Can Tho Spatial Information Strategy 2020

Moving to a New Era of Decision-making and Opportunity with Spatial Information Technologies

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Peoples Committee Chairman's Foreword

Can Tho is taking a huge leap forward in urban planning, flood risk monitoring and transportation management by adopting digital maps and images (referred to as spatial information) to enable improved decsion making for the betterment of the community.

Spatial information is of vital importance. Every decision we make, every event or activity we do in our daily lives occurs at a geographic location. Whether we are determining the best site for a new hospital, choosing the location for a new business venture, staging a community event or responding to an emergency – spatial information is inherent in our decision making.

While government and research institutions collect, manage and analyse spatial data, this information is not easily accessed.

This strategy delivers a new paradigm where our spatial information assets are able to be accessed, shared, analysed and applied to create meaningful policy and robust decisions.

Our aim is to build a more vibrant and resiliant community using the best available information.

The Can Tho Spatial Data Infrastructure Strategy provides clear direction to a better future by providing a consistent information framework enriched by online web services, mobile apps and community mapping programs for decision-making, planning and risk management across Can Tho Province.

I encourage all government departments, businesses and citizens to embrace the vision, goals and actions in this strategy. Our future as a knowledge-based society depends on us getting our spatial information framework right.

Mr Võ Thành Thống
Chairman
Can Tho City's Peoples Committee

SDI Committee Chair's Introduction

Spatial information has a central role in helping government, industry and the community to achieve a prosperous, healthy and safe lifestyle for all.

Spatial information can help solve complex problems and enhance decision-making and service delivery across a range of public, private and community sector activities. This inlcudes urban planning, transport management, flood risk management, sanitation and health services, emergency response and much more.

The Can Tho Spatial Data Infrastructure Strategy will be driven by the SDI Committee, established to provide a whole-of-government strategic approach to maximise the value and benefits of spatial information for the whole community.

This strategy puts in place a strategic framework for the innovative use and sharing of spatial information. This need is identified as a priority measure under the World Banks Resilient Citiies Program. Spatial informaiton is also recognised by the United Nations as an enabler to achieving the sustainable development goals.

This strategy marks the beginning of an extensive consultation process with Can Tho business community, non-government organisations, and peak professional and research bodies.

With access to integrated spatial information, government will be able to make smart choices about where to invest in infrastructure and services, businesses will be able to leverage spatial information to create new products and services, and the community will have mobile and online access to information for everyday travel.

With better information we will be able to make better decisions and achieve better outcomes.

Madam Vo Thi Hong Anh
Vice Chairwoman
Can Tho City's People Committee
and Chair, SDI Committee

Executive Summary

The prosperity and wellbeing of our community relies on being able to resolve many complex and interrelated social, economic and environmental challenges. Spatial Information technologies deliver better decision-making tools that will enable us to understand these challenges and set future policy. A Spatial Planning Platform will be implemented to share information across the government, private, scientific and community sectors so that it can be used to plan for the future.

Vision – Prosperity and Wellbeing

Our vision is to have advanced spatial information decision-making tools to achieve better living standards for our people, stronger economic growth, and the ability to preserve our environment and natural resources for future generations.

Mission – Leadership through Endeavour

To foster innovation, provide leadership and coordination, and promote standards to build a spatial data infrastructure that can be used to find sustainable solutions to meet emerging needs and opportunities.

Goals – Modern Decision-making Capabilities

Our specific goals are:

1. A high quality representation of our social, economic and environmental landscape
2. Spatial Information that is accessible and easy to use
3. Community resilience through knowledge-based solutions
4. Awareness, capacity and skills in spatial technologies
5. Effective cross-sector collaboration and community partnerships

Priority Applications

The Can Tho Spatial Information Strategy identifies three priority applications that will take advantage of the new spatial technologies and improve decision-making in the areas that matter most. These are:

- Integrated Flood Risk Management (including Subsidence Monitoring)
- Public Transport Connectivity
- Flood Responsive Scaleable Safety Net

The successful implementation of decision-making capabilities in these priority areas will provide the basis for other initiatives, such as Long Term Planning.

Applications that will deliver government strategic priorities

Increasing Economic Activity

Improved access to, and use of, spatial information will stimulate economic growth in the region.

This is because the business community will be able to leverage maps to create new opportunities.

Restaurants, shops, dentists and mechanics can advertise their products by showing their location on maps.

Similarly, the real estate sector can advertise properties globally, potentially increasing international investment.

Business start-ups can use spatial data to deliver new services, such as traffic congestion reporting and social networking.

Taxi companies can improve their service offering through improved customer interfacing and vehicle routing.

All these services have a positive impact on tourism and the economic growth of the region.

Introduction

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Can Tho faces many complex and interrelated social, economic and environmental challenges at both a local and regional level. Can Tho City, in particular, is vulnerable to climate change and hydro-meteorological disasters, and uncontrolled urbanisation.

New decision-making tools are required to better understand these challenges and plan for the future needs of the community. It is currently difficult for the City to keep up with demands for infrastructure, such as roads, drainage and sanitation, and the increasing threat of flooding.

There are a growing number of government, business and academic organisations that collect spatial information, and technology has advanced considerably in recent years. There is now a significant opportunity to use this information and computing power for evidenced-based policy setting and integrated and transparent government services.

New Approach

The Spatial Planning Platform will allow people to view, acquire and use maps for urban planning, disaster risk management, public financial management and business innovation;

- for the government, this means improved decision-making capacity through having access to integrated and more reliable information;
- for businesses, it means having the potential to leverage government data to create new products and services; and
- for the community, it means having increased awareness of social, environmental and economic impacts and the ability to better engage in government decision-making processes.

Current Challenges

Multidisciplinary issues like climate change, disaster risk reduction, emergency response and urban planning require a coordinated effort across multiple government departments.

However, collaboration is currently difficult. Planning and risk management instruments are mainly paper-based and there is no effective mechanism to share information between departments.

Access to integrated information, such as base topographic information, traffic data, cadastral boundaries and land use plans, is not possible and this is making collaborative planning and decision-making difficult. While, several departments have been assessing and using spatial data, this information is managed independently and not accessible to other agencies. This means it is not possible to effectively draw together initiatives from the many line departments into a collective action plan.

The inability to effectively coordinate activities among city departments, the Mekong Delta provinces, other government entities, and donor agencies - limits the effectiveness of resilience-building efforts**.** Activities often overlap when dealing with complex planning systems, such as planning, implementing and operating the integrated flood risk management system; constructing future urban developments; and delivering transportation infrastructure improvements. The lack of clarity around integrated activities is making the planning and development process inefficient and, as a consequence, flood hazards perpetuate.

In addition, there is a lack of awareness and technical skills in spatial information technologies and how data can be accessed and used to benefit society. This is most evident at the grass roots level, and therefore training will need to focus at all levels of government.

