Education, Training and Capacity Building Efforts in support of the GGRF Roadmap Implementation Plan

Progress on the Proposed Five-Year Education, Training, and Capacity Building Implementation Plan

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July 2018

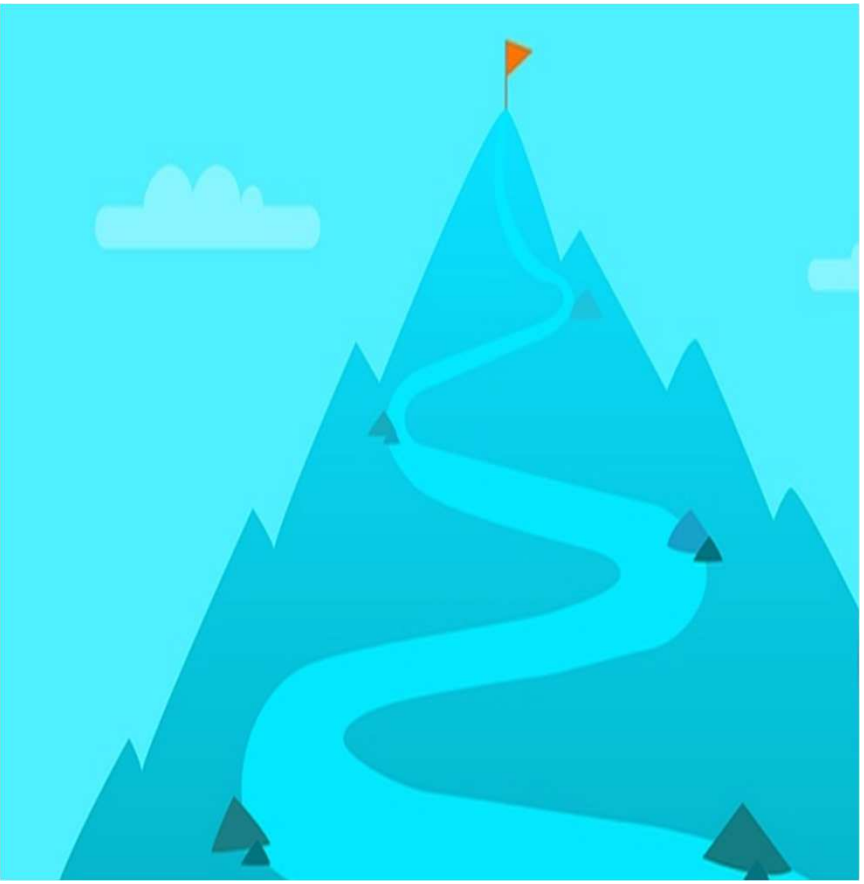
Overview

- ETCB Focus Group Mission
- ETCB Objectives
- Recent Activities: Capacity Building Survey
- Looking Forward with the Roadmap Implementation Plan

GGRF Roadmap Recommendations Highlights

- Actions must be taken to maintain and upgrade current national infrastructure and secure all Member States accurate access to the Global Geodetic Reference Frame (GGRF)
- Member States are urged to support efforts to develop geodetic standards, and more openly share their data, standardized operating procedures, expertise, and technology
- **Actions must be taken to raise geodetic competence and skills, as a lack of geodetic capability currently limits utilization of the GGRF in many countries; and hinders their achievement of the UN Sustainable Development Goals (SDGs). It also threatens the development and sustainability of the GGRF**
- Actions must be taken to raise the general awareness around the value proposition of the GGRF
- Actions must be taken to improve the GGRF governance mechanism, as this is needed to ensure the sustainability and improvement of the GGRF

Education Training and Capacity Building Focus Group 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).

