



# UNITED NATIONS GLOBAL GEODETIC CENTRE OF EXCELLENCE

## MODERNISING GEOSPATIAL REFERENCE SYSTEM CAPACITY DEVELOPMENT WORKSHOP

### Identifying capacity development needs in geodesy for the region

**Ryan Keenan**  
Senior Consultant for UN-GGCE

**Day 2, Session 4** [2\_4\_1]

*Acknowledgements: Albert Momo (USA); Andrick Lal (FIJ); Eva-Marie Unger-Morscher (AUT); Christopher Byren (SWE); John Gitau (NIG); Ryan Keenan (AUS); Vaipo Mataorta (FIJ); Meizyanne Hicks (FIJ); Zuheir Altamimi (FRA);*

# Overview of Capacity Development

What it is and what forms does it take?

Why is it needed?

How it does it happen?

Who initiates it?

Case Study examples (Country and Region)

Useful Links, Insights and Resources

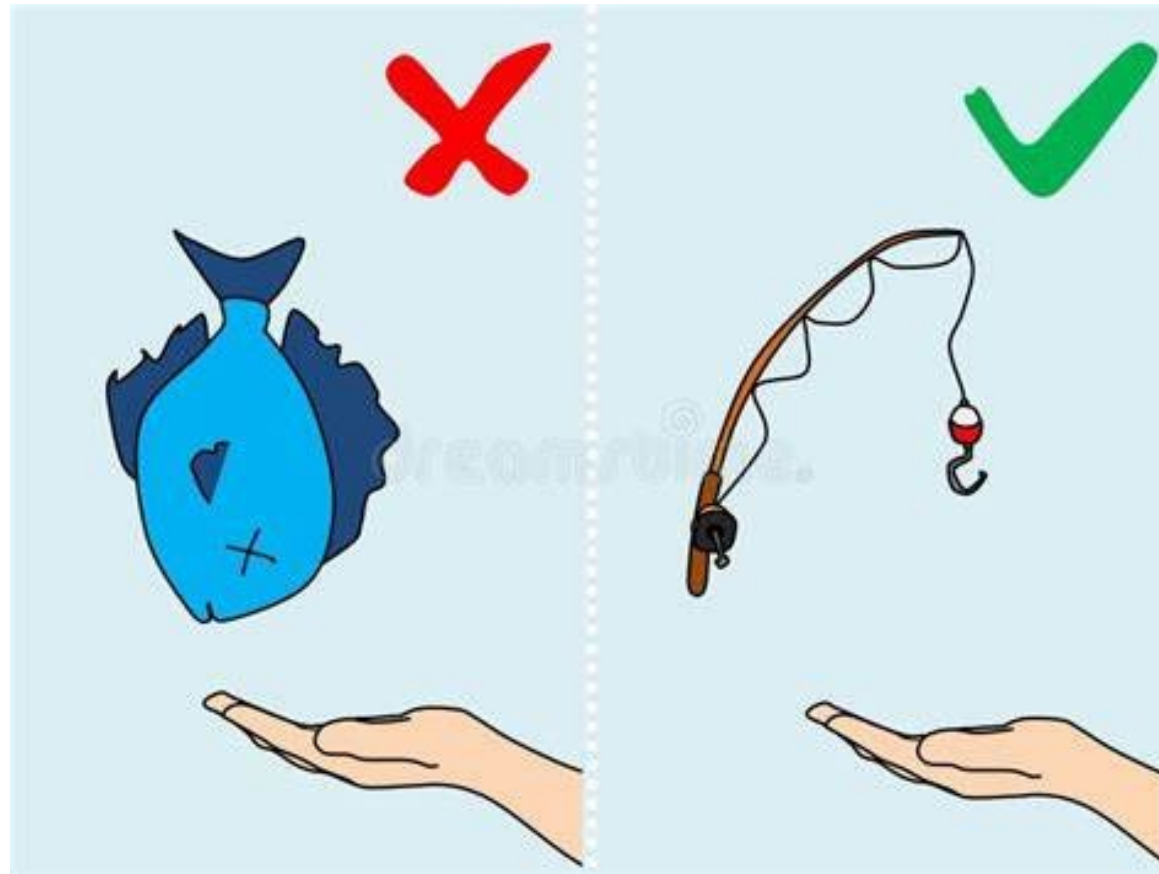
Communications and Marketing



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# Capacity Development - What and Why?

What is it?

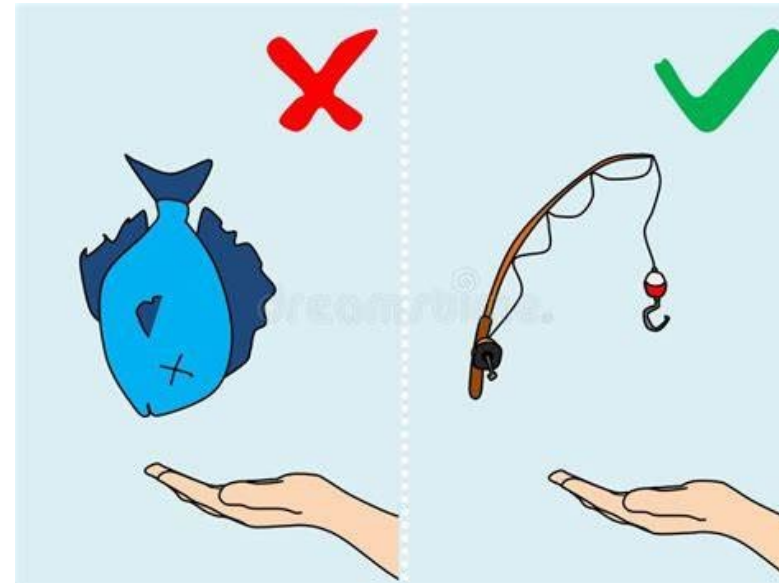


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# Capacity Development - What and Why?

**What is it?** It is assistance (formal and/or informal) comprising....

- Resources...
  - Human
  - Fiscal
  - Equipment
  - Expertise
  - Data
  - Policy
  - Time



**Why is it needed?**

- Because an 'organisation' may not possess a sufficient amount of resources (or capability) to do it by themselves
  - It can also be stated as 'lack of capacity'
- Because groups wish to learn, network and collaborate

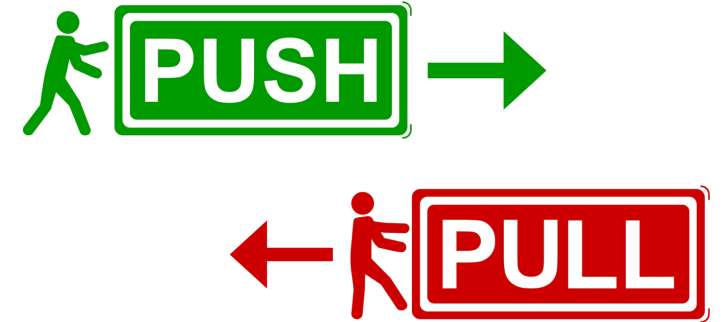


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# Capacity Development - How and Who starts?

