the intervention has the potential to provide to citizens, both from the public and the private sphere, the instruments (data architecture and governance) and the capacity (Data Capabilities) to access, visualise assess and share the information related to urban governance. The transparency and accountability of the municipality will increase and the direct and indirect contribution of several society groups will be promoted.

MID-TERM OUTCOME

The intervention promotes a strong attention to the collection of data related to the most vulnerable society group - women and low-income communities - through the direct contribution of NGOs or communities' associations and communitarian inclusion. This will help with integrating gender equality approaches into policies, strategies and plans. Data use and application case studies should create transparent visual monitoring tools supported by easily accessible datasets, contributing to a culture of transparency and evidence-based decision-making.

In the mid-term, all of this will produce integrated plans, frameworks and approaches to promote more sustainable, resilient, and socially-inclusive urbanisation,

including the monitoring of environmental risks and the implementation of climate change adaptation and mitigation measure.

Finally, the emphasis given to economic analysis, to better utilising data for economic modelling, empirical evaluation, spatial planning and cost benefit analysis will provide the ability to plan for inclusive economic growth in a sustainable, climate smart manner.

LONG-TERM POTENTIAL IMPACT

The long-term impact of the intervention concerns a broad range of urban and social issues and represents the frame where the development of the Data Governance Framework, combined with the Urban Information Hub and the Data Engagement Plan, expresses its potential.

The possibility of accessing and comparing data regarding urban, transport and natural environment can lead to monitoring the current city plans and to improving their quality for future city strategies. Land use and transport could be coordinated towards the transit-oriented development pursued by the city, optimising density, mixed use and efficient urban development, where the provision and distribution of basic services will be based on a clear knowledge of urban needs and gaps. At the same time, better integration of the transport network can then reduce the traffic congestion and reduce air pollution.

The city will have improved tools to protect its environmental heritage and increased planning, monitoring and forecasting capacity to respond to environmental risks. The ability of the city to respond to the harmful threats of climate change and increasing frequency of extreme shock events will be enhanced, protecting Cape Town's inhabitants especially its vulnerable communities.

The increased evidence-based awareness and the improved administrative control of urban, social and environmental data will allow for a more efficient and sustainable financial urban management. The intervention has the potential to improve the city's capacity to optimise and reduce public expenses and to strengthen municipal finances and increased municipal capacity for revenue.

Contribution to Sustainable Urban Development

2030 SUSTAINABLE DEVELOPMENT GOALS

The Global Future Cities Programme aims to contribute the implementation of the 2030 Agenda for Sustainable Development, whilst mobilising efforts to end all forms of poverty, fight inequalities and tackle climate change while ensuring that no one is left behind.

INCREASED ACCOUNTABILITY

The implementation of the City of Cape Town's Data Strategy will enhance inclusive and sustainable urbanisation through a responsive, inclusive, participatory and representative decision making at all levels (SDG 16.7). The participatory process and the community involvement in several sectors of public life will allow a stronger monitoring and evaluation process on the public administration, leading to the establishment of more accountable and transparent institutions at all levels (SDG 16.6).

INCREASED MUNICIPAL REVENUE

With better quality and more relevant data for economic analysis, the intervention will assist the city in application of economic modelling to spatial planning and cost benefit analysis, improving municipal spending and revenue generation (SDG 17.1).

GENDER EQUALITY AND INCLUSIVITY

Moreover, the data architecture and data governance component of the intervention will "increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts" (SDG 17.8). This data use will lead to an improvement and strength city policies to "enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels" (SDG 5.c).

INNOVATION, INFRASTRUCTURE AND JOB OPPORTUNITIES

The Engagement Action Plan can also significantly increase access to information and communications technology (SGG 9.c) and "promote development-oriented policies that support productive activities, of ICT related job creation, entrepreneurship, creativity and innovation and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services" (SDG 8.3).

