

Education, Training and Capacity Building in the Framework of Implementing the UN Resolution

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Acknowledging especially Rob Sarib (FIG), Graeme Blick (FIG) and Allison Craddock (IGS)

UN Resolution: Global Geodetic Reference Frames for Sustainable Development



Discussing e.g.

- Need of global geodetic infrastructure
- Data sharing
- Education, Training and Capacity Building

Photo: Kyoung-Soo Eom

General Assembly, 26 February 2015

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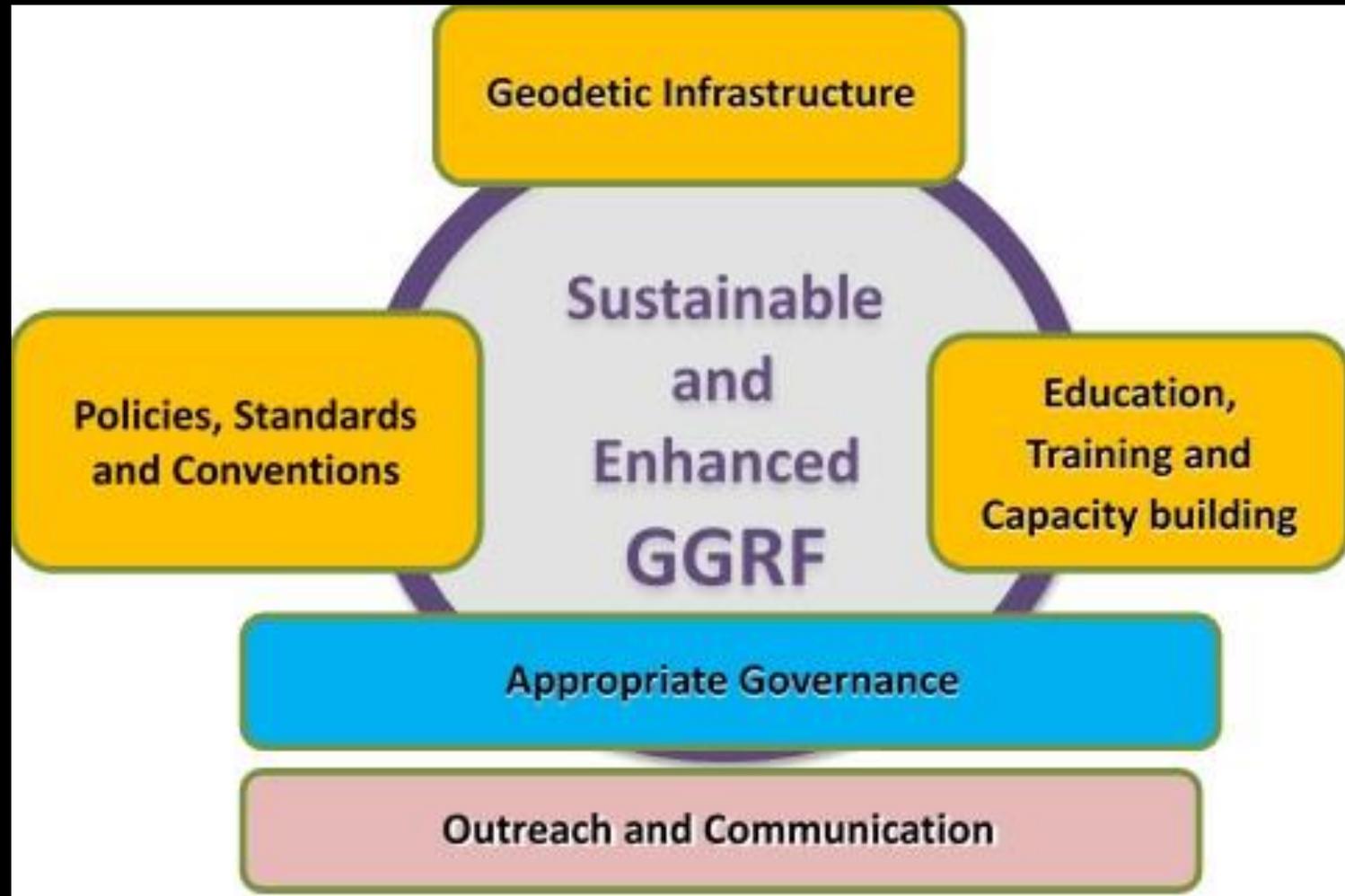
Photo: Kyoung-Soo Eom