Objectives of the UN GGRF Education, Training, and Capability Building working group (1..3)

Development of Strategic Implementation Plan

- Develop a series of *measurable goals and objectives.*
- Establish a permanent ETCB working group, under the auspices of UN GGIM Subcommittee on Geodesy, to implement and measure progress against the strategy using these metrics.
- Develop a programme that ensures *balanced regional representation*
- Prepare and implement an *annual openly available training programme* that includes workshops and the provision of technical material
- Provide a regional mechanism to *develop and disseminate technical material*
- Monitor the capacity training programme and its effectiveness through aforementioned metrics.

Funding

- Establish a **Geodesy Education and Capacity Building Fund** to support individual attendance at training schools, and access to online-based educational resources.

Objectives of the UN GGRF Education, Training, and Capability Building working group (2..3)

Educational Needs Assessment

- **Using GGRF-wide and approved metrics, assess the geodesy training needs (and abundances) of each member state or region, particularly focused on providing resources to developing countries**
- **Establish a priority list of short- and long-term training needs, their objectives, and required resources for achievement**

Geodetic Organizational Support, and Advocacy

- Maintain close contact with national and international agencies and organizations, including IAG, IAG Services (such as IGS), and FIG, who may provide funding, advocacy, or other technical support for training and capacity building

Objectives of the UN GGRF Education, Training, and Capability Building working group (3..3)

NGO Collaboration

- Work with the IAG and FIG (possibly also GEO and others) to establish and run technical workshops in, and with a focus on, developing countries

University, Research Institute, and other Academic Collaboration

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

Support Progress Toward UN SDGs and Sendai Framework

- Address the applicability of geodesy within the UN SDG target and indicator framework, and align the engagement of the SCG with the work of other SDG stakeholders.

UN-GGIM GGRF ETCB 5 Year Strategy

Vision

Member States have the capability to develop, access, and maintain Global Geodetic Reference Frame

Mission

The UNCCIM Working Group on Geodesy sub-committee on capacity building will coordinate and facilitate capacity building with a particular focus on regional needs and Member States with less capacity.

Goals

Development organisations invest in national and regional geodetic capacity building to ensure efficient access to, and utilisation of, the GGRF in developing countries

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

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

Member States openly share all geodetic skills.

Activities

Develop a capacity building programme that ensures balanced regional representation

- *Encourage regional participation on the UNGGIM sub-committee on Geodesy*
- *Work with regional groups to determine training needs at regional levels*

Using GGRF-wide and approved metrics, assess the geodesy training needs and capacities to assist or contribute, of each member state.

- *Carry out a training needs analysis for all member states.*
- *Assess any surplus or abundant resources, and the ability to share these*
- *Establish a priority list of short term and longer-term training needs,.*

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*

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 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*

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*

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*

Measures of Success

- **All Member States have appropriate geodetic capacity to underpin the realisation of the sustainable development goals.**
- **Geodetic education, skills, and capabilities are continuously developed and available to all Member States sufficient to underpin both GGRF and Member State sustainability and development.**
- **A global geodetic technical assistance program exists.**
- **Those Member States wishing to contribute to the GGRF are supported through the provision of technical assistance, educational programs, and coaching. Targeted capability development may be required to allow for continuity of skills through time.**
- **Continuous improvement of geodetic expertise in developing and developed Member States, through participation in, and open sharing of, geodetic skills through conferences, meetings, and educational programs.**
- **Capability transfer occurs between existing experts and those emerging in this area.**
- **Sufficient resources are allocated to research programs promoting and underpinning GGRF development.**

Current State: a Needs Assessment that is Globally Focused, and Regionally Oriented

Development organisations invest in national and regional geodetic capacity building to ensure efficient access to, and utilisation of, the GGRF in developing countries

Develop a capacity building programme that ensures balanced regional representation

- ***Encourage regional participation on the UNGGIM sub-committee on Geodesy***
- ***Work with regional groups to determine training needs at regional levels***