A Liveable City Through Better Urban Planning

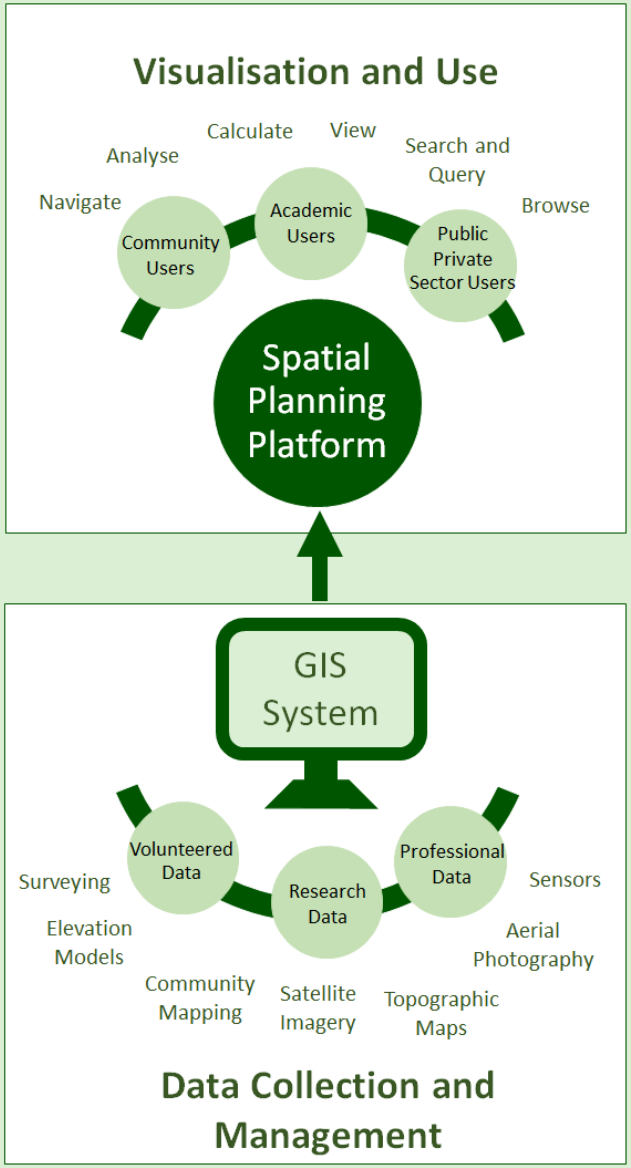
The population of Can Tho is 1.2 million, with the majority living in Can Tho city.

Spatial information will play a vital role in determining the housing, education, health, sanitation and transport infrastructure that will be needed to cater for this growing community.

The Peoples Committee recognise that for Can Tho to be a safe, healthy and prosperous place to live, the government needs to be able to make smart choices about where to invest in public infrastructure and services.

Spatial information provides an integrated view of urban growth and the intelligence to better predict and plan for future needs.

Spatial Information



Spatial information is collected and managed in a Geographic Information System (GIS) and is viewed in the Spatial Planning Platform with other data

What is Spatial Information?

Spatial Information (maps) describes the physical location of geographic features and their relationship with other features. Spatial information is presented in many forms including hard copy maps, digital geographic data sets, satellite imagery and aerial photography.

Spatial information provides the digital connection between a place, its people and their activities and can be used to illustrate what is happening - where, how and why. It can also be used to show the impact of the past, the present and likely future scenarios.

A Geographic Information Systems (GIS) is used to collect and manage spatial information. A GIS provides the capability to visualise the 3-dimensional characteristics of features, such as the height, depth, volume and adjacency of buildings, as well as the dynamic 4-dimensional nature of the environment, such as land use changes over time.

What is a Spatial Data Infrastructure?

A Spatial Data Infrastructure (SDI) is the physical and organisational aspects of managing and exchanging spatial information. A SDI comprises the people, policies and technologies necessary to enable the use of spatially referenced data for decision-making. When implemented together, these components effectively institutionalise cross-government data exchange, operational transparency and the ability to mainstream spatial data sharing.

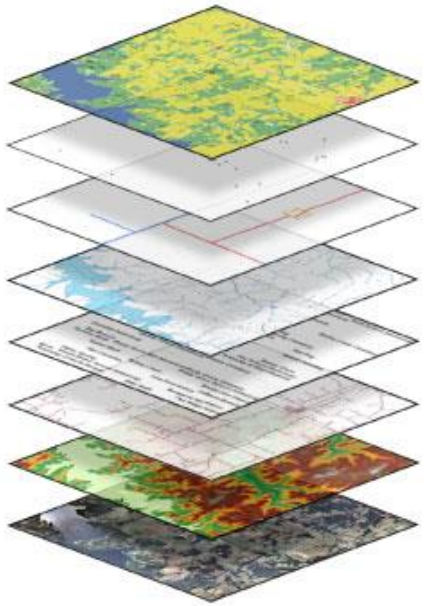
Having an operational SDI in place means that organisations will have the ability to work at scale using the best available data. Easy access to data is important. Being able to understand and recognise the geographic distribution of people throughout the country and respond effectively to their needs, is dependent on having access to information for decision-making.

What is the Spatial Planning Platform?

The Spatial Planning Platform is the technology core of the Spatial Data Infrastructure. It provides a single online portal for accessing and querying spatial information.

The Spatial Planning Platform brings together and integrates spatial information resources from across the government, business and academic sectors. It also includes volunteered data gathered through community mapping programs.

The Spatial Planning Platform will be publicly accessible to all stakeholders involved in integrated urban planning, flood risk management and transportation management. It will allow stakeholders to contribute to, and access, a comprehensive catalogue of spatial data.



Integrated layers of spatial information can be used for evidence-based decision-making as it enables the relationships between geographic features to be compared and contrasted.

Why is spatial information important?

Once integrated and accessible, spatial information can be used for urban planning, integrated flood risk management, natural resource monitoring, management of public infrastructures and disaster preparedness. This is because it:

- provides a holistic and integrated approach to problem solving, decision-making, planning and service delivery;
- offers a big picture, enabling the analysis of complex data and the ability to identify relationships, trends and patterns, such as population change;
- illustrates the best course of action to be taken by exploring various scenarios, such as the potential impact of flood waters;
- provides community safety and resiliency through disaster mitigation, preparedness, response and recovery operations; and
- provides a real world context for business information.

Vision, Mission and Goals

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Vision – Prosperity and Wellbeing

Our vision is to have advanced spatial information decision-making tools to achieve a better living standard for our people, strong economic growth, and the ability to preserve our environment and natural resources for future generations.

Mission – Lead through Endeavour

To foster innovation, provide leadership and coordination, and promote standards to build a spatial data infrastructure that can be leveraged to find sustainable solutions to meet emerging needs and opportunities.