## It depends ....

- Those with the spare capacity, can offer it to the community (..PUSH)
- Organisations requiring it, can request it (..PULL)



## Often summarised as:

- Knowledge Transfer (KT)
- CapDev (CD)
- Education, Training and Capacity Building (ETCB)
- Outreach and Engagement (OE)

Not all capacity development is between two parties  
... it can also be 'Inreach' - internal to an organisation



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# Capacity Development - Geodesy Crisis

## Geodesy Crisis ....

- Lack of geodesists?
- Lack of resources?
- Lack of funding?
- Lack of support?
- Lack of understanding?
- Lack of interest?

All of the above!! Plus more!



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# Capacity Development - Some Sources

## Various Examples (internal and external)

- Institutional / Agency
  - United Nations - UNDP; UN-GGIM; UNOOSA; UN-GGCE;
  - World Bank Group (WBG)
  - Development Banks - ARDB (Asian Regional Development Bank)
- Academic
  - UN GGIM Academic Network
  - IAG Early Career Scientists
- Corporate and Foundations
  - The Gates Foundation.....
- Community of Geospatial Science and Associations
  - IUGG, IAG; FIG .....

*More information in the Business Cases session*



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# Capacity Development Sources - Institutional Risks

USAID disbursed US\$72 billion in fiscal year 2023, the most recent full year for which information is available.

**USAID was suspended in January 2025..... This action has triggered global repercussions, with unknown consequences both in terms of scale and coverage**

An official website of the United States Government [Here's how you know](#)

## 2021-2025 ARCHIVED CONTENT

You are viewing ARCHIVED CONTENT released online from January 20, 2021 to January 20, 2025.

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## The President's Fiscal Year 2024 Budget

FACT SHEET

OFFICE OF THE SPOKESPERSON

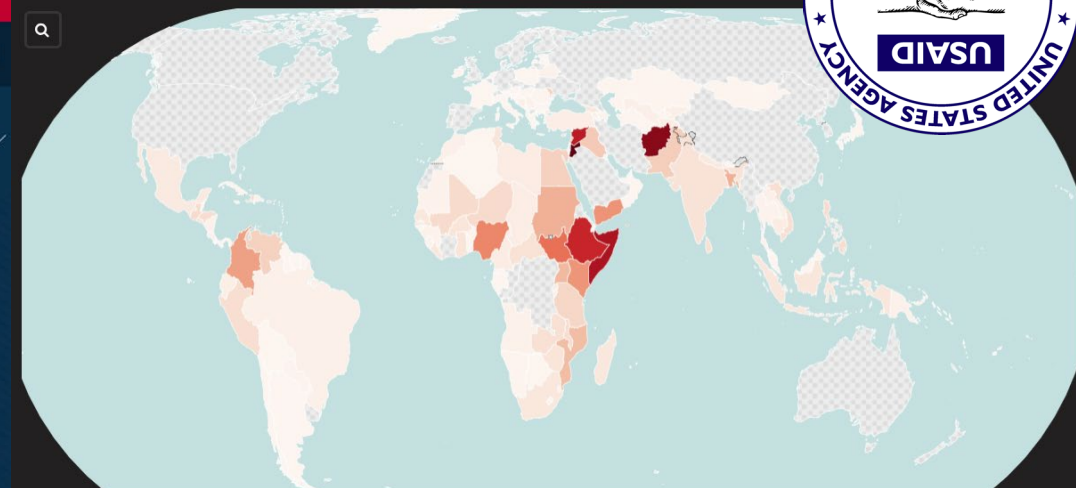


MARCH 9, 2023

## USAID Distribution

Disbursement 2023

8568 1,197,604,198



Source: [U.S. government](#)

<https://www.newsweek.com/usaids-map-counties-most-money-202507>

The Budget makes critical, targeted investments in the American people that will promote greater prosperity and economic growth for decades to come. At the Department of State and USAID, the Foreign Affairs Budget will

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# Capacity Development - Case Studies

The following section will feature examples of CapDev in different countries and regions

Purpose is to provide:

- **Evidence** – capacity development does work!
- **Motivation** – it can be done ... with a little effort to start
- **Inspiration** – as to how this could be done for your member state/region

Present a number of Case Studies where Capacity Development activities have been provided between countries, across regions, and internationally

*Note 1: for these studies: the Capacity, the forms, the providers and the levels of collaboration.*  
*Note 2: not all are exclusively geodesy, most are a combination of capabilities that complement each other.*

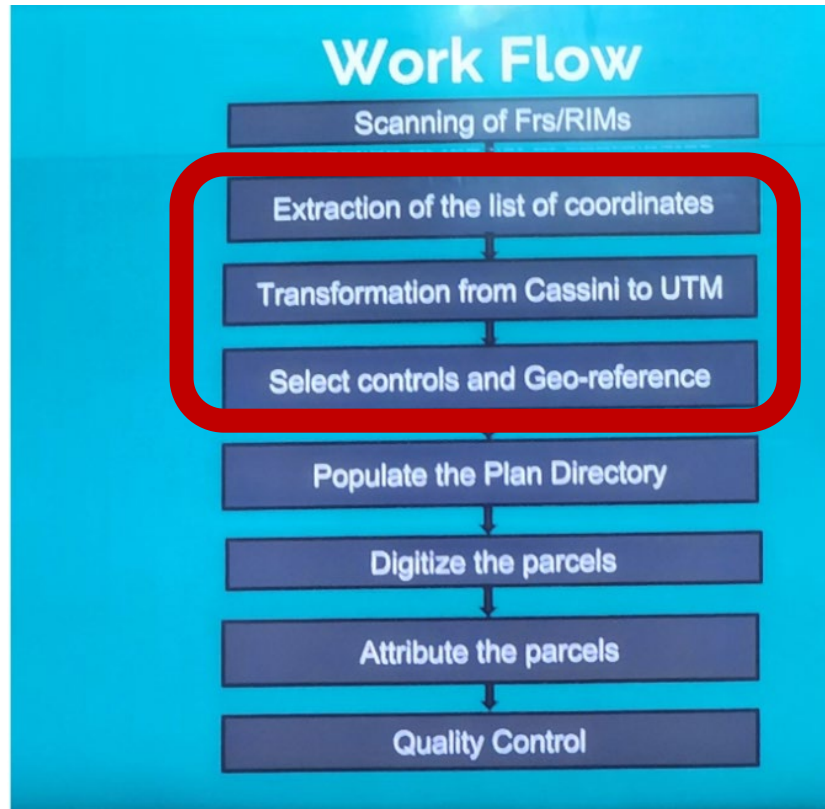


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# CapDev – Kenya – Land Administration

## The long road to digitization in Kenya | GIM International - January 2025\*

By Dennis Mbugua Muthama, Catherine Gateri



*A visualization of the spatial data digitization workflow (captured during the Ardhisasa stakeholder meeting and training presentation in July 2024).*

Geodetic-related activities  
required within this workflow....

