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COMMISSION FOR BASIC SYSTEMS

OPAG ON INTEGRATED OBSERVING SYSTEMS

**EXPERT TEAM ON EVOLUTION OF
GLOBAL OBSERVING SYSTEMS
*Seventh Session***

(ET-EGOS-7)

Geneva, Switzerland, 7-11 May 2012

FINAL REPORT



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EXECUTIVE SUMMARY

The Seventh Session of the CBS Expert Team on the Evolution of Global Observing Systems (ET-EGOS-7) was held at the WMO Headquarters in Geneva, Switzerland, from 7 to 11 May 2012, and was chaired by Dr John Eyre (United Kingdom). A key issue discussed at the meeting was the finalization of the new Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) responding to the Vision of the Global Observing System in 2025 (approved by EC-LXI in 2009) and to plans of the WMO Integrated Global Observing System (WIGOS). The new EGOS-IP will completely replace the current EGOS-IP and will be a key document providing Members with clear and focused guidelines and recommended actions in order to stimulate cost-effective evolution of the observing systems, addressing in an integrated way the requirements of WMO programmes and co-sponsored programmes. The goal is to submit the new EGOS-IP for approval by CBS in September 2012, then to EC in June 2013. The meeting identified a number of points to be addressed in a communication strategy for the launch and securing of commitment to the new EGOS-IP.

The Team reviewed several activities related to its work, such as The Observing System Research and Predictability Experiment (THORPEX), WMO Polar Activities including the development of the Global Cryosphere Watch (GCW), the African Monsoon Multidisciplinary Analysis (AMMA), recent developments of the WMO AMDAR Programme, and EUMETNET activities. It received a report from the CBS Rapporteur on GCOS matters.

The Team discussed how the work of the ET-EGOS and the EGOS-IP would complement other activities described in the WIGOS framework Implementation Plan (WIP).

As part of the Rolling Review of Requirements (RRR) process, the Team reviewed the status of the WMO database of observational user requirements and observing systems capabilities (the RRR Database). The Team noted and agreed with the proposed adjustments to the strategy for the evolution of the RRR Database. It noted with appreciation that the user requirements database is now fully functional on the WMO website, and that a "Satellite Observation Capabilities Review and Analysis Tool" is currently in a test and validation phase.

Also in the context of RRR, the Team reviewed the status of the Statements of Guidance (SoGs) for several WMO Application Areas, including Global Numerical Weather Prediction, High Resolution Numerical Weather Prediction, Aeronautical Meteorology, Nowcasting and Very Short Range Forecasting, Atmospheric Chemistry, Ocean Applications, Agricultural Meteorology, Hydrology and Water Resources, Seasonal to Inter-Annual Forecasting, Climate Monitoring (GCOS), Climate Applications (other aspects, CCI), Space Weather, and Global Terrestrial Observing System (GTOS – non-GCOS requirements of GTOS). The status is summarized in the table below. The Team agreed that the Global Cryosphere Watch (GCW) should not be regarded as an Application Area in the RRR context. However, there are many sub-applications to be addressed within GCW, and some of these may be appropriate as RRR Applications Areas. The Team also agreed to use the IGOS Cryosphere Theme document as a basis for understanding GCW observational requirements, and it revised the description of GCW key issues in the new EGOS-IP.

Application Area	New version reviewed	Adopted	To be updated
Global Numerical Weather Prediction	√	√	√
High Resolution Numerical Weather Prediction	√	√	
Nowcasting and Very Short Range Forecasting	√	√	
Seasonal to Inter-Annual Forecasting	√	√	
Aeronautical Meteorology	√	√	√
Atmospheric Chemistry			√
Ocean Applications	√	√	√
Agricultural Meteorology	√		√
Hydrology and Water Resources	√		√
Climate Monitoring (GCOS)		n/a	
Climate Applications (other aspects, CCI)	√	√	√
Space Weather	√	√	
GTOS (non-GCOS requirements of GTOS)			√

The Team reviewed the results of recent numerical weather prediction (NWP) impact studies relevant to the future evolution of observing systems. It noted that the plan to organize the Fifth WMO Workshop on “The impact of various observing systems on NWP”, in Sedona, Arizona, USA, 22-25 May 2012, was well underway and looked forward to seeing the outcomes.

The Team reviewed feedback from National Focal Points concerning progress against the current EGOS-IP and considered the information collected when updating the EGOS-IP. It reviewed the progress and actions related to the surface-based and space-based sub-systems parts of the current EGOS-IP, which responds to the “Vision of the GOS for 2015”.

The Team developed a proposal for a new work plan and drafted recommendations to be submitted to ICT-IO5-7 (Geneva, Switzerland, 18-22 June 2012) and CBS-XV (Jakarta, Indonesia, 10-15 September 2012) for consideration and approval, including a draft Recommendation on the EGOS-IP.

The Team agreed on its action plan for the period until the next ET-EGOS meeting.

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1 Opening of the meeting

1.1.1 The Seventh Meeting of the Expert Team on the Evolution of Global Observing Systems (ET-EGOS) of the Open Programme Area Group for Integrated Observing Systems (OPAG/IOS) of the Commission for Basic Systems (CBS) opened at 10.00 hours on Monday, 7 May 2012, at the WMO Headquarters in Geneva, Switzerland.

1.1.2 Dr Wenjian Zhang, Director, WMO Observing and Information Systems Department, opened the meeting on behalf of WMO. He welcomed the participants and explained the significant developments relevant to CBS and especially OPAG-IOS since the sixth ET-EGOS meeting in June 2011. He particularly recalled the WMO sixteenth Congress decision to implement the WMO Integrated Global Observing System (WIGOS) through Resolution 50 (Cg-XVI) and the implications for the work of the Team. The ET-EGOS is expected to play a crucial role in WIGOS implementation by managing the Rolling Review of Requirements (RRR), which promotes a cost-effective management of the existing resources through prioritization and recommendations for the deployment of observing systems that are believed to substantially impact the end products for each application area of the WMO.

1.1.3 Dr Zhang explained that the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS), established by the sixty third Executive Council, has made good progress regarding the production of a first draft version of the WIGOS Implementation Plan (WIP). He invited the Team to review this draft, and make sure it is consistent with the Rolling Review of Requirements, and the development of the Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP). The EGOS-IP together with other recommendations from the Team will be presented to the forthcoming CBS Session in September 2012.

