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## Strengthening Sustainability Planning: The City Capability Framework

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### Abstract

Existing city planning and implementation processes are ‘tried and tested’ and have proven to be a successful means of planning and implementing large-scale infrastructure projects in cities. However an increasing interest in developing more sustainable cities has led questions about whether existing planning processes, on their own, will be able to achieve the change required to address climate change and sustainable development. At the same time a range of city sustainability indicator frameworks such as ISO 37120:2014 are being developed. These measure the performance of cities in terms of environmental aspects such as carbon emissions, waste production, pollution and water consumption as well as social and economic aspects such as economic activity and health and education. These indicators aim to report on how effectively cities address sustainability. However, these indicator systems are often divorced from actual city planning processes, such as the development of Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) that plan infrastructure, such as energy, water, sanitation, road and public transport systems, which actually determine sustainability performance of a city.

This paper therefore proposes a City Capability Framework that strengthens the relationship between city sustainability strategy, targets and indicators and city planning and implementation process and shows how this may work through practical examples. The paper outlines how the framework can be applied, and integrated with existing planning processes within a city, through the examples from the City of Johannesburg in South Africa. Critical analysis is undertaken to identify strengths and weaknesses of the framework and make proposals for its improvement. Finally, the paper draws a number of conclusions on the applicability and effectiveness of the framework as a means of improving sustainability performance of cities and makes recommendations for further research.

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## **1. Introduction**

A range of city sustainability indicator frameworks such as ISO 37120:2014 have been developed. These measure the performance of cities in terms of environmental aspects such as carbon emissions, waste production, pollution and water consumption as well as social and economic aspects such as economic activity, health and education. These indicators are used to report on how effectively cities are addressing sustainability and can be used to compare cities [1].

However, these indicator systems are often divorced from actual city planning processes, such as the development of Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) that plan infrastructure, such as energy, water, sanitation, road and public transport systems, which determine sustainability performance of a city. This paper argues that in order to improve sustainability performance of cities, it is important that sustainability indicators and targets are effectively integrated, and inform, city strategy, planning and implementation processes.

This paper determines how this integration can be supported. It proposes a City Capability Framework that strengthens the relationship between sustainability strategy, targets and indicators and city planning and implementation processes and shows how this may work through practical examples. The paper outlines how the framework can be applied, and integrated with existing planning processes within a city, through the examples from the City of Johannesburg in South Africa. Critical analysis is undertaken to identify strengths and weaknesses of the framework and make proposals for its improvement. Finally, the paper draws a number of conclusions on the applicability and effectiveness of the framework as a means for achieving sustainability targets and makes recommendations for further research.

## **2. Objectives / Research Questions**

The objective of the study is to understand the relationship between city sustainability strategy, targets and indicators and the planning and implementation processes that may be used to achieve these strategic objectives and targets. In particular, the study proposes a framework that supports improved alignment between city sustainability strategy, targets and indicators and city infrastructure planning and implementation. This framework is presented and critically evaluated in the paper in order to ascertain its potential contribution to improved sustainability planning in cities. The research questions addressed by the paper are as follows:

1. What defines sustainability strategy, targets and indicators in cities?
2. How does infrastructure planning and implementation occur in cities?
3. What is the relationship between city sustainability strategy, targets and indicators and city planning and implementation processes?
4. Can the relationship between city sustainability targets and indicators and city planning and implementation processes be improved?
5. If this relationship can be improved, can this be formalised as a framework?
6. What are the characteristics of this framework?
7. What can be learnt from this framework?

### 3. Approach and Methodology

The study is structured in five parts. First, a literature review of sustainability indicators and existing strategy, planning and implementation processes in cities is undertaken. Second, a critical analysis of city sustainability indicators and city strategy, planning and implementation is carried out. Third, a city capability framework is proposed for strengthening the alignment between sustainability targets, indicators, strategy, planning and implementation. Fourth, the capability framework is critically reviewed and discussed. Fifth, conclusions and recommendations are developed.

### 4. Literature Review

The Literature Review reviews ISO 37120:2014 city sustainability indicators in order to understand the how these are set out and applied to cities [2]. This is followed by a review of strategy, planning and implementation processes used within a city. This provides a context for the City Capability Framework that is proposed later in the paper.

