PGSC

Pacific Geospatial and Surveying Council

The Pacific Geospatial and Surveying Council Strategy 2017-2027

Positioning Pacific Island Countries and Territories for the Future

Pacific Community
Communauté du Pacifique

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THE PACIFIC GEOSPATIAL AND SURVEYING COUNCIL

STRATEGY 2017-2027

Positioning Pacific Island Countries and Territories for the Future

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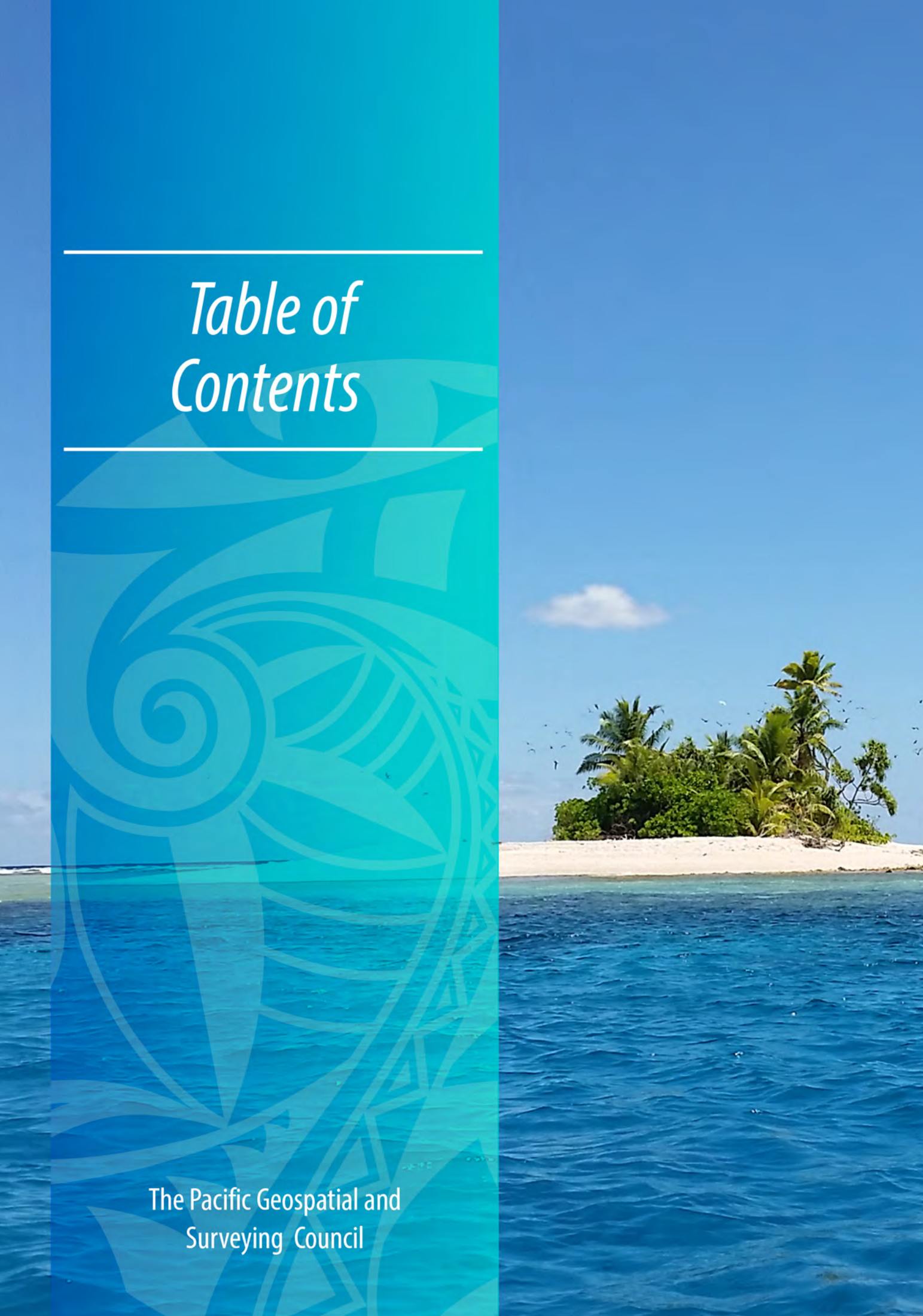

The Pacific Geospatial and Surveying Council

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STATEMENT FROM THE INAUGURAL CHAIRMAN

The endorsement and publication of the Pacific Geospatial and Surveying Council Strategy 2017-2027 marks a critical milestone for surveying and geospatial progress in the Pacific Islands region. This Strategy will help guide the members of Pacific Geospatial and Surveying Council (PGSC) toward achieving our vision of sustainable development in the Pacific, enabled by world class geospatial information and surveying services.

> *As this Strategy so clearly demonstrates, continued investment in and development of geospatial and surveying departments and services must be a priority for the governments of Pacific Island Countries and Territories.*

Upgrading the standards of geospatial and surveying methods in the Pacific region is critical to support improved decision-making in matters of land, marine, and natural resource management. Accurate mapping, positioning, monitoring and data availability is of primary importance to our region's economic growth as it has a direct impact on key sectors such as shipping, land tenure, engineering and coastal development, fisheries and aquaculture, forestry and agriculture, tourism and more. Of particular importance to the Pacific region, geospatial and surveying information is crucial in monitoring and analysing the impacts of disasters and climate change in near-real time for adaptation, mitigation, and risk reduction purposes.

I'm proud to say that since the establishment of the PGSC in 2014, we have witnessed steady growth in Council participation as well as growing support from Pacific Island governments and external development partners. In the last few years, a number of members have been able to leverage PGSC Membership, Charter endorsement, participation in international meetings and Regional Declarations to progress geospatial and surveying developments in their own respective countries. In addition, the PGSC has been recognised and commended at international for a as an example of global leadership in geospatial and surveying advancement. These have been a reassuring signs that as a Council, we are moving in the right direction.

As inaugural Chairman of the PGSC, I am honoured to be leading the Council through this defining moment and to provide leadership as we embark on the implementation of our newly endorsed Strategy. Narrowing the gaps in surveying and geospatial technology will benefit all citizens of the Pacific, and the clear linkages to national, regional and global initiatives already underway ensure that our tasks will remain relevant for many years to come.

Our continued thanks go to our partners who have supported our work through the years. The establishment of the PGSC and development of this strategy has been largely made possible with support from the Australian Government's Climate and Support Program in the Pacific (COSPPac) through the Pacific Community's PGSC Partnership Desk. In addition, the International Federation of Surveyors (FIG), Land Information New Zealand (LINZ), the New Zealand Government, Geoscience Australia (GA), and the United Nations Initiative on Global Geospatial Information Management (UN-GGIM) have all contributed significantly toward the PGSC's growth.

To my fellow Council members, I thank you all for your commitment and individual contributions to this strategic process. We now have a duty of care to oversee that the details and directions of the Strategy are undertaken to the best of our abilities. Together may we map the pathway of progress for the next decade and position the Pacific for the future.

Fakafetai lasi,

Faatasi Malologa
DIRECTOR
TUVALU DEPARTMENT OF LAND AND SURVEY

FOREWORD

It is the role and responsibility of national, regional and global professional geospatial and surveying organisations to promote, support and enable –

"An environment of land, marine and space professionals to effectively provide innovative, reliable and best practice solutions to address the regional social, economic, environmental and technological challenges associated with geospatial trends, our rapidly changing and complex world." – FIG Regional Capacity Development Network

The formation of the Pacific Geospatial and Surveying Council (PGSC) epitomises the above statement, as it empowers Pacific Island Countries and Territories (PICTs) to address geospatial and surveying challenges through a regional, unified, coordinated and collaborative approach. As such, the Pacific Community (SPC), United Nations Global Geospatial Information Management for Asia and the Pacific (UN-GGIM-AP), and FIG (Fédération Internationale des Géomètres) are honoured to be founding partners of the PGSC, and where possible provide assistance to realise the goals of their Strategy.

The Pacific Geospatial and Surveying Council Strategy articulates how PICTs will modernise geodetic infrastructure, develop the capacity of their surveyors and utilise geospatial information to achieve the UN 2030 Agenda for Sustainable Development. The incremental, realistic and people-focused approach by the PGSC to build "fit for purpose" and sustainable geospatial infrastructure to facilitate integrated land and marine administration systems and good governance, is to be commended. It also needs to be acknowledged the outstanding effort of the PICTs, in particular Fiji, to initially introduce the resolution "Global Geodetic Reference Frame for Sustainable Development" to the UN General Assembly, and then to ensure its adoption on 26 February 2015. At a UN-GGIM Plenary meeting held in Kuala Lumpur in October 2016, the UN-GGIM Secretariat stated:

"The global geospatial community, particularly through national geospatial information agencies, has a unique opportunity to integrate geospatial information into the global development agenda in a more holistic and sustainable manner, specifically in measuring and monitoring the targets and indicators of the Sustainable Development Goals."

Thus, geospatial and surveying information is not only critical to development itself but it is also needed for measuring and monitoring global progress in meeting our shared goals. It is clear that the PGSC is critical to this happening in the Pacific.

