United Nations Global Geospatial Information Management Subcommittee on Geodesy 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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September 2019

United Nations General Assembly Resolution 2015: Global Geodetic Reference Frames for Sustainable Development

New York, 26 February 2015 Photo: Kyoung-Soo Eom

Sub-Committee Progress

- Recognising its importance the UN General Assembly adopted resolution 69/266 in February 2015, entitled 'A Global Geodetic Reference Frame for Sustainable Development'
- At the 6th session of UN GGIM, the Road Map for the development and sustainability of the Global Geodetic Reference Frame was endorsed by the CoE, who then requested the development of an implementation plan, and a Position paper on Governance



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

"A global reference frame is key if you want to be able to compare data from all continents; and to **empower** scientists from all parts of the world – to really give precise information, to make the planet a better place."

- Erik Solheim, Executive Director

United Nations Environment Programme

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



ATTACHMENT 1



United Nations Committee of Experts on Global Geospatial Information Management

Road Map for the Global Geodetic Reference Frame for Sustainable Development 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

The ETCB working 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.

Pilot Initiative: *Provide a framework for Member States to identify their 'Level' of competency requirements*

- First version has been available for participation since April 2018; will continue to accept responses.
- Some 80 Responses from 50 countries

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



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
- 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 "-GGIM Subcommittee on Geodesy

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 	 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?

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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?

Pilot Initiative: Identification of Existing Capacity Building Resources and Enabling Discoverability – knowledge database

- Identify and leverage existing ETCB resources
- Develop a system of tagging for discoverability and categorization of existing resources:
 - Questionnaire Level 1/2/3/4
 - Standardized Keywords
 - Vetted/endorsed by community
- Establish a central point of information on UN GGIM SCoG website
 - A "referral service" linking to external resources maintained by universities, societies, NGOs, and others
 - Lower the barrier to entry by identifying and explaining first steps to geodetic capacity





Platform for the Reference Frame in Practice seminars:

- Publication produces by FIG, IAG, IGS and UNOOSA ICG
- Needs an update to be relevant
- Previous authors have been contacted
- New authors are welcome



Pilot Initiative: Drafting Standardized Capacity Building and Development Frameworks



- How to empower nations to take ownership of relevant capacity building efforts/initiatives by providing a clear, easy to understand framework with standards and references?
 - Addressing different aspects of the GGRF Implementation Plan
 - Tailor to individual member state or region needs and circumstances
 - Increasing capacity capability
 - Organized facilitation of knowledge transfer
- Identify existing standards, frameworks, checklists, and other "how to" resources
- Work in conjunction with stakeholders

ATTACHMENT 1



United Nations Committee of Experts on **Global Geospatial Information Management**

Road Map for the Global Geodetic Reference Frame for Sustainable Development **Implementation Plan**





UN-GGIM - Subcommittee on Geodesy

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 peodesy.

The UN-GGIM Subcommittee on Geodesy was inaugurated in Mexico City in November 2017. The subcommittee is now presenting the position paper defining appropriate governance arrangements for the GGRF, and has finalised the roadmap implementation plan.

unggrf.org

From a UN mandate to commitment for global geodesy

Without commitment by Member States, the Global Geodetic Reference Frame (GGRF) will be in danger of degradation over time and consequently gradually lose its required accuracy and fundamental role in societal and scientific applications. As demonstrated by the GGRF Governance Position Paper a UN GGRF convention could be the long-term solution to this problem.



on the GGES for sustainable develo opment calls for commitments by Member Material Instructing Reported

examples to follow by other nations", says Zuhelr Altamimi, France. geodesic minaspucture as an estential means to enflance the global geodetic No one country can do this alone relevence frame, Willrout commitment "For the global geodetic reference by Merman States, the Goat will be frame to be sustainable all countries In deliger of degradation over time. rived to play a role, with many of the and consectantly will gradually loss developed countries providing earlsits required acturacy and fundamental tarce to the less developed countries where possible, while also communing

role in societial and sciencific applica term. The current developments and vegrans to invarie the prodetic interstructure in Australia, and more norming the manifesterior of the rew produce Leith observatory in Ny-Assund by Norway tre concrete

UN-GGIM United Nations Committees of Reserves on Stable Connection Information of Reserves on Management of Managements

to upgrade their own contribution to GGRE to enhance its quality," says Gary Johnston, co-chair of the UN-GGIM Subcommittee on Geodesy. representing Australia

ness to cooperate in this way, currently no clear mechanism exists to facilitate cooperation, especially where the

"It is our belief that a UN convention on geodesy will create such a mechanism. Coupled with the possible creation of a UN trust account, which would provide a financial mechanism for donor contribution to this effort, we believe many of the current betwers to success will become far more manageable, therefore mproving the outcome for all UN Member States, and the evenoual Successful and sustainable enhancement of the Global Geodesic

says Alexey Trifuence, co-chair of the UN GGIM Subcommittate on Geodesy representing the Russian Federation.

ggimum org

Newsletter August 201

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Global Geodetic Centre of Excellence In February 2015 the UN General Assembly adopted the resolution "A Global Geodetic Reference Frame for Sustainable Development" - the first resolution

UN-GGIM - Subcommittee on Geodesy

recognizing the importance of a globally-coordinated approach to geodesy. The UN-GGM Subcommittee on Geodesy is now presenting the second iteration of the position paper defining appropriate governance arrangements and recommends to establish a Global Geodetic Centre of Excellance to strengthen the capacity to implement this resolution.

uncorf.org

CAPACITY BUILDING: Need for a coordinating entity

«Capacity development is one of the main pillars, and main challenges when it comes to the national geodetic network. There is a great need to develop and strenghten capacity for us to be able to sustain our geospatial activities, a says Oumar H. Ka, director of DTGC/National Mapping at the National Agency for Spatial Planning (ANAT) of Sinegal and chairman of UN-GGIM Africa.