#### 4.1. Sustainability Indicators in Cities

‘ISO 37120:2014 Sustainable development of communities - Indicators for city services and quality of life’ defines indicators which aim to measure the performance of city services and quality of life within cities. It has been developed for cities, but can also be applied to municipalities and local government and provides a way of measuring and comparing performance between these entities [2]. It includes indicators in the following areas:

- Economy
- Education
- Energy
- Environment
- Finance
- Fire and emergency response
- Governance
- Health
- Recreation
- Safety
- Shelter
- Solid waste
- Telecommunications and innovation
- Transportation
- Urban planning
- Wastewater
- Water and sanitation [2]

Indicators within these areas are defined as either a) core indicators, which demonstrate performance in the delivery of city services and quality of life, b) supporting indicators, which demonstrate performance in the delivery of city services and quality of life or c) profile indicators which provide basic statistics and background information on cities [2]. An example of the water and sanitation indicators is provided below.

- Percentage of the city population with potable water supply service (core indicator)
- Percentage of the city population with sustainable access to an improved water source (core indicator)
- Percentage of the city population with access to improved sanitation (core indicator)
- Total domestic consumption per capita (litres/day) (core indicator)

- Total water consumption per capita (litres/day) (supporting indicator)
- Average annual house of water service interruption per household (supporting indicator)
- Percentage of water loss (unaccounted for water (supporting indicator) [2].

The World Council of City Data (WCCD) has adopted the ISO and draw on it to report on the performance of cities such as London, New York, Barcelona and Johannesburg [1]. An online portal developed by the WCCD enables cities to be compared and ranked in terms of sustainability performance [1]. The ISO standard is still relatively new and appears not to have been widely applied or integrated into city planning processes globally.

#### 4.2. City Strategy, Planning and Implementation Processes

The section reviews the city strategy, planning and implantation processes used to plan and develop infrastructure within a city over the long, medium and short term. It makes specific reference to processes developed by the City of Johannesburg in South Africa and describes the main development strategy (the Growth and Development Strategy 2040), key planning tools (The Integrated Development Plan and the Spatial Development Framework (SDF) and implementation processes (Annual Business Plans).

#### 4.3. Growth and Development Strategy 2040

The Growth and Development Strategy 2040 is the long term plan for the City [3]. It draws on national plans and priorities, such as the National Development Plan, to define City priorities and strategies. It provides outcomes and indicators that set out what the City would like to achieve by 2040 and are outlined below.

Outcome 1: Improved quality of life and development-driven resilience for all

- Indicator 1: Human Development Index
- Indicator 2: Poverty Rate
- Indicator 3: HIV prevalence
- Indicator 4: Food Security Index
- Indicator 5: Public Safety Index

Outcome 2: Provide a resilient, liveable, sustainable urban environment – underpinned by infrastructure supportive of a low-carbon economy

- Indicator 6: Ecological Footprint
- Indicator 7: Percent share of energy utilised in the city i.e. gas, solar, coal etc.
- Indicator 8: Percent of unaccounted for water
- Indicator 9: Percent of water reclaimed
- Indicator 10: Percent waste to landfill as a proportion of waste generated
- Indicator 11: Percent of energy share utilised from waste
- Indicator 12: Revenue from waste generated
- Indicator 13: Sustainable Human Settlements Index
- Indicator 14: Eco-mobility

Outcome 3: An inclusive, job-intensive, resilient and competitive economy that harnesses the potential of citizens

- Indicator 15: GVA growth rates
- Indicator 16: Unemployment
- Indicator 17: Ratio GDP to jobs

- Indicator 18: Gini-co-efficient
- Indicator 19: City Competitiveness Rankings
- Indicator 20: Entrepreneurship growth (informal and formal economy)

Outcome 4: A high performing metropolitan government that pro-actively contributes to and builds a sustainable, socially inclusive, locally integrated and globally competitive Gauteng City Region

- Indicator 21: Participation Index
- Indicator 22: Customer Satisfaction
- Indicator 23: Quality of Life
- Indicator 24: Transparency index

#### 4.4. Integrated Development Plans

The Integrated Development Plans (IDPs) aim to translate the Growth and Development Strategy into plans for implementation [4]. These plans include a Spatial Development Framework (SDF) and set out what will be achieved over a 5 year period. The current Integrated Development Plan identifies the following key priorities [4].