It is anticipated that development partners and donor agencies will appreciate the importance of the Strategy to advocate, to the wider community, the role of geospatial information to help "build back better" and to generate resilience of a nation and the region to natural disasters. As we know the consequences of climate change are real in the PICTs. The role of the surveyor and geospatial scientist to measure, monitor and analyse data associated with sea level rise, and to develop land and marine information systems is now more crucial as it will not only assist with managing the social and economic impacts but also help reduce a PICTs exposure to risk and vulnerabilities related to the effects of climate change.

Dr. Colin Tukuitonga
DIRECTOR GENERAL
The Pacific Community (SPC)

Dr. Chryssy Potsiou
FIG PRESIDENT
International Federation of Surveyors (FIG)

Dr. Hiroshi Murakami
PRESIDENT
The Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific (UN-GGIM-AP)

EXECUTIVE SUMMARY

Geospatial information underpins the majority of economic and sustainable development activities in the world today, and the Pacific Islands are no exception. The services provided by Pacific Island geospatial scientists and surveyors contribute to the security and well-being of Pacific people, supporting a multitude of industries and sectors.

Increasingly, geospatial information is relied upon for its applications in natural resource management, civil engineering, climate change adaptation, disaster risk reduction, transport, land ownership, health, agriculture, topographic mapping and nautical charting, as well as the delimitation of maritime zones and boundaries.

To meet these needs, geospatial scientists and surveyors must have the capability to not only capture, compute, and create spatial information but also enable the various layers of information in different systems to "communicate"- that is, to be integrated and interoperable. It is critical that the Pacific Islands region continue to develop these capabilities.

The Pacific Geospatial and Surveying Council (PGSC)'s Strategic Vision is:
Sustainable development in the Pacific Islands region enabled by world-class geospatial information and surveying services.

The PGSC has adopted this Strategy to guide the development of geospatial and surveying services over the next decade, ensuring that National Lands & Survey Departments, Hydrography Offices, and Geospatial Units can fulfil their responsibilities and expand their capabilities.

The Long-term Goal of the Strategy is that:
Pacific Island survey and geospatial services are sufficiently resourced to respond to member country needs and geospatial requirements for sustainable development.

This Long-term Goal is supported by four priority areas for action (Goals) identified in the Strategy. These Goals are:

1. Fostering regional leadership, direction and support for member states to engage stakeholders and the community on geospatial and surveying activities.
2. Adopting a modern Geodetic Reference Frame (GRF) and improving the technology underpinning geospatial systems and applications.
3. Increasing support and diversity of resources for geospatial and surveying activities at the national and regional level.
4. Building a self-reliant geospatial and surveying community supportive of learning, innovation and gender equity.

Contributing to each goal are a series of outcomes, which will be achieved by indicative activities implemented at the national, regional, and international level.

These goals, outcomes and activities are supported by existing institutional partnerships that bring together PICTs and development partners in support of geospatial and surveying services.

In addition, monitoring and evaluation of the activities and outcomes is an integral component of the Strategy and will be conducted at regular intervals over the next 10 years.

Introduction

The Pacific Geospatial and Surveying Council

1. PURPOSE

The Pacific Islands Geospatial and Surveying Strategy, hereby referred to as 'the Strategy,' has been developed through a participatory process with all members of the Pacific Geospatial and Surveying Council (PGSC). This document has been compiled and edited by the PGSC Strategic Plan Working Group and endorsed at the 3rd PGSC meeting in November 2016.

The strategy aims:

1. To demonstrate the critical nature of geospatial and surveying information and services and the development and maintenance of these services in the Pacific region;

2. To articulate the collaborative aspirations of the region's geospatial and surveying professionals in advancing capacity;

3. To guide the development of sustainable geospatial and surveying information and services in Pacific Island Countries and Territories, and;

4. To serve as an entry point for engagement with internal and external partners.

2. BACKGROUND: POSITIONING THE PACIFIC

Geospatial information underpins most of the economic and social activities in the world today, and it is critical that the Pacific region continue to develop its geospatial and surveying capacity.

FIGURE 1: REGIONAL MAP

With the increased availability and access to satellite or space-based technology, such as the Global Navigation Satellite Systems (GNSS) and earth observing systems providing high resolution imagery, geospatial information has become an increasingly powerful tool, especially now that it can be accessed in near-real time. Those who use a dashboard-mounted GNSS positioning device for driving directions or consulted a smartphone to locate a shop or restaurant would appreciate how this technology has changed the way people navigate in the world.

> *"We fully realize the importance of critical geospatial infrastructure and information in helping countries and decision-makers make more informed, evidence-based decisions on mitigation and preparedness."*
>
> - Ambassador Peter Thomson, Fiji's Permanent Representative to the UN -

What do Pacific geospatial and survey professionals do?

The diversity of functions performed by geospatial and survey professionals varies from country to country across the Pacific. In Fiji, for example, which is more populous and developed than many other Pacific Islands, geospatial and survey professionals can be found in the following government departments:

- *Department of Lands and Survey: conducting regular land surveys; valuing, zoning and mapping land resources; updating and maintaining national cadastre maps and boundaries; testifying in legal boundary disputes.*
- *Mineral Resources Department: leading geologic and submarine survey and resource management; hazard and vulnerability mapping; mapping and negotiating maritime boundaries; tectonic monitoring and tsunami alerts.*
- *Geospatial Information Management: maintaining and upgrading national geospatial infrastructure; data digitization, integration and interoperability; GIS mapping for lands and mineral resources.*
- *Fiji Navy Hydrographic Unit: updating nautical charts; hydrographic surveying in support of dredging and maintaining ports and waterways.*

In addition, Geographic Information Systems (GIS) specialists and surveyors can be found working in many areas of government from health and environment, to statistics and agriculture as well as privatised authorities including Housing Authority of Fiji, Fiji Roads Authority, Water Authority of Fiji, and Fiji Electricity Authority.

Overall, more than 500 civil servants are directly involved in or supporting national geospatial and survey activities, including 39 registered surveyors, 2 FIG IHO Category A and 1 Category B hydrographic surveyors. In addition, Fiji also has its own private Institute of Surveyors (FIS) and more than 20 private surveying companies with bases throughout the country.

In contrast, Tuvalu with a population of around 10,000, has 10 staff in its Department of Land and Surveys, including two GIS officers and one qualified surveyor. These staff are responsible for a variety of functions including:

- *Cadastre surveys and land boundary mapping in Funafuti and outer islands*
- *Surveys for any new building developments*
- *Digitization of survey data and GIS mapping of resources and infrastructure*
- *Testifying in legal boundary disputes*
- *Maritime boundaries development and negotiation with neighbouring countries*

How does geospatial information and surveying support sustainable development in the Pacific?

Land administrators and development planners have long recognised the value of maps in communicating information and facilitating an informed decision making process. If a 'picture is worth a thousand words', a single map can tell volumes. Apart from providing the fundamental geographical context of "where it is" – locations of roads, towns, rivers, coasts, resources – maps can also be used to interpret or analyse land information both statistically and visually. For example, answering questions such as: What areas of a city have highest crime rates? What regions of a country are most agriculturally productive? A time series of maps can show how geographic features or demographics have changed over time, informing future development decisions about where best to locate a new hospital, or explaining the implications of building a new wharf in a certain location.

Increasingly, geospatial information is relied upon for its applications in natural resource management, climate change adaptation, hazard and vulnerability mapping, transport, land ownership, engineering and construction, population, health, agriculture, topographic mapping and nautical charting, as well as the delimitation of maritime zones and boundaries. To meet this need, geospatial scientists and surveyors must have the capability to not only capture, compute, and create spatial information but also enable the various layers of information in different systems to "communicate"- that is, be integrated and interoperable.

As a consequence, the reliability of these decision-making tools is inextricably linked to the integrity of data used to create them. Most of this data is managed by geospatial scientists and surveyors on a routine basis, so it follows making capacity building, fit-for-purpose infrastructure and modernised digital information systems available to them is of critical importance.

3. PRESENT SITUATION AND OPPORTUNITIES FOR GEOSPATIAL DEVELOPMENT

A series of participatory discussions and exercises conducted with the region's geospatial and survey leaders from 2014-2016 has highlighted experiences that the countries share in common, as well as some opportunities to build on existing capacity.

PRESENT SITUATION

Pacific Island countries and territories have varied existing geospatial and surveying capacity, reflecting the different priorities of Governments and many other factors. Capacity in this context includes human capacity, skills and qualifications, as well as technical infrastructure, organisational practices and systems, the supporting national legislative frameworks, and enabling environment within Pacific Island governments to support the continued growth and development of geospatial and surveying services. This is summarised in Figure 2 below.