INCREASED RESILIENCE

The intervention's objectives will be aligned to the goal of promoting a more environmentally-sustainable urban development and integrate climate change measures into national policies, strategies and planning (SDG 13.2). The Data Strategy implementation would allow better monitoring, report and forecast processes of climate events that need to be faced with an effective climate change-related planning and management (13.b), ensuring also the conservation of the Cape Floral Kingdom and its invaluable ecosystems (15.1).

BASIC SERVICES, SUSTAINABLE CITIES AND COMMUNITIES

Finally, an evidence-based urban governance can improve the provision of urban services such as transport system (SDG 11.2), water and sanitation (6.1, 6.2), waste management (11.6), energy (7.1) and public spaces (SDG 11.7), making them more accessible, safe and affordable for all. Special attention will be given to the needs of vulnerable groups such as women, children and persons with disabilities (1.4).

NEW URBAN AGENDA ALIGNMENT

The New Urban Agenda is an action-oriented document adopted by Member States during the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) held in Quito, Ecuador, in 2016.
The NUA sets the framework for sustainable urban development globally for the coming 20 years, laying out how cities should be planned and managed to best promote sustainable urbanisation.

The New Urban Agenda encourages UN-Habitat and others 'to generate evidence-based and practical guidance for the implementation and the urban dimension of the SDGs in close collaboration with Member States, local authorities, major groups and other relevant stakeholders, as well as through the mobilization of experts'.

The Global Future Cities Programme is directly related with the UN-Habitat's draft Action Framework for the implementation of the New Urban Agenda (AFINUA). This framework is organized under five categories:

- National urban policies
- Urban legislation, rules and regulations
- Urban planning and design
- Urban economy and municipal finance
- Local implementation

Supporting the implementation of the Data Strategy in Cape Town will lead to set up under a planning and design process that is evidence-based and participatory (AFINUA key item 3.1) and will contribute to establishing and supporting community-led groups that bridge the citizens and government (AFINUA key item 5.6).

The intervention will help to the design and the implement systems that ensure social, economic and safe physical access to quality basic services by all (AFINUA key item 4.5). This should go along with the provision of integrated, efficient and equitable urban service frameworks, particularly in unplanned, built urban areas (AFINUA key item 5.4).

Coordination and cooperation between different institutions and levels of government during the rolling out of the Global Future Cities Programme in Cape Town will promote alignment between development plans and policies at all territorial levels (AFINUA key item 1.4) and jurisdictional coordination and coherence (AFINUA key item 1.6).

Moreover, better quality and more relevant data for economic analysis will support local authorities to design and implement a more inclusive, sustainable and equitable local financial and economic framework to operationalise municipal finance principles (AFINUA key item 4.2).

At the same time, a new data architecture and data governance for Cape Town could have a beneficial influence on the ICT environment of the city, with the city playing a catalytic role as a user of services and provider of data and thus stimulating entrepreneurship within the sector and supporting inclusive local economic development, job creation and microfinance (AFINUA key item 4.4).

ALIGNMENT WITH CROSS-CUTTING ISSUES AND THE PROSPERITY FUND

The Global Future Cities Programme seeks to achieve higher rates of sustainable and inclusive growth while increasing long-term investments in sustainable urban projects. Moreover, it will provide greater awareness, capability and confidence while establishing regulatory frameworks resulting in higher incentives for partnerships and financial mechanisms.

The four Cross-Cutting Issues of UN-Habitat, as identified in the Strategic Plan 2014-2019, are mainstreamed to ensure that all UN-Habitat work targets those with the most need and promotes socially- and environmentally-sustainable cities. In this regard, the interventions detailed for Cape Town are shaped under the mainstreaming of environmental safeguards, youth, gender equality and human rights.

The support of the implementation of the city's Data Strategy is strongly aligned with the Programme, helping to establish public policies that meet the practical and strategic interests of vulnerable groups. This will be achieved with the generation of disaggregated data focused on gender-sensitive issues and demographic and economic trends as the base for informed and inclusive decision making.

Transparent visual monitoring tools and accessible datasets are meant to engage society as a whole, with the specific aim of broadening access to information and fighting the digital divide affecting many low-income groups, while developing a culture of transparency in the public decision-making process.