Our mission and goals are integral to achieving on our vision

Goal 1: A high-quality spatial representation of our social, economic and environmental landscape

The objective is to streamline the management of spatial information and improve the accuracy, coverage, content and overall quality of information for assesing and monitoring the growth and development of urban areas.

Goal 2: Spatial information that is accessible and easy to use

The objective is to maximise the innovation potential of spatial information by making it available to government departments, businesses, academia and the community to develop and use new products and services.

Goal 3: Community resilience through knowledge-based solutions

The objective is to develop capabilities to analyse spatial information to address economic, social and environmental challenges.

Goal 4: Awareness, capacity and skills in spatial technologies

The objective is to increase awareness, capacity and skills in spatial technologies through education and training programs, research, innovation hubs and outreach programs.

Goal 5: Effective cross-sector and interdisciplinary collaboration and community partnerships

The objective is to create and sustain the value of spatial information through cross-sector collaboration, industry partnerships, community participation and national cooperation.

Envisioning a Smarter City

The internet of things is set to change how people live and work. City-wide sensors connect people with locations and services, creating a richer experience for the community.

For example, social activities, land use management, energy conservation, asset maintenance, traffic congestion, and waste management, all share common geographies and locations that can be integrated and visualised.

This spatial information can be harnessed to interconnect government functions and commercial services. Noise pollution, traffic congestion, weather conditions, air pollution, bus locations and electricity outages can be synthesised into a single knowledge model so that information can be accessed quickly by users to make informed decisions.

Priority Applications

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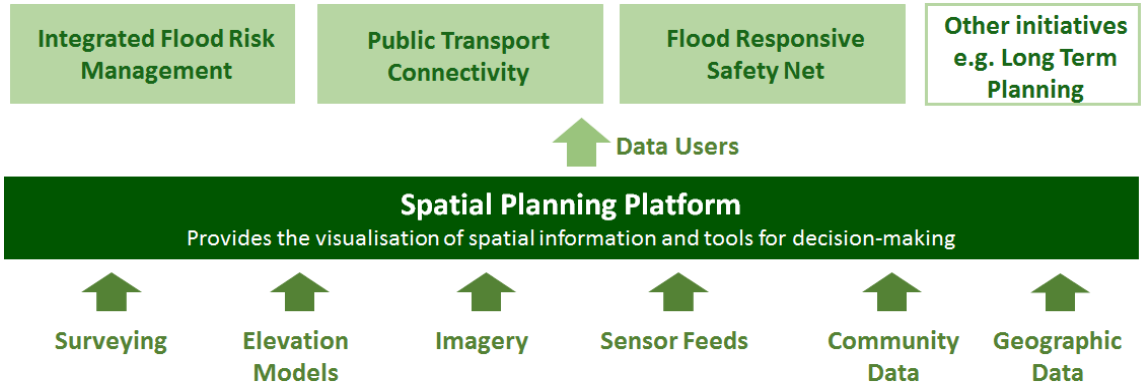
Three projects will be implemented to deliver applications that will have a high degree of impact and move the Can Tho community towards a more prosperous lifestyle and enhanced community wellbeing. These are:

- Integrated Flood Risk Management
- Public Transport Connectivity
- Flood Responsive Scaleable Safety Net

These priorities are chosen as their success relies on the coordination of activities across various sectors, or between local planning and national level projects. The value of the Spatial Planning Platform is that is provides new data sharing mechanisms, tools and capabilities that will enable collaborative planning practices to build climate resilience, and as a consequence keep citizens safe and establish more vibrant communities. These pilot projects will test the functionality of the new Spatial Planning Platform, identify data needs, and build the necessary skills and expertise for future initiatives.



The Spatial Planning Platform is an enabler for integrated flood risk management, public transport connectivity and flood responsive safety nets.

Strategic Framework

VISION	**Prosperity and Wellbeing** To have advanced spatial information decision-making tools to achieve better living standards for our people, stronger economic growth, and the ability to preserve our environment and natural resources for future generations.				
	Realising our vision is dependent on achieving our goals				
GOALS	Quality Spatial Information	Accessible and Easy to Use	Knowledge-based Solutions	Capacity	Sustained Cooperation
	Our goals will be achieved through our actions				
ACTIONS	Gather Data Requirements Conduct data inventory and gap analysis Develop guidelines for custodians Data framework Compliance framework Data Capture Develop optimised data supply chains	Develop Spatial Planning Platform Build data catalogue, warehouse storage capabilities Data sharing policy framework Develop public/private investment model Implement an innovation program Data security services	Specify end-user requirements Implement a modular and scalable system Develop query and analysis tools Develop 3D and 4D visualisation Build links between data themes Allow for various information types Develop Application Framework	Investigate gaps in core competencies Deliver training modules Deliver awareness raising programs Upskill community to enable crowdsourcing Promote the Spatial Planning Platform Host hack-a-thons, fellowships and workshops	Implement a governance model that fosters collaboration Align with National policies and standards Collaborate to collect and maintain data Initiate community mapping programs New products and services through public/private partnerships
	Our actions will enable us to achieve our strategic priorities				
PRIORITY APPLICATIONS	Integrated Flood Risk Management	Public Transport Connectivity	Flood Responsive Safety Net	Other initiatives e.g. Long Term Planning	

Goal 1: Quality Spatial Information

Goal 1

A high-quality spatial representation of our social, economic and environmental landscape

Objective

To streamline the management of spatial information and improve its accuracy, coverage, content and overall reliability for assessing and monitoring the growth and development of urban areas.

Actions

- Engage with stakeholders responsible for collecting and managing data including government departments, businesses, academia and professional bodies to understand data requirements
- Conduct an inventory of spatial data holdings locally and nationally, and identify gaps in data coverage and quality
- Develop guidelines for data custodians, including roles and responsibilities, technology and data standards, quality requirements, update frequency and metadata standards
- Develop the Data Framework to organise data themes and datasets
- Implement a data standards compliance framework in line with National policy
- Develop and prioritise data capture and maintenance, initially focussing on fundamental data and priority applications, then expanding to other areas as required
- Implement and optimise authoritative and crowdsourced spatial data supply chain processes to ensure sustained operation over time

Outcomes

Goal one aims to achieve the following outcomes:

- An authoritative source of spatial information developed on a common reference system
- Processes, data and systems that have integrity and are reliable and resilient to change
- Policies, standards and guidelines for data collection, management and sharing
- Recognised responsibilities for all data custodians including the adoption and adherence to standards

Benefits

Improving the quality and overall management of spatial information results in:

- More streamlined government services
- The community having a strong sense of trust in government data
- Productivity improvements across the government sector due to eliminating duplication and improving data management

Open Cities Program

Government organisations often find it difficult to create detailed maps due to a lack of local knowledge. Because of this common problem, the Open Cities community mapping program has been developed to enlist the help of local volunteers to collect data critical to preparing for, and responding to disasters. This includes, neighbourhood boundaries, critical infrastructure such as buildings, and hazard prone areas.