General Assembly, 26 February 2015

An accurate, sustainable and accessible Global Geodetic Reference Frame to support science and society



GGRF road map key issue categories



Education, Training and Capacity building

The ETCB focus group seeks to

- assess the current availability of education, training, and capacity building resources

- identify gaps in capacity or other areas of need

- propose short- and long-term solutions to realize the full scientific and social benefit of the Global Geodetic Reference Frame.



Photo: Geoscience Australia

Think globally, act regionally?

- Even though basic ETCB needs are global, a regional focus strategy is essential!
- The nature, size, and variety of challenges differ regionally and may include linguistic, technological, economic, and cultural impediments.
- It is also clear that access to highly skilled personnel varies widely among Member States, thus necessitating the need to ensure that knowledge and competence is readily and openly shared.
- A key to optimizing the efficiency of the group's objectives is to identify and make existing educational and capacity building resources easily discoverable.

Our currently proposed mission

Five years from now there will be:

- A higher level of geodetic technical capability, particularly among developing nations
- A developed capacity building programme that focuses at the regional level and emphasizes supporting efforts in developing nations
- Recognized certification and achievement documentation programs, supported by regular technical training courses and material that is openly available to all nations
- A permanent working group for UN Geodesy Education, Training, and Capacity Building established and operating under the auspices of the UN GGIM Subcommittee on Geodesy
- Documented evidence of geodetic education, training, and capacity building in support of the United Nations Sustainable Development Goals (SDGs).

UN SCoG ETCB Self-evaluation questionnaire

QUESTIONS RESPONSES 22

Reference Frame Competency Questionnaire

Dear Colleagues and Fellow Delegates,

The UN-GGIM Subcommittee on Geodesy is working towards developing an accurate and sustainable Global Geodetic Reference Frame (GGRF). The Subcommittee's Focus Group on Education, Training, and Capacity Building is tasked with assisting UN Member States build their capacity and expertise for the worldwide development of the GGRF. By assessing the current and future competency requirements of each Member State, we will be able to focus our efforts on helping build targeted training and developing competency that will benefit each Member State, as well as filling critical needs for the GGRF.

This survey is designed to assess UN Member State Reference Frame competency requirements and educational needs. We hope to receive feedback from each Member State's UN-GGIM Head of Delegation, as well as national agency representatives, decision-makers, and leaders of the geodetic communities in each State.

Your participation in this questionnaire will help the Subcommittee to understand your:

1. current competencies in Reference Frames;
2. future competencies and special interests that you require; and
3. understand your training needs.

Please feel free to forward this survey to other people who may wish to contribute.

The questionnaire is divided into 4 sections:

1. Information about the responder and his or her affiliation
2. Responder's assessment of current and future Reference Frame competency requirements of his or her Member State
3. Member State training needs
4. Other information

We ask that you please complete this short questionnaire by 5 May, 2018.

Your participation is important for the UN to support the development of a GGRF.