Furthermore, the intervention promotes actively better monitoring and forecasting tools for adapting to and mitigating the consequences of climate change, through a systematic, comprehensive collection of environmental data.

Potential Benefit	Short term	Medium Term	Long term	SDG Alignment		New Urban Agenda	Programme Objectives and Cross-cutting issues
				GOALS	TARGETS	AFINUA KEY ITEM	1. Climate change; 2. Gender equality; 3. Human Rights; 4. Youth; 5. Sustainable and inclusive economic growth
Increased capacity to prioritize strategies and improved tools for decision making based on informed demographic, economic, cultural, environmental and other holistic projections.				11, 17	11.a; 17.18	1.1, 3.1	Climate change; Gender equality; Human Rights; Youth; Sustainable and inclusive economic growth
Increased local capacity for evaluating and monitoring the impact of urban plans, policies, and strategies.				17	17.16; 17.18	3.1, 5.1	Climate change; Gender equality; Human Rights; Youth
Better Governance & Integrated Management of cities including better coordination and cooperation between different levels of government.				17	17.14; 17.15	1.4, 1.6, 2.5, 5.5	Climate change; Human Rights; Sustainable and inclusive economic growth
Improved last mile connectivity and increased access to information and communications technology.				9	9.c	4.2, 4.5, 5.3, 5.4	Gender equality; Human Rights; Youth
Integrated gender equality approach in policies, strategies and plans.				5	5.c	3.1, 4.4	Gender equality
Increased citizen participation in developing municipal plans and decision making processes.				11, 16	11.3; 16.7	3.1, 4.5, 5.6	Gender equality; Human Rights; Youth
Better Planning for & Managing the impacts of climate change				11, 13	11.b, 13.2	2.1, 2.2, 2.3, 3.2	Climate change
Enhanced monitoring of environmental risks and increased capability for forecasting				13	13.2	3.6	Climate change
Integrated plans, frameworks and approaches to promote more sustainable, resilient, and socially inclusive cities				11, 13, 16	11.3, 11.b, 13.2, 16.7	3.4, 4.5, 5.4	Climate change; Gender equality; Human Rights; Youth
Increased ability to better plan inclusive economic growth in a sustainable, climate smart manner.				16, 17	16.6, 17.1	2.5, 3.8, 4.1, 4.2, 4.4, 4.5	Climate change; Human Rights; Youth; Sustainable and inclusive economic growth
More equitable and effective provision of urban services and affordable housing. Sustainable density and mixed use to promote urban vibrancy.				1, 6, 7, 11, 16	1.4, 6.1, 6.2, 7.1, 11.1, 11.3, 11.6	2.7, 3.7, 4.5, 4.6, 5.4	Gender equality; Human Rights; Youth; Sustainable and inclusive economic growth
Vulnerable communities more protected from impacts of climate change				1, 11	1.5, 11.5	5.2, 5.4	Human Rights
Protected and safeguarded cultural and natural heritage				11, 15	11.4, 15.1	2.1, 2.2, 3.2, 3.6	Climate change; Human Rights
Higher rates of sustainable and inclusive economic growth				9, 17	9.a.1, 17.3.1, 17.9.1	4.1, 4.2, 4.3, 4.4, 4.5	Sustainable and inclusive economic growth
Strengthened municipal finances and increased municipal capacity for renevenue generation.				17	17.1	2.6, 3.4, 4.1, 4.3	Sustainable and inclusive economic growth

Fig. 16. Potential Impact and Programme Objectives Alignment

Success Factors

The following statements are considered as evidenced success factors, based on international best practices, for the intervention in Cape Town in order to achieve maximum impact in line with the Goals, the Prosperity Fund and the cross-cutting issues. Success factors are divided into spatial, financial and legal and aim to address potential barriers for the long-term sustainability of the interventions.

BUILDING AND MANAGING DATA SYSTEMS FOR URBAN PLANNING

Establish Planning Needs and Identify the Associated Data Requirements

A clear definition of planning problems and objectives will facilitate the scoping of an intervention and inform future data collection efforts. Identify the datasets that correspond to the planning activities and objectives. Datasets that are relevant for planning may include land-use data,[45] disaggregated data on population characteristics, cadastral data[46] and physical geography data.