People have a rare insight to the local area in which they live, and given the right tools and training, can contribute valuable information that leads to the long term prosperity and wellbeing of their community.

The Open Cities Program uses Open Street Map and mobile mapping tools to collect information. Community partnerships have proven successful for updating maps in Sri Lanka, Philippines, Haiti and Nepal.

Goal 2: Accessible and Easy to Use

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Goal 2

Spatial Information that is accessible and easy to use.

Objective

To maximise the innovation potential of spatial information by making it available to government departments, businesses, academia and the community to develop new products and services.

Actions

- Design and develop the Can Tho Spatial Planning Platform (Map Portal) in order to serve spatial data straight to the desktop or mobile device of anyone, anywhere and anytime.
- Build and deploy the data catalogue and warehouse, and department data storage capabilities
- Develop an agreed policy framework for sharing, accessing and releasing data.
- Develop a public/private investment model to increase the utility and commercial value of data, products and services.
- Implement an innovation program to inspire the use of the Spatial Planning Platform
- Implement security services to protect government data and individuals' privacy.

Outcomes

Goal two aims to achieve the following outcomes:

- An increase in the range and scope of spatial data available
- Open and transparent access to information balanced with respect for individuals' privacy
- Cross-government data sharing through supportive policy
- Integrated spatial information in a form that can be used in multiple environments
- A data warehouse that provides an improved data storage solution and backup capabilities

Benefits

Centralised access to integrated spatial information through various government channels results in:

- Better use and integration of spatial information across government, commercial, research and community sectors
- Increased potential for value-added services and new business opportunities and innovations
- Community satisfaction through better access to spatial information as well as public confidence in the security of information
- Growth in government revenue generating capacity through an increase in the number of businesses operating and producing value-added services

Data Release Policy

The Can Tho Peoples Committee is currently bound by State regulations for the release of data, and therefore some data may not be available to the public in the first instance.

The City will work with the State towards a more Open Data Policy as a default position in the future. This default position recognises that there will be legitimate reasons why some data cannot be released or re-used.

The intention of make data more openly available is to encourage economic growth through new business opportunities, improve government administration and planning, and to develop applications that build community resilience.

While Open Data can be viewed for free, at an agency level there are costs in providing high quality data. In some cases a fee will apply when downloading information. A schedule of fees and charges under the Data Release Policy will be published and reviewed annually.

Goal 3: Knowledge-based Solutions

[18]

Goal 3

Community resilience through knowledge-based solutions

Objective

Develop capabilities to analyse spatial information to address economic, social and environmental challenges

Actions

- Specify end-user data analysis requirements for priority applications
- Implement a modular-based Spatial Planning Platform designed to grow capability over time including policies and procedures for implementing new applications that are replicable, scaleable and adaptable
- Develop 3-dimensional (height, volume, area) and 4-dimensional (times series) visualisation capabilities to enable robust decision-making and effective communication
- Put decision-making in the hands of the wider-community by implementing user-friendly data manipulation and query tools for comparative and statistical analysis
- Build linkages between vertically integrated data themes so that knowledge can be drawn from these relationships and smarter city services can be enabled
- Develop the ability to incorporate multimedia data types, such as images and videos, to aid analysis of existing situations and develop future scenarios
- Develop an Application Framework identifying key value streams for delivering future citizen-centric urban services and business opportunities

Outcomes

Goal three aims to achieve the following outcomes:

- A better understanding of social, economic and environmental problems
- Decision-making capabilities for general, professional and commercial purposes
- Ability to use spatial data to analyse complex relationships, trends and patterns across a broad spectrum of applications
- An evidenced-based approach to public policy through access to accurate data
- A policy framework that encourages intellectual solutions to societal problems and fosters change on the community.

Benefits

Knowledge-based solutions will enable better government and community decision-making resulting in:

- An enhanced level of economic development and competitiveness of Can Tho City, attributed to increased levels in usage of spatial information products and services.
- Transparency in government processes leading to mutual trust among partners
- Reduced complexity and uncertainty when making policy decisions
- Well informed and effective social, economic and environmental policy-driven reforms
- The potential to transform the way government services are delivered and how citizens use these services

Evidence-based Decision-making

Both the government and private sector have a major role to play in developing applications for the community. Exploring avenues for such opportunities is far simpler when spatial information is integrated and centralised.

In the health sector, spatial information combined with a changing demographic distribution can be used to analyse patterns in communicable disease, plan for future health services, and target health education programs.

In the tourism sector, spatial information can be used to assess potential impacts of tourism on natural ecosystems as well as attracting tourists to the regions' celebrated landmarks.

The insurance sector can use flood models to make decisions about levels of risk.

Goal 4: Capacity

Goal 4

Awareness, capacity and skills in spatial technologies

Objective

To increase awareness, capacity and skills in spatial technologies through education and training programs, research, innovation hubs and outreach programs

Actions

- Investigate and identify gaps in spatial core competencies and skill sets across all sectors
- Develop and deliver spatial training modules in conjunction with universities and education providers to ensure the spatial sector has the necessary skills to create, manage and use spatial information
- Create and deliver awareness raising programs, including presentations and fact sheets targeted at senior decision-makers, businesses and the general community
- Engage with and up-skill the community to become effective content providers
- Conduct projects (see priority applications pages 24-29) to develop a range of professional skills
- Actively promote spatial information and advertise the Spatial Planning Platform widely
- Host hack-a-thons, code sprints, fellowships, outreach programs and workshops to foster the development of skills and awareness in spatial technologies

Outcomes

Goal four aims to achieve the following outcomes:

- Community awareness and use of spatial technologies
- An entrepreneurial mindset across the government, private and community sectors
- A skilled workforce in the application of spatial technologies
- Research and innovation in spatial technologies
- Sustained growth in graduating professionals in the spatial sciences

Benefits

Having professional and general skill sets in spatial technologies will result in:

- Spatial information products and services more widely available
- Public/private partnerships that stimulate use of spatial information and enable the production of value-added services for the business and community sectors
- An engaged community skilled at mapping local features and conditions
- Best practise spatial information management and access

Education and Awareness Programs

Having the technology to share spatial information is only one aspect of this strategy. It is just as important to have a high level of computer literacy skills within the community to ensure its use; and the professional skills in the workforce, to use it innovatively.

Making innovation work requires a workforce with a range of sophisticated skills. Building this capacity is crucial for economic development and growth.

Having the right people, with the right skills is the first step towards successful decision-making using spatial technologies. This requires education and awareness programs that include a range of professional, technical, vocational and outreach programs.