Transformations and geo-  
referencing



\*<https://www.gim-international.com/content/article/the-long-road-to-digitization-in-kenya>

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## Data Collection – Observations





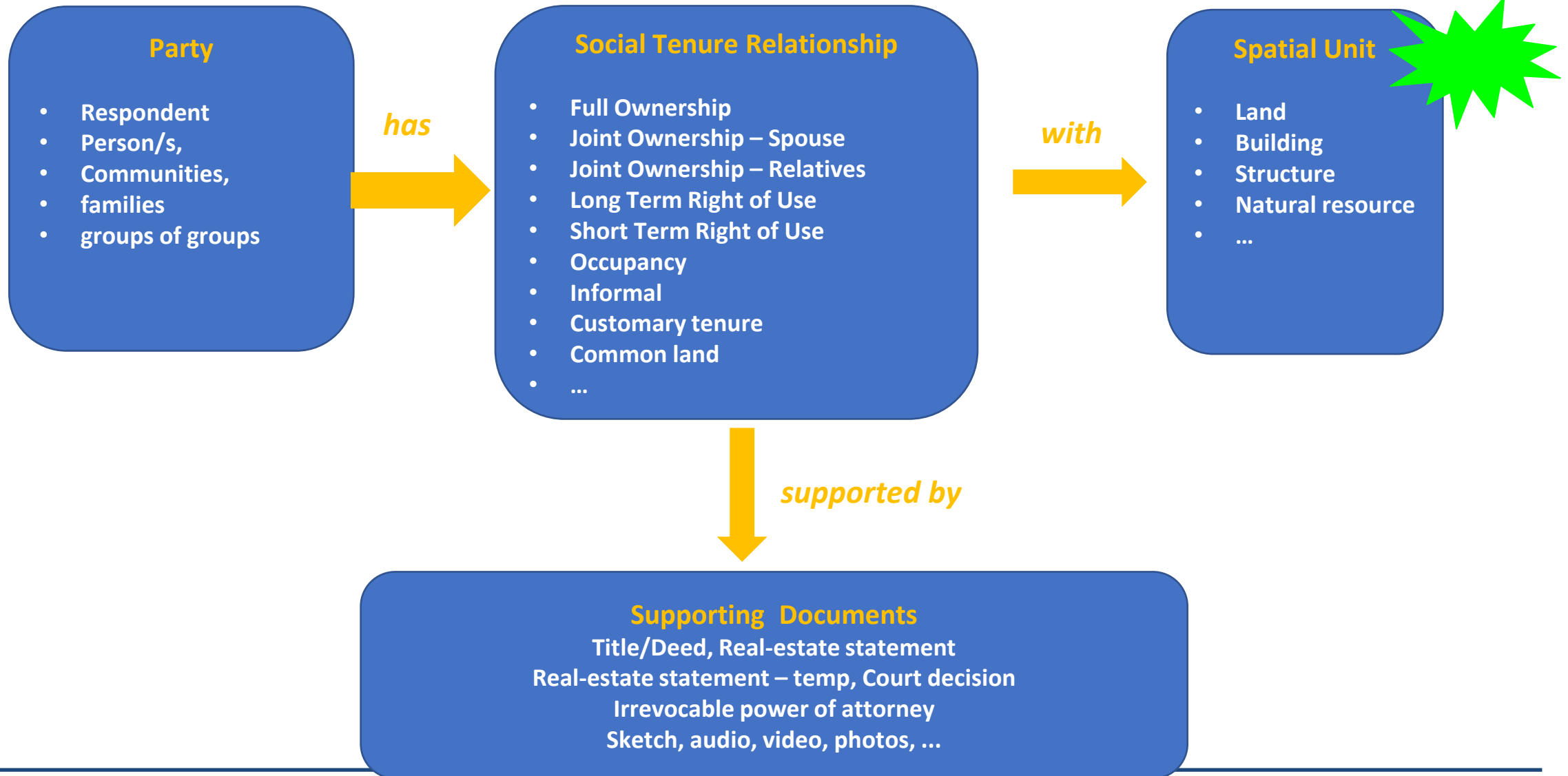
## Data Collection – Observations

**When we are discussing about accuracy and precision, let's not forget about the reality on the ground!**

**Besides accuracy and precision, the neighbors agreement is the key!**

**In the case of Chad, the role of the community/village leader!**





# CapDev – New Approaches in Land Admin

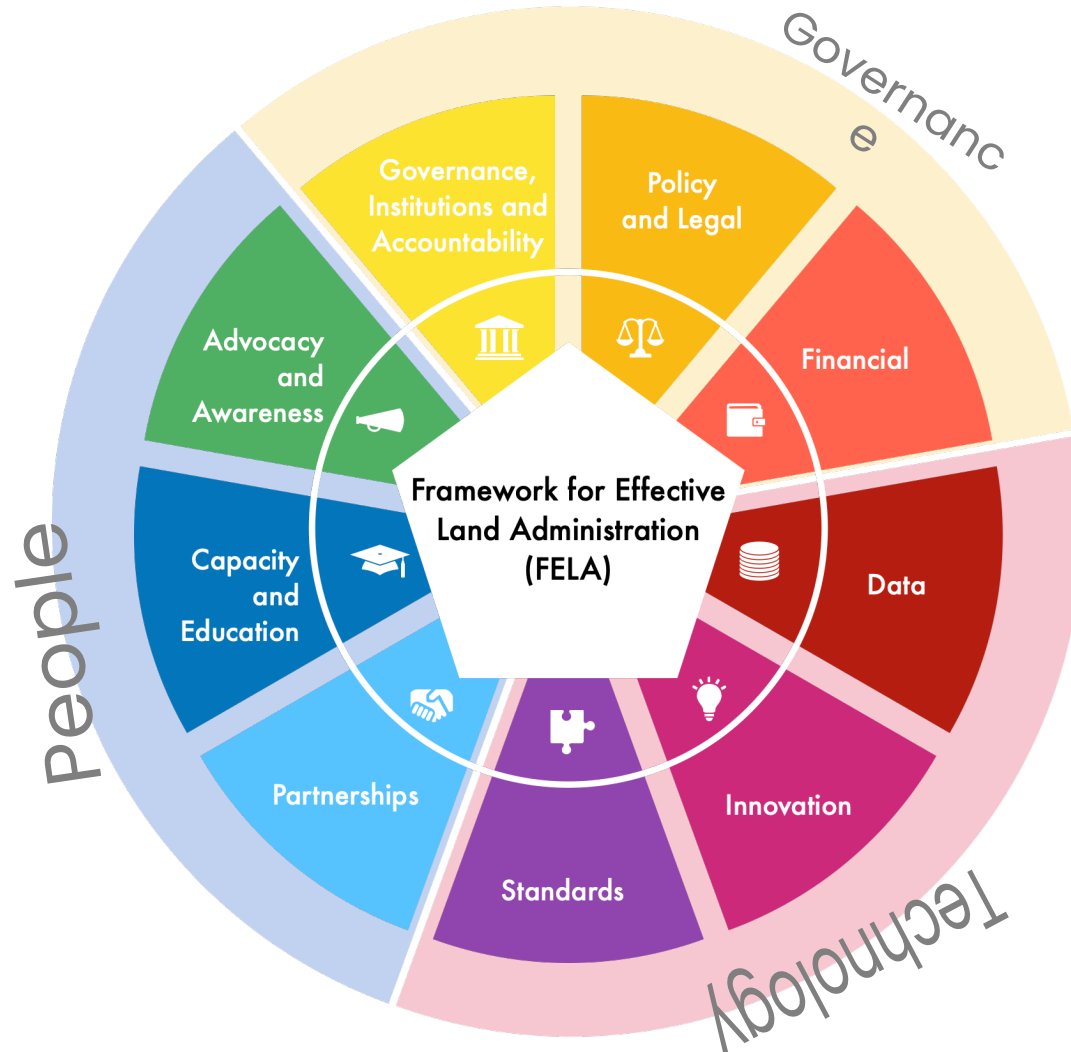
First of all, in Land Administration, the Global Land Tool Network (GLTN) is a **unique network that bring together NGOs, CSOs but also governments and industry.**

A lot of focus of GLTN is on **Capacity Development through in country work, publications, webinars and regional events/workshops** – a lot of the CD is also happening in cooperation with FIG and other Network partners.

That's also how STDM - Social Tenure Domain Model - was developed (itself based on **ISO LADM**).

STDM is used in informal setting – and can bring benefits to communities in need – that can for example not be registered/mapped by the government (because it is informal).

# FELA – the Framework for Effective Land Administration



- Adopted at 10th Session of UN-GGIM
- Global Framework for Land Administration

## Application in Chad

- Used to raise awareness within leadership (link to SDGs and 2030 Agenda)
- Used to develop guidance (baseline assessment prior and impact assessment post field work)
- Supported assessment 'As Is' Situation and the 'Wants to Be' Situation



# INTERNATIONAL COOPERATION

- **Rwanda (Capacity Development in Land Management 2022-2027)**
- **Serbien (SmartSDI, 2022-2025)**
- **Bosnien Hercegovina (Digital Enhancement of Land Management for the European Future of Bosnia and Herzegovina, 2023-2027)**
- **ITP Applied Land Governance**
  - **LZ (Liberia Zimbabwe, 2021-2025)**
  - **3 I I (Rwanda, Uganda, Tanzania, Kenya, Zambia, 2016-2025)**
- **Liberia (Development for Delivery of Sustainable Land Services, 2024-2027)**
- **Mocambique – Feasibility Study**



# Pacific Geospatial and Surveying Council (PGSC)

## Partnership Desk

**MISSION:** ensure 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.

Supported through Australian Government's Climate and Support Program in the Pacific (COSPPac), PGSC acts as the regional hub in expertise of applied geoscience, surveying and geospatial technology.



Pacific  
Community  
Communauté  
du Pacifique



Australian Government



# PGSC Partnership Desk - Roles..



1. Facilitating Collaboration and Partnerships; Global & Regional Collaboration, Technical Assistance, Capacity Building
2. Supporting Sustainable Development Goals (SDGs); Geospatial Data, Surveying Techniques and Tools