1.1.4 In closing, Dr Zhang wished for a successful and productive session and an agreeable stay in Geneva.

1.1.5 Dr John Eyre (United Kingdom), Chair of ET-EGOS, also greeted the participants and expressed his confidence that the session would work hard to fulfil its obligations.

1.1.6 The Team acknowledged apologies from Team members Dr Lars-Peter Riishojgaard (USA), Mr Stephan Klink (EUMETNET), Dr William Wright (CCI), Dr Aurora Bell (Romania) and Mr Malamine Sonko (Senegal) for not being able to attend the meeting. The list of participants is given in [Annex I](#).

1.2 Adoption of the agenda

1.2.1 The Team adopted the Agenda for the meeting, which is reproduced at the beginning of this report.

1.3 Working arrangements

1.3.1 The Team agreed on its working hours and adopted a tentative time table for consideration of the various agenda items.

1.3.2 The Team established the following working groups for the duration of this ET-EGOS Session (working group leads are underlined):

- **EGOS-IP Sections 1-4 – Intro. & cross-cutting; Exec. Summary**
R. Stringer, J. Lawrimore, W. Fricke, J. Dibbern, W. Zhang, O. Tarasova, E. Charpentier

- **EGOS-IP Section 5 - Surface-based observing systems**
H Zhou, K. Monnik, E. Andersson, JB Ngamini, F. Grooters, J. vd Meulen, J. Lawrimore, E. Charpentier, O. Tarasova
- **EGOS-IP Sections 6 and 7 - Space-based observing systems & Space weather**
J. Eyre, J. Lafeuille, L. Machado, R. Munro, O. Tarasova
- **RRR Database issues**
J. Lafeuille, N. Hettich, E. Charpentier, E. Andersson, O. Tarasova
- **WIP & new OPAG IOS structure**
J. Eyre, R. Stringer, F. Grooters, J. Dibbern, L. Machado, K. Monnik, J. vd Meulen, W. Zhang

2. REPORT OF THE CHAIR

2.1 Dr John Eyre (United Kingdom), recalled the Terms of Reference of the Team ([Annex II](#)) and reported on activities related to the work of ET-EGOS since its last meeting, ET-EGOS-6 (Geneva, Switzerland, 14-17 June 2010). He reported that there has been progress in many areas as addressed in the ET-EGOS Work Plan and Actions list, and addressed some of the key challenges for this Session and beyond.

2.2 Dr Eyre reported that since ET-EGOS-6, there has been progress in many areas as the Team addressed its Work Plan and Actions list, drawing particular attention to the following aspects:

- The Team's membership has not changed since ET-EGOS-6.
- The activity which has received most attention during the last year has been the updating and review of the new Implementation Plan for the Evolution of the Global Observing Systems (EGOS-IP) (see item 10).
- He has participated as a member of the organizing committee of the 5th WMO Workshop on "The impact of various observing systems in NWP", under the leadership of Dr Erik Andersson. The workshop will be held in Sedona, Arizona, USA, 22-25 May 2012 (see item 9).
- Some queries concerning the user requirements database have been addressed. This will be discussed under item 8.1, and latest developments will be presented by the Secretariat.
- There has been some discussion concerning the database of observing system capabilities and discussion with EUMETNET. This will be discussed under item 8.2, and latest developments presented by the Secretariat.
- In June 2011, a draft of the GRUAN manual was made available to ET-EGOS members and some comments provided.
- In January 2012, he received an invitation for ET-EGOS to be represented at a GRUAN Climate Network Design Workshop to be held in Berlin, 13-15 June 2012. Mr Tim Oakley (UK) has agreed to participate, representing OPAG/IOS.
- He contributed to input from the Secretariat to the Implementation Plan for the Global Framework for Climate Services (GFCS-IP), for a section covering the RRR process.
- He reviewed the substantial changes made by the Secretariat regarding the EGOS pages on the WMO website (<http://www.wmo.int/egos>).
- At ET-EGOS-6, the Team discussed briefly some emerging issues concerning the global exchange of weather radar data. This was prompted by an approach from Dr Tom Keenan of Bureau of Meteorology (Australia) who is a member of the THORPEX Data Assimilation and Observing Systems Working Group (DAOS WG) and a former Chair of the WWRP Nowcasting WG. Dr Keenan suggested that a coordinated response to the need for improved international exchange of radar data would require the involvement of many WMO groups and teams, including ET-EGOS, ET-SBRISO, CIMO ET-ORS, IPET-DRC and ET-CTS. He further suggested a "tiger team", including representatives of all these groups, might be an appropriate way to initiate necessary action. Dr Eyre suggested that ET-EGOS-7 reviews the status of activity in this area and proposes a way forward.

2.3 The Chair proposed that ET-EGOS-7 give particular attention to the following issues:

- The next session of CBS is planned for late 2012. It will be preceded by a meeting of ICT-IOS, 18-22 June 2012. Therefore it will be important for the ET to finalize its input to these meetings. It will need to consider recommendations for approval by CBS and also propose a work plan for continued activities of ET-EGOS, on the assumption that CBS will decide that the role of the ET should continue in close to its current form.
- In particular, ET-EGOS should devote significant attention at this meeting to the review and revision of the new EGOS-IP (see item 10.2). In order to recommend a new version of EGOS-IP to CBS in late 2012, it will be necessary for ET-EGOS to provide a complete and mature version of this document for consideration by ICT-IOS in June 2012.
- ET-EGOS should note that the 5th WMO Workshop on “The impact of various observing systems in NWP” is imminent. It should consider the process through which recommendations from this workshop will be passed to ICT-IOS and then for consideration by CBS.

2.4 The meeting noted that Aurora Bell (Romania) has moved to another position, and could no longer act as Point of Contact (PoC) for Nowcasting and Very Short Range Forecasting (NVS RF). The Team requested the Secretariat in liaison with the ET-EGOS Chair to seek another PoC for NVSRF (**action: Secretariat; ASAP**).