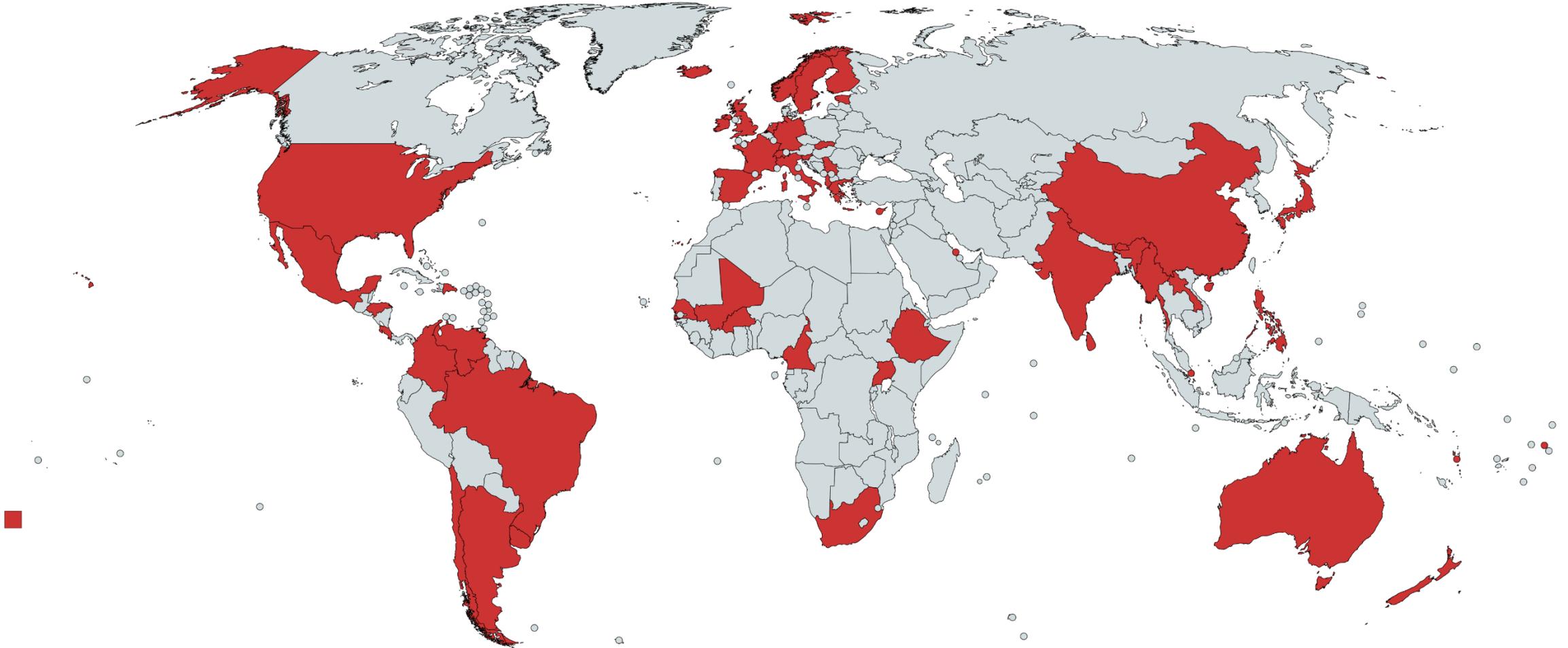
Best regards,

Education, Training and Capacity Building Focus Group
UN-GGIM Subcommittee on Geodesy

- Focusing on Reference Frame Competence
- The aim is to use results from the questionnaire to present an implementation plan.

Level	Competence Requirements	Training provided by	
1	Basic understanding of: <ul style="list-style-type: none"> • GNSS • Reference frames, including geoid models, vertical and horizontal datums 	<ul style="list-style-type: none"> • Educational institutions – universities and polytechnic institutes • Government mapping agency • Private companies 	Countries that might have one CORs and maintain a traditional geodetic network of reference marks – e.g. small Pacific Island Nations?
2	The above plus knowledge of: <ul style="list-style-type: none"> • Constructing, building and running a small CORs network • GNSS processing using standard software - e.g. Trimble, Compass Solution (ComNav), LGO(Leica),.... • Least squares processing and provision of datum access • Geoids models, precision, determinations and basic implementation • Implementation of a vertical datum including use of geoid models 	<ul style="list-style-type: none"> • Educational institutions – universities and polytechs • UN-GGIM Geodesy Capacity Group • FIG • Government mapping agency • Private companies 	Countries with small CORs network and those who adopt global Reference frames for their nation reference frames – e.g. Fiji?
3	The above plus high knowledge of: <ul style="list-style-type: none"> • Implementing and running large CORs networks • High end GNSS processing and datum access • Geoid model computation and implementation into a vertical datums • Monitoring earth dynamics and including in datum realization • Geodetic database management 	<ul style="list-style-type: none"> • Specialized courses – e.g. geoid school • UN-GGIM Geodesy Capacity Group • IAG and FIG • Government mapping agency • Private companies 	Countries with a more extensive CORS and developing their own specialized national and vertical datum – e.g. New Zealand and Sweden?
4	The above plus expert knowledge of: <ul style="list-style-type: none"> • Reference frame determination and computation • High end GNSS analysis and processing • SLR including analysis and processing • VLBI including analysis and processing • Gravity collection, processing and geoid determination 	<ul style="list-style-type: none"> • IAG • Specialist training courses run by NASA/JPL – e.g. on VLBI or SLR • Private companies • Specialized software training courses – e.g. Bernese 	Countries engaged in Global Reference frame determination and Geodesy Science - e.g. US, Australia and Germany?