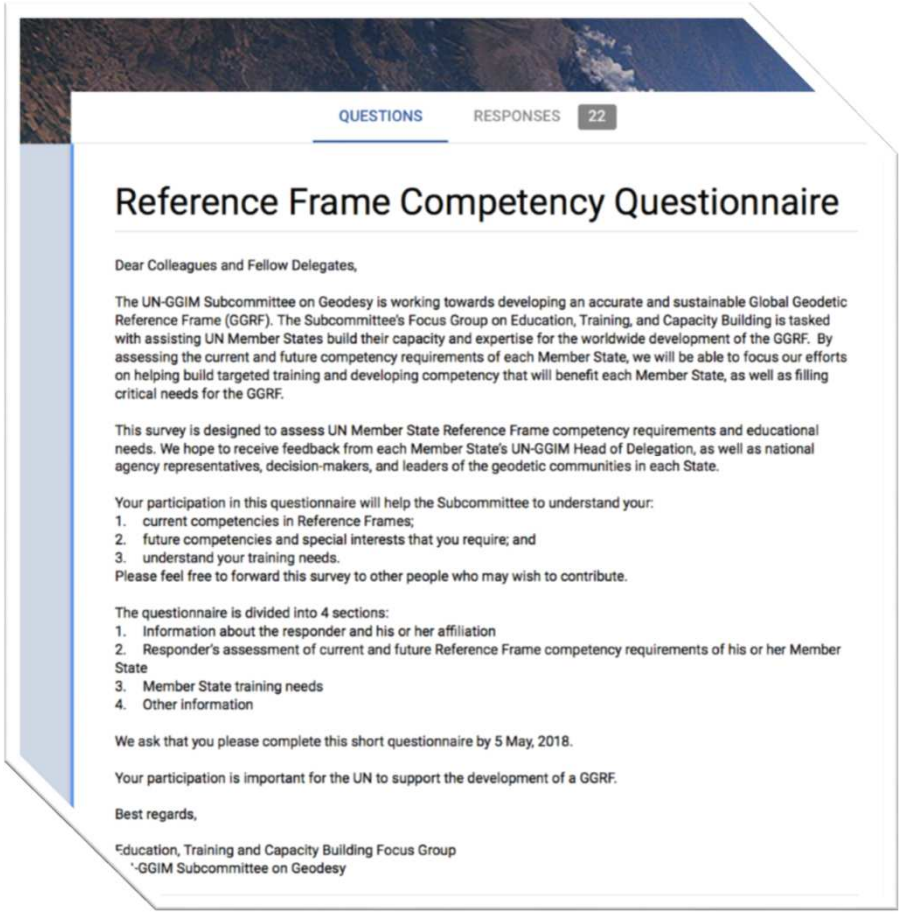
Using GGRF-wide and approved metrics, assess the geodesy training needs and capacities to assist or contribute, of each member state.

- ***Carry out a training needs analysis for all member states.***
- *Assess any surplus or abundant resources, and the ability to share these*
- *Establish a priority list of short term and longer-term training needs,.*

Recent Initiatives and Next Steps

- **Provide a framework for Member States to identify their 'Level' of competency requirements**
- **Maintain a register of Member States self-reported 'Level' of competency, and professional and technical requirements**
- **Identify training and educational gaps for Member States, working on a regional basis where appropriate**
- Provide training modules and assist with running specialized training courses to fill gaps
- Encourage other agencies to run specialized training where gaps have been identified
- Maintain a register of courses and training opportunities
- Maintain a register of trainers and training institutions
- **Identify SDG and Sendai Framework indicators that benefit from or require geodetic data**

Self-evaluation questionnaire sent out



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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

- First version has been available for participation since April 2018; will continue to accept responses until the UNWGIC.
- 79 Responses as of July 2018
- Using the results from the questionnaire, we hope to present an implementation plan for the subcommittee to consider at its next meeting.

Survey available here: http://bit.ly/ggimscgq

Level	Competency Requirements	Training provided by	
1	Basic understanding of: • GNSS • Reference frames, including geoid models, vertical and horizontal datums	• 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: • 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	• 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: • 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	• 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: • 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	• 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?