3. Promoting Data Sharing and Standards; Data Management, Standards and Protocols
4. Disaster Risk Management and Climate Change Adaptation
5. Building Geospatial Infrastructure
6. Advocacy and Awareness
7. Providing Technical and Financial Resources
8. Supporting Maritime and Oceanographic Surveys



# Communications & Community



## Pacific Geospatial and Surveying Council

Public group · 1.3K members

<https://www.facebook.com/groups/3998884766792177/>



Home > Updates from SPC > Web Stories

## Mapping our Pacific Geospatial Future

Suva | 21 June 2022



Imagine a world without maps. It's hard to do. Humans are born map-makers, instinctively looking for landmarks, making sense of patterns, and forming connections when we venture beyond our known environment.

For this reason, geospatial science may be one of the most important fields of study you have ever heard of. Geospatial information is location information. At its simplest, this can be topographical information found on a map. But you can also add in layers of location-tagged data, to show changes or trends, for example, in land use, population density, vaccine distribution, or coral reef health over time.

"If you look at Fiji's national development plan, there are so many areas where geospatial information comes in. There are calls for geospatial information to be used in a variety of ways, from land use planning to disaster risk reduction."



### Feature

modernization programs in CMA, there are also other institutions that will require assistance, such as:

- Revision of legislation of the National Lands Act, and relevant survey and mapping legislation
- Revision of the National Surveying and Mapping Act
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Embracing challenges through Partnerships, Pacific Geospatial and Surveying Council (PGSC) and the Pacific Community (PC) By: Andrea Lai, Senior Geomatics Engineer

In November 2014, a group of Pacific regional surveying and geospatial experts met in the margins of the annual Pacific Geospatial Information Systems and Remote Sensing (PGIS) User Conference in Suva, Fiji. It was at this meeting that the PGSC was first conceived and a charter governing its mission and objectives was developed. In addition, the Pacific Community (PC) endorsed the Pacific Geospatial and Surveying Council Partnership to provide accurate surveying and mapping services to the Pacific region, and to support the PGSC in achieving its goals and objectives.

Today, the PGSC is an independent organization that provides a forum for Pacific Island geospatial professionals to share knowledge and address regional challenges. The PGSC aims to enhance the capacity of regional and international organizations, agencies and individuals in the Pacific region to use geospatial information and technology to support sustainable development and global development objectives for sustainable development in the Pacific region.