- Financial sustainability and resilience
- Agriculture and food security
- Sustainable human settlements
- SMME and entrepreneurial support
- Engaged active citizenry
- Resource sustainability
- Smart City
- Investment attraction, retention and expansion
- Green economy
- Safer cities

Detailed implementation plans for each of these priority areas are set out with key performance indicators, targets, interventions/projects, lead departments and baseline data. Detailed input and output targets are also provided.

#### 4.5. Spatial Development Framework

The Spatial Development Framework (SDF) sets out a spatial vision of the City [5]. It focusses on priority areas and nodes for development to achieve this vision and aims to translate the IDP spatially. The City's SDF includes targets for urban performance based on UN Habitat guidelines [5]. These targets will be used to assess all new township developments and building developments which have an area of over 1,000m<sup>2</sup>. SDF targets are outlined below.

- Street area including sidewalks (public realm) as a percentage of total neighbourhood / township area (30-45%)
- Population density of 15,000 to 60,000 people / km<sup>2</sup>
- Economic Floor Area as percentage of total floor area (40-60%)
- Residential Floor Area as percentage of Total Floor Area (30-50%)
- Single Tenure Residential Floor Area as percentage of total Floor Area (0-50%)
- Affordable Housing Units as percentage of total residential units (20-50%)
- Single Function Block Area as a percentage of total neighbourhood area (0-10%)
- Job density (0.5 – 1 job per resident)
- Access to transit (30% of new housing opportunities within 1km of public transport stops, 70% within 2km of public transport stops)
- Street connectivity (Intersections per km<sup>2</sup>) (80-120 intersection/km<sup>2</sup>)

- Public open space (parks, squares, playgrounds, sports field etc) as a percentage of total public open space (15-20%) [5].

#### 4.6. Annual Business Plans

Annual operational plans are used to define annual work programmes that achieve the IDP. These operational plans have baselines, budgets, annual and quarterly targets. Performance against quarterly targets are reported on by Departments and collated by the Monitoring and Evaluation Department of the City to track progress.

#### 4.7. Current city planning strategy and implementation processes

The relationship between city planning strategy and implementation processes is shown in figure 1. This shows how the strategy informs the IDP and SDF, which is then translated in capital investment frameworks and business plans for implementation, leading to change which can be reflected in future strategies.

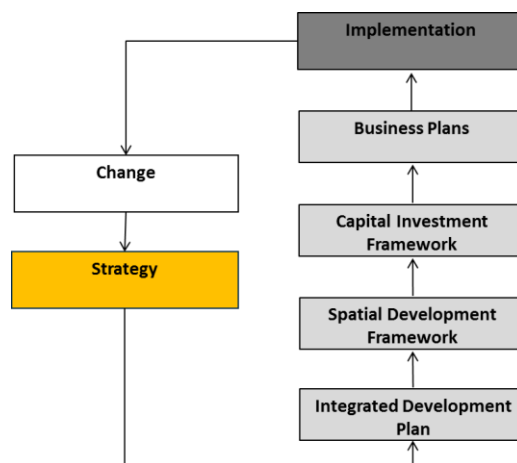


Fig. 1. Existing city strategy, planning and implementation system

## 5. Critical Analysis

### 5.1. Sustainable city indicators

The sustainability indicators developed in ISO 37120 represent a comprehensive framework for evaluating city sustainability performance. However a review of the indicators raises a number of questions. For example, a core health indicator is ‘Average life expectancy’ and other health indicators include ‘number of in-patient hospital beds per 100,000 population’, ‘number of physicians per 100,000 population’ and ‘under 5 mortality per 1,000 live births’. These are interesting because it appears indicators aim to track both the achievement of a ‘desired situation’ for city, such as a ‘high average life expectancy’ as well as the means for achieving this situation, such as the ‘number of physicians per 100,000 population’ [2].

However the implicit ‘cause and effect’ relationships implied by these indicators does not always apply. For instance, research shows that factors such as diet and exercise are important contributors to high life expectancy, but these are not included as health indicators [6,7]. In addition, higher numbers of, for instance ‘physicians per 100,000 population’ does not necessarily indicate high health performance, as very healthy populations may require (and have) fewer physicians compared to areas where health levels are poor. Finally, health measurement frameworks are increasingly moving away from life expectancy as an indicator of health in populations to more holistic measures such as measures of disability. This broader focus is considered a better guide for public policy interventions [7].