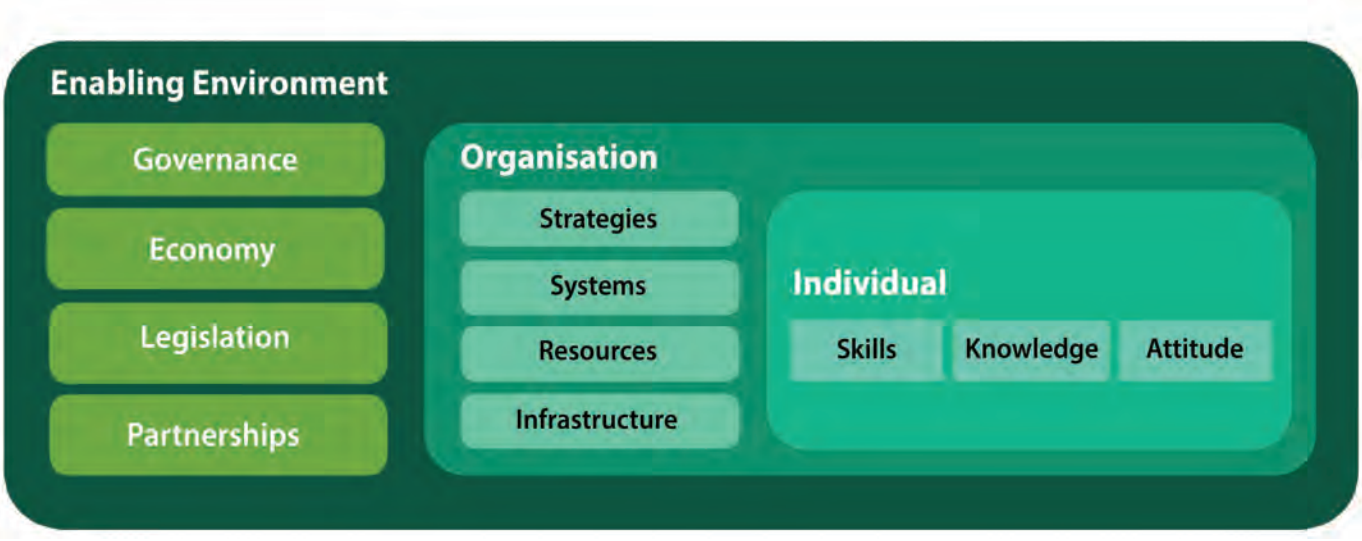


Figure 2: Inter-related levels of geospatial and surveying capacity

The region's surveyors and geospatial specialists have numerous resources and strengths upon which to draw. Most countries have qualified and experienced surveyors, a few have qualified hydrographic surveyors, and increasingly, governments are recognising the value of robust survey and geospatial services and supporting them within national budgets. GIS is increasingly relied upon as a decision making-tool and more training opportunities are available now in the region than ever before. In the early 2000s, the Pacific Sea Level Monitoring (PSLM) Project established Continuously Operating Reference Stations (CORS) in 13 PICs which contribute a global standard of near real time data to the International GNSS Service (IGS) and enable access to the definitive global reference frame underpinning scientific, educational and commercial applications. Over the past decade, and with the support of the SPC Maritime Boundaries Unit, the Pacific Island region has made the most progress of any in the world in mapping, negotiating, and officially declaring their maritime boundaries under the UN Convention on the Law of the Sea (UNCLOS). Through this project and others, surveyors and GIS users have had opportunities to network and advance their profiles on the national and regional stage.

However, PGSC members also face a number of capacity-related challenges in common as well. For one, there is currently a critical shortage of geospatial professionals and qualified surveyors in the region. Many current Pacific leaders in the fields of surveying received their training with the support of scholarships then available to attend the University of the South Pacific's Diploma in Geomatics. This programme was discontinued in 2011. Many senior land and marine professionals in the region

are now approaching retirement age in their respective countries, some within the next 5 years. To prevent loss of institutional knowledge and ensure continuity of services, it is imperative that countries invest in training the next generation of surveyors. Another key challenge is the absence of a modern geodetic reference frame (also known as a 'modern geodetic datum') in the region. A geodetic datum is the fundamental reference layer for surveying and mapping as it underpins most land and marine related datasets. It subsequently allows the integration of layers of data and interoperability of systems. Datums are also used in navigation and surveying to translate positions indicated on maps (paper or digital) to their real position on Earth. Most of the datums used in the Pacific Islands are out-dated and are not aligned with the global standard. In other words, each country's datum is isolated, 'floating' on the global grid. This means that the coordinates for a wharf or road on a map in Fiji, for example, do not line up with the same coordinates on Google Maps or on a vessel using GNSS as a navigation aid. They might be off by as much as 10m, which could make a significant difference to those activities requiring a high level of absolute accuracy.

Generally, Pacific geospatial and survey services are under-resourced and undervalued, which is an issue common to many specialist sectors. Geospatial and survey departments may be particularly disadvantaged because the work is highly technical and not always well-understood. In some countries, the mandate of the lands & survey department is limited to cadastral surveys and land tenure administration, and plans to further develop capacity and services have stalled. If faced with a decision between budgeting for new survey equipment or building a new school, for example, decision-makers would most likely choose the school because of the obvious public benefits. This advocacy dilemma presents a public relations challenge for Pacific geospatial and survey professionals: how can they best communicate the economic and societal benefits of a robust geospatial and surveying service?

OPPORTUNITIES

Nevertheless, there are abundant potential funding opportunities for geospatial development in the region, provided that relevant links are made to ongoing climate change adaptation and disaster risk reduction efforts. Geospatial information and surveying are critical components to vulnerability mapping, post-disaster assessment, community relocation or adaptation planning, all of which are features of most projects currently underway or being designed in the region. At present, there is insufficient data in most countries to produce such assessments, so quality geo-referenced data collection is also an important component in these projects.

The economic and social benefits of a robust geospatial and surveying service are also easily demonstrated and this can be a powerful tool for mobilising funding. For example, a cost-benefit analysis of a hydrographic survey and updating nautical charts in Port Vila and Luganville, Vanuatu concluded that every $1 spent on hydrography would produce $91 in return on ongoing economic activity in the form of cruise ship traffic and inter-island transport connecting markets and services. Failure to act, on the other hand, could result in legal liability for the cost of accidents as a result of inadequate charts, high insurance premiums, and even withdrawal of visiting international vessels.

In addition, continuing advances in geospatial technology mean that investments in hardware and software are more affordable, with a higher cost-benefit ratio. The accessibility of this technology is improving each year thanks to the steady penetration of smart phones in the Pacific, making geospatial infrastructure and accurate information relevant to a growing population. With the proliferation of mobile-based apps and geographically-specific surveys and texts, public awareness campaigns are cheaper and easier to run. In much of the Pacific, making use of these tools is the most effective way to reach a target audience.

Finally, the steps already being taken in the Pacific signal that there is considerable opportunity for increased collaboration, investment and development in relation to geospatial services and information. The enabling environment in the region has developed enough so that meetings of geospatial and survey professionals have been possible. Development initiatives including, but not limited to, the Pacific Maritime Boundaries Project, the Pacific Sea Level Monitoring Project, the Climate and Oceans Support Program in the Pacific, the Pacific Regional Navigational Initiative, and the PACGEO online geospatial database have already begun to build the geospatial and surveying capacity of Pacific Island governments. The establishment of the Pacific Geospatial and Surveying Council in 2014, followed by the drafting and endorsement of the PGSC Charter and the development of this cohesive regional strategy are all important components of a geospatial framework, indicating a mature regional voice and collective plan by the community of geospatial and survey professionals.

4. THE PACIFIC GEOSPATIAL AND SURVEYING COUNCIL

A group of Pacific surveying and geospatial professionals met in November 2014 in the margins of the 17th annual Pacific Geospatial Information Systems and Remote Sensing User Conference in Suva, Fiji. With support from the Australian Government's Climate and Ocean Support Program in the Pacific (COSPPac), they convened to discuss the establishment of a regional network to guide the development of geospatial information in the Pacific.

It was at this meeting that the Pacific Geospatial and Surveying Council (PGSC) was first envisaged and a charter governing its mission and objectives was developed. To date, this charter has been formally endorsed by 11 Pacific Island Governments.

The Pacific Community (SPC) Geoscience Division has established the PGSC Partnership Desk to provide secretariat and support services for the PGSC. As the Pacific's regional hub of expertise in applied geoscience, surveying, and geospatial technology, SPC is well-placed to serve this role and to assist the PGSC in promoting its agenda to potential development partners.

MEMBERS

Core members are national geospatial and surveying authorities of Pacific Island Countries and Territories. At present, these include:

- Cook Islands
- Federated States of Micronesia
- Fiji
- Kiribati
- Tuvalu
- Nauru
- Niue
- Republic of Marshall Islands
- Papua New Guinea
- Vanuatu
- Samoa
- Solomon Islands
- Tonga
- Palau

This list can expand to include all SPC member countries and territories.

VISION

Sustainable development in the Pacific enabled by world class geospatial information and surveying services.