Level	Competency Requirements	Training provided by	
1	Basic understanding of: • GNSS • Reference frames, including geoid models, vertical and horizontal datums	• 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?

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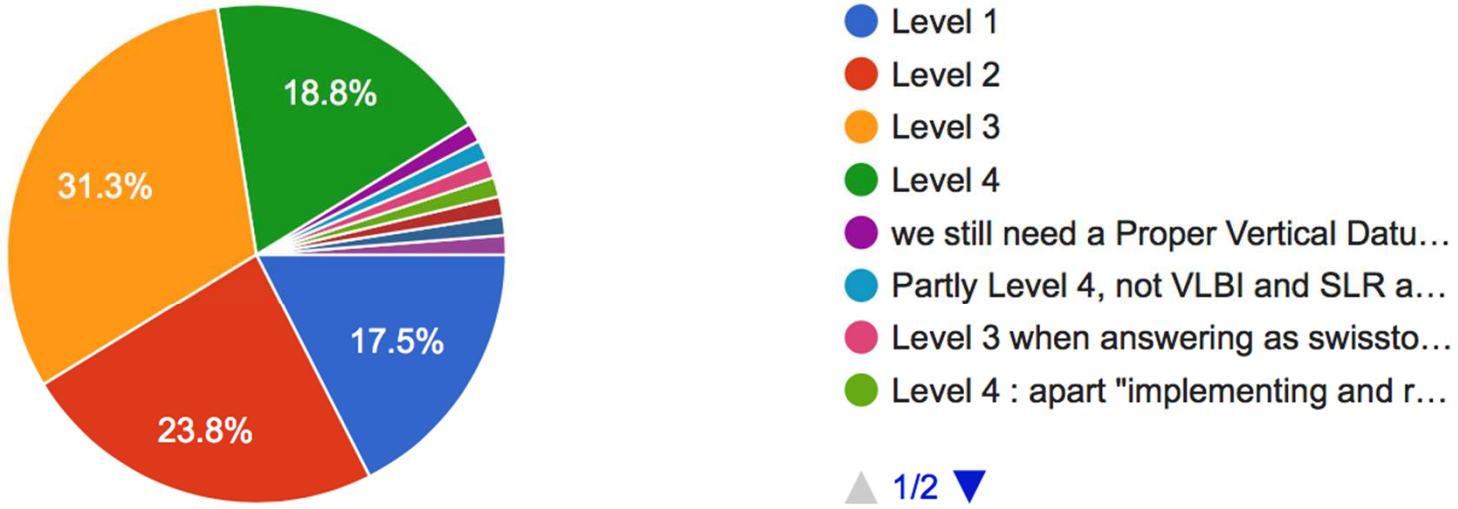
Level	Competency Requirements	Training provided by	
4	The above plus expert knowledge of: • Reference frame determination and computation • High end GNSS analysis and processing • SLR including analysis and processing • VLBI including analysis and processing • Gravity collection, processing and geoid determination • Analysis centre – combining various geodetic techniques to determine reference frame parameters • Use of other potential geodetic techniques – e.g. DORIS and InSAR	• 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?