The 14 country members of the PGSC are: Australia, Cook Islands, Fiji, French Polynesia, Kiribati, Marshall Islands, Micronesia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Tonga, and Vanuatu.

### Modern Geospatial Infrastructure - Key to Consistency and Efficiency

By: Joseph Kase, Senior Surveyor, Auckland, New Zealand

Fiji is highly vulnerable to natural disasters such as cyclones, coastal erosion, and flooding due to climate change and subsequent sea level rise. These natural disasters have led to the loss of lives and property, and the destruction of infrastructure. It is therefore critical for Fiji to enhance the resilience of its infrastructure and to ensure that it is able to withstand the impacts of natural disasters and climate change.

Barriers to disaster preparedness, building resilience, and ensuring the continuity of essential services are the lack of accurate and up-to-date geospatial data, the lack of skilled personnel, and the lack of resources. The PGSC is working to address these barriers by providing technical assistance and training to the Pacific region, and by promoting the use of geospatial information and technology in disaster preparedness and response.

Underpinning these activities, Fiji requested the world and international community to support the development of a consistent, comprehensive and modernized geospatial infrastructure, framework, and positioning network.

By achieving a modernized datum, Fiji has embraced the challenges and opportunities of modern geospatial infrastructure.

### Geospatial Surveying Stations

Geospatial Surveying Stations are part of the Pacific Geospatial and Surveying Council (PGSC) network. These stations are used to collect geospatial data and to provide a reference for other geospatial data. The PGSC is working to establish a network of geospatial surveying stations across the Pacific region, and to ensure that they are accurate and reliable.

The PGSC is also working to establish a network of geospatial surveying stations across the Pacific region, and to ensure that they are accurate and reliable.



# PGSC Partnership - Activities



- UN-GGIM Integrated Geospatial Information Framework **IGIF Deep Dive Session**; November 2024
- UN-GGCE International Workshop on the Integration of Terrestrial, Maritime, Built, and Cadastral Domains: **“Joining Land and Sea”**; December 2024
- FIG Working Week (Brisbane) – **SIDS Session**; April 2025
- **GNSS Applications and Capacity** Workshop (COSPPac); May 2025
- IAG/GGOS Geohazards Focus Area, IUGG GeoRisk Commission, IUGG Joint Tsunami Commission, **GeTEWS Oceania Workshop**; November 2025



# PGSC Partnership Desk - Capacity

- PGSC Coordinator – SPC Partnership Desk
- PGSC Communications – SPC Partnership Desk
- Regional Positioning – GNSS & Tide Gauge (equipment pool) for PICs

# Structure of UN-GGIM: Americas

## Leadership

- President: **Sofía Nilo Crisóstomo**
- Vice-President: **Leonardo Scharth Loureiro**
- Executive Secretary: **Pamela Castillo**
- Board Members (Vocales)
  - **Gabriela García Seco**, North America
  - **Isis Tejada**, Central América
  - **Simone Lloyd**, Caribbean
  - **Marcelo Emery**, South America

## Working Groups and Networks

### • Working Groups

- Integration of Statistical and Geospatial Information
- Disasters
- **Geodesy (GRFA)**
- Integrated Geospatial Information Framework
- Land Administration (in process of implementation)

### • Networks

- ANA - **Rosario Casanova**
- Private Sector – **Valrie Grant**





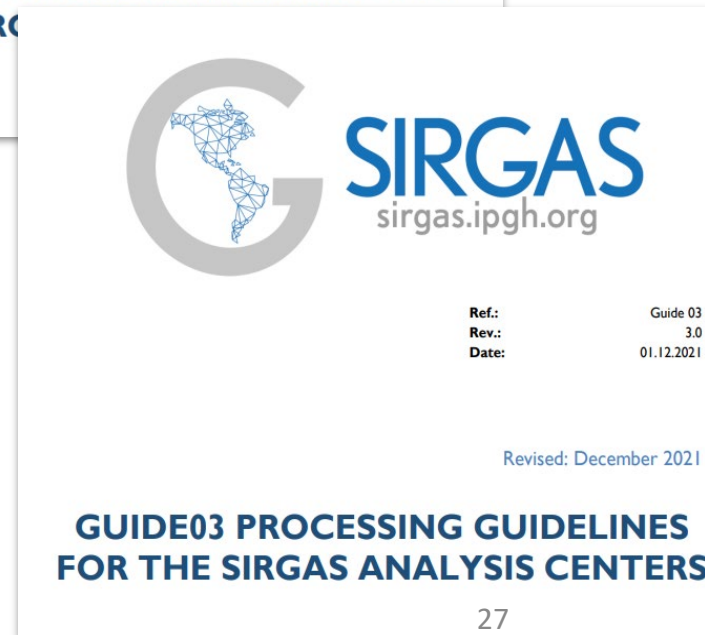
# SIRGAS WG 2

## Technical guidelines

- Guidelines for the Coordination of the SIRGAS Continuously Operating Network (SIRGAS-CON)
- Guidelines for the installation, operation and registration of SIRGAS-CON stations
- Guidelines for SIRGAS Analysis Centers
- Guidelines for IHRF station selection
- Guidelines for performing gravimetric measurements around IHRF stations

## Recommendations

- IGS site guidelines
- Monumentation of permanent GNSS stations ? UNAVCO
- Physical Site Specifications: Geodetic Site Monumentation (W.L. Combrinck and M. Schmidt)
- NOAA/NGS Guidelines for establishing and operating CORS





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REGIONAL COMMITTEE OF UNITED NATIONS  
ON GLOBAL GEOSPATIAL INFORMATION  
MANAGEMENT FOR THE AMERICAS

# SIRGAS WG 3 - Training activities

## ***2022 - Workshop "Vertical Reference Systems" – Santiago, Chile***

November 2 to 4. 14 assistants from 6 countries.

## ***2023 - 14th International School on "The Determination and Use of the Geoid" – Buenos Aires, Argentina***

November 13 to 17. The school was held in cooperation with the International Service for the Geoid from the International Association of Geodesy. 40 assistants from 14 countries.

## ***2024 - SIRGAS Symposium***

November TBD. To train scientists, professionals and technicians from national mapping agencies, universities and research centers in the most modern geodetic techniques linked to the geocentric, altimetric and gravimetric reference frameworks.