The review suggests therefore that sustainability indicator frameworks should have as a primary objective of capturing the rate of progress towards a target or desired ‘more sustainable state’. It also suggests that is important to have indicators that capture the extent to which the requirements, or the capabilities, required to achieve this state, are in place.

## *5.2. Strategy and planning frameworks*

An analysis of the strategy, planning and implementation processes indicate that there is strong coherence within individual City of Johannesburg planning documents, such as the GDS2040 Strategy, the IDP and the SDF, however it indicates that the alignment between documents is not strong and the IDP and SDF do not comprehensively address all of the objectives set out in GDS 2040. For instance, the Strategy makes reference to sustainable and integrated delivery of water and refers to sustainable water-catchment management practices. This is picked up in the IDP to some extent, but is not addressed in the SDF. However, if strategic outcomes are to be achieved, it is important that medium term plans such as the IDP and SDF align closely with the Strategy and comprehensively define how all of the outcomes will be achieved.

The Strategy also provides high level targets, such as ‘By 2040, Johannesburg will be water-secure’[3]. This goal however is not defined further and quantified targets are not provided. Strategies, such as rain water harvesting, are also alluded to, but detailed targets are not set out. Similarly, a review of the medium term plans in the form of the IDP indicate that while strategies such as rain water harvesting projects and smart metering are included, no detailed targets or implementation plans are defined. Without quantified sub targets and implementation plans, it is possible that insufficient work is being carried out to achieve the goal of a water-secure Johannesburg by 2040. It is also unclear whether the strategies identified the strategy and IDP, such as rainwater harvesting or smart meters are sufficient to enable Johannesburg to be water secure, as the quantum of savings, or level of change envisaged by these interventions, are not indicated.

The methodology followed to prioritize and weight actions and strategies to achieve targets is not presented or referenced in the strategy and medium term plans. For instance, strategies to achieve ‘Eco mobility’ have a strong focus on public transport and a much weaker emphasis on pedestrian and cycle routes. Does this mean that there is strong evidence to indicate that public transport is much more important than walking and cycling for achieving ‘Eco mobility’? If this is the case, referencing this evidence would be valuable. Given limited resources and timeframes to address development pressures and aspects such as climate change, it will become increasingly important to ensure that decisions are based on evidence and that structured processes are followed to ensure that optimum strategies, or mixes of strategies, are selected for implementation.

The review indicates, therefore, that there may be ways may be ways of improving the relationship between sustainability targets, indicators, strategy, planning and implementation. The next part of the paper makes a number of proposals in this regard. These proposals are described in terms of a City Capability Framework.

## **6. A City Capability Framework**

A City Capability Framework aims to ensure that the link between sustainability targets, indicators and strategy, and planning and implementation processes is as direct as possible. It is based on mechanisms that endeavor to ensure that sustainability outcomes envisaged in a strategy are achieved efficiently and effectively. These mechanisms, which make up the City Capability Framework, are described under the following headings; City Sustainability Strategies, Options Analysis Processes, Capability Assessments, Infrastructure Plan and Resourcing Models. They are also shown in figure 2.

### *6.1. City Sustainability Strategies*

City strategies should have clarity of purpose and ensure that overarching high level goals are translated into sets of sub objectives and quantified targets that can be achieved. Where the primary purpose of the strategy is achieve

improved sustainability or sustainable development, overarching goals related to human development and environmental constraints should be determined [8,9].

An example of this type of goal is ‘a Human Development Index (HDI) of at least 0.8 and an Ecological Footprint (EF) of less than 1.8gha per inhabitant is achieved in every district of the City’. This goal is based on a definition of sustainability developed by the World Wildlife Fund related to human development and environmental constraints [9]. This goal can be readily translated into sub objectives related to the factors that contribute to HDI and EF performance, such as education, health, employment, waste, energy, settlement, water, goods and services. Within each of these areas specific targets can be set which, together, would ensure the HDI and EF goal to be achieved [10,11].