2.5 The Chair recalled that CBS had asked ET-EGOS to nominate an expert to contribute to an expert meeting on documenting GRUAN observing practices in WMO Regulatory Material, and that Mr Russell Stringer had been nominated. The meeting took place in late January 2012 and was asked to consider two matters: accommodating GRUAN operational practices in Regulatory Material and the governance and management aspects associated with integration. Mr Stringer briefly summarised the purpose of GRUAN as a high quality reference network, and mentioned the WIGOS demonstration project for the operational implementation of GRUAN. He indicated that the January meeting had been attended by several representatives of GCOS and of CBS and CIMO, and that discussions had been productive leading to good progress on the GRUAN Manual, the identification of aspects to include in the GOS Manual, and the general governance and management arrangements for GRUAN. Of particular note:

- the steering and guidance for GRUAN will be broadened by the addition of representatives from WMO (potentially from CBS, CIMO, CAS and CCI) and from GCOS AOPC (Atmospheric Observations Panel for Climate); and
- GRUAN will explicitly aim to provide near real time provision of profile data for the benefit of other WMO application areas, noting that more extensive quality management processes are required over a longer period of time to take the data to a level suitable for GRUAN purposes.

2.6 The full report of the meeting¹ provides more details. Further action may be needed to identify a CBS representative to contribute to the WG-ARO (Working Group on Atmospheric Reference Observations), now to be renamed the WG-GRUAN. The Team requested the Chair to bring this issue to the attention of the ICT-IOS (**action: Chair; June 2012**).

3 GUIDANCE FROM CHAIR OF THE OPAG-IOS

3.1 The Team considered guidance from the Chair of the OPAG-IOS, Dr Lars Peter Riishojgaard (USA), in the form of a written report, addressing latest developments within the OPAG-IOS and its Expert Teams, as well as of relevant resolutions by Cg-XVI (16 May – 3 June 2011), EC-LXIII (6-8 June 2011), and preparation of ET report to the ICT-IOS-7 (second quarter, 2012) and CBS-XV (Jakarta, Indonesia, 10-15 September 2012). Special consideration was given to the role and responsibilities of CBS and its expert teams vis-à-vis WIGOS. Dr Riishojgaard highlighted some of the decisions and discussions from these meeting as well as point out some general development trends that are relevant to the work of ET-EGOS.

3.2 He reported on several important meetings that had taken place since ET-EGOS-6 in June

1 http://www.wmo.int/pages/prog/www/OSY/Reports/GCOS-WIGOS-CBS-CIMO_GRUAN_Report_final.pdf

2012. In particular, he called the attention of the team to the activities around WIGOS triggered by CG-XVI and EC-63. These included the first meeting of the Inter-commission Coordination Group on WIGOS (ICG-WIGOS) in September 2011 and the first meeting of the Task Team on the WIGOS Implementation Plan (TT-WIP) in March 2012.

3.3 The Inter-Commission Coordination Group (ICG-WIGOS) had made good progress regarding the development of the WIGOS Functional Architecture, and the WIGOS Implementation Plan (WIP). Some efforts remain to be made regarding the WIGOS Regulatory Material (Manual and Guide).

3.4 In his written report, Dr Riishojgaard explained the relationship between WIGOS and the Global Observing System and the work of ET-EGOS in particular. A common understanding is now emerging across both ICG-WIGOS and the Secretariat staff responsible for WIGOS support. In essence this means that the work of ET-EGOS will continue along the current lines, but with continued expansion into the “new” areas for WIGOS, e.g. atmospheric composition, oceans and climate. ET-EGOS (or its successor, depending on the outcome of the next CBS Session) will thus continue to focus primarily on collecting, vetting and documenting observational requirements for all WIGOS application areas and will have primary responsibility for the Rolling Review of Requirements (RRR). This will include activities related to the Implementation Plan on the Evolution of Global Observing Systems (EGOS-IP), and particularly the monitoring of progress against the plan, and proactive pursuance of its actions.

3.5 However, those integrating activities that are new to WIGOS, such as the development of standards for metadata and of a quality management framework will not be included in the ET-EGOS Work Plan and it appears likely that responsibility for these areas will be given to an Inter-Programme Expert Team yet to be created.

3.6 Dr Riishojgaard encouraged the Team to take into consideration the draft WIGOS Implementation Plan during its discussions of agenda item 7. This should also help clarify the current thinking of the relationship of ET-EGOS and WIGOS.

3.7 The Team recalled that the fifth WMO International Workshop on the Impact of Various Observing Systems on NWP (Sedona, USA, 22-25 May 2012) is a key element of the information gathering part of the RRR process. This issue will be discussed under item 9.3.

3.8 The forthcoming ICT-IOS meeting (Geneva, 18-22 June 2012) would prepare the report from OPAG-IOS, including ET-EGOS to the forthcoming Regular Session of the CBS in Jakarta from 10 to 15 September 2012. Team members were invited to express their views on the role, Terms of Reference and Work Plan for the team during the period after CBS-XV.

4. PROGRESS ON ET-EGOS WORK PLAN FOR CBS

4.1 Dr Eyre introduced the progress on the detailed ET-EGOS work plan proposed by the CBS-XIV (2009) for the period 2009-2012 and based on the guidance of CBS-Ext. (2010) and updated status from ET-EGOS-6. He recalled that the previous ET-EGOS meeting had updated the work plan by assigning responsibilities to Team members, specific deadlines, and status information where appropriate.

4.2 The Team again reviewed the ET-EGOS work plan for progress and further action. The Team agreed on some aspects to be considered during this ET-EGOS Session. The updated work plan is reproduced in [Annex III](#) and progress against this plan will be submitted to the next CBS Session.

4.3 The Team recalled that there is a RRR section in the WIGOS Functional Architecture document which needs to be reviewed. The Team also needs to recommend to the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) what to include in the WIGOS Manual regarding RRR. In addition, the current descriptions of the RRR in the GOS Manual & Guide should be reviewed and checked to see whether they accurately reflect how the RRR is currently performed, whether they

require updating (see also paragraph 8.2.15 and the identified action for the Chair), and what information on the RRR process should be provided by the Team for the WIGOS Manual. This will be a task of the Team or its successor in the future. (See also the new proposed workplan discussed under item 11, and provided in Appendix II of [Annex XII](#).)