MISSION

To develop a regional network and forum for the geospatial information and survey authorities of Pacific Island Countries and Territories (PICTs) to address regional challenges, such as:

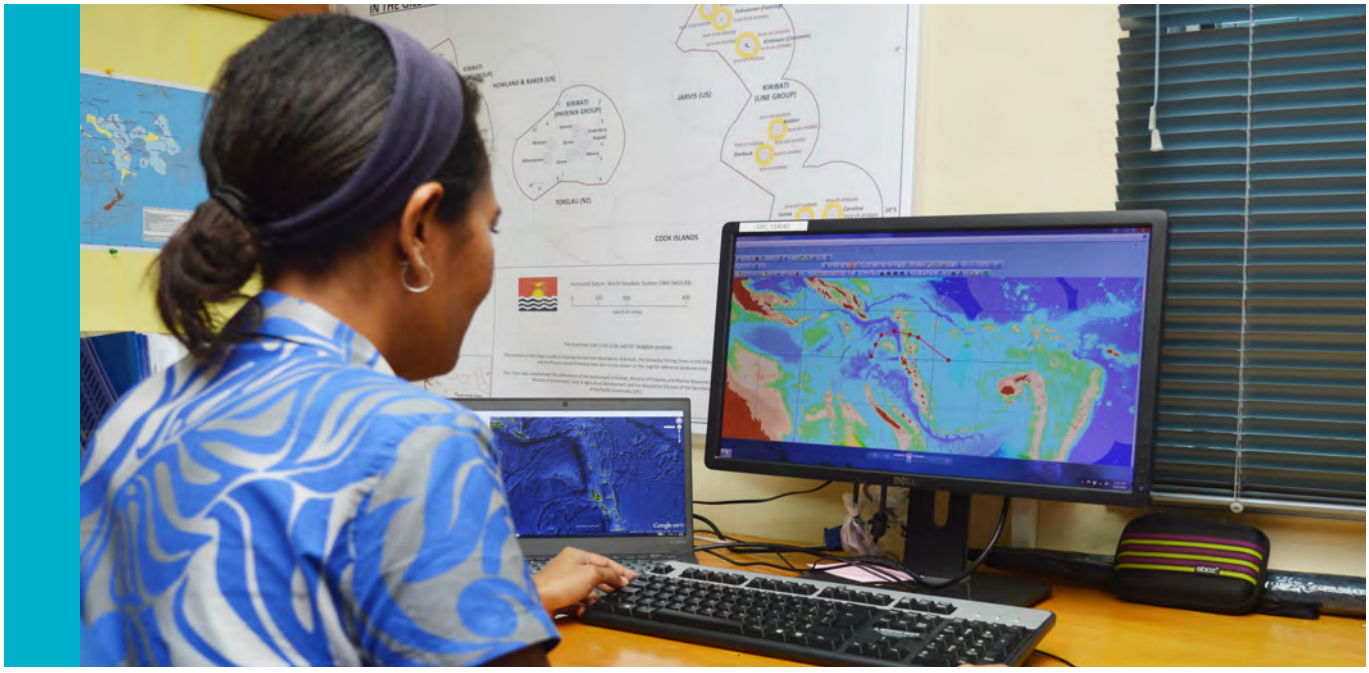
- Developing the capacity of geospatial professionals and surveyors,
- Improving and standardising geospatial information gathering and dissemination,
- Maximising economic and social growth,
- Alleviating poverty,
- Improving natural resource management, disaster risk management and climate change adaptation.

GUIDING PRINCIPLES

- **Members** – PGSC expertise and energy is devoted to delivering geospatial and surveying services that make a positive difference in the lives of PICTs peoples.
- **Development partners and stakeholders** – PGSC values our development partners and stakeholders.
- **Staff** – PGSC values the people who work with or volunteer their time for the PGSC.
- **Commitment to excellence and relevance** – PGSC strives to deliver excellent services that are directly relayed to member priorities and add value to their development outcomes.
- **Commitment to achieving results** – PGSC is committed to monitoring performance to contribute to ongoing improvement and deepening understanding about the link between our work and beneficial outcomes.
- **Governance and leadership** – PGSC aims to meet the highest standards of good governance, transparency and accountability, and to exercise sound leadership of the organisation.
- **Gender equity, cultural diversity and human rights** – PGSC is committed to promoting gender equity, cultural diversity and human rights for all, including in relation to disability and sexuality.
- **Focus on Small Island states** – PGSC endeavours to pay particular attention to the priorities of Small Island state members.
- **Sustainable development** – PGSC is committed to the three pillars of sustainable development: economic development, social development and environmental protection.
- **Information sharing** – PGSC supports the sharing of ideas, practices, methodologies, information and data amongst members and partners, contributing toward development outcomes.
- **Communication and Relationships** – PGSC is committed to open and transparent communication and relationships with members, staff, partners and stakeholders.

5. IMPLEMENTATION

The implementation of the Strategy, the activities for which are described below in Sections II and III, will be carried out by institutions at multiple levels:



NATIONAL

- Individual members are responsible for nominating representatives to the PGSC and endorsing the PGSC charter.
- National Survey and Geospatial Departments will be responsible for promoting their capacity development plans at the national level and for overseeing implementation of funded initiatives.
- PGSC representatives will be responsible for reporting on their country's progress against the Strategy outcomes and goals at each PGSC meeting.
- SPC, as the host of the PGSC Partnership Desk, will support each country to assess their existing capacity and identify priorities for ongoing capacity strengthening.
- The PGSC Partnership Desk will provide support to individual PGSC members in promoting their work nationally and internationally.

REGIONAL

- The PGSC Partnership Desk (SPC) will support the administrative functioning of the PGSC. They are responsible for mobilising the resources necessary to convene the PGSC on a regular basis and will also provide secretariat services at PGSC meetings and the meetings of PGSC Working Groups.
- PGSC Working Groups will develop TORs and work plans to guide them in progressing their respective tasks and report back to the PGSC during PGSC meetings.
- The PGSC Young Geospatial Professionals and Surveyors Network will develop a work plan, to be endorsed by the PGSC, and report back to the PGSC on progress during PGSC meetings.
- The PGSC Partnership Desk will advocate on behalf of the PGSC at the regional level, will organise regional trainings in support of the Strategy.
- The PGSC Partnership Desk will act as a regional hub for coordinating and facilitating regional access to technical services, expertise and advice for PGSC members.
- Geoscience Australia (GA) and Land Information New Zealand (LINZ) will seek out opportunities to support the

implementation of the PGSC Strategy.
- The International Federation of Surveyors (FIG) through its Asia Pacific Capacity Development Network and technical Commissions will seek out opportunities to support the implementation of the PGSC Strategy.

In addition, partnership and input from other institutions will be critical to the success of the Strategy. These institutions include:

EDUCATIONAL INSTITUTIONS

- Fiji National University (FNU)
- University of the South Pacific (USP)
- University of New South Wales (UNSW)
- University of Otago
- Solomon Islands National University
- PNG University of Technology
- College of the Marshall Islands
- College of Micronesia
- Queensland University
- Toi Ohomai Institute of Technology
- Royal Melbourne Institute of Technology (RMIT)

PRIVATE SECTOR

- Some Pacific countries boast active private survey and geospatial sectors. Private surveying firms can help support educational and professional development opportunities, as well as align with government to advocate the advantages of a modernised geodetic reference frame for the country.
- Commercial service and equipment providers can sponsor events, provide training and help advocate for advancement of the profession.
- Spatial Industry Business Association (SIBA)

PROFESSIONAL GROUPS AND ASSOCIATIONS

- South West Pacific Hydrographic Commission (SWPHC)
- Fiji Institute of Surveyors (FIS)
- Surveyors Registration Boards/ Licensing Boards
- The Association of Surveyors of Papua New Guinea
- New Zealand Institute of Surveyors (NZIS)
- The Pacific Geographic Information Systems/ Remote Sensing Conference (GIS/RS)
- Australian Surveying & Spatial Sciences Institute (SSSI)Others

INTERNATIONAL ORGANISATIONS

- International Federation of Surveyors (FIG)
- United Nations Global Geospatial Information Management Asia Pacific (UNGGIM AP)
- International Hydrographic Organisation (IHO)
- International Maritime Organization (IMO)

6. PARTNERSHIPS AND LINKAGES

Partnerships are critical to the successful implementation of this Strategy. The Pacific Geospatial and Surveying Council relies upon these relationships and is an important contributor to global efforts to improve positioning and geospatial information management in the Pacific and around the world.

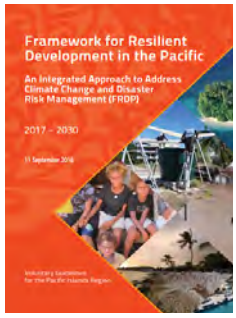
The PGSC acknowledges the particular importance of aligning actions under this Strategy with the Framework for Resilient Development in the Pacific (FRDP), the Framework for Pacific Regionalism, and other relevant regional and international initiatives.

The table below demonstrates how key regional and international frameworks, strategies, and statements have similar priorities and contribute to similar outcomes, despite disparate origins. The Strategy helps to highlight the strong role surveying and geospatial management plays in relation to all these goals, priorities and outcomes.