Engage in Efficient Data Collection Procedures

Data collection can be shaped by planning objectives. The data landscape within the municipality of Cape Town is wide but the strategy should not be limited to the government-produced data. Instead, it should engage in the survey of systems and datasets in use in the city.

To avoid duplicating datasets and wasting data collection resources, it is crucial to search for existing relevant datasets that may have been collected by other organisations and explore partnerships with other institutions.

Urban data centres in the Netherlands, for example, are supported through a partnership with the national statistics institution (CBS) to gain access to a wide range of existing datasets.[47]

Consider Balancing Authoritative Datasets With Information That Reflects Local Perspectives

A focus solely on authoritative, government-generated data (such as that from Census surveys) may result in a top-down approach that disregards local perspectives. Information generated by citizens, or in direct consultation with citizens, should also be included in the planning process. While traditional methods of public consultation continue to play an important role in planning processes, planners are looking to incorporate newer types of public engagement, which are made possible through data systems and technology. For example, volunteered geographic information (VGI) and other crowdsourced data can be a valuable source of planning information that is sensitive to the local context[48] and inexpensive to collect.

However, it may be difficult to assess the quality and accuracy of crowdsourced information as the identity, expertise, and motivation of a contributor often remains unknown. Platforms that incorporate VGI, such as OpenStreetMap,[49] may in part rely the assumption that inaccurate data will be flagged or corrected when there is a large enough crowd engaged in contributing content. The PetaBencana.id example[50] also exemplifies how crowdsourced data can be used to monitor flood conditions in real time.

Data Quality Assessment and Data standards

Data quality assessment is an integral component of a data system. Policies and approaches should be developed to address issues such as data completeness, uncertainty, and measurement error. In this sense, the Data Architecture and Data Governance components of the intervention will include a detailed set of recommendations for conducting data quality assessments.

Datasets will have to be updated when necessary to ensure relevance and accuracy. The inclusion of metadata is also critical in informing conclusions regarding the quality of a dataset. Relevant metadata includes information such as data sources, occasion of data collection and data collection methodology.

The city's Data Coordination Committee (DCC) and its Chief Data Officer are already responsible for advising on governance and management in this area.

The intervention will have to develop and promote organisational policies and procedures to ensure that adequate data management processes are in place across the city.

At the same time, the municipality of Cape Town will have to appoint a data custodian responsible for managing datasets throughout all phases of the data lifecycle. This includes activities such as creating, maintaining and enforcing data standards, and ensuring the availability and quality of datasets. Best practices in data management should be formalised as well under the intervention. Such policies and guidelines may include topics such as data security procedures, data access and appropriate disposal of data.

Policies, Protocols and Data Standards for Data Sharing

Supporting the implementation of Cape Town's Data Strategy will likely mean the coordination and facilitation [51]of data sharing between a variety of government departments. It is important that policies and protocols for data sharing are in place. These policies must comply with relevant data protection and privacy laws. Such policies can, for example, cover privacy and security considerations and outline clear responsibilities for data ownership. The development of protocols and policies for data sharing can also be an opportunity to adopt data standards and create protocols for data quality monitoring.

The adoption of these standards can also promote the interoperability of datasets, allowing for data from a variety of sources to be combined and compared. The adoption of standards can also facilitate data sharing between departments and institutions. Types of data standards may include those that govern metadata, specification of character formats, predefined vocabularies and file formats. Standardised data can also be used by software developers to create apps.

For example, the adoption of GTFS (general transit feed specification) by many transit operators around the world has led to the creation of transit apps, such as the Transit App, that combine multiple sources of transit schedules around the world. Open 511[52] and GTFS[53] are examples of existing data standards for road event data and transit data, respectively. Moreover, the Open Data Standards Directory[54] provides detailed information on existing data standards for data from categories such as crime, expenses and election results.

Ensure Representativeness in Datasets

Data collection efforts should be evenly distributed across geographic and socio economic communities. Communities that are not represented in data may be excluded from policy and planning decisions, potentially exacerbating existing social divides.