5. REVIEW OF ACTIONS

5.1 The Chair reported on progress on actions from the ET-EGOS-6. These actions were structured as follows:

- I. RRR process – general
- II. RRR process – user requirements (URs) and SoGs
- III. RRR process – observing system capabilities
- IV. Impact studies, including OSEs and OSSEs
- V. Preparation of the new EGOS-IP
- VI. Other issues

5.2 The Team reviewed progress made against each item. It noted that most of the actions have been completed; for the remainder, it updated them or continued them as the actions from the ET-EGOS-7, as appropriate. These, together with additional actions decided by this meeting, are listed in [Annex IV](#).

5.3 The Team also reviewed the actions from the Space Programme (ET-EGOS-7 doc 10.1.2). Those related to the new EGOS-IP were addressed under agenda item 10 (see 10.2.1.3).

6. REVIEW OF OTHER ACTIVITIES RELATED TO ET-EGOS AND OPAG-IOS

6.0 The Team was informed by designated experts and the WMO Secretariat on the activities within WMO and other international programmes / projects relevant to the OPAG-IOS and ET-EGOS.

6.1 Update on GCW activities

6.1.1 Dr Barry Goodison (Secretariat) reported on WMO Polar activities, and development of the Global Cryosphere Watch (GCW).

6.1.2 He recalled that the WMO Sixteenth Congress adopted Resolution 60 (Cg-XVI) - Global Cryosphere Watch - and requested EC-PORS to oversee GCW's initial development. Funding within WMO's regular budget was re-allocated to this project. The first GCW Implementation Meeting, held in Geneva, 21-25 November 2011 and led by the EC-PORS GCW Task Team, successfully engaged participants from outside organizations as well as selected GCW focal points and produced actions to develop GCW for implementation. A draft implementation plan is being finalized. It expands on the Implementation Strategy approved by Congress (Annex XIV (Cg-XVI)). All documentation and presentations of the GCW meeting are available on the web².

6.1.3 Dr Goodison reported that the GCW Task Team of EC-PORS oversees the implementation of GCW, while selected tasks, including initiation of CryoNet, are being initiated within a very limited budget.

6.1.4 The Team agreed on the following:

- Implementation agents for observations in polar regions (noting that there is no WMO Regional Association for the Antarctic area) need to be mentioned in the EGOS-IP, e.g. EC-PORS, GCW Advisory Board, Cryonet Team;

² <http://www.wmo.int/pages/prog/www/OSY/Meetings/GCW-IM1/DocPlan.html>

- The practice for reporting “Snow” and “No snow” in FM-12 SYNOP reports will should be addressed, for example by using BUFR, which allows the reporting ambiguity to be avoided;
- The scope of GCW is very different from RRR Application Areas. GCW concerns many applications and could also be treated as a component observing system (e.g. similar to how AMDAR is treated in the RRR context). Also GCW extends to products and service provision whereas the RRR process deals only with Application Areas that have direct requirements for observations;

6.1.5 ET-EGOS-7 has requested the PoCs of all Application Areas to review how requirements for cryospheric variables and observations in polar regions are taken into account in the user requirements database and in their SoGs. Reviews of GCW plans may also reveal new Application Areas that should be included in the RRR process. ET-EGOS-7 also requested the Secretariat to investigate adding a new Cryosphere “Theme” in the RRR Database to facilitate management of the user requirements for cryospheric variables within it (**action: Secretariat; end 2012**).

6.1.6 The PoC for GCW was requested to identify the key GCW documents of interest to the ET-EGOS (e.g. IGOS Cryosphere Theme document. Implementation Plan, Regional groups documents) (**action: GCW PoC; ASAP**).

6.1.7 The Team invited its members to review the IGOS Cryosphere Theme document and other related documents (**action: ET-EGOS; end 2013**).

6.1.8 The Team invited the GCW to review the current definitions of the variables in the RRR Database (**action: GCW PoC; end 2013**).

6.2 Update on architecture for climate monitoring from space

6.2.1 Dr Barbara Ryan (Secretariat) reported on latest developments with regard to the Architecture for Climate Monitoring from Space, which had been presented at the previous ET-EGOS Session. The intent was for developing an architecture for monitoring climate from space which is largely based on the increasing role that satellites are playing in observing the Earth’s climate, and the need for an end-to-end system to ensure these space-based observations are sustained over time. Cg-XVI adopted Resolution 19 (Cg-XVI) - Development of an architecture for climate monitoring from space - which particularly requested the Technical Commissions to update WMO regulatory material, including development of the Manual on WIGOS.

6.2.2 Since ET-EGOS-6, the *ad hoc* Writing Team, comprised of representatives from the Committee on Earth Observation Satellites (CEOS), the Coordination Group for Meteorological Satellites (CGMS) and the WMO Space Programme, have written a report titled, “*Strategy towards an Architecture for Monitoring Climate from Space*”. This report, building upon the Concept Document presented at ET-EGOS-6 was first reviewed by the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and the Group on Earth Observations (GEO).

6.2.3 The report was then presented to plenary sessions of both CEOS and CGMS in the autumn of 2011. Discussions conducted at both plenary sessions were positive and supportive of the overall effort, recognizing that once developed, an architecture for climate monitoring could help ensure coordinated and sustained observations from space. Specific review comments received from both organizations have since been incorporated and presented to the Team at this Session.

6.2.4 The Team noted that the architecture document, where a RRR section has been added, is also a key component in the WIGOS framework, and also provides a contribution of the WMO Space Programme to the Global Framework for Climate Services (GFCS).

6.2.5 The Team noted with appreciation that the comments it had provided have now been included in the last version of the document.

6.2.6 The Team or its successor will have opportunities to comment on the technical content of the

architecture regarding observing systems.

6.3 Update on GFCS

6.3.1 Filipe Lucio (Secretariat) reported on latest developments with regard to the Global Framework for Climate Services (GFCS).