In order to assess progress in the achievement of these sub objectives and targets, corresponding tracking indicators are required. Tracking indicators measure progress towards the achievement of a specific target. This can be shown through a water example. Based on research, the city strategy may define a specific water consumption target for a city based on a sustainable water supply and human consumption requirements. This would result in sub targets related to different water consumption sectors being determined, such as targets for domestic water consumption. In this case, a suitable tracking indicator could be ‘total water consumption per capita (litres/day)’ and could be aligned with the ISO 37120 indicator in this area [2]. A tracking indicator therefore measures progress towards the defined target or a desired sustainable state.

The City Capability Framework therefore aims to ensure that city strategies that include sustainability or sustainable development goals, address the following questions:

1. Have clear sustainability/sustainability goals been defined in terms of local and international environmental limitations and equitable human development goals?
2. Have these goals been broken down into specific quantified targets based on rigorous research and data which take into account risks and change such as climate change?
3. Have tracking indicators which accurately measure progress towards the achievement of specified targets been defined?
4. Will the achievement of the defined targets in (2) achieve the sustainability goal set out in (1)?

## *6.2. Options Analysis Processes*

An Options Analysis Process aims to ensure that the most appropriate strategies are selected to achieve the specific targets set out in the Strategy. This can be illustrated through an example related to water. A quantified target for total water consumption may be defined in the strategy based on research that takes into account environmental limitations (a sustainable local supply) and human development (minimum requirements for health). An analysis of this target may indicate that an existing water supply from sources such as local dams will not be sufficient and that additional strategies will need to be put in place to ensure a sustainable supply. These strategies could include water leak reduction programmes, the installation of water efficient fittings and rainwater harvesting. An Options Analysis process would review these strategies in detail and carry out studies to establish which strategy, or which mix of strategies, would be most appropriate for achieving the targets. Options Analysis may include detailed modelling and cost-benefit studies to establish the most appropriate option. Where there is some uncertainty about options, piloting and evaluation of the strategies may also be undertaken to establish the most appropriate solution.

The Options Analysis Processes therefore aims to address the following questions in relation to city planning and implementation:

1. What are the different strategies that can be used to achieve defined sustainability targets?
2. What criteria will be used to select the most appropriate strategy?
3. What studies need to be carried out to select the most appropriate strategy, or mix of strategies, for implementation?



4. Are there levels of risk, or uncertainty, associated with favored strategies that require piloting and further evaluation before full-scale implementation?

### 6.3. Capability Assessments

Once strategies to achieve targets have been selected in the Options Analysis stage, Capability Assessments need to be undertaken. These assessments assess the extent to which the capabilities, such as required infrastructure, are in place to achieve specified sustainability targets. To return to the water example, the capabilities required for rainwater harvesting would be a) suitable collection surfaces and b) appropriate water storage facilities. Once these capabilities are defined, an assessment can take place in each area of the city to determine the extent to which this capability is in place. Thus, for rainwater harvesting, a capability assessment could be based on a GIS assessment that established the nature and scale of surfaces that could be used for rainwater harvesting. This type of work has been carried out for cities like Gaborone in Botswana by UNEP [12]. Capability assessments therefore are based on capability indicators which measure the extent to which *requirements, or capabilities necessary*, to achieve a sustainability target or a specified sustainable state are in place.

The Options Analysis Process therefore aims to address the following question in relation to city planning and implementation:

1. What is required to implement the strategies selected through the Options Analysis process?
2. Can precise definitions of these requirements be derived? For instance, what are the physical and organisational requirements, or capabilities, that need to be in place for the strategy to be implemented?
3. Can the extent to which these capabilities are in place be measured for different districts within the city?
4. Can capability assessments be used to develop prioritised actions plans, including infrastructure plans, which ensure that the capability required to achieve sustainability targets is achieved over time?

### 6.4. Infrastructure Plan and Resourcing Models

Capability Assessments provide the ‘gaps’, or an indication of the extent of interventions, required to achieve the required capability. Again, to return to the water example, a Capability Assessment may indicate that the required volumes of rainwater could be harvested off existing roads, open car parking areas and shopping centre, social infrastructure and residential housing roofs within an area, but would require associated water storage capacity. Infrastructure plans could then be developed to define the infrastructure required to achieve this water storage capacity.

A prioritized infrastructure list, while daunting, is useful because it provides a clear long term picture of what will be required to achieve strategic sustainability goal. It also enables different types of infrastructure to be classified and linked to resourcing models. Resourcing Models are models which set out how infrastructure will be paid for, constructed and maintained. Conventional infrastructure, such as roads and electrical reticulation may continue to be paid for and maintained by the Local Government, however other infrastructure such as parks, rainwater harvesting systems and community facilities may be achieved through partnerships with community and local businesses.