Currently 52 countries and 80 responses



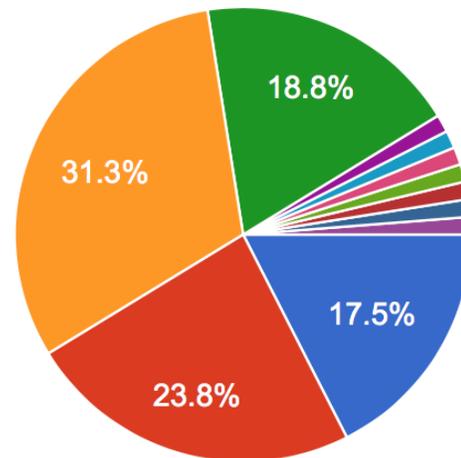
Some preliminary results...

Based upon the table, what is your Member States current competency level?

Based upon the above table, what is your Member State's current competency level?



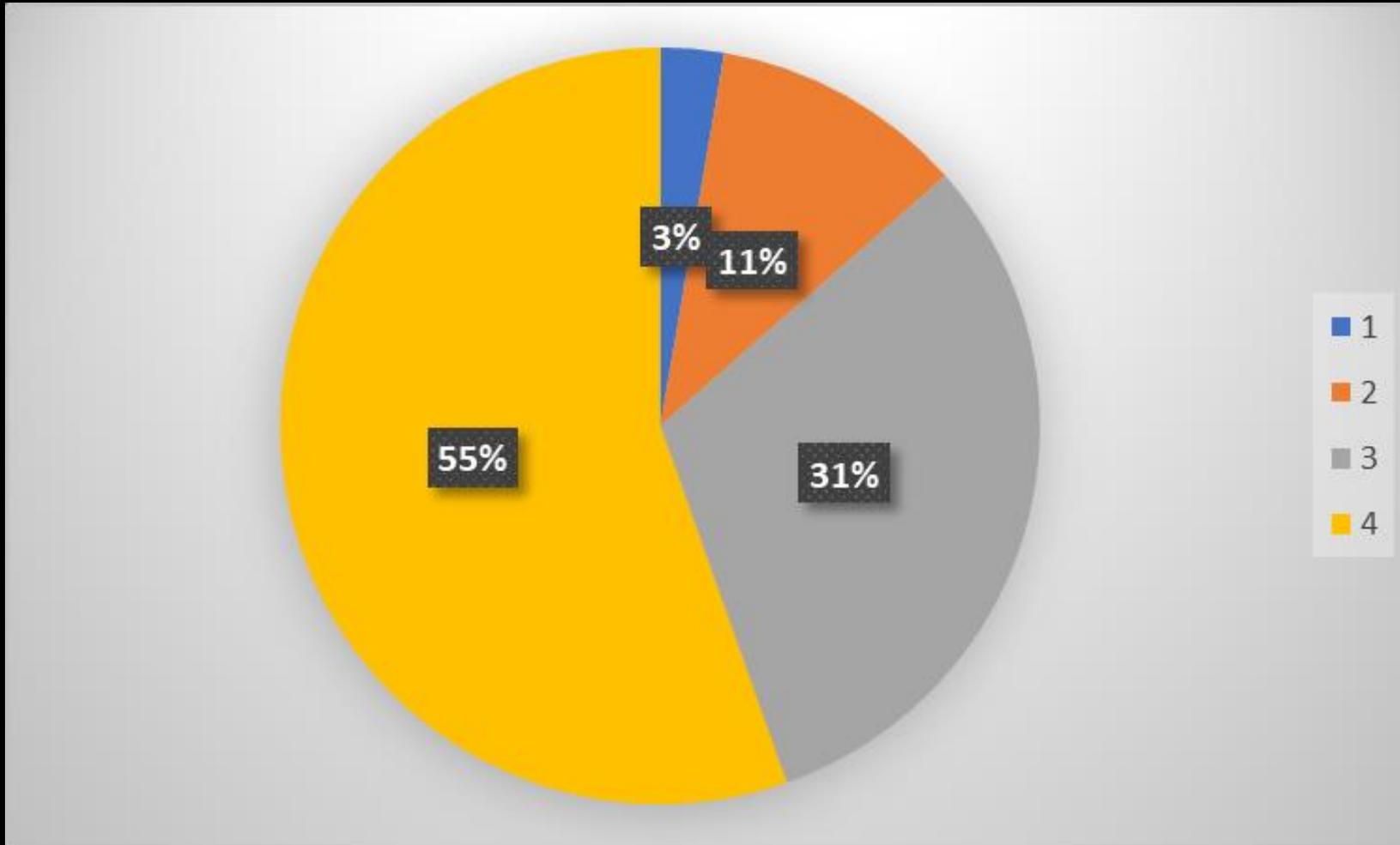
80 responses



- Level 1
- Level 2
- Level 3
- Level 4
- we still need a Proper Vertical Datu...
- Partly Level 4, not VLBI and SLR a...
- Level 3 when answering as swissto...
- Level 4 : apart "implementing and r...

▲ 1/2 ▼

Based upon the table, what is your Member States future required competency level



What barriers prevent you from achieving your desired level of competency?

70 responses

Funding; adequate high level expertise

Time and money. Lack of understanding.

Access to training, Funding allocation

Lack of observatories and observation data, human resource and funding

Few people and a small budget

time to dedicate only to this

Políticas de estado, Recursos (presupuesto, infraestructura tecnológica, personal permanente calificado).

Lack of training opportunities and lack of money to facilitate attendance of trainings.

Budget constraints

Knowlege ,materiel and moneys

All developments are only possible with a corresponding budget, which may not be assigned (due to government and research budget limitations).

What do you feel is needed to overcome the barriers to reaching your desired competency level?

68 responses

Require hardware and software, training in terms of survey equipment and data handling, processing and analysis.

Political will

Political decision and committment.

technical expertise and funding.

training in international level

Improved interaction between geodesist and GIS experts, Improved interaction between geodesist and InSAR experts

need to have better funds, resources and training.

Proper Training to achieve relevant qualification

training and specialized courses, eg: geoid school and SLR course in data processing and analysis