	TITLE	OUTCOMES/PRIORITIES ALIGNED WITH THE STRATEGY
	**Sustainable Development Goals 2015-2030**	• SDG 5 Gender Equality • SDG 6 Clean Water and Sanitation • SDG 7 Affordable and Clean Energy • SDG 8 Decent Work and Economic Growth • SDG 9 Industry, Innovation and Infrastructure • SDG 11 Sustainable Cities and Communities • SDG 12 Responsible Consumption and Production • SDG 13 Climate Action Responsible Consumption and Production • SDG 14 Life Below Water • SDG 15 Life On Land • SDG 17 Partnerships for the Goals
	**UN General Assembly Resolution on the Global Geodetic Reference Frame for Sustainable Development**	• Data sharing • Education and capacity building • Geodetic infrastructure • Communication and outreach • Governance
	**UN-GGIM Roadmap for the Global Geodetic Reference Frame for Sustainable Development 2015**	• Data sharing • Education and capacity building • Geodetic infrastructure • Communication and outreach • Governance

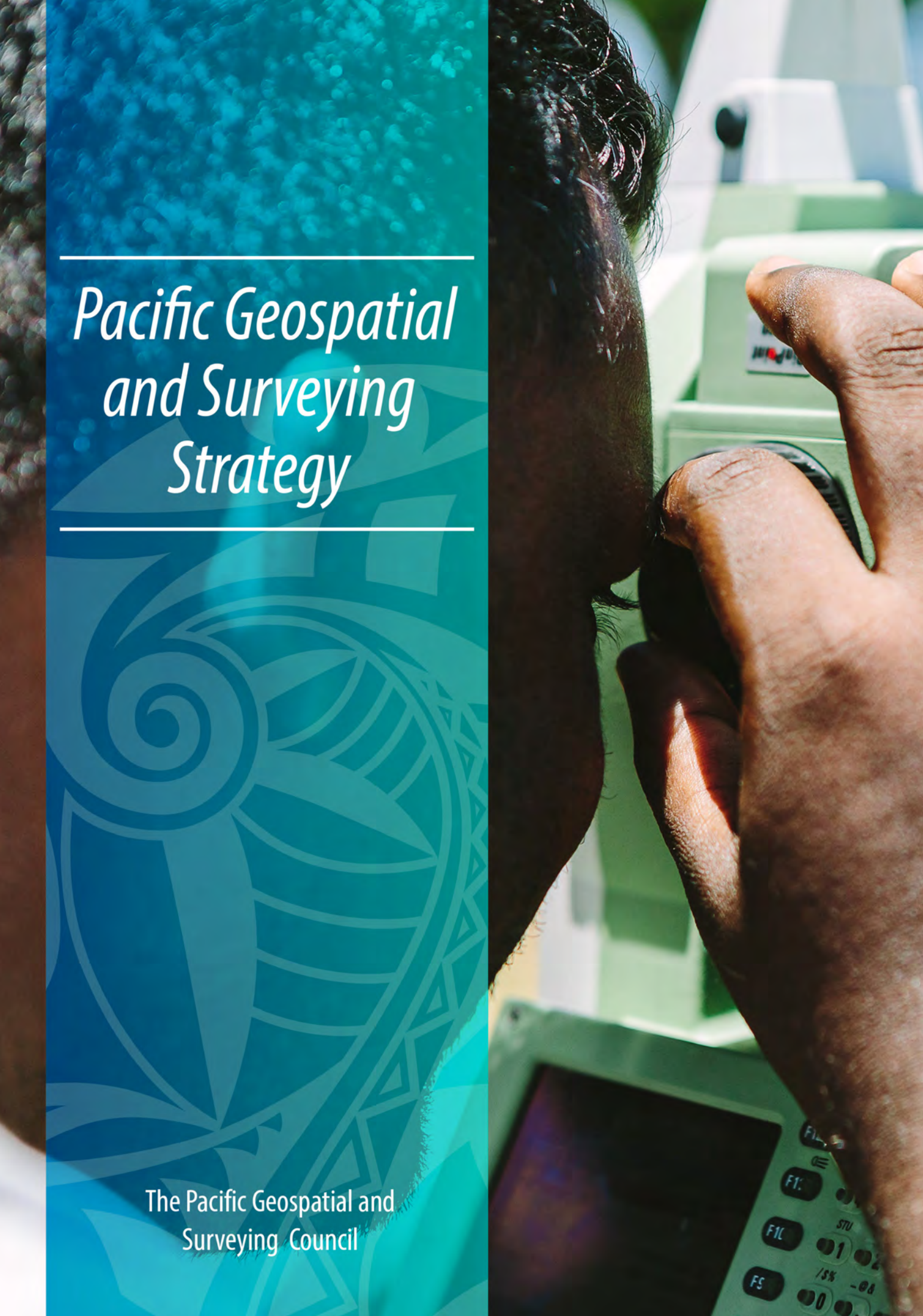
	TITLE	OUTCOMES/PRIORITIES ALIGNED WITH THE STRATEGY
Sendai Framework for Disaster Risk Reduction 2015 - 2030	**Sendai Framework for Disaster Risk Reduction 2015-2030**	• Understanding disaster risk • Strengthening disaster risk governance to manage disaster risk • Investing in disaster risk reduction for resilience • Enhancing disaster preparedness for effective response and to 'Build Back Better' in recover, rehabilitation and reconstruction
UNITED NATIONS ESCAP Economic and Social Commission for Asia and the Pacific	**Strategic Framework for 2016-2017**	• Improved policies for integrating environment into development, management of energy and water resources for urban development • To enhance the contribution of information and communications technology connectivity, space applications and disaster risk reduction strategies and management to the achievement of inclusive, sustainable and resilient development in Asia and the Pacific • To strengthen regional cooperation and integration in line with the development priorities of the Pacific subregion in order to accelerate progress towards attainment of internationally agreed development goals to achieve inclusive and sustainable development
FAO FIAT PANIS	**Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries, and Forests 2012**	• Improve tenure governance by providing guidance and information on internationally accepted practices for systems that deal with the rights to use, manage and control land, fisheries and forests • Contribute to the improvement and development of the policy, legal and organizational frameworks regulating the range of tenure rights that exist over these resources • Enhance the transparency and improve the functioning of tenure systems • Strengthen the capacities and operations of implementing agencies, judicial authorities, local governments, civil society, private sector, academia and all other persons concerned with tenure governance as well as to promote the cooperation between the actors mentioned

	TITLE	OUTCOMES/PRIORITIES ALIGNED WITH THE STRATEGY
UN HABITAT UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME	**UN-Habitat Strategic Plan 2014-2019**	• Vision: UN-Habitat promotes the stronger commitment of national and local governments as well as other relevant stakeholders to work towards the realization of a world with economically productive, socially inclusive and environmentally sustainable cities and other human settlements. • Goal: Well-planned, well-governed and efficient cities and other human settlements with adequate infrastructure and universal access to employment, land and basic services, including housing, water, sanitation, energy and transport. • Focus area 1: urban legislation, land and governance • Focus area 2: urban planning and design • Focus area 3: urban economy • Focus area 4: urban basic services • Focus area 5: housing and slum upgrading • Focus area 6: risk reduction and rehabilitation • Focus area 7: research and capacity development • Cross-cutting issues: Gender, Youth, Climate Change, Human Rights
ISLAND VOICES GLOBAL CHOICES Small Island Developing States SAMOA PATHWAY SAMOA PATHWAY Outcome of Third International Conference on SIDS	**SIDS Accelerated Modalities of Action (SAMOA) Pathway 2014**	• Sustained and sustainable, inclusive and equitable economic growth with decent work for all • Climate change • Disaster risk reduction • Sustainable energy • Ocean and seas • Water and sanitation • Sustainable transportation • Sustainable consumption and production
FIG	**FIG** **Suva Statement on Spatially Responsible Governance 2013** **FIG Christchurch Declaration - Responding to Climate Change and Tenure Insecurity in Small Island Developing States 2016**	• Confirm the role of national professional organizations for responsible inputs and contributions towards the preparedness of the surveying profession to respond and address the challenges in the region including coastal zones management, marine and climate related issues • Confirm the importance of and the need for strengthening and modernizing the geodetic framework • Confirm the importance of legislation, institutions, common standards and frameworks

	TITLE	OUTCOMES/PRIORITIES ALIGNED WITH THE STRATEGY
		• Confirm the need for partnership, to share and collaborate to reduce duplication in these efforts • Confirm the need for capacity and professional development including strengthening of teaching and training institutions • Climate change Challenges and Risk of Natural Disasters in SIDS • Rapid Urbanisation • Improved Land Governance
	**Framework for Resilient Development in the Pacific 2017-2030**	• Strengthened integrated adaptation and risk reduction to enhance resilience to climate change and disasters • Low-carbon development • Strengthened disaster preparedness, response and recovery
	**Framework for Pacific Regionalism 2014**	• Sustainable development that combines economic, social and cultural development in ways that improve livelihoods and well-being and use the environment sustainably • Economic growth that is inclusive and equitable • Strengthened governance, legal, financial, and administrative systems • Security that ensures stable and safe human, environmental and political conditions for all

The relevant outcomes and priorities listed are not exhaustive. They serve as examples of how the national responsibilities of survey and geospatial management correspond to broader regional and international initiatives, and how these contribute toward sustainable development.

Pacific Geospatial and Surveying Strategy



The Pacific Geospatial and Surveying Council

II. PACIFIC ISLANDS GEOSPATIAL AND SURVEYING STRATEGY

VISION: Sustainable development in the Pacific Islands region enabled by world-class geospatial information and surveying services.

LONG-TERM GOAL: Pacific Island survey and geospatial services are sufficiently resourced to respond to member country needs and geospatial requirements for sustainable development.

GOAL 1: The PGSC enables regional leadership, guidance and support for members to engage stakeholders and the community on geospatial and surveying activities.