Goal 5: Sustained Cooperation

[22]

Goal 5

Effective cross-sector and interdisciplinary collaboration, industry partnerships, community participation and national cooperation as an important premise to developing a sustainable SDI

Objective

Create and sustain the value of spatial information through a culture based on trusted partnerships and strategic alliances that recognise common needs and aspirations

Actions

- Put in place an operational SDI Governance Structure that fosters collaboration (see Page 32)
- Align with National data sharing policies and standards
- Collaborate with Ministries, departments, businesses and academia to better manage and maintain spatial information resources and technologies
- Initiate participatory mapping programs to source local knowledge (see Open Cities Program page 15)
- Develop public/private sector partnerships to develop new products and services

Outcomes

Goal five aims to achieve the following:

- Cultural change centred on trusted partnerships, and sharing resources and knowledge
- Realisation of public/private partnerships that stimulate the use of spatial information and a competitive value-adding industry
- Strategic alliances that deliver effective spatial data supply chain management and data sharing between the various levels of government and across the government sector
- Uniformity with National spatial data standards, policies and guidelines, and technology protocols
- Community mapping programs

Benefits

Cross-government collaboration, and industry and community partnerships will result in:

- Shared resources and expertise making the collection, processing and delivery of spatial information far more manageable
- Access to new knowledge and higher level skills for State and infrastructure management
- Reduced data duplication across the sector and more streamlined supply of data
- Stakeholders having an increased awareness and greater involvement in government activities
- A multidisciplinary approach to public sector administration

National Cooperation

The Can Tho SDI initiative provides a significant opportunity for line departments to work in partnership with Ministries for the two-way sharing of spatial information.

The State is moving to formalise the Vietnam National SDI to enable the sharing of nationwide data currently collected by Ministries. This includes the Department of Survey and Mapping, which has topographic data, satellite imagery, aerial photography and elevation models of Can Tho.

Similarly, the Can Tho SDI can contribute locally gathered data in the National interest.

Information exchange will be enabled through compliance with data standards and an online data sharing network that synchronises updates.

The outcome of this automation is that the Can Tho Spatial Planning Platform can be sustained in the longer term through shared resourcing.

Priority Application: Integrated Flood Risk Management

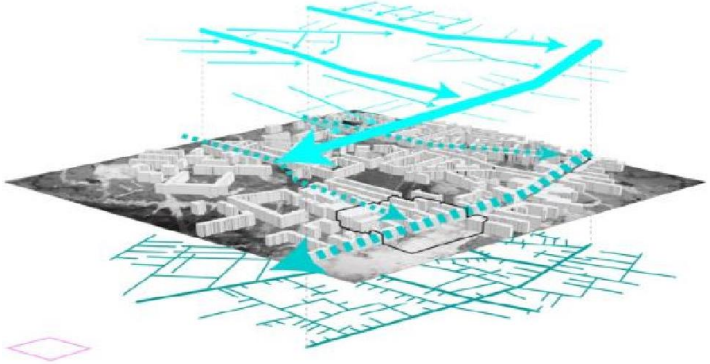
Can Tho City needs to move from traditional flood response approaches to a more integrated and multi-sectorial flood risk management system to support investment, planning, preparedness, early warning dissemination and response.

To combat flooding and mitigate future risks, the City will develop a hydrological hydrodynamic flood risk model to help urban planners, scientists and emergency responsders to better understand the environment and thus risks to people, property and infrastructure.

The flood risk model will be derived from spatial information sourced through the Spatial Planning Platform. Initial conversion of paper maps to digital format will be required. The model will be used to plan future structural investments that provide protection against flood losses, stimulate economic development, improve land value appreciation and increase growth in tourism.

In particular, the flood risk model will be used to determine areas most at risk from flooding, develop water management strategies, recommend emergency measures to mitigate flood risk, and plan improvements to the sewage system.

The model will show the canal system, low lying lands, tidal gates and simulated floods. The boundary conditions that drive the water movement in the model come from measured and predicted rainfall data and water levels in the rivers outside the area; the latter coming from a larger Mekong river model.



A flood risk model integrated with other layers of spatial information supports long term planning and investment strategies

Importantly, the flood risk model will be made available through the Spatial Planning Platform so that it can be reused by other agencies in the course of their operational mandates for the design, control and maintenance of the drainage and flood control systems including:

- Climate Change Coordination Office and Committee for Flood and Storm Control to coordinate and maintream flood management;
- Department of Transport for managing the piped drainage system;
- Department of Agriculture and Rural Development for the management of open canals, drainage of agricultural lands and the operation of the flood control system;
- Department of Natural Resources and Environment for water resource management; and
- Department of Contruction for issuing building codes for drainage systems.

The Spatial Planning Platform provides an integrated and cross-agency approach to the multi-dimensional flooding problem, as the flood model can be combined and contrasted with other layers of information. This will strenghten the ability of the City to integrate flood risk considerations into future policy-making and investment planning.

Information exchange between other Mekong Delta Provinces will be supported through common data exchange protocols enabling broader integrated river basin studies and an enhanced flood early warning system.

The Spatial Planning Platform, together with data collected for the Flood Risk Model, will support subsidence and ecosystem studies by making datasets more accessible to the scientific community. Topographic data, digital elevation models, satellite and LIDAR imagery, along with social-economic statistics and hydraulic models, will allow scientists to analyse the relationships between land use and changes in environmental conditions over time.

Impact of Flooding

Flooding significantly impacts the socio-economic development of Can Tho City and the entire Mekong Delta as a whole.

Situated on the Hau River, Can Tho city is susceptible to Mekong alluvial overflow, high tides and extreme rainfall events. Seasonal flooding typically impacts 30 percent of the city area and this has recently increased to 50 percent. As a consequence, economic activity in the city and surrounding regions.

During the Wet Season (May to November) the City floods on average twice a day and it can take four hours for the water to recede.

During this time, water impacts homes and shops. People must find ways to protect their belongings and children have to wade through muddy water to get to school. Motorbike travel is dangerous, shops have to close and tourism is impacted.

Priority Application: Public Transport Connectivity

[26]

The transport infrastructure in Can Tho is predominately dependent on roads, rendering the transport sector vulnerable to disruptions caused by seasonal flooding.

While the city has proactively assessed transport investments based on flood risks, the relationships between transport and urban land-use planning has not been fully considered. In general, road investments in Can Tho have tended to focus on providing improved access to existing communities or providing access to large-scale economic development sites. The scale and nature of land-use along the roadways has not been sufficiently monitored or planned, and the result has been sprawling growth into low-lying areas.

The Spatial Planning Platform is an enabler for transportation management as it provides access to integrated information collected and managed by authorities. This information can be used to design, plan and implement new transport-related policy, such as long term plans to guide land use planning and development along integrated transport corridors, and priority management plans for upgrading deteriorating infrastructure.