## Collaboration working groups

- Aguascalientes Declaration
- Capacity Development WG

## Education/webinars

- As part of the activities of UN-GGIM: Americas
- Diffusion of other educational activities from partners

## Geo-Ethics

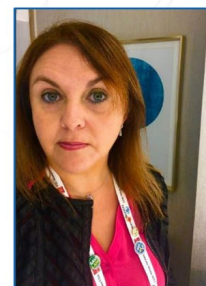
- Include SDG in Academic Curriculum
- Ethical use of Geospatial Data

## Inventory of courses related to Geospatial Data

# ACADEMIC NETWORK

## UN-GGIM: AMERICAS

### ANA Executive Committee 2023 - 2027



ROSARIO CASANOVA  
CHAIR



MACARENA PÉREZ  
VICE CHAIR



RIGOBERTO MORENO  
SECRETARY



### Advisory Board 2023 - 2027



CHARLOTTE D. SMITH



DANA J. CACCAMISE



MIRIAM OLIVARES



AND  
New representatives for each working group of UN-GGIM:  
Americas

# Translation documents IGIF

The overall ambition of the Translation Team (TT) is:

- to help promote the UN-IGIF documents widely in support of improved geospatial information management for sustainable development.
- to help foster the launch of as many language tracks as possible.

## FRENCH TEAM

BELGIUM – Sandrine D'Hoedt

CANADA – Eric Loubier



Sandrine D'Hoedt



Eric Loubier

## ARABIC TEAM

KINGDOM OF MOROCCO – Nabila Licer

KINGDOM OF SAUDI ARABIA – Mohammad Abdoh AlMabrook

UNITED ARAB EMIRATES – Mohamed Gheta



Nabila Licer



Mohammad AlMabrook

## PORTUGUESE TEAM

BRAZIL – Rafael Lopes da Silva

MOZAMBIQUE – Odete Semiao



Rafael Lopes da Silva



## TRANSLATION TEAM



Mikael Lilje



Sergio Cimbaro



Paul L. Riley



Rosario Casanova

## SPANISH TEAM

ARGENTINA – Sergio Cimbaro

MEXICO – Gabriela García Secco



Sergio Cimbaro



Gabriela García Secco

## SERBIAN TEAM

SERBIA – Ljiljana Živković



Ljiljana Živković

## RUSSIAN TEAM

RUSSIA – Alexey Trifonov



## GERMAN TEAM

GERMANY – Gwendolin Seidner



Gwendolin Seidner



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- o **Standards Network**
- o **Regional Capacity Network**
  - o **Americas**
  - o **Africa ARN (African Regional Network)**
  - o **Asia/Pacific AP-CDN (Capability Development Network)**
- o **Young Surveyors Network (YSN)**



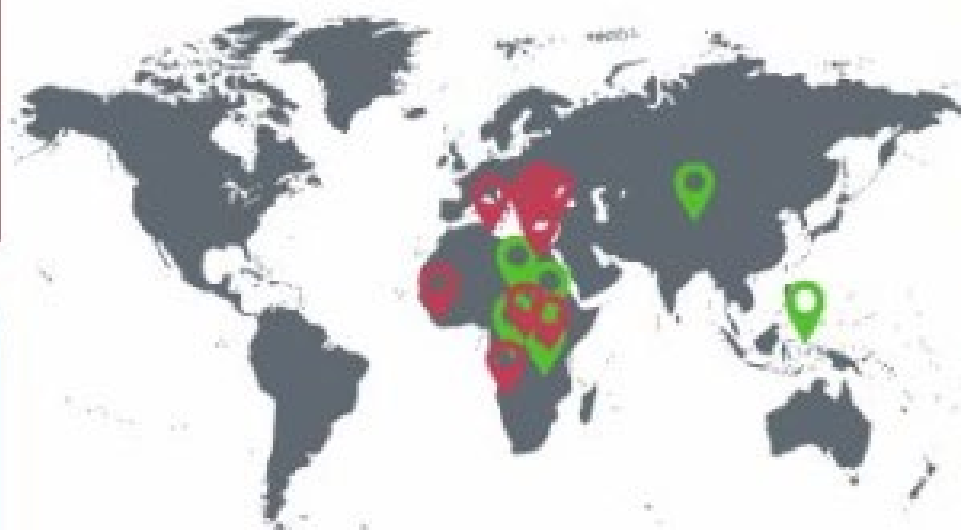
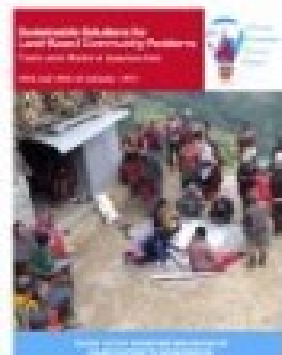
# FIG YOUNG SURVEYORS NETWORK

(Under 35 years of age)

- To **improve** the number of young professionals participating within FIG.
- To **help** young professionals in the beginning of their careers with contacts.
- To **increase** co-operation between the commissions and the students and young professionals network.



# Volunteer Community Surveyor Programme



## in-Country Deployments

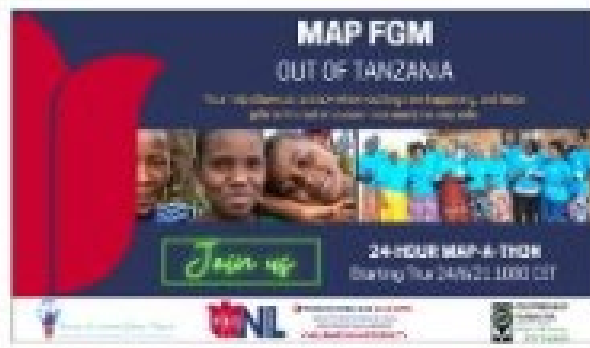
2015 - 2021 (green)	2022-2023 (red)
6 Countries	9 Countries
2 Opportunity Partners	2 Opportunity Partners
7 GLTN Partners	8 GLTN Partners
20 VCSs	15 more VCSs
7 VCS Mentors	15 VCS Mentors

## VCSP Wisdom Workshop

3 separate workshops and MOOCs with over 250 participants from over 40 countries globally

## Knowledge Portal

Comprehensive and ambitious structure  
Technical development well underway  
On track for 2024 delivery



## VCSP e-Volunteering

3 Mapathons  
2 Countries, 1 global  
140+ Mappers (45+ countries)  
3 Opportunity Partners  
37,000+ Features Mapped



# FIG Asia Pacific CDN - Delivery of Capacity Development

- **Promote and create an awareness of the geodetic / geospatial profession** through an effective technology-based marketing campaign
- **Evaluate the geodetic / geospatial capability** – status, determine immediate needs, future core capabilities, educational and training requirements, institutional curriculum, mutual recognition of qualifications
- Developed mechanisms to **access and exchange information and experience** w.r.t geodetic / geospatial technical developments, data management, operations, applications
- Create **opportunities for professional development, mentoring, sponsorship**
- Provision of “advice” through **workshops, forums, meetings, seminars**
- Collaborate to **form alliances with “like minded agencies”**, and
  - Professional / Scientific organisations – FIG, ASEAN Flag, PGSC, IAG, LINZ, Geoscience Australia, NGS, GCA, SSNZ, RICS
  - Academic / Educational institutions (secondary / tertiary) – USP, University of Fiji, UNSW, RMIT, University Otago
  - International agencies – UNGGIM, UNOOSA, ICC, UN ESCAP, World Bank Group