Develop a Strategy for Digital Inclusion

Citizens who lack access to digital services may be excluded from planning processes and are put at a disadvantage when it comes to accessing the city and its services. Research on the digital divide indicates that individuals who lack basic digital skills, network connections and usage opportunities may not be able to benefit from city services or information which are delivered through digital platforms, such as a municipality's open data portal. For instance, the Smart Cities for All initiative works towards building inclusive smart cities and promotes digital urban interventions that are accessible to elderly and disabled populations.

The Data Architecture component of the intervention proposed in Cape Town should include recommendations meant to cover this fundamental aspect.

APPLYING DATA SYSTEM FOR URBAN PLANNING

Adapt the Data Systems and Their use to the Planning Context

Consider how data can be translated into useful planning information. Analysis techniques may include data layering, visualisation, exploring relationships between datasets, computational models and big data analysis. Information from data analysis may be used to understand the local context, make predictions or projections of future growth, develop spatial strategies, visions and more.

Build and Formalise Practices for Integrating Data Analysis Into Decision-making Processes

Data systems may be applied to measure the impact of previous plans and policies, which can inform the making of an urban plan. It is important in that sense to consider how the information obtained from data analysis will inform and support urban planning decision-making.

At the same time, digital technology creates the opportunity for new approaches to public engagement in urban planning. For example, online apps and tools can facilitate two-way communication between citizens and municipal governments.

This could raise awareness on local urban development plans and make prominent critical issues regarding gender and vulnerable groups and violence as well as share local knowledge among citizens.

Capacity Building

It is important to develop human capacities and quantitative skills within planning professionals to match investments in data technology. This ensures that the information contained in a dataset can be turned into actual benefits for users and operators. While specific capacity needs will vary with each case, a baseline level of digital literacy for urban planning staff is necessary to ensure effective application of data systems.

Capacity-building efforts are a structural component of the intervention in Cape Town. Necessary skills may include geospatial analysis, computer programming, statistics and database management. The Rio Operations Centre[55] is a successful Brazilian example of how a partnership with a technology company can build local capacity for embedding a large-scale data system in a city.

FINANCIAL CONSIDERATIONS

Private Sector Engagement

Besides the investment dedicated for the intervention, operation and maintenance within the project cycle are fundamental phases which will require funds. Data can be costly to collect on a regular basis.

However, improvements in the way the city can generate, manage, store, secure and access data will not only have benefits for the city but could constitute an investment into a collective good with potential spillover effects to other parts of the economy as well. Sources of financing for these types of systems are usually derived from internal sources of revenue.

However, private sector involvement can be a sustainable way for securing the longevity of the system.

The private sector may have the interest and expertise to set up and run data collection systems for the city. They may have systems, technologies and solutions to help set up the system and could potentially bring in experience that can be adapted for the local context. For example, the start up WhereIsMyTransport already provides data collection, data access and journey-planning services for Transport for Cape Town. Improvements in efficiency can result in revenue gains.

LEGAL CONSIDERATIONS

Open Data Policies

Open data policies and regulations are essential to ensure that the data is shared and interoperable by different operators and agencies. This is a necessary condition to maximize all the potential gains of the intervention in promoting data integration.

Additionally, open data policies could allow the use of data by entrepreneurs who could use it for new innovative projects, which could enhance small- and medium-sized enterprises.

Moreover, open data policies are essential to ensure transparency and allow citizens to monitor the performance of the transport system and hold the city government accountable.

In the case of involvement of the private sector, open data policies can avoid the creation of monopolies, through which the public sector can only contract the service provider that has access to the information.

Privacy Law

Ensuring that collected data is protected and not used for purposes that citizens are not aware of is an essential step for the use of any data-related project.

The lack of trust on the user's side can become a solid barrier hindering the leverage effect of data related interventions.

Partly based on the lessons learnt from recent efforts in developed countries to improve the safety of everyday data use, new interventions in developing countries have the potential to leapfrog the privacy concerns, which may otherwise jeopardise the value of personal information in urban transport.