Spatial information can also be used to conduct feasibility studies to identify new opportunities for rapid transport networks, bus transit systems and pedestrian thoroughfares. This is made possible by being able to visualise the relationship between road networks, employment hubs and the likely change in demographics through continued urban development.

The Public Transport Authority can use spatial information to study ways to incentivise public transport, replace buses and upgrade the city bus system. Network connectivity and analysis tools can be used for optimum route selection and planning.

The Spatial Planning Platform will have the ability to visualise the city in 3-dimensions. This provides a realistic communication tool for urban planning and the ability to assess overlooking and overshadowing from new developments.

The Spatial Planning Platform also provides a platform for collaboration between multiple agencies that are mandated to plan, design, build, maintain and operate the transport system. Having access to the same information means that engineers, designers, city officials and planners, can all work from the same blueprint. This expedites the planning process.

Community participation in the planning process is also possible through the Open Cities Program (see page 15). Local communities can propose or oppose new developments by attaching comments to maps provided through the portal. Being able to link technical experts with the outside world, through collaborative community mapping programs, means that public perceptions and suggestions can be better incorporated into future designs.

A computer-generated 3D City Model derived from spatial information (Courtesy ESRI, 2016)

3D City Models

A 3D City Model is a 3-dimensional digital representation of buildings, vegetation and transport infrastructure. These features are geographically referenced and support precise measurement.

Information required to build 3D City Models can be sourced directly from the Spatial Planning Platform. The 3D model is created by integrating various spatial datasets into a single framework. This includes road networks, land use maps, building footprints and digital elevation models.

City Models help envisage a City's future in relation to growth scenarios and in transportation management they are used for:

- Visualisation of future transport networks, urban designs and infrastructure projects
- Developing and refining construction proposals
- Assessing development applications for overshadowing, overlooking and aesthetics
- Public consultation to assist planners

Priority Application: Flood Responsive Scaleable Safety Net

[28]

Currently, support for those impacted by flooding is *ad hoc,* resulting in delays to rebuild public infrastructure and assist affected people with financial support. On average, it is the poor and most vulnerable households that experience the worst impacts of economic losses due to flood. This is due to relatively limited savings and access to finance, forcing many to employ negative coping strategies that compound poverty and worsen their hardship. Coping strategies include selling productive assets, taking out a high interest loan for quick liquidity, and removing children from school to work for additional household income. This negative coping can undo hard-won development gains and have a scarring effect on both households and society.

Given the nature of the flood risk in Can Tho, and the demographics of the City, the most important area to engage in disaster risk financing is to develop a robust system to deliver post-disaster livelihood support.

Therefore, a robust disaster risk financing program is required – one that provides evidence-based decision-making capabilities to ensure social assistance is targeted at the right households and without delay in times of stress.

The ethical distribution of financial support can be achieved using a geographically-referenced **Social Assistance Targeting System** to identify poor and vulnerable households in flood prone areas. A geographic information system will be used to map the location of households including characteristics, such as building structure, household income, number of people, and the likelihood of flooding based on a dwelling's location in relation to flood prone areas. Flood risk analysis for social assistance targeting will make use of the integrated flood risk model available through the Spatial Planning Platform.

One of the benefits of using a geographic information system is that historical events can be captured spatially, providing visual and statistical evidence to understand Can Tho's dependent liability. Historical flood losses can be used to estimate annual average losses and the probable maximum losses to the city in the future.

The new hydraulics and flood mitigation infrastructure is intended to reduce the volume, duration and flow of waters. A probablistic analysis will be perfomed to better understand the community's contingent liability given these imrprovements.

All data captured as part of the social assistance targeting, either through data analysis or household surveys, will be made available to stakeholders via the Spatial Planning Platform for the purpose of administering financial assistance. **Importantly, the personal details of individuals' will NOT be made public, but instead held in a de-identified state and in a secure storage system.**

Household surveys will map the geographic location of homes, flood risk and household income

Flood Responsive Scaleable Safety Net - A National Pilot

The Can Tho Flood Responsive Scaleable Safety Net Program is breaking new ground.

The Ministry of Labor, Invalids and Social Affairs (MOLISA) support the development of an insurance mechanism to assist the poor in times of disaster.

MOLISA is looking to scale-up the Flood Responsive Scaleable Safety Net Program nationally on the back of a successful implementation in Can Tho.

The success of the Can Tho system will be used to showcase and facilitate knowledge sharing and vision development at the national level. This includes the use of spatial information technologies for gathering and analysing data to ensure effective evidence-based targeting of households for financial assistance and thus economic stability.

Other Initiatives: Long Term Planning

[30]

Rapid population growth, resulting largely from people migrating from rural areas to the cities, is resulting in urban sprawl. This uncontrolled urbanisation is a threat to the resilience of Can Tho and is closely linked to flooding. This is because the encroachment of households on canals and river beds, as well as the development of buildings and public infrastructure, is occurring without sufficient consideration of the underground pipe system. As a consequence, flood hazards are on the increase.

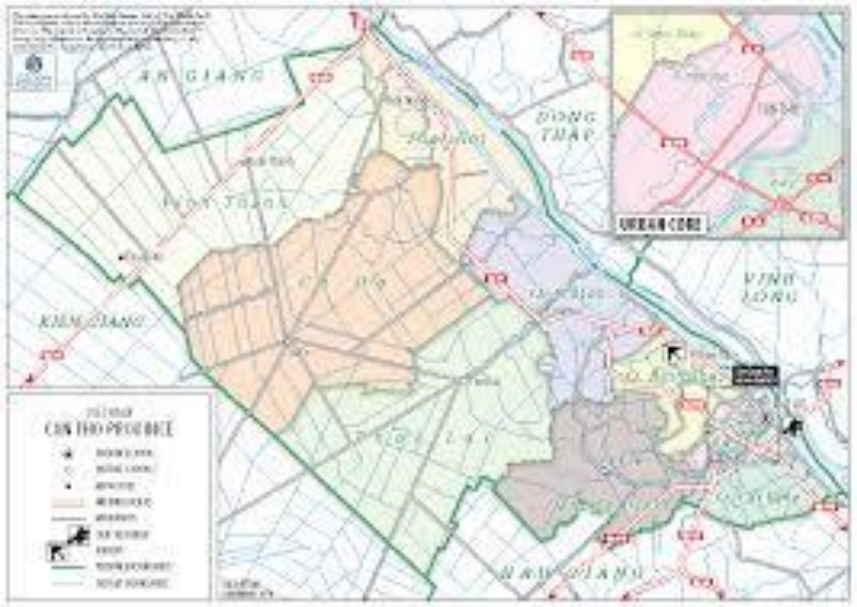
Long term urban planning strategies are required to manage the increasing number of settlements, industrial growth and transportation infrastructure development. However, existing medium and long term urban plans are not informed by robust evidence-based decision-making, as the data required for statistical and spatial analysis is not accessible nor is it in the right format for integrated analysis and planning. A more systematic and integrated approach is required.