more coordination on the international/global level and more support from geodetic community to be included (participate) in different projects

Looking Forward: The Roadmap Implementation Plan in Action

Organized and Centralized Access to Training

Member States, in cooperation with the IAG, FIG and other organisations, establish a global geodetic technical assistance program.

Member States, which have the capacity, assist Member States with less capacity to build sufficient geodetic capacity to efficiently and accurately access and utilise the GGRF

Work with the IAG and FIG to establish and run technical workshops in, and with a focus on, developing countries

- Develop a programme of training workshops*
- Develop a standing scientific organizing committee*
- Provide a centralised list of technical workshops and training activities*
- Provide access to training material*
- Establish training agreements with key stakeholders*

Prepare and implement an annual openly available training programme

- Compile and promote the annual training programme*
- Ensure training material from workshops is made readily and openly available*
- Implement a policy of open-availability for all materials and recordings from training programs/classes*

Prepare and implement an annual openly available training programme that includes workshops and the provision of technical material

- Compile and promote the annual training programme*
- Ensure training material from workshops is made readily and openly available*
- Implement a policy of open-availability for all materials and recordings from training programs/classes*

Looking Forward: The Roadmap Implementation Plan in Action

Broad Information Availability and Task Training Standardization

Member States take actions to ensure educational and research institutions recognise the importance of geodetic science, as well as increase the number and availability of geodetic courses in other associated degrees