These alternative Resourcing Models are valuable in that they help share the very large-scale funding requirements required for sustainable infrastructure within a city between more role-players and avoid this being the sole responsibility of a council. Resourcing Models can also be design to promote local organizational structure and social cohesion and support associated increased local resilience, which is beneficial for addressing issues such as climate change. However implementing alternative Resourcing Models will require effective design and systems and bylaws, organizational structures, procedures and contracts will need to be put in place to support this. These detail how projects are designed, constructed and managed and can be defined in Standards and Protocols. This element is shown in figure 2 as the block above implementation.

Again aspects of this part of the framework can be illustrated through a water example. The Capability Assessments may indicate that a neighbourhood will require rainwater harvesting systems to capture water from a

large retail store, school sports fields and from individual houses. Where this level of investment in infrastructure cannot be borne by the municipality or by government alternative Resource Models will be required. In this case, a bylaw could make rainwater harvesting a requirement of large retail stores and therefore the cost of this system would be borne by the store. In the case of the school, a mixed resourcing model could be applied and the costs of implementation borne by the school and parents. In the case of housing, costs of materials such as rainwater tanks could be subsidised by government, while the cost of installation was covered by households. Practical implementation of these different models could be defined in implementation Protocols and Standards defined within the Capability Framework.

Infrastructure Plans and Resourcing Models within the Capability Framework therefore aim to address the following questions in relation to city planning and implementation processes:

1. What is the scale, and nature, of the infrastructure required to achieve the sustainability targets set out in the Strategy?
2. Do the costs and timeframes associated with the development of this infrastructure indicate that this can be implemented by the City or are additional resources required?
3. What are the potential resourcing models that can be used to develop the infrastructure required?
4. How can these models be applied to achieve the infrastructure required?
5. What standards and protocols are required to support alternative resourcing models and enable alternative efficient delivery and operation processes?

#### 6.5 Linkage between strategy, plans, projects and resourcing

The relationship of the City Capability Framework with conventional city strategy, planning and implementation processes is shown in figure 2. This shows that the framework includes a number of additional stages in the form of detailed strategic targets, tracking indicators, options analysis, capability indicators and infrastructure plans, resourcing models and standards and protocols to be carried out as inputs for conventional planning processes such as the Integrated Development Plan, the Spatial Development Framework, Capital Investment Frameworks, Business Plans and Implementation Standards and Protocols.

It also shows how detailed targets, tracking and capability indicators, options analysis and infrastructure plans and resourcing models can be used within an integrated monitoring and planning system to support improved planning and implementation processes for achieving strategic sustainability objectives.

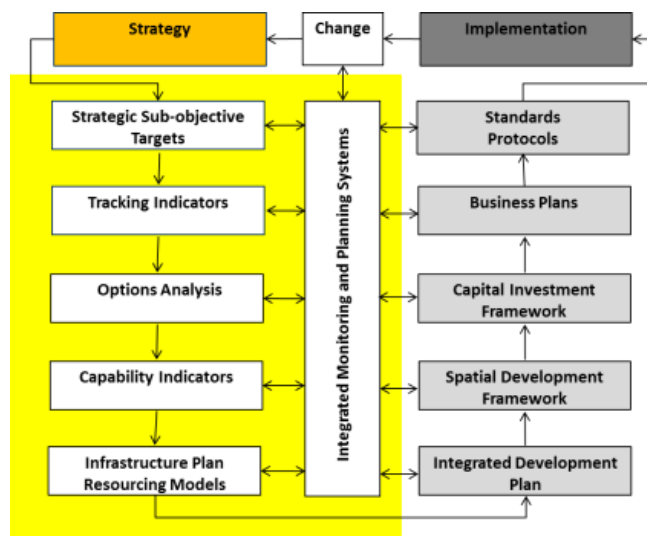


Fig. 2. City Capability Framework integrated into city strategy, planning and implementation systems

## 7. Discussion

A review of the City Capability Framework and its potential application to the City of Johannesburg can be used to reveal strengths and weakness of the approach.