The Spatial Planning Platform will provide access to physical, social and economic data that can be used by planners to analyse the existing urban landscape for future growth. By overlaying land developments with land suitability maps, planners can identify areas of environmental sensitivity and conduct site selection in a way that will minimise impacts to the environment and reduce flood risk.

A key function of the Spatial Planning Platform is to provide access to spatial distribution models showing population trends and changes in demographics over time. A range of environmental scenarios can then be investigated through the projection of future demands for land resources.

Areas of environmental conflict can be identified and presented in map form, making it simpler to communicate with decision-makers from across the various departments responsible for city operations and planning. In this way, engineers, urban planners, disaster managers, hydrographers and waste management officers can collaborate to plan future land use without contributing further to flood hazards and environmental degradation.

These collaboration tools can also be extended to the community to help guide future developments through contributed local knowledge.



Broad scale land use planning maps of Can Tho

Local stories assist climate change studies and planning

The Spatial Planning Platform enables information, gathered at the community level, to be included in the planning process. This is important as the community has a unique insight to local issues.

Currently, the Office of Climate Change collects local stories of historical flood events to assist scientists to understand the impact that climate change has over time. These stories are currently paper-based.

With the Spatial Planning Platform these stories can be visualised geographically and contrasted with other socio-economic information. This helps government to better understand social assistance needs and develop hazard reduction plans.

Governance, Leadership and Coordination

The Spatial Data Infrastrucuture (SDI) Governance Model provides for multi-disciplinary and multi-sectoral participation. All SDI-related organisations will have a role to play in the Can Tho SDI development process and its ongoing operation. Institutional mandates will be strengthened to ensure they are well equipped to deliver SDI data and services.

The **SDI office** is the central hub for the coordination of cross-sector SDI activities. The Office reports to the **Can Tho Peoples Committee**, initially through the Overseas Development Agency (ODA), which has responsibility for the SDI Project. The SDI Office formulates strategies and produces general standards, policies and guidelines for data management, exchange and access. Its core mission is to provide stewardship and build networks of people to continually improve the sharing of spatial information, and promote its use.

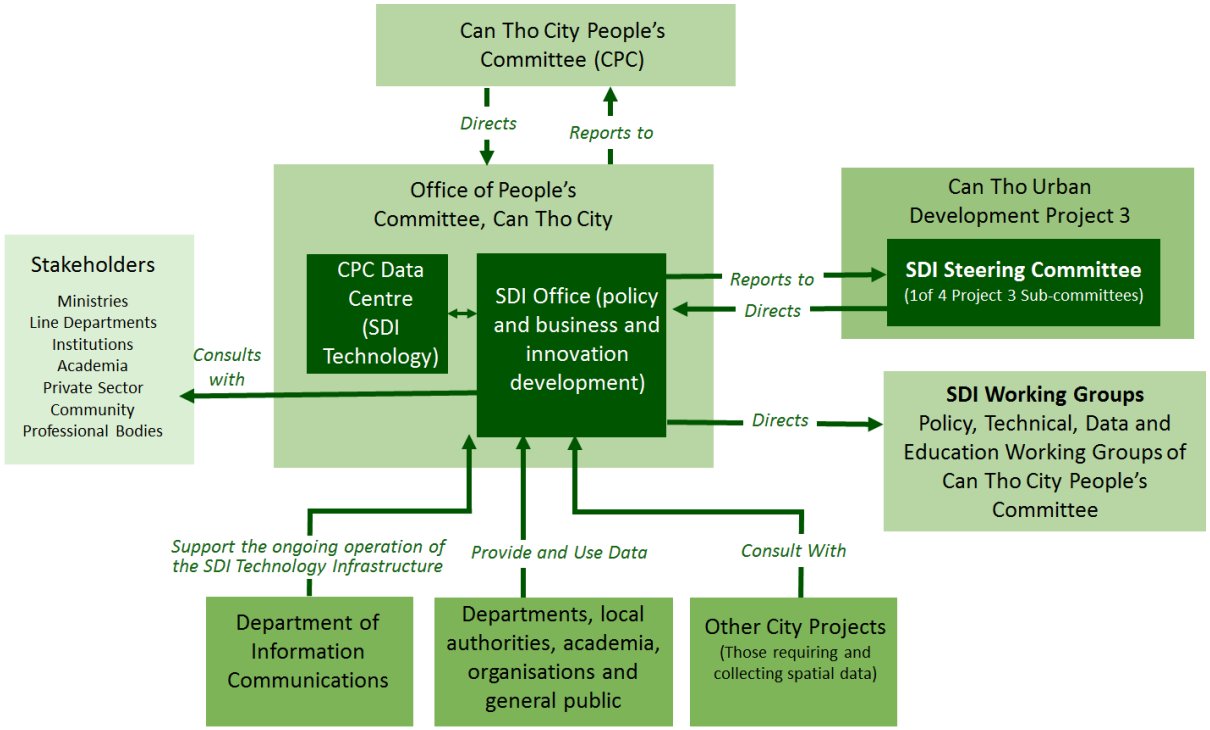
An **SDI Committee** will provide policy direction and make recommendations for spatial data sharing in line with whole-of-government strategic priorities.

The **Policy, Technical, Data, and Education and Training Working Groups** provide professional advice to the SDI Office. Drawn from the line Departments, these experts actively seek opportunities to collaborate on data collection initiatives, set standards to enable system interoperability and data integration, and provide advice on data acquisition.

The Spatial Planning Platform technology will be provided centrally through the **CPC Data Centre** on behalf of all participating agencies. This approach is cost effective.

The governance model recognises that **government and research projects** often acquire spatial data. To make provision for the ongoing maintenance and reuse of this data, all project leaders are encouraged to consult with the SDI Office in regards to data standards and to determine if data already exists to avoid duplication.

Governance Model



Governance Model for Can Tho Spatial Data Infrastructure. Coordination is centralised through the SDI Office.

Project Data - Working At Scale

The SDI Governance Model makes provision for project data and its ongoing maintenance and reuse. The SDI Office provides clear lines of accountability and oversight for all projects that acquire spatial information.

This is an important part of the Governance Model. Currently, spatial data acquired by projects is not visible across the broader sector; and yet this information contributes significantly to SDI outcomes.

The challenge is compounded when trying to initiate, develop and subsequently maintain these project-level data acquisitions once the project is complete.

Without a SDI governance model, there is no provision for the ongoing storage and management of project data and these data assets quickly depreciate in value. Having good governance will ensure project data is available long term.