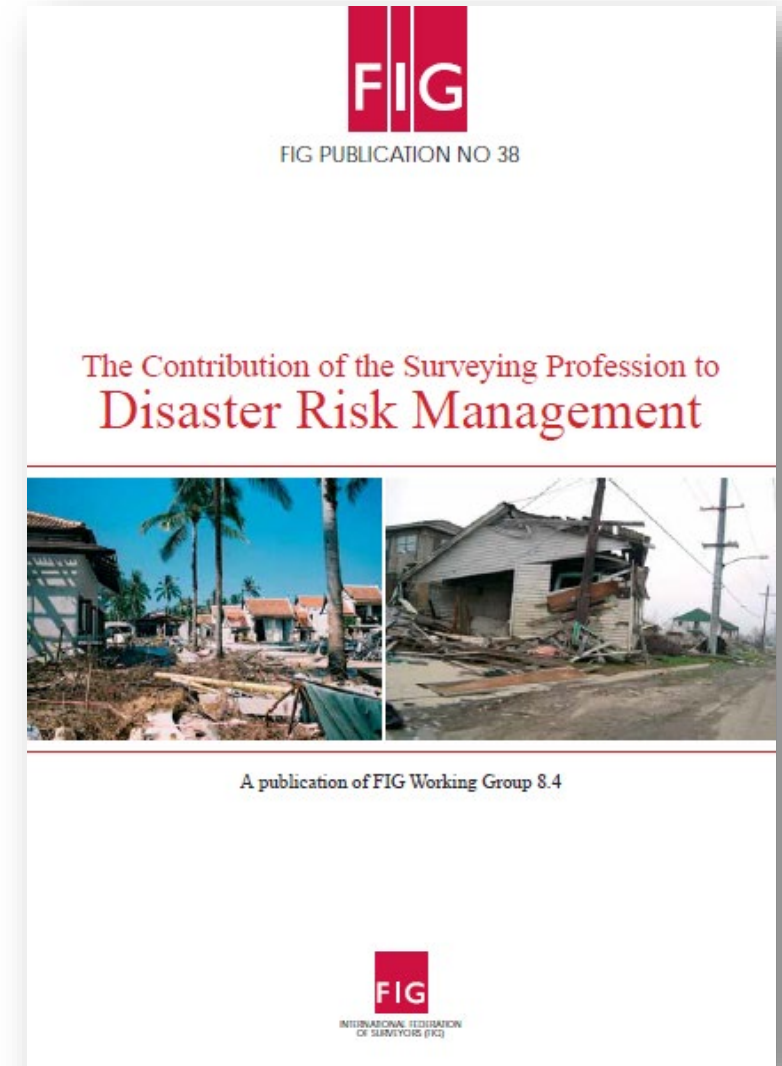


# Capabilities of Surveyors - Publications

Surveyors' capabilities make an important contribution to improve the outcomes of the disaster risk reduction and resilience .....

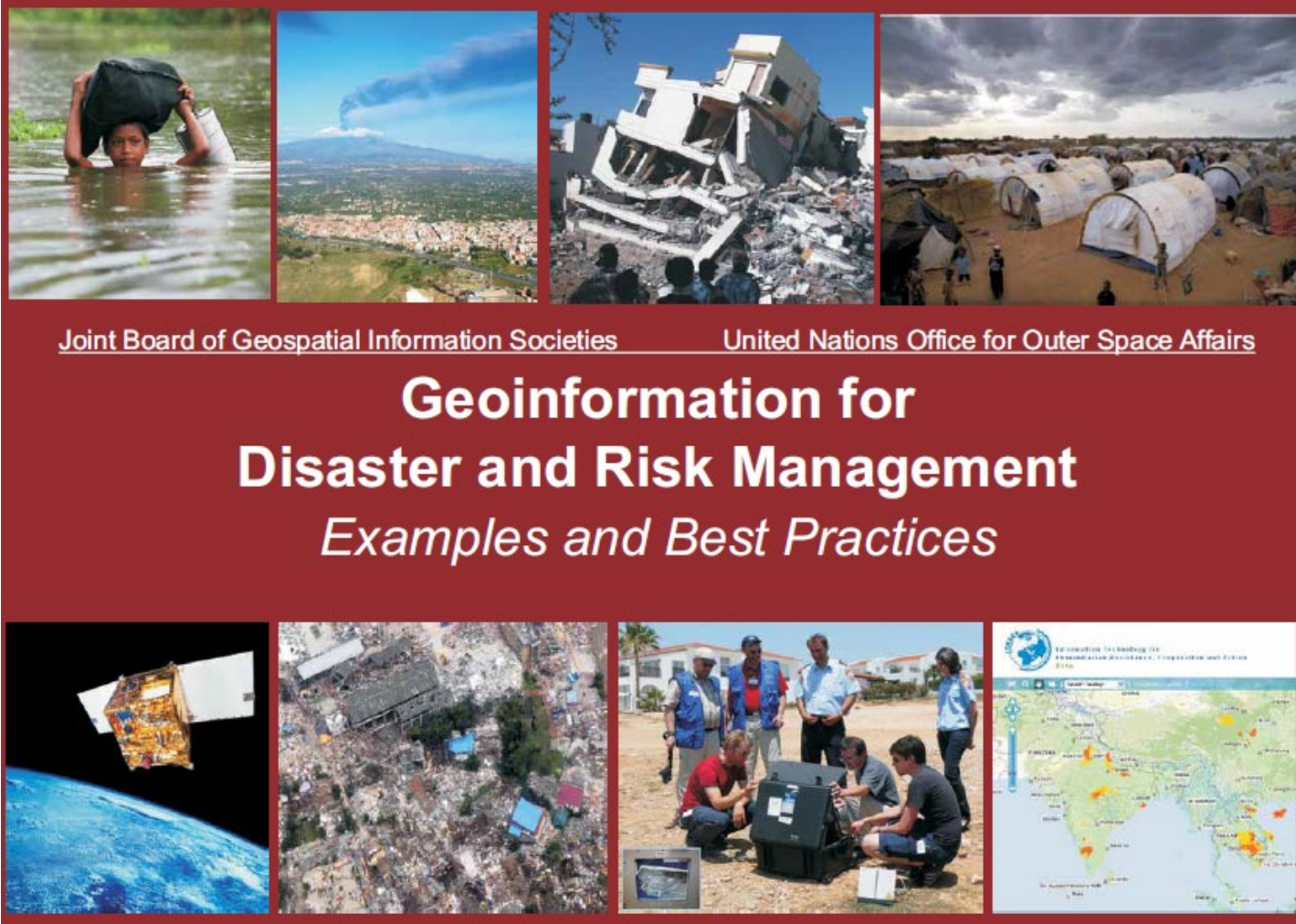
Through the supply of geospatial / geodetic information from a combination methods and measures

- **before** (risk analysis, prevention, preparedness),
- **during** (emergency planning) and
- **after** a disaster (reconstruction).