Long-term Outcome 1 focuses on regional governance, highlighting the role of the PGSC to enhance, coordinate and guide the development of geospatial and survey services in the Pacific. This goal also recognises that stakeholder and community engagement are required to improve awareness and catalyse action. Expected intermediate outcomes include:

Outcome 1.1 Increased engagement, communications, information sharing, support and coordination between

practitioners within a 'community of practice.'

Outcome 1.2 Enhanced visibility of geospatial and surveying activities and contributions at community, national, regional and global levels.

Outcome 1.3 Improved understanding of and commitment to the role of geospatial information and surveying on the part of government decision makers.

GOAL 2: Countries across the region adopt a modern Geodetic Reference Frame (GRF) and improved technology underpinning geospatial systems and applications.

Long-term Outcome 2 reinforces the vital role of accurate positioning in economic and social development and national planning processes. Transitioning to the standard global coordinate system is an involved process and requires significant investment on the part of individual countries, but it is a requirement in order for countries to participate in the increasingly global systems of industry, trade, transport, tourism, geospatial monitoring and mapping. Upgrades to current geodetic infrastructure, technology, and data management are required steps in this process. Expected intermediate outcomes include:

Outcome 2.1 Strengthened national geospatial and surveying legislation.

Outcome 2.2 Improved national geospatial and surveying information management.

Outcome 2.3 Members' geospatial and surveying technology, software and geodetic infrastructure are upgraded, maintained, and appropriate training provided.

Outcome 2.4 Members modernise their respective GRFs.

GOAL 3: Geospatial and surveying activities at the national and regional level are supported by a diverse and sustainable resource base.

Long-term Outcome 3 recognises that the geospatial and surveying sector requires investment to ensure national development priorities can be achieved. It also advocates for increased support by Pacific governments. This can be accomplished both by reallocating existing sources of funding and seeking out new sources of donor assistance. In addition to the related outcomes under Long-term Outcome 1, the following Intermediate Outcomes are expected:

Outcome 3.1 Enhanced engagement and collaboration with UN, international, regional, national and private sector partners.

Outcome 3.2 Increased diversity of funding sources resources for member-determined priorities from diverse sources.

GOAL 4: The geospatial and surveying community is self-reliant with a culture supportive of learning innovation and gender equity.

Long-term Outcome 4 captures the PGSC members' ambition to strengthen the geospatial and surveying workforce across the region. This requires not only increasing the number of surveyors and geospatial professionals trained and retained in the region, but also boosting professional development and educational opportunities for developing those skills and promoting the career path. The PGSC also aspires to provide equitable access for youth and women to pursue careers in geospatial management and surveying. The Intermediate Outcomes expected include:

Outcome 4.1 Increased access to career development and educational opportunities for regional geospatial professionals and surveyors.

Outcome 4.2 Increased number and improved retention of qualified geospatial professionals and surveyors.

Outcome 4.3 Increased gender, cultural and age diversity amongst surveyors and geospatial professionals.

The theory of change diagram below summarises the intermediate and long-term changes the PGSC hopes to effect in the region, as well as some of the key indicative activities that will drive these changes.

Theory of Change

Vision

Sustainable development in the Pacific Islands region enabled by world-class geospatial information and surveying services.

Mission

Pacific Island survey and geospatial services, including hazard mapping, urban planning, cadastre mapping, hydrography and other geospatial requirements for sustainable development, are sufficiently resourced to respond to member country priorities.

Goals

1 The PGSC enables regional leadership, direction and support for member states to engage stakeholders and the community on geospatial and surveying activities

2 Countries across the region adopt a modern Geodetic Reference Frame (GRF) and technology underpinning geospatial systems and applications

3 Geospatial and surveying activities at the national and regional level are supported by a diverse and sustainable resource base

4 The geospatial and surveying community is self-reliant with a culture supportive of learning innovation and gender equity

Outcomes

- Increased engagement, communications, support and coordination between practitioners within a 'community of practice'
- Enhanced visibility of geospatial and surveying practices at community, national, regional and global levels
- Improved understanding of and commitment to the role of geodetics on the part of government decision makers
- Strengthened national geospatial legislative frameworks
- Improved national geospatial data management and data recovery systems
- Members' geospatial technology, software and geodetic infrastructure are upgraded
- Agreements are formed with members to modernise GRF
- Increased resources for member-determined priorities from diverse sources
- Increased engagement with international organisations
- Increased access to career development and educational opportunities for regional surveyors and geospatial professionals
- Increased number and retention of qualified surveyors/ geospatial staff
- Improved gender and age balance of surveyors/ geospatial staff

Indicative Activities

- Organise and participate in PGSC meetings and facilitate communications and collaboration between members
- Support partnerships with international organisations and donors
- Facilitate development of a regional geodetics curriculum and establishment of scholarships, some specifically for women and youth
- Support development of national plans covering workforce, infrastructure, legislation and other resources
  - plans based on mapping of existing infrastructure, legislation, resources and capacity
  - plans to include goals, means to track progress and priorities for engaging partners
- Support national and regional campaigns aimed at decision-makers to emphasise importance of services, infrastructure and workforce development
- Establish PGSC Working Groups to oversee development of priority areas for regional collaboration

THE PACIFIC GEOSPATIAL AND SURVEYING COUNCIL STRATEGY 2017-2027

ASSUMPTIONS

The logical hierarchy presented in this theory of change relies on a number of assumptions. These include:

- Improved access to and understanding of more accurate information and evidence in a variety of user-friendly formats will result in more informed and improved decision-making.
- Increased visibility of geospatial and surveying applications will attract more donor funding.
- Promoting the importance of geospatial information and surveying via targeted communications methods and materials will influence the target audience's perception and ultimately their decision-making.
- Enhanced educational and career development opportunities will motivate more young people and women to pursue and maintain careers in surveying and geospatial management.
- Improved regional coordination, regular meetings, targeted trainings, and exposure to international for a will help develop regional geospatial and surveying leadership.
- Increased investment in critical geodetic infrastructure underpins the ability of the region to build resilience against climate change and disaster risk.
- Development partners will continue to support Pacific Island development.

SUPPORTING EVIDENCE

Given the indicative activities in Section III, progress toward the Strategy Goals is expected based upon past experience and successes at the regional and national level with other similar technical and capacity building programmes. Some examples of these include:

ASSUMPTION	EXAMPLE	DETAILS
Improved access to more accurate information and evidence in a variety of user-friendly formats will result in more informed and improved decision-making	Tonga / SPC	Hazard maps based upon a tsunami model developed by SPC were used to generate evidence-based evacuation and disaster management plans for Nuku'alofa in 2013. These have been posted throughout the city, along with early warning sirens, and accompanying public awareness campaigns have been conducted.
Increased visibility of geospatial and surveying applications will attract more donor funding	Pacific Meteorological Council (PMC) / Pacific Islands Meteorological Strategy (PIMS)	Prior to the establishment of the Pacific Meteorological, Pacific National Met Services (NMS) were often isolated within their respective governments, perceived as technical data gatherers and service providers. With the development of the PIMS, the PMC has promoted the value of robust Meteorological information and services to support integrated development within countries. NMSs are now attracting much more donor visibility, capacity building and funding.

ASSUMPTION	EXAMPLE	DETAILS
Promoting the importance of geodetic surveying via targeted communications methods and materials will influence the target audience's perception and ultimately their decision-making	Fiji	In 2015, during the annual national conference on Lands and Geospatial Information, Fiji Lands & Survey presented an audience-targeted campaign to the Prime Minister, arguing on behalf of the importance of transitioning to a modern geodetic datum. This proposal was funded at the same meeting and the work is currently underway.
Enhanced educational and career development opportunities will motivate more young people to pursue careers in surveying and geospatial management	USP	When regional programmes and scholarships for geomatics and surveying existed at USP in the past, there were more trained surveyors in the region than at present. Scholarships are typically implemented by Pacific governments to ensure sufficient continuity across a variety of professions.
Improved regional coordination, regular meetings, trainings, and exposure to international fora will help develop regional geospatial and surveying leadership	PGSC / COSPPac Project	Since the establishment of the PGSC, there has been increased recognition of the importance of geospatial and surveying services to the Pacific Sea Level Monitoring project. Since 2015 there have been 3 positions for PGSC members added to the Committee, including the PGSC Chair. This has resulted in increased appreciation for the work of geospatial professionals and surveyors and increasing opportunities to participate in international for a, such as the UN-GGIM AP Plenary in 2016.
Increased investment in critical geodetic infrastructure improves the ability of the region to build resilience against climate change and disaster risk	Pacific Sea Level Monitoring Tide Gauges and GNSS Stations	Since the installation of the tide stations in the early 1990s and the addition of the Continuously Operating Reference Stations in the early 2000s, there have been numerous additional benefits and applications beyond monitoring sea level. The data from these sites is used to derive global estimates of sea level change and increasingly it underpins all geospatial and surveying information and activity in the Pacific.
Development partners will continue to support Pacific Island development		Given the current international focus on supporting SIDS, Oceans, countries that are vulnerable to climate change, and the strategic value of supporting the Pacific region, there is strong evidence that development assistance for the Pacific will continue.

Indicative Activities

The Pacific Geospatial and Surveying Council

III. INDICATIVE ACTIVITIES

The tables below list activities in relation to each goal, alongside responsibilities and indicative timeframes.