Provide a mechanism to develop and disseminate technical material

- *Implement an ETCB web page as a sub-page of the GGIM Sub-committee on Geodesy*
- *Work with the GGRF WG Outreach and Communications Focus Group to ensure optimal development and delivery of educational and advocacy materials,*

Work with geodesy technical and research institutes to develop and enhance geodesy training

- *Establish minimum training needs for a set of standardized tasks, spanning infrastructure, academic, and long-term sustainability.*
- *Established training resources and centres of expertise*

Looking Forward: The Roadmap Implementation Plan in Action

Capacity Building through Strong Collaborations, Incentives, and Certifications

Member States openly share all geodetic skills.

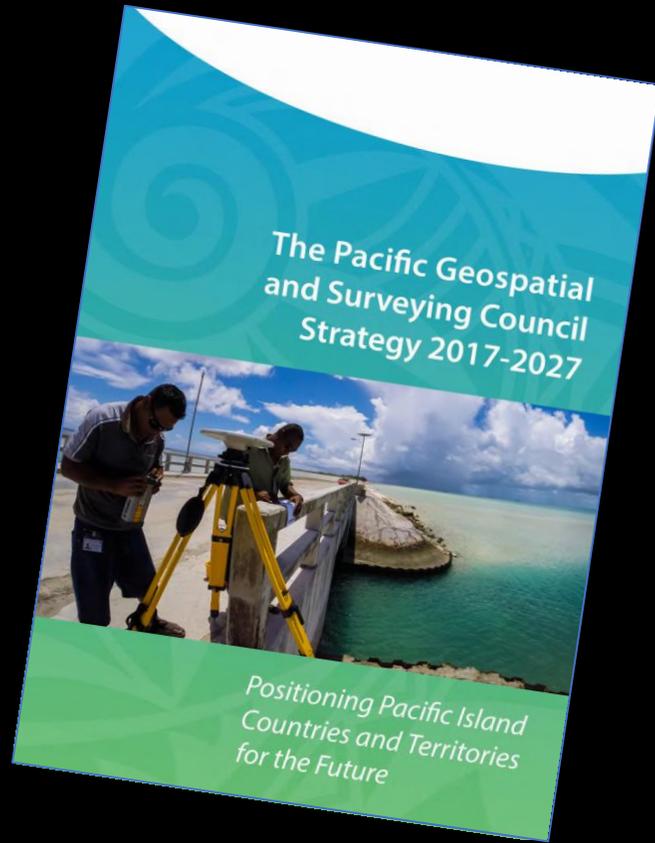
Encourage stakeholder and member state participation in capacity building

- *Promote the capacity building programme through geodesy conferences and meetings, and the UN GGIM web site*
- *Incentivize stakeholder participation and sponsorship*

Maintain close contact with national and international agencies and organizations, who may provide funding, advocacy, or other technical support for training and capacity building

- *Work with stakeholders to ensure cooperation and benefits for the strategy*
- *Establish centers of training expertise and capability*
- *Work with national agencies and international organizations to develop internationally-recognized certification programs*

One good example: Pacific Geospatial and Surveying Council



Joint strategy that includes Capacity Building



Australia supporting Tonga with knowledge as well as GNSS-equipment

Countries as Australia and New Zealand ensuring long term support

Organisations as



FIG Asia Pacific Capacity Development Network

facilitate the development



References Frame in Practice Seminar -
Operational Aspects of GNSS CORS, 18-20
September 2018, Suva, Fiji

Why is this a good example

1. The region / countries / organisation has a long term strategy on where they want and need to be
2. The "richer" countries are involved with a long term perspective
3. The "receiving" countries / organisations ensures a long term stability in their organisation.

In summary;

- The countries express a need / desire to raise the competence and capability
- The countries are very ambitious
- More than 50 % of the countries wants to be very advanced!

What are the main barriers;

- Funding
- Language
- Access to skilled trainers
- The nature, size, and variety of challenges differ regionally and may include linguistic, technological, economic, and cultural impediments.