Some preliminary results…

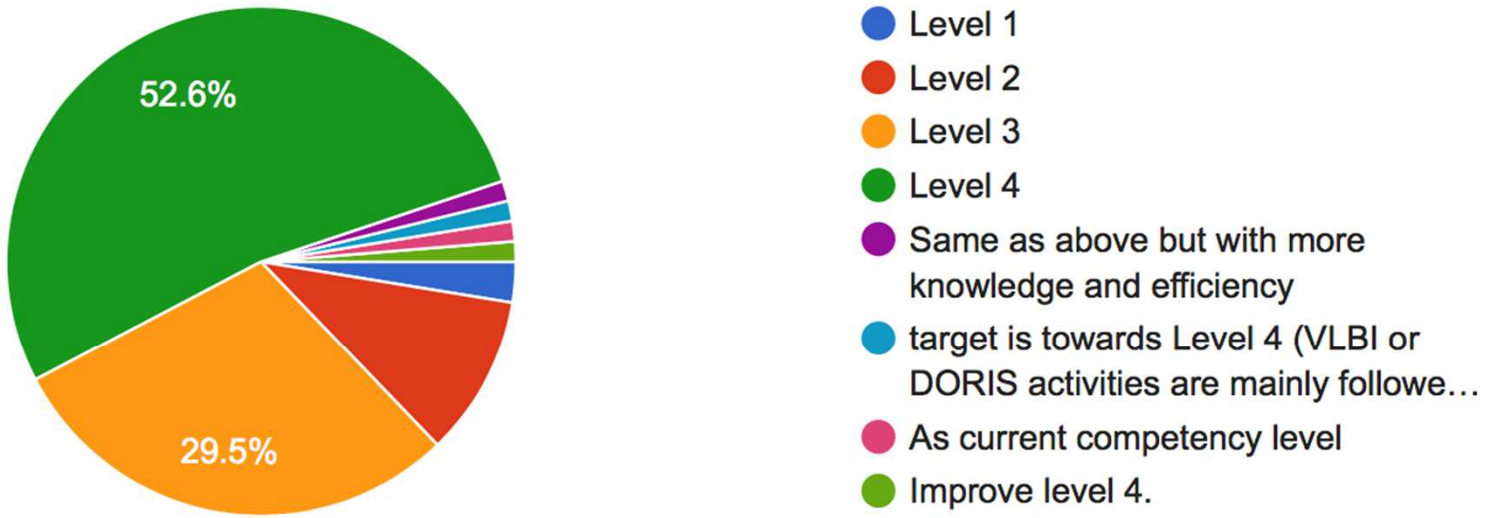
Based upon the above table, what is your Member State's current competency level?

80 responses



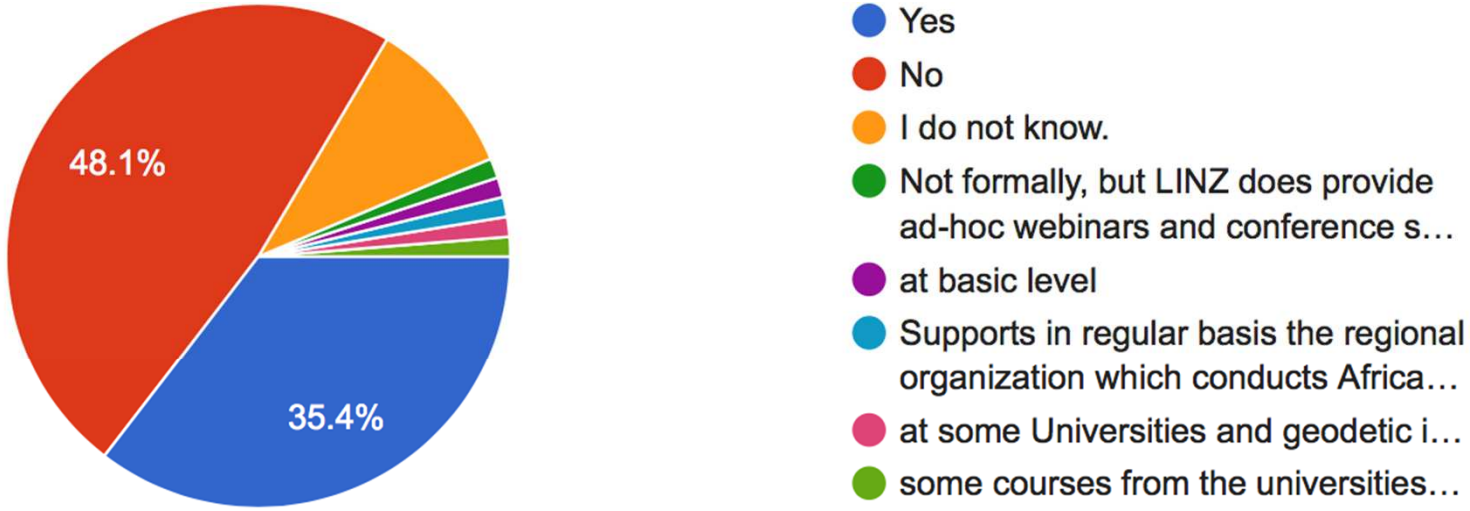
Based upon the above table, what is your Member State's future required competency level?