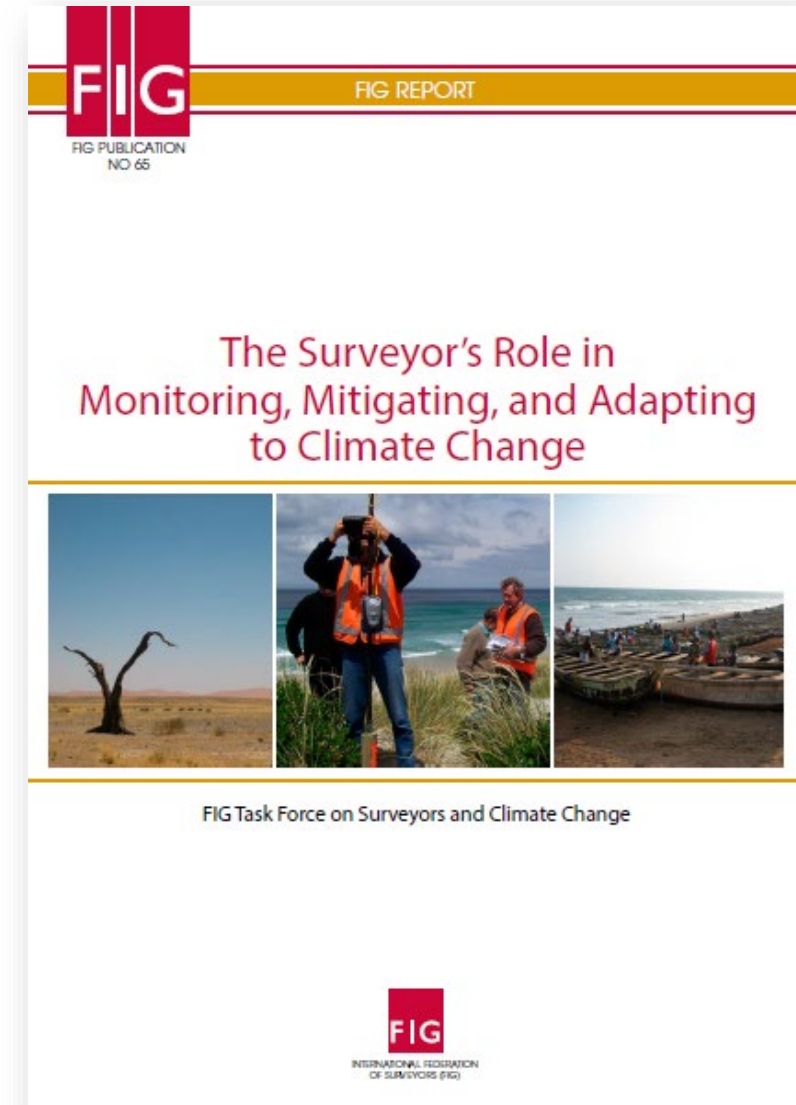


<https://www.fig.net/resources/publications/figpub/pub38/figpub38.asp>

# Capabilities of Surveyors - Publications



[https://www.fig.net/resources/publications/Geospatial\\_societies/Geoinformation\\_for\\_Dasaster\\_and\\_Risk\\_Management.pdf](https://www.fig.net/resources/publications/Geospatial_societies/Geoinformation_for_Dasaster_and_Risk_Management.pdf)



<https://www.fig.net/resources/publications/figpub/pub65/figpub65.asp>



## Concise Guide



### Strategic Approach to Capacity Development for Implementation of the Sendai Framework for Disaster Risk Reduction

## CD for DRR Obstacles and Challenges

1. Insufficient understanding/appreciation of DRR-specific CD needs
2. Over-reliance on training and education
3. A lack of access to or existence of facilities, programmes, or resources to support awareness
4. Failing to provide support for or access to CD for DRR
5. Insufficient availability of resources
6. Little or no local ownership of CD programmes and projects
7. Insufficient focus on sub-national capacity
8. Lack of standardized CD for DRR evaluation indicators
9. Lack of general awareness and knowledge of risk drivers and the stakeholders' DRR roles (including at the local level)
10. A lack of understanding of existing legal instruments
11. A focus on non-conflict areas

# Strategic Collaboration is the Key !



Co-operate and Communicate with organisations who represent a diverse group of members  
Work **collaboratively** to build the **capabilities** of geodetic and geospatial professional to  
meet the **challenges of the future**



# Capacity Development - Insights

Being able to communicate your needs, your skills and the benefits that geodesy can provide, is critical BEFORE asking for CD Support

- **Human** - technical training and review on CORS network design
- **Fiscal** - funds (how much, by when) needed to upgrade CORS to multi-constellation
- **Equipment** - IT infrastructure and data storage required to support new CORS
- **Expertise** - in field installation of CORS and IT; configuration
- **Data** - new archiving and QC; data sharing with IGS / regional partners; data analysis, determining geodetic products; scientific and societal applications
- **Planning** - consider the Joint Global Geodesy Development Plan

**Capacity Development Requests - terms to include**

- > Request | Purpose | Partners | Benefits | Quantity | Why | Risk not | Cost



*If you require support to summarise your needs, the GGCE is here to help*

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# Capacity Development - Partners with experience

## International bodies



## Organisations



## Other International Organisations





# Summary - Capacity Development (CD)

“Building capabilities (skills) will develop capacity”

- Groups are out there in countries, regions and internationally
- Collaboration is the main catalyst in Capacity Development

## Main Takeaways

- Assistance is always available - just ask around
- Asking for it is not a weakness
- Be clear and objective about what you are asking for
- Communicating a clear request for CD is important
- Communicating the clear offer of CD is important
- Reach out, participate, collaborate
- Craft a pragmatic Business Case for investment (*tomorrow*)



**Communications and Marketing is critical to crafting a  
successful ‘request/offer’ of assistance**

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