IN RELATION TO GOAL 1: *The PGSC provides regional leadership, guidance and support for member states to engage stakeholders and the community on geospatial and surveying activities.*

INDICATIVE ACTIVITIES	LEAD	TIMEFRAME
Support members to document existing national capacity (personnel, legislation, infrastructure and other resources), priorities and draft of development plans	PGSC Partnership Desk PGSC members	2-3 years
Facilitate endorsement of charter by all members	PGSC members	1 year
Collate national priorities into a regional strategic plan and receive member endorsement	PGSC Strategic Plan working group PGSC members	1 year
Develop a communications plan for promoting and sharing the PGSC's Strategy	PGSC Partnership Desk	1-2 years
Provide technical support on geospatial and surveying matters to member state officials	PGSC Partnership Desk	As necessary
Engage stakeholders and promote the value of geospatial information and surveying to member state officials	PGSC Partnership Desk PGSC Members	1-2 years
Support the development and review of existing and new national strategies, work plans and the implementation of frameworks and legislation	PGSC Partnership Desk PGSC members	As necessary
Support the strategic alignment of the Strategy and activities with relevant regional strategies and frameworks	PGSC Partnership Desk	As necessary
Increase membership, participation and recognition in relevant international organisations	PGSC members	1 year
Develop communication strategies to engage international stakeholders and agencies for assistance and support funding	PGSC Partnership Desk PGSC members	3-5 years

IN RELATION TO GOAL 2: *Countries across the region adopt a modern Geodetic Reference Frame (GRF) and technology underpinning geospatial systems and applications.*

INDICATIVE ACTIVITIES	LEAD	TIMEFRAME
Promote the value of geospatial information and surveying among government decision makers	PGSC members	1-2 years
Support the design of national plans for modernising geodetic infrastructure	PGSC Partnership Desk	1 year
PGSC members	3-5 years	1 year
Review and support the strengthening of national legislation relevant to geospatial information and surveying	PGSC members	1-2 years

IN RELATION TO GOAL 3: *Geospatial and surveying activities are supported by a diverse and sustainable resource base.*

INDICATIVE ACTIVITIES	LEAD	TIMEFRAME
Share PGSC Strategy with potential partners in the private and public sector	PGSC Partnership Desk PGSC members	1-2 years
Every member to identify national geospatial and surveying priorities in collaboration with other national agencies and stakeholders	PGSC members	1-2 years
Every member to articulate their national priorities and how their work contributes to the broader government's work	PGSC members	1-2 years
Development of a resource kit to support members in mobilising national funding and resources	PGSC Partnership Desk PGSC members	2-3 years
Identify and coordinate access to existing and new external funding sources for national and regional activities	PGSC Partnership Desk PGSC members	2-3 years
Establish mechanisms for member collaboration, sharing of equipment and expertise	PGSC Partnership Desk PGSC members	3-5 years

IN RELATION TO GOAL 4: *The geospatial and surveying community is self-reliant with a culture of learning innovation and gender equity.*

INDICATIVE ACTIVITIES	LEAD	TIMEFRAME
Engage with tertiary institutions to identify and facilitate the opportunities for geospatial and survey students to attain higher qualifications at partner institutions	PGSC Partnership Desk PGSC members	1-2 years
Encourage government geospatial and surveying internships or short-term placements for high school graduates	PGSC members	2-3 years
Encourage national geospatial and surveying scholarships, some specifically for women and youth	PGSC members	2-4 years
Establish a young geospatial and surveyors network in the region	PGSC Partnership Desk	1-2 years
Communicate and promote to communities the importance, value and career opportunities of the geospatial and surveying profession	PGSC Partnership Desk PGSC members	2-3 years
Support the continued development of existing regional geospatial and surveying programs offered by technical institutes (e.g. USP, FNU, Solomon Islands National University, UniTech PNG, College of the Marshall Islands, FSM)	PGSC Partnership Desk PGSC members Educational Institutions Surveyors Boards	3-5 years
Organise ongoing professional training or career development opportunities with NZIS, GA, FIG, SSSI and other potential partners	PGSC Partnership Desk Regional partners	2-3 years
Seek to include more workshops and hands-on training for geospatial and surveying professionals as part of regional development projects	PGSC Partnership Desk	3-5 years
Submit national and regional success stories to the Asia Pacific Spatial Excellence Awards (APSEA)	PGSC Partnership Desk PGSC members	3+ years

Monitoring & Evaluation

The Pacific Geospatial and Surveying Council

IV. MONITORING AND EVALUATION

A set of performance questions has been developed in relation to the Strategy described above, to support ongoing monitoring and to guide periodic evaluation of the connections between the work of the PGSC and outcomes.

Based on these questions, listed below, PGSC members and PGSC Partnership Desk will report on progress at meetings of the PGSC.

A mid-term independent evaluation of the Strategy will be undertaken in 2022, to assist in its ongoing refinement and revision and to enable the lessons learnt over the first five years to inform the second five years of activities.

A second independent evaluation will be carried out in 2027, at the end of the Strategy, to identify evidence of change overall and links to the efforts described in this Strategy. Selected questions from the lists below will be used in the terms of reference for the evaluations, subject to agreement at the time.

The following performance questions are suggested as means for PGSC Partnership Desk and members to monitor progress and identify evidence of the achievement of outcomes.

These performance questions will also be used to guide discussions at each meeting of the PGSC as well as ongoing internal monitoring within the PGSC Partnership Desk. Discussion outcomes and evidence generated will be used to inform ongoing efforts and will be documented in meeting reports. A variety of tools may also be used to gather information, such as written or phone surveys, subject to available resources.

OUTCOME 1.1: Increased engagement, communications, support and coordination between practitioners within a 'community of practice.'

- Has adequate support been provided for members to document national priorities and identify opportunities to collaborate at national levels?
- Are priorities for regional collaboration agreed and opportunities being pursued?
- Are PGSC activities effectively coordinated?
- Is practitioner communication effective?

OUTCOME 1.2: Enhanced visibility of geospatial and surveying activities and contributions at community, national, regional and global levels.

- Is the benefit of geospatial and surveying activities understood by the community?
- Is there increased stakeholder engagement at the national level? Is the council actively engaging regional partners?
- Is there increased membership, participation and recognition in relevant international organisations?

OUTCOME 1.3: Improved understanding of and commitment to the role of geospatial information and surveying on the part of government decision-makers.

- Has an improved understanding of the role of geospatial information and surveying led to better government decision making?

OUTCOME 2.1: Strengthened national geospatial and surveying legislation.

- Is member geospatial and surveying legislation strengthened?

OUTCOME 2.2: Improved national geospatial and surveying information management.

- Is members' geospatial and surveying information management improved?

OUTCOME 2.3: Members' geospatial and surveying technology, software and geodetic infrastructure are upgraded, maintained, and appropriate training provided.

- Have countries geospatial and surveying technology, software, and geodetic infrastructure been upgraded in a useful and long lasting manner?
- Is the technology, software, and geodetic infrastructure being maintained?
- Is succession planning for staff in place with regards to training and understanding?

OUTCOME 2.4: Members modernise their respective GRFs.

- Are geodetic reference frames modernised?

OUTCOME 3.1: Enhanced engagement and collaboration with UN, international, regional, national and private sector partners.

- Are there more partners supporting PGSC activities? If so, who?
- Is there improved understanding of the value of geospatial information and surveying on the part of government decision makers and the private sector and civil society? What has worked well? What has been attempted but been unsuccessful?
- Are PGSC members participating in working groups and committees at all levels?

OUTCOME 3.2: Increased diversity of funding sources for member-determined priorities.

- Have funding resources for member activities increased?
- Has the diversity of funding sources for member activities increased?

OUTCOME 4.1: Increased access to career development and educational opportunities for regional geospatial professionals and surveyors.

- Have professional development opportunities for surveyors increased?
- Have professional development opportunities for geospatial professionals increased?
- Have educational opportunities for surveyors increased?
- Have educational opportunities for geospatial professionals increased?
- Has intra-regional collaboration increased?

OUTCOME 4.2: Increased number and improved retention of qualified geospatial professionals and surveyors.

- Is there an increase in qualified geospatial and survey professionals?
- Has retention of geospatial and survey professionals improved?

OUTCOME 4.3: Increased gender, cultural and age diversity amongst surveyors and geospatial professionals.

- Do our organisations and communities encourage diversity?
- Has the gender diversity of geospatial professionals and surveyors improved?
- Has the cultural diversity of geospatial professionals and surveyors improved?
- Has the age diversity of geospatial professionals and surveyors improved?