78 responses



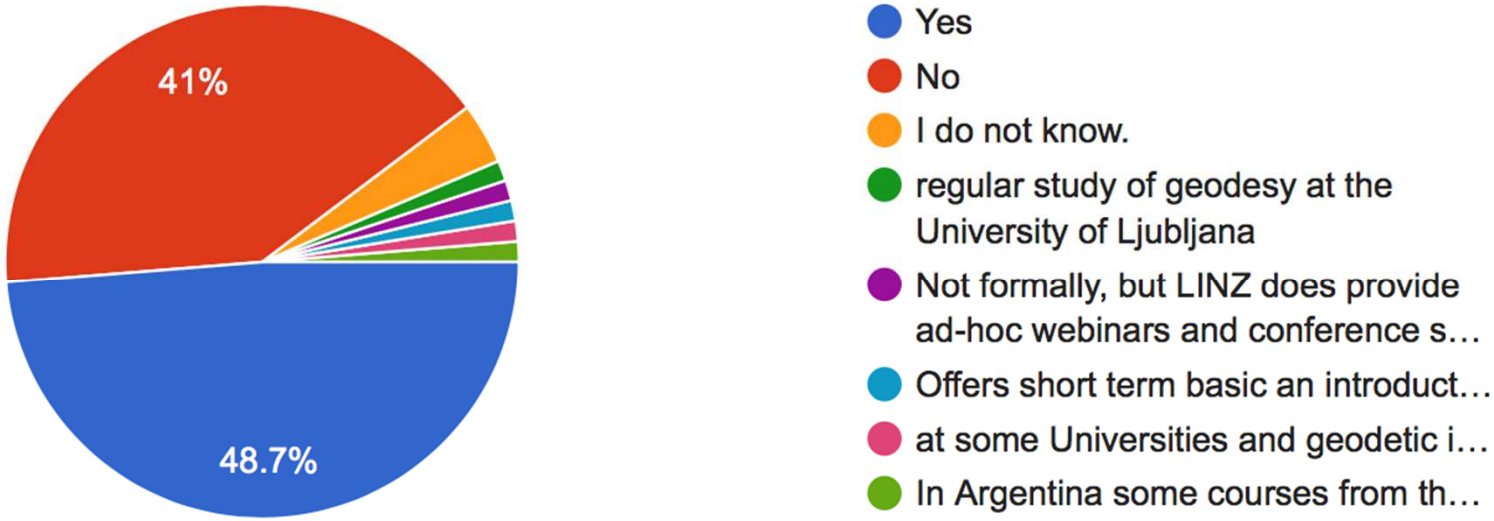
Does your Member State or Organization offer Reference Frame training or education?

79 responses



Does your Member State or Organization offer Geodesy-related training or education?

78 responses



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?