### 7.1. Weaknesses of the City Capability Framework

A weakness of the framework is its requirements for data and the capacity required to use this data effectively to support decision making. This data and the required capacity may not exist with smaller towns within developing countries. For instance, there may not be the data available or capacity to calculate Ecological Footprints and Human Development Indexes for a city or town. Similarly, the options analysis component of the framework requires strong analytical ability in order to develop and test different strategies. This is will require modelling and analytical tools such as a Geographical Information System (GIS) which may not be available in smaller towns.

A number of potential problems are also associated with the Infrastructure Plan and the Resourcing Models component. Firstly, proposed Infrastructure Plans may become out-of-date as developments in surrounding areas and new technology change requirements. It may also encourage developers to buy up land where strategic development is planned in order to benefit financially from increased values.

This could be addressed through capacity and systems which ensured that capability assessments and infrastructure plans were up-to-date. In addition, legislation could be passed to ensure that developers did not benefit from land in locations earmarked for ‘sustainable infrastructure’ development within the Infrastructure Plan.

### 7.2. Strengths of the Capability Framework

The Capability Framework demonstrates how high level sustainability goals can be translated into implementable projects. It show how goals can be defined in terms of quantified targets and matched with tracking indicators which ascertain progress towards their achievement [13,14].

The Options Analysis component aims to ensure that strategies selected are the most suitable, or the optimum way of achieving the desired result. This is particularly important given the scale of sustainable infrastructure required and limited resources available for implementation. The application of detailed research and piloting during this stage may enhance the success, efficiency and effectiveness of implementation programmes [14]. It also supports a more nuanced approach which responds to local situations. For example, an options analysis exercise may indicate that a water efficient fittings bylaw may be a highly effective, low cost, way of achieving required water targets in household compared to the installation rainwater harvesting systems. However, it may also show that rainwater harvesting systems are a highly effective approach of achieving required water targets in large retail developments. This would enable the City to develop different strategies for different sectors, instead of applying ineffectual and inefficient ‘blanket-type’ solutions.

The Capability Assessment component of the Framework can be used to define the physical requirements within each city area, or district, required to achieve a specific sustainability target. These requirements can be listed and quantified. This enables phased plans to be developed to achieve required infrastructure over time. It also enables infrastructure to be listed and matched with resourcing models. This enables a number of valuable processes to happen.

Firstly, long term phased infrastructure plans support effective and efficient integrated planning and implementation as the entirety of the proposed infrastructure build is known. Secondly, it enables different resourcing models to be applied. For instance, infrastructure required in a neighbourhood to achieve water savings may include a) fixing water leaks in mains water supplies, b) rainwater harvesting tanks at facilities with roof areas of over 1000m<sup>2</sup>, and c) water efficient fittings in all new buildings. These requirements could be met through different resourcing models as follows. Council funding and a renovation programme could be used to fix leaks (a). A bylaw could be passed to require tanks at facilities with roof areas of over 1000m<sup>2</sup> ensuring that this requirement was addressed by property owners. Finally, c) could be addressed in plan approval processes that required the installation of water efficient fittings ensuring that building developers addressed this requirement.

These examples show that the Capability Framework could be integrated well with existing strategy, planning, and implementation processes within the City of Joburg. It also suggests that Framework may make a valuable contribution to improved alignment and efficiencies in planning and implementation processes.

## 8. Conclusions and Recommendations

Existing city planning and implementation processes are ‘tried and tested’ and have proved to be successful at planning and implementing large-scale infrastructure projects. However an increasing interest in developing more sustainable cities has led questions about whether existing planning processes, on their own, will be able to achieve the changes required. A review of sustainable city indicators and existing city planning processes indicates that it will be important to ensure there is a closer relationship between sustainability strategy, targets and indicators and planning and implementation processes. The City Capability Framework is proposed as means of addressing this gap and ensuring that planning and implementation processes address sustainability objectives in a more effective and efficient way. In this respect, the Framework shows considerable promise. However, the framework requires further development, testing and applications in order to demonstrate its value. Therefore the following recommendations are made. Firstly, the City Capability Framework should be fully developed into templates, tools, guides and training. Secondly, the framework should be piloted by being applied to a medium sized town and city and tested. Monitoring and evaluation of the pilot should be used to refine the framework in to knowledge tools that can be disseminated and used by other cities wishing the replication the approach.

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