6.3.2 The meeting recalled that the main findings and recommendations of the High-level Taskforce (HLT) report³ were endorsed by the Sixteenth Session of the WMO Congress (Cg-XVI), which entrusted the WMO Executive Council (EC) with the responsibility of developing the Implementation Plan and the Draft Terms of Reference and Rules of Procedure for the Intergovernmental Board of the Global Framework for Climate Services (GFCS) and its substructures based on the implementation plan (hereafter Implementation Plan). To accomplish this task, the Sixty-third Session of the WMO Executive Council (EC-64) established a Task Team on the GFCS, chaired by the President of WMO, which leads the process for the development of the Implementation Plan involving appropriate consultations with governments, United Nations and international agencies, key institutions and stakeholders.

6.3.3 To facilitate the range of activities to support the development of the GFCS draft Implementation Plan, a GFCS Office was established within the WMO Secretariat in July 2011. The GFCS Office is a working and transition mechanism, which will also prepare the WMO Extraordinary Congress in October 2012.

6.3.4 The Executive Council Task Team on the Global Framework for Climate Services (ECTT-GFCS) held two meetings so far. In the first meeting (Geneva, Switzerland, from 13 to 15 October 2011), it agreed on the process, including timeline and deliverables leading up to EC-64 in June 2012 and subsequently to the Extraordinary Congress in October 2012. In the second meeting (Geneva, Switzerland, from 28 February to 1 March 2012), the ECTT-GFCS reviewed the Zero Order Drafts of the Implementation Plan and Governance document and made concrete recommendations for its further improvement. It also agreed on the milestones and deliverables leading up to the Extraordinary Congress. Currently more than 100 experts from 36 countries nominated by governments, United Nations, international agencies and regional organizations, constitute the team, which is drafting the Implementation Plan of the GFCS. In the selection of experts, consideration was given to geographical and gender balance. The timeline and deliverables for the process agreed by the ECTT-GFCS was presented to the Team.

6.3.5 The various consultations under the GFCS have highlighted the need to improve the accessibility of climate/climate-related data and information. Under the realm of the GFCS, consideration needs to be given to the development of a data policy that will go beyond Annex I to Resolution 40 of Cg-XII and Resolution 25 of Cg-XIII.

6.3.6 In collaboration with the Resource Mobilization Office, efforts are underway for the mobilization of resources for GFCS as part of the overall WMO resource mobilization strategy. Various Members have pledged financial support to GFCS during and after Cg-XVI.

6.3.7 Key to the success of the development process of the GFCS and its subsequent implementation is the level of engagement of all the stakeholders from the end users of climate services to the producers and intermediaries. In this regard, a transparent and inclusive consultation as well as communication strategy intended to involve as many stakeholders as was considered by the second meeting of the ECTT-GFCS (28 February to 1 March 2012). The communication strategy of the GFCS is intended to (i) inform all stakeholders about progress, the ongoing activities and plans related to the GFCS process; (ii) encourage the participation of stakeholders in the GFCS processes; and (iii) offer space for stakeholders to provide views, opinions and ideas about the GFCS and the process for its development.

3 The High-level Taskforce report is available at : http://www.wmo.int/hlt-gfcs/downloads/HLT_book_full.pdf

6.3.8 The Team agreed that the ET-EGOS (or its successor) should consider through the RRR process additional requirements for observations in response to applications covered by GFCS. The Team recognized that the GFCS development is a long process, and that no specific requirements have been submitted by the GFCS to the RRR and the EGOS-IP yet. The Team stressed that a direct and routine dialogue will have to be established in the GFCS framework with those operational agents who directly use the observations for elaborating the products and services that the end users need.

6.3.9 The Team also encouraged GFCS to express their requirements for observations in relation to those already documented for climate monitoring by GCOS.

7. WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)

7.1 Dr Alexander Karpov (WMO Secretariat) reported on the status of the development of WIGOS concept following guidance from Cg-XVI, and Congress decision to implement WIGOS through Resolution 50 (Cg-XVI). Cg-XVI further decided that implementation activities will be undertaken during the next financial period as one of the major efforts of the Organization with the goal that WIGOS should become operational from 2016 onwards. Cg-XVI provided an overall guidance and determined responsibilities for all constituent bodies to ensure WIGOS implementation. The tasks assigned by Congress to Technical Commissions are of direct relevance to ET-EGOS as one of the working bodies of CBS. In particular, Congress made the following points:

- It emphasized that the implementation of WIGOS should build upon and add value to the existing WMO observing systems with emphasis on integration of surface- and space-based observations in an evolutionary process to satisfy requirements of WMO and WMO co-sponsored Programmes. Congress noted that, since all WMO Programmes would benefit, each should actively participate and contribute its own expertise and resources in implementing WIGOS;
- It recognized the important role of WIS in WIGOS implementation, in relation to data exchange and discovery, and the provision of effective standards and practices for data management. Congress stressed the importance of coordination between WIGOS and WIS implementation activities;
- It stressed the importance of the development of an implementation plan for the evolution of WIGOS beyond 2015 including technical guidance on how to design, develop and implement integrated national observing systems to provide comprehensive observations in response to the needs of all WMO Members and Programmes;
- It agreed that the implementation of WIGOS must be reflected in the revised WMO Technical Regulations, documenting the WIGOS concept of operations and contributions of all observing components. In this regard, the Congress endorsed the inclusion of the Manual on WIGOS in the list of mandatory publications. Following the decision by Cg-XVI, EC-LXIII (May, 2011) established the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) under the chairmanship of Mr Fred R. Branski (USA), the president of CBS, with representatives of regional associations and international partner organizations during the implementation process. ICG-WIGOS was specifically tasked to develop and submit the WIGOS Implementation Plan (WIP) for approval by the EC-64.

7.2 The first session of the ICG-WIGOS was held at the WMO Secretariat in Geneva, Switzerland, from 26 to 30 September 2011. Based on the decisions by Cg-XVI and EC-LXIII, ICG-WIGOS-1 addressed all key components of WIGOS implementation. ICG-WIGOS formulated recommendations and guidance on the WIGOS implementation components⁴ and established, inter-alia, the following Task Teams (TT): TT on WIGOS Manual, TT on WIGOS Metadata and TT on WIGOS Implementation Plan (WIP).