Moreover, the regulations in privacy can balance opportunities for private companies to profit while maintaining citizens' rights.

ENDNOTES

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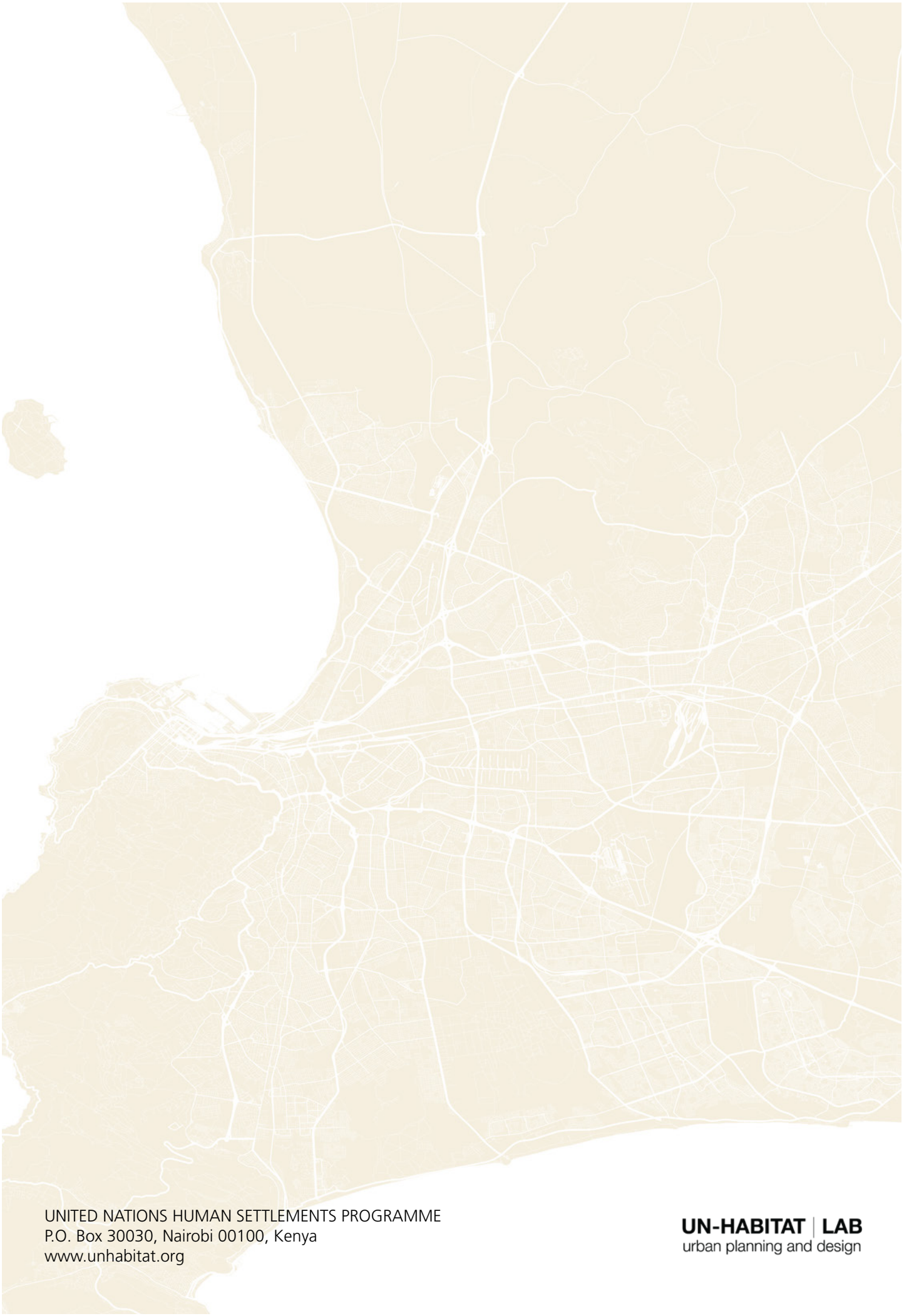

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