Some years ago, to part of the National Geometrics Han of Senectal, Nettural where now trying to implement Renderines Canada supported the network stations for the entire counnational data intrastructure program and set up a tess reference station for try and one of the main intues we are satuble lanari postisming in Soregal raising is capacity development," The stantist was insugariated in 2012 to support international efforts involving a global retwork of stations to calca-The challenges He explains that having a well are catellite information and define functioning positioning system is elements frames, it also exhauses the nore than just building GNSS Stragal geodetic reference (start). stations and securing them. "It is National banefits about people, the technical knowbow surveyors the means that they can

and resonants to resonant thes to their work edition for and atomreteinfrastructure your after year." Creducing costs for all apple stores in-Cashing responsible and science. For all the people of Seregal, a solid geodetic darance spins supports postoning spong and property rights

«As part of the national spatial deta infrastructure program the Canadians arranged a geomatica training technology program which was very helpful and beneficial. They also had clear recommendations on how to get this whole "geomatization" process moving forward when they left, but since they left everything went dry", says Qumar H. Ka.

The Senegalese developed an action plan to deal with all the components of the program including the station.

«But for now things haven't moved that much. The government of Servegal was supposed to put money

Important infrastructure The station is one of a vory few ective satellite based stations in Africa, connected to the international GNSS (Global Nevigetion) Satallite System) Service (IGS) It has custom made Canadian

hardware that must be serviced by the Canadians. Senegal would need more capacity transfer to be able to take responsibility for this work. *To improve the situation, I shink there is a need for a global coordinating body that can coordinate capacity development at the international UN-GGIM Under Matters Commission of Expositions UN-GGIM Under Matters Commission of Expositions UN-GGIM Under Matters Commission of Expositions UNDER COMMISSION OF EXPOSITION OF EXPOSITION OF EXPOSITION UNDER COMMISSION OF EXPOSITION OF and regional level," says Mr. Ka.

States and states

While many countries have a willing-

sharing of resources is required. Facilitate commitment

Reference Frame*, says Johnston "The legal framowork allowable by a UN convention should provide a basis for the coordination of joint work of Member States in the field of global prodesy it will also provide governmental support and attention to the development of the GGRF both at the national and the plotal level



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

GGIM.un.org www.unggrf.org



Factsheet

UN-GGIM - Global Geodetic Reference Frame Working Group The UN-GOM Readmap for the Global Geoderic Reference Frame In Rebrisity 2015 the UR General Assembly a Suptial the resolution "A Global Geodelic Reference Irgane for Surfamable Development." The first resolution recognizing the importance of a globally coordinated approach to geodesic The QURE Working Group is working on the development of a roadmap that will describe how governments can contribute to the suitar ability and enhancement of the Global Geodetic Reference Frame. unight and

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 scentury co-chair LIN-COMPGER Munking Group



MRC 158C Ambatration Peter Shomon from Pgi introduct

to the UN General Assembly

After the UN Genetal Agentals adopted the resultation "A Glabel Geodetic Reference Frame for Settainable Development", the QGRF Working Group has been working un a roadmap tur global geodess

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

"the roadnap is intended to provide an understanding interface between the prodetic sciences by who are scoretically skilled, and administration in the national mepting 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 geodery. "It is rather intended to be an actions focused decument that referensis existing technical material, or recommends the development of more detailed plans," says tolendors.

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

· Global cooperation in providing technical assistance in geodesy for those sourbles in need to ensure the development. softwhelity and advancem of a light

· trajlement open grudette data sharing

improve and maintain pations geodetic infrastructure

· Enhanced multilatoral cooperation that addresses infrastructure gaps and

Augilications globally angeomet outneeds to make

the GGAS more visible and understandable to society

The roadmap needs to indicate a series of recommended actions

+ belighter ber

* Policy, Standards and Constitues

+ Education, Tearing and Capacity building

· Commission and Outreads

* Gurentation



Take-home resources

International GNSS Service

Information, data and product access: <u>IGS.org</u>

GGOS Paper on GNSS-Enhance Tsunami Early Warning Systems

- bit.ly/gtews2018
- <u>https://apru.org/gnss-tsunami-early-warning-system-report/</u>

UN Global Geospatial Information Management + GGRF

- Committee of Experts: <u>ggim.un.org</u>
- Subcommittee on Geodesy: <u>ggim.un.org/UNGGIM-wg1/</u>
- Information about the GGRF: www.unggrf.org

Sendai Framework for Disaster Risk Reduction

- Global Assessment Report 2019: gar.unisdr.org
- Interactive Story Map: <u>arcg.is/1f90XP</u>
- Sendai Framework Monitor: <u>sendaimonitor.unisdr.org</u>

Sustainable Development Goals

Group on Earth Observations support of SDGs: <u>eo4sdg.org</u>

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