7.3 The Task Team on WIP (TT-WIP) met in Geneva from 27 to 30 March 2012 under the chairmanship of F. Branski and developed a draft WIP, version 0.8, which will be submitted to EC-64 for approval. In elaborating the WIP, TT-WIP-1 addressed major technical issues, and made

4 Final report of the ICG-WIGOS-1 is available at <http://www.wmo.int/pages/prog/www/WIGOS-WIS/reports.html>

appropriate changes/edits to ensure full compliance with the guidance and recommendations made by Cg and EC. Table 4.1 of the draft WIP presents the description of implementation activities, associated deliverables, timelines, responsibilities, costs and associated risk. ET-EGOS was invited to pay particular attention to Section 2.3 of the draft WIP- *Key Activity Areas for WIGOS Implementation* and to Section 3 of the Table 4.1 - *Design, planning and optimized evolution of WIGOS and its regional, sub-regional and national observing components*, where the tasks relevant to the ToR of the ET-EGOS are specified. It was also recommended that for each activity listed in that table, a detailed activity plan be developed by the responsible entity(s) with support of the Project Office and guidance from ICG-WIGOS.

7.4 The Chair of ET-EGOS had expressed some concern regarding the Regional and National activities identified as part of this area of activity in the draft WIP (Table 4.1 Activity Nos. 3.2.1 and 3.3.1).

7.5 The Team agreed that the following should be considered in order to ensure complementary roles of the EGOS-IP and the WIP; (i) the EGOS Implementation Plan will focus on the long term evolution of WIGOS component observing systems, while the WIP will focus on the integration of these components; (ii) avoiding duplication between the EGOS-IP and the WIP; and identify required regulations, processes, and implementation activities; and (iii) addressing the GFCS requirements.

7.6 The Team reviewed the sections of WIGOS-IP (versions 0.8 and 0.9) relevant to its work. For section 2.3, the Team advised:

- some reorganization of the text,
- a more prominent and higher priority role for EGOS-IP in the activities described at Regional and National/Sub-regional level,
- feedback to CBS on any departures between user requirements identified at Regional and National/Sub-regional level and those documented in the RRR Database.

These comments were passed to the WIGOS Project Office. The Team also noted that, following any changes to the text in section 2.3, Table 4.1 should be revised accordingly.

7.7 Following the task on further alignment of Programme activities to support WIGOS implementation, a proposal for a possible new structure of CBS OPAG-IOS (2012-2016) was developed jointly by the Secretariat with the President of CBS and the Chair and co-Chair of the OPAG-IOS. Subsequently, the view has been expressed by the Chair and co-Chair of the OPAG that retaining ET-AWS and ET-SBRISO as separate ETs may be preferred, due to a lack of perceived overlap, and that further discussion may be warranted regarding the WIGOS-related ETs identified as part of the possible new structure.

7.8 Team noted the proposal for the future OPAS IOS structure to take WIGOS implementation requirements into account (see also agenda item 11):

- An Inter-Programme Expert Team (IPET) on WIGOS Network Design and Evolution, with a Work Plan similar in scope to that of ET-EGOS,
- A new Expert Team on WIGOS Implementation to take into account issues which are not “evolution-related”.

The Team agreed that the change from “ET” to “IPET” would formalise what was already true in practice. It also suggested, in relation to the new ET, that clarification was needed on the scope of its activities and its role in relation to other groups.

7.9 The Team invited the Chair to refer the renaming of the Plan from the “WIGOS Implementation Plan” to the “WIGOS framework Implementation Plan” (both WIP) to the ICT/IOS (**action: Chair; June 2012**).

8. ROLLING REVIEW OF REQUIREMENTS AND STATEMENTS OF GUIDANCE

8.0.1 The Secretariat recalled the concept and structure of WMO database of observational user requirements⁵ and of observing system capabilities (RRR Database) and its on-going updating process in the context of RRR. The Team recalled that the RRR Database is a key element of the RRR process, which is planned to play a crucial role within WIGOS.

8.0.2 The meeting reviewed progress regarding the strategy endorsed by CBS-Ext 2010 for the evolution and future hosting of the RRR Database. The Team further recalled that the ET-EGOS-6 had reviewed the strategy, as well as the technical specification for the RRR Database, prepared by the Secretariat in consultation with the *ad hoc* sub-group based on the strategy. Both documents can be found among the documents on the ET-EGOS-6⁶. Due to different constraints on the hosting side for the observing system capabilities part, and after thorough review, ET-EGOS-6 concurred with the WMO Secretariat proposal to keep a distributed approach in general (i.e. specific centres being responsible for specific components of the RRR Database), but concentrate initial development and hosting of the RRR Database in one point. Information collection regarding the observing system capabilities would be taken care of by responsible agencies on behalf of the WMO. The RRR Database will be structured around the following elements: (1) user requirements, (2) space-based observing systems capabilities and (3) surface-based observing systems capabilities, including both land-based and ocean-based capabilities.

8.0.3 This evolution from the original strategy is described in the *Technical Specification for the Evolution and Future hosting of the WMO Database of Observational User Requirements and Observing System Capabilities*, version 1.2, 4 March 2011. As all 3 parts of the RRR Database (requirements, space-based capabilities, surface-based capabilities) may need to be used in a combined manner, it is important to have one common (software) infrastructure, which allows queries across these parts, by one single interface. This approach also reduces development time and costs by avoiding unnecessary duplication. However, collection of information to feed into the three parts still follows the distributed approach and remains the responsibility of the respective agency/institution committing to it. Appropriate interfaces allowing these agencies full and direct access to the respective parts of the RRR Database are to be provided. The CBS Management Group (MG) has endorsed the new “distributed” approach for the strategy for the evolution of the RRR Database.