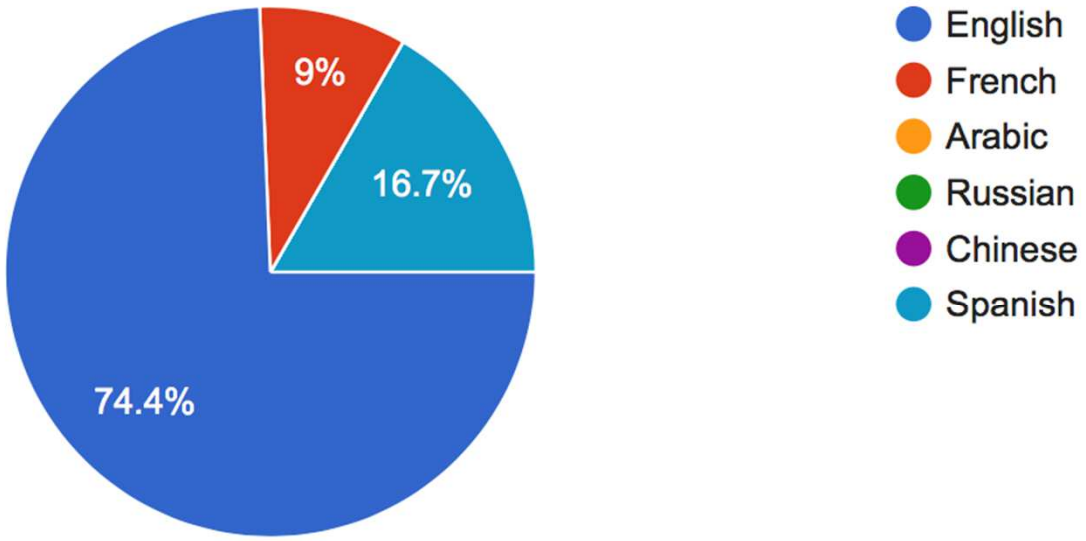
68 responses

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

Communications

What is your preferred UN language for announcements, information, and communications?

78 responses



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.

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*
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Prepare and implement an annual openly available training programme

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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

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- *Compile and promote the annual training programme*
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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*

For more Information and to download newsletters and other resources prepared by the Subgroup on Geodesy:

GGIM.un.org

www.unggrf.org

Twitter:
@UNGGRF
@UNGGIM

Factsheet
December 2015

UN-GGIM – Global Geodetic Reference Frame Working Group

The UN-GGIM Roadmap for the Global Geodetic Reference Frame
In February 2015 the UN General Assembly adopted the resolution "A Global Geodetic Reference Frame for Sustainable Development" - the first resolution recognizing the importance of a globally-coordinated approach to geodesy.

The GGRF Working Group is working on the development of a roadmap that will describe how governments can contribute to the sustainability and enhancement of the Global Geodetic Reference Frame.

unggrf.org

Actions forward

– From a UN mandate to a roadmap for global geodesy

"The momentum the adoption of the UN resolution has created will position the global geodetic community well for the complex task ahead, developing a roadmap for GGRF enhancement."

Gary Johnston, co-chair UN-GGIM/GGRF Working Group

NEW YORK: Ambassador Peter Thomson from Fiji introducing the resolution to the UN General Assembly.

After the UN General Assembly adopted the resolution "A Global Geodetic Reference Frame for Sustainable Development", the GGRF Working Group has been working on a roadmap for global geodesy.

Role of the roadmap
The UN-GGIM Roadmap for the Global Geodetic Reference Frame is intended to identify the role that governments, through UN-GGIM, can play in improving the sustainability and enhancement of global geodesy.

"The roadmap is intended to provide an understanding interface between the geodetic community, who are scientifically skilled, and administrators in the national mapping and space agencies, and their governments", says co-chair Gary Johnston.

He explains that the roadmap is not intended to be a full scale technical document describing every element of geodesy. "It is rather intended to be an actions focused document that references existing technical material, or recommends the development of more detailed plans," says Johnston.

The roadmap needs to address the operational paragraphs from the UN General Assembly resolution

- Global cooperation in providing technical assistance in geodesy for those countries in need to ensure the development, sustainability and advancement of a GGRF
- Implement open geodetic data sharing
- Improve and maintain national geodetic infrastructure
- Enhanced multilateral cooperation that addresses infrastructure gaps and duplications globally
- Improved outreach to make the GGRF more visible and understandable to society

The roadmap needs to indicate a series of recommended actions

- Infrastructure
- Policy, Standards and Conventions
- Education, Training and Capacity building
- Communication and Outreach
- Governance

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