Appendices

The Pacific Geospatial and Surveying Council

ABBREVIATIONS

BoM	Bureau of Meteorology (Australia)
COSPPac	Climate and Oceans Support Program in the Pacific
DFAT	Department of Foreign Affairs and Trade (Australia)
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agricultural Organization
FIG	International Federation of Surveyors
FIS	Fiji Institute of Surveyors
FNU	Fiji National University
FRDP	Framework for Resilient Development in the Pacific
FSM	Federated States of Micronesia
GA	Geoscience Australia
GSD	Geoscience Division (SPC)
GRF	Geodetic Reference Frame
GGRF	Global Geodetic Reference Frame
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IGS	International GNSS Service
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
LINZ	Land Information New Zealand
NZIS	New Zealand Institute of Surveyors
MDGs	Millennium Development Goals
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
PILPA	Pacific Island Land Professionals Association
PICTs	Pacific Island Countries and Territories
PIDF	Pacific Island Development Forum
PIFS	Pacific Island Forum Secretariat
PGSC	Pacific Geospatial and Surveying Council
PNG	Papua New Guinea
PRNI	Pacific Regional Navigational Initiative
PSLM	Pacific Sea Level Monitoring
RMI	Republic of the Marshall Islands
RS	Remote Sensing
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SPC	The Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
SSSI	Australian Surveying & Spatial Sciences Institute
SWPHC	South West Pacific Hydrographic Commission
TOR	Terms of reference
UAV	Unmanned Aerial Vehicle (drone)
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UN-GGIM	United Nations Initiative on Global Geospatial Information Management
USP	University of the South Pacific
WMO	World Meteorological Organization

GLOSSARY

Aerial photography
Photography of part of the Earth's surface, but is not rectified to account for differences in scale throughout the photograph.

Altitude
Vertical angle between the plane of the horizon and the line to the object which is observed, in photogrammetry, altitude applies to elevation above a datum of points in space.

Azimuth
The horizontal angle measured from the meridian planes (i.e. a plane which contains the polar axis, being true north).

Bathymetry
Is the study of the "beds" or "floors" of water bodies, including the ocean, rivers, streams, and lakes. Originally referred to the ocean's depth relative to sea level, although it has come to mean "submarine topography," or the depths and shapes of underwater terrain and is the foundation of the science of hydrography, which measures the physical features of a water body. In the same way that topographic maps represent the three-dimensional features (or relief) of overland terrain, bathymetric maps illustrate the land that lies underwater. Variations in sea-floor relief may be depicted by colour and contour lines called depth contours or isobaths.

Benchmark
A permanent object, natural or artificial, displaying a marked point whose location position and elevation above or below an adopted datum is known.

Cadastral
A Latin term from cadastre referring to a registry of lands, Cadastral surveying is the process of determining and defining land ownership and boundaries.

Cadastral map
A map depicting land parcels and associated nomenclature.

Capacity
Your ability to do it, or the amount of it that you are able to do or the capacity of something such as a factory, industry, or region is the quantity of things that it can produce or deliver with the equipment or resources that are available.

Capacity mapping
Assessment of resources or capacity that is available or required to do.

Cartography
The art and science of the production of maps, this includes the construction of projections, design, compilation, drafting and reproduction.

Chart
Special purpose navigation maps chiefly used for nautical, aeronautical and mapping of the cosmos.

Control points
Are fixed points of known coordinates. This information provides only elevation or can include all coordinates. Control points are determined by high-accuracy surveys. In a less rigorous sense, control points for a construction project can be established conveniently around the project area using high-accuracy procedures. Such points would then be used throughout the project for referencing subsequent survey work (e.g. locating foundations, pipes).

Climate change
A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels; Melting glaciers imply that life in the Arctic is affected by climate change.

Climate variability
Climate, sometimes understood as the "average weather," is defined as the measurement of the mean and variability of

relevant quantities of certain variables (such as temperature, precipitation or wind) over a period of time, ranging from months to thousands or millions of years.

Electronic distance measurement (EDM)
This instrument measures distances using light or sound waves.

Elevation
The height above mean sea level.

Field notes
Field notes are a permanent record of field procedures and the data collected in those procedures.

Geocentric datum
A datum which has its origin at the Earth's centre of mass, this datum can therefore be used anywhere on the planet and be compatible with the same datum anywhere else on the planet.

Geodesy
The science which treats mathematically the shape and size of the earth; also, the branch of surveying in which measurements are made for determining the shape of the earth including precise horizontal and vertical positions on its surface. One branch of geodesy includes gravity forces.

Geodetic
Referred to or based on considerations of geodesy.

Geodetic Datum
A mathematical representation that best fits the shape of the Earth, accurate mapping and coordinate systems must be based on a datum. A new datum known as the Geocentric Datum of Australia (GDA) was introduced in 2000 to bring Australia in line with the rest of the world's coordinate systems. GDA is also totally compatible with satellite based navigation systems (e.g. global positioning Systems (GPS)). The previous datum used in Australia was known as the Australian Geodetic Datum (AGD). However, this was restricted because it was defined to best fit the shape of the Earth in the Australian region only. The change in datum had a major consequence to all coordinates. Both latitudes/longitudes and eastings/northings were shifted by approximately 200 metres in a north-easterly direction

Geographic information systems (GIS)
GIS is the spatial capture of themed data layers and the storing, analysing and displaying of the geographically referenced information. A GIS also includes the procedures, software, hardware, operating personnel and spatial data associated with the system.

Geodetic reference system
A geodetic datum or geodetic system is a coordinate system, and a set of reference points, used to locate places on the Earth (or similar objects).

Geodetic survey
A precise survey of considerable extent which takes into account the shape of the earth.

Geographical coordinates
A point on a map given as latitude and longitude readings, the values are given as degrees, minutes and seconds.

Geospatial
Relating to or denoting data that is associated with a particular location.

Geodetic Infrastructure
The geodetic infrastructure consists of two principal components: (1) the network of observation instruments for each geodetic observation technique; and (2) associated international services composed of the various scientists, technicians, and administrators that support each geodetic survey technique.

Global Positioning System (GPS)
GPS is a satellite based navigation system originally developed by the United States Department of Defence. A GPS receiver

calculates a position by measuring distances to 4 or more satellites of a possible 24. These orbit the Earth at all times.

Global Navigation Satellite System (GNSS)
A global navigation satellite system (GNSS) is a type of satellite navigation that provides global coverage. A GNSS is defined by a constellation of orbiting satellites working together with a network of ground control stations and receivers that calculate ground positions through an adapted version of trilateration. To date, operational GNSSs, the United States' NAVSTAR Global Positioning System (GPS), the Russian Federation's Global Navigation Satellite System (GLONASS), the European Union's Galileo, China's Compass or BeiDou-2 and Satellite Based Augmentation System (SBAS).

Grid
A group of parallel lines that run perpendicular to another group of parallel lines to form map coverage of squares.

Grid coordinates
A point on a map given as an easting and northing reading, the values are given in metres.

Hazard mapping
Is a process to represent that highlights areas that are affected by or vulnerable to a particular hazard. They are typically created for natural hazards, such as earthquakes, volcanoes, landslides, flooding and tsunamis. Hazard maps help prevent serious damage and deaths.

Hydrography
Includes not only bathymetry, but also the shape and features of the shoreline, including rivers, streams, lakes, swamps and other water related features. The characteristics of tides, currents, and waves; and the physical and chemical properties of the water itself.

Latitude
The angular distance along a meridian measured from the Equator, either north or south.

Longitude
The angular distance measured from a reference meridian, Greenwich, either east or west.

Magnetic North
The direction from a point on the Earth's surface to the North Magnetic Pole, the difference between magnetic north and true north is referred to as magnetic declination.

Map
A representation of the Earth's surface where constituencies and related nomenclature are portrayed to a specific format.

Map projection
A means of systematically representing the meridians and parallels of the Earth onto a plane surface.

Map scale
The relationship between a distance on a map and the corresponding distance on the Earth's surface.

Mark
An object (e.g. an imprinted metal disc) used to designate a survey point. It is usually associated with terms such as reference mark, azimuth mark or bench mark.

Mosaic
A number of continuous aerial photographs overlapped and joined together by way of best fit to form a single non-rectified image.

Orthophoto
Aerial photograph images transformed using an orthophoto verification process to remove distortions and capable of registering perfectly with cadastral data.

Overlay
Information recorded on a transparent medium, superimposed and registered to one or more other records.

Photogrammetry
The science of obtaining reliable measurements by photography.

Rectification
The mathematical and calculated correction made to an aerial photograph to show its true ground position at a consistent scale.

Position
A position of a point on the surface of the earth expressed in terms of geodetic latitude and geodetic longitude. A geodetic position implies an adopted geodetic datum. In a complete record of a geodetic position, the datum must be stated.

PGSC Charter
A document formally recognizes the prerogative of the recipient to exercise the rights specified issued by the Pacific Islands Country governments Geospatial Scientists and Surveyors for geospatial and surveying activities.

Spatial Information
Data that has a geographical reference to a location on the Earth's surface, this includes latitude and longitude co-ordinates, street address and lot number on plan.

Survey
The process of recording observations, making measurements, and marking the boundaries of tracts of lands.

Survey plan
A plan of subdivision (or survey plan) is a plan prepared for the purpose of formally changing the boundaries of land. A plan of subdivision can only be prepared by a surveyor, and must be prepared in accordance with the requirements of the Titles Registry.

Surveyor
The person who practises science or art of making the measurements necessary to determine the relative position of points or above, on, or beneath the surface of the earth.

Sustainable Development
Is the organizing principle for meeting human development goals while at the same time sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which the economy and society depends.

Theodolite
Instrument used by a surveyor for measuring horizontal and vertical angles.

Topographic map
A detailed representation of cultural, hydrographic relief and vegetation features. These are depicted on a map on a designated projection and at a designated scale.

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