8.1 Review database of user requirements

8.1.1 Following ET-EGOS-6, the Secretariat has implemented the recommendations from ET-EGOS regarding new definitions of variables, and the requirements for Ocean Applications and Space Weather. On 2 August 2011 the database was authorized by the ET-EGOS Chair for operational use and was made operationally available on: <http://www.wmo-sat.info/db>. Explanations of the mechanism for collecting requirements and of the concepts of goal, breakthrough and threshold are also provided on the website. The Team noted that:

- The Application Area PoCs for High Resolution NWP, for Climate (AOPC-OOPC-TOPC) and for Ocean Applications have provided updates using the on-line editing capability. The PoC for Atmospheric Chemistry has sought comments from the Global Atmospheric Watch Scientific Advisory Groups on Greenhouse Gases and on Aerosols respectively. The valuable feedback received has led to correcting definitions of aerosol related variables (e.g. aerosol optical depth).
- As the administrator of the RRR Database, the Secretariat has continued to bring editorial corrections, for instance to correct unit conversion errors originated during the migration from Excel files to the RRR Database. Early 2012 it was noted that for most Application Areas no “breakthrough” figures had been entered by the respective PoCs and that the database still contained the automatically interpolated values that had been entered four years ago as

5 User requirements refer to the observational data requirements for the Application Areas identified in the Rolling Review of Requirements.

6: http://www.wmo.int/pages/prog/www/OSY/Meetings/ET-EGOS_Geneva2011/DocPlan.html

placeholders for the breakthrough. The Secretariat has rounded off many of these figures in order to avoid displaying a meaningless number of decimals, and decided not to include the breakthrough columns in the default display view; the user must now use the “Show/hide details” button in order to display the breakthrough columns.

- More recently, the GCOS Joint Planning Office has submitted the Climate/TOPC requirements to the GCOS/WCRP TOPC for review, and valuable comments were received on terrestrial variables. The requirements database was then submitted to the 17th meeting of the GCOS/WCRP AOPC, which expressed a strong interest and took action to review and update the Climate/AOPC requirements. Furthermore, an introduction to the RRR database is scheduled for the 33rd session of the WCRP Joint Scientific Committee in July 2012.
- Over six months from October 2011 to March 2012, web usage statistics show an overall audience of around 900 visitors (excluding the bounce visitors). The frequentation is stable around 50 visitors per week or 10 per business day, one third of them for multiple visits, and the average visit duration is 6 to 7 minutes.

8.1.2 Noting that the database is now operationally available and has the potential to be a unique reference tool for a wide user community in the context of WIGOS, the Team agreed that it is essential that the requirements be carefully maintained. While the Secretariat commits to technical maintenance and administration of the RRR Database, the PoCs have the crucial role to check and maintain the requirements. The online editing functionality is aimed at facilitating this updating process. Feedback from the PoCs, experts and users at large is welcome to help improving both the functionality and the contents of this database.

8.1.3 The meeting recalled a few outstanding issues regarding the user requirements database, and requested the breakout group on the RRR Database to address them together with additional issues arising from the discussion. The summary of the working group discussions with proposed actions is provided in **Annex IX**.

8.1.4 The Team recalled that breakthrough criteria are often entered as placeholders in the database, and invited the PoC to review these figures. In addition, where the definitions or units have changed, the uncertainty value had to be converted, and must be checked. The Team therefore requested the Secretariat to re-send the list of requirements where uncertainty figures had been converted and specifically need to be reviewed by the PoCs (**action: Secretariat & PoCs; ASAP**).

8.1.5 The Team requested its members to review the GFCS Observations and Monitoring and the Research and Modelling Component annexes to the draft GFCS Implementation Plan and provide feedback to the Chair (**action: ET-EGOS; Sept. 2012**). The draft GFCS-IP with annexes is available from the WMO website⁷.

8.2 Review database of observing system capabilities

8.2.1 The Meeting reviewed the status of the observing system capabilities part of the RRR Database.

Space-based capabilities

8.2.2 Mr Nils Hettich (Secretariat) reported on the status of the space-based observing system capabilities part of the RRR Database. The database on space-based capabilities, the Satellite Observation Capabilities Review and Analysis Tool (SOCRAT⁸), has been developed internally. As noted by ET-EGOS-6, the space-based capabilities were recorded so far in the Dossier on the Space-based Global Observing System (GOS-Dossier). As the GOS-Dossier has expanded along the years, with over 600 instruments and above 400 satellites quoted, it has become more and more important to ensure that this vast amount of information can be updated in a practical and consistent manner. This was the primary driver for migrating this information to a database of satellite capabilities.

⁷ http://www.wmo.int/pages/gfcs/ip_en.php

⁸ www.wmo-sat.info/db2

8.2.3 Furthermore, given the absence of any firm proposal from a hosting agency to implement the CBS strategy, it was decided to design this database in accordance with the technical specifications agreed by CBS and to implement the database within the Secretariat without further delay, building on the successful experience of the user requirements database (www.wmo-sat.info/db) in 2011.

8.2.4 The Team noted that the outcome of this development is SOCRAT, which is currently in a test and validation phase. The tool includes an online database recording all the relevant space-based observing capabilities, and online search and filter functionalities to analyze these capabilities. The whole tool is meant ultimately to replace the GOS-Dossier. This tool meets in particular the following objectives:

- unifying information that was previously distributed among the Dossier and other media (600-page GOS Dossier, Satellite Status web pages, 200 HTML pages of instrument characteristics, internal spreadsheets on the evaluation of instruments and products);
- improving accessibility through an online search interface;
- facilitating the updating of information, and ensuring its consistency;
- supporting monitoring the evolution of the space-based GOS over time;
- supporting gap analyses in support of the RRR.

8.2.5 The Team further noted that the gap analysis methodology used in Volume 3 of the Dossier has been reviewed, which has led to distinguishing two functionalities of the Tool, in accordance with the conclusions of ET-EGOS-6:

- evaluation of implementation progress of the GOS with reference to a baseline, based on the "Vision for the GOS in 2025" (Annex V), which replaces current Volume 3 of the Dossier;
- gap analysis for selected variables, which is a new functionality; this is initially provided in a qualitative manner and could be refined at a later stage to quantify the potential performance of the capabilities with respect to the requirements.

8.2.6 The Team underlined that this development was a major step forward for the RRR process and agreed with the approach proposed by the Secretariat for finalizing the tools. The Team invited its members to test the beta-version of the SOCRAT tools⁸ and to provide feedback to the Secretariat (**action: ET-EGOS; end July 2012**). The attention of the CBS should be raised to the need to allocate adequate resources to ensure that such a resource be maintained.