Policy Framework

When developed in conjunction with government organisations, academia and the private sector, policies can be used to overcome many barriers to information access including organisational boundaries, lack of consistent information standards and the use of incompatible technologies.

The Can Tho SDI Policy Framework is designed to enable information access through an integrated approach that incorporates:

- A **Custodianship Policy** to explain the roles and responsibilities of organisations within the broader context of the SDI.
- A **Data Acquisition and Management Policy** that identifies how data should be managed by an organisation in terms of their existing operations, provides guidelines to assist in streamlining data exchange and principles for data acquisition to ensure information is not duplicated.
- A **Data Release Policy** that addresses the concerns of data security and sensitivity, individuals' privacy and intellectual property by providing guiding principles that can be adopted by organisations in the course of their normal operations. It also specifies the requirements for open access to data and allows organisations to set their own pricing conditions.

The intent of the Policy Framework is to sustain Open Data Programs and mainstream cross-sector partnerships well into the future. Policy management will be coordinated through the SDI Office and policies made available online and through media channels.

Importantly, the Policy Framework leaves the control of spatial data in the hands of data producers, which have the professional expertise to deliver specialist services. It does this by providing guidelines that enable organisations to progressively move towards the adoption of standards, formats, metadata collection, and storage and archiving of data, without having to reinvent workflows or build databases from scratch.

Policy Framework

Policies	Custodianship Policy	Data Acquisition and Management Policy	Data Release Policy	**Policy Management** Policy Register Communication Strategy Quality Audit Policy Analysis Policy Review
Guidelines and Standards	Roles and Responsibilities of Data Custodians	Technology, Data and Metadata Standards	Information Sensitivity, Intellectual Property and Privacy Guidelines	
Policy Enablers	Department Mandates and Procedures	Training Guides and Manuals Data Models	Pricing and Licensing Framework	

The Policy Framework for Can Tho Spatial Data Infrastructure. Coordination is centralised through the SDI Office.

Intergovernmental Charter

Policy Reform is an incremental process that involves inspiring cooperation and collaboration among many stakeholders. Done properly, this process can take time.

To fast track policy development and data sharing, the Steering Committee will initiate an *Intergovernmental Charter for Spatial Data Management* as a way to engage with departments early and move forward quickly.

The Charter will articulate the main principles and some specific undertakings required by data custodians.

The Charter is a short two-page agreement designed to bring agencies together to discuss the broader SDI issues and policy needs.

Spatial Planning Platform – Road Map

Goal 1: A high-quality spatial representation of our social, economic and environmental landscape

Objective: To streamline the management of spatial information and improve the accuracy, coverage, content and overall quality of information across the region

Actions	Spatial Planning Platform	Integrated Flood Risk Management	Public Transport Connectivity	Flood Responsive Scaleable Safety Net	Year 1				Year 2				Year 3			
					1	2	3	4	1	2	3	4	1	2	3	4
Engage with stakeholders to gather data requirements	✓	✓	✓	✓												
Conduct a data inventory	✓															
Develop guidelines for data custodians (e.g. roles and responsibilities, operations manuals)	✓	✓	✓	✓												
Develop Data Framework	✓															
Establish data standards compliance framework in line with National policy	✓	✓	✓	✓												
Prioritised data capture (fundamental data needs as well as application priorities) following gap analysis	✓	✓	✓	✓												
Develop optimised data supply chain processes to sustain operation over time	✓	✓	✓	✓												

Goal 2: Spatial Information that is accessible and easy to use

Objective: To maximise the innovation potential of spatial information by making it available to government departments, businesses, academia and the community to develop new products and services

Actions	Spatial Planning Platform	Integrated Flood Risk Management	Public Transport Connectivity	Flood Responsive Scaleable Safety Net	Year 1				Year 2				Year 3			
					1	2	3	4	1	2	3	4	1	2	3	4
Design and develop the Spatial Planning Platform	✓	✓	✓	✓												
Build the data catalogue and warehouse, and department data storage capabilities	✓	✓	✓	✓												
Develop an agreed Policy Framework for sharing, accessing and releasing data	✓															
Develop public/private investment model to increase the utility and commercial value of data, products and services	✓															
Implement and innovation program to inspire the use of the Spatial Planning Platform	✓															
Implement security services to protect government data and individual privacy	✓	✓	✓	✓												

Spatial Planning Platform – Road Map

Goal 3: Community resilience through knowledge-based solutions																
Objective: To develop capabilities to analyse spatial information to address economic, social and environmental challenges																
Actions	Spatial Planning Platform	Integrated Flood Risk Management	Public Transport Connectivity	Flood Responsive Scaleable Safety Net	Year 1				Year 2				Year 3			
					1	2	3	4	1	2	3	4	1	2	3	4
Specify end-user data analysis requirements for priority applications	✓	✓	✓	✓												
Implement a modular and scaleable system	✓															
Develop tools to query and analyse data	✓	✓	✓	✓												
Develop 3D and 4D visualisation capabilities	✓	✓	✓	✓												
Build links between data themes	✓															
Allow for various information types	✓	✓	✓	✓												
Develop the Application Framework for future urban services and business opportunities	✓															

Goal 4: Awareness, capacity and skills in spatial technologies

Objective: To increase awareness, capacity and skills in spatial technologies through education and training programs, research, innovation hubs and outreach programs

Actions	Spatial Planning Platform	Integrated Flood Risk Management	Public Transport Connectivity	Flood Responsive Scaleable Safety Net	Year 1				Year 2				Year 3			
					1	2	3	4	1	2	3	4	1	2	3	4
Investigate gaps in core competencies and skill sets across all sectors	✓	✓	✓	✓												
Develop and deliver training modules in conjunction with universities and education providers	✓	✓	✓	✓												
Create and deliver awareness raising programs	✓	✓	✓	✓												
Engage with and upskill the community to enable crowdsourcing	✓			✓												
Actively promote spatial information and advertise the Spatial Planning Platform	✓															
Host hack-a-thons and code sprints, and conduct fellowships, outreach programs and workshops to build skills	✓															

Spatial Planning Platform – Road Map

Goal 5: Effective cross-sector collaboration, industry partnerships, community participation and national cooperation																
Objective: To create and sustain the value of spatial information through a culture based on trusted partnerships and strategic aliances that recognise common needs and aspirations																
Actions	Spatial Planning Platform	Integrated Flood Risk Management	Public Transport Connectivity	Flood Responsive Scaleable Safety Net	Year 1				Year 2				Year 3			
					1	2	3	4	1	2	3	4	1	2	3	4
Implement a Governance Model that fosters collaboration	✓															
Align with National policies and standards	✓	✓	✓	✓												
Collaborate to collect and maintain data	✓	✓	✓	✓												
Initiate community mapping programs	✓			✓												
Develop public/private partnerships to develop new products and services	✓	✓	✓	✓												

Acknowledgements

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