Surface-based capabilities

8.2.7 Mr Etienne Charpentier (Secretariat) reported on the status of the Surface-Based Observing System Capabilities part of the RRR Database. Following ET-EGOS-6 request, the Secretariat wrote to the EUMETNET Secretariat and the JCOMM Co-President in November 2011 to ask whether EUMETNET and the JCOMM in situ Observations Programme Support Centre (JCOMMOPS) would respectively be interested to play an active role regarding the collection of parts of the land-based (for EUMETNET) and the ocean-based (JCOMMOPS) parts of the observing systems capabilities respectively as a contribution to the distributed database.

8.2.8 The Team noted that EUMETNET has made a first evaluation of the effort required, and the matter has then been discussed by the EUMETNET Assembly in December 2011. While the first estimate of the cost to make the necessary developments was beyond what the Secretariat could afford in this regard, the EUMETNET Assembly agreed to engage negotiations with the WMO Secretariat in order to clarify the required effort and find a compromise. Additional information has then been provided to EUMETNET to clarify the role of EUMETNET and the list of variables and platform types that EUMETNET would eventually be responsible for providing estimates of the capabilities.

8.2.9 These developments lead to the more general questions of whether we should be compiling information:

- (i) on actual performances of the instruments in terms of the database criteria (space/time resolutions, timeliness, uncertainty), i.e. based on actual data monitoring activities to derive the required information (which is what EUMETNET and JCOMM were originally requested), or
- (ii) on observing systems capabilities based on lists of platforms Members actually operate, together with appropriate description of the platform characteristics in terms of the database criteria.

8.2.10 The Team agreed that the second approach was more realistic to implement, and could also feed on the content of the WMO Publication No. 9, Volume A⁹, Observing Stations and WMO Catalogue of Radiosondes, and its future evolution in the WIGOS framework (i.e. the WIGOS Observing Systems' components description database) with the required additions to allow the recoding of observing platform actual capabilities. The proposal is now therefore to build the surface-based capabilities database on the basis of Volume A, add new tables and fields as required, and link it with the requirements database so that a critical review can be performed. The database would be organized in such a way to permit authorized focal points to enter information directly in the database through password protected access. Information could either be entered for individual platforms or for a set of platforms with common capabilities (to simplify the work of the focal points when large platform networks are deployed in a country or within a programme). Focal points could be national, or represent specific programmes in charge of specific types of observing platforms. Draft technical specifications of the surface-based capabilities database have been written, and will be further refined.

8.2.11 From that perspective, it is now for example proposed that EUMETNET looks at about 6 platform types for the platforms they are responsible of. In addition, some prioritization can be proposed to focus initially on a sub-set of the required platform types.

8.2.12 Regarding JCOMMOPS, the Team noted that the required developments have been included in the JCOMMOPS overall evolution strategy although the timeline for those developments is not clear at this point. It is understood that some limited financial contribution to these developments will be provided by the WMO.

8.2.13 The Team strongly supported the updated strategy for the RRR Database as proposed by the Secretariat, recognized the resource implications, and recommended the ICT-IOIS to concur with these developments, and promote resource mobilization for the required developments and future maintenance (**action: Chair; June 2012**).

8.2.14 The Team noted a few issues to be considered regarding the observing system capabilities database, and requested the breakout group on the RRR Database to address them. The summary of the working group discussions with proposed actions is provided in Annex IX.

8.2.15 The Team agreed that the way the RRR and the critical review is described in existing documentation (i.e. website, GOS manual & guide) should be reviewed and that these processes should be better documented to reflect the reality of how the RRR is actually performed, and to show more clearly how key stakeholders can submit their views on requirements and priorities in the various WMO Application Areas (**action: Chair; end 2012**).

8.2.16 The Team requested the Chair to discuss with the Chair of the ET-SBRISO the status of the weather radar database (a result from the questionnaires from ET-SBRISO) (**action: Chair; July 2012**).

8.3 Statements of Guidance (SoGs)

⁹ <http://www.wmo.int/pages/prog/www/ois/volume-a/vola-home.htm>

8.3.1 Overview of status

8.3.1.1 The ET-EGOS Chair recalled that the SoG is a gap analysis and is meant to help CBS formulate plans to address gaps in the observing system with respect to user requirements. Recommendations derived from these gap analyses eventually go into the Implementation Plan and the Vision for the GOS ([Annex V](#)). The RRR process informs POCs of all WMO Application Areas (and indirectly all Members, WMO constituent bodies, WMO Programmes and co-sponsored Programmes) on the extent to which their requirements are met by present systems, will be met by planned systems, or would be met by proposed systems. This would also allow Members, WMO constituent bodies, WMO Programmes and co-sponsored Programmes, to check whether their requirements have been correctly interpreted and update them through the relevant POC according to the RRR process. The procedure agreed by the Team for update, validation and approval of SoGs is provided in [Annex VII](#).

8.3.1.2 The Team noted that, following ET-EGOS-6 recommendations and further guidance from the Chair, some of SoGs have been updated during the last intersessional period. The Team reviewed available updates on individual SoGs as provided by the PoCs. Current status of SoGs is summarized in [Annex VIII](#).

8.3.2 Consider newly revised SoGs

8.3.2.1 The Meeting reviewed available updates on individual SoGs as provided by the nominated Point of Contacts within specific application areas.

Global Numerical Weather Prediction (GNWP)

8.3.2.2 A version (dated 10 May 2011) of the SoG for GNWP was considered at ET-EGOS-6 in June 2011. Updates proposed for the current revision include:

- introduction of ensemble forecasting and ensemble data assimilation as important elements of global NWP;
- emphasising further the role and importance of radio occultation data;
- removing the reference to observation targeting as a future technique;
- Modification of the summary section to incorporate the comments of ET-EGOS-6.

8.3.2.3 These were incorporated in a revised version (dated 28 March 2012) submitted to ET-EGOS-7. The Team agreed to post the new version of the SoG for GNWP on the website.

8.3.2.4 The Team requested the PoC to update the SoG for GNWP with the latest information from THORPEX on targeting (e.g. for tropical regions) (**action: GNWP PoC; June 2012**).

High Resolution Numerical Weather Prediction (HRNWP)

8.3.2.5 ET-EGOS-6 comments were passed to the PoC by the ET-EGOS Chair, and the SoG updated accordingly in August 2011 (web version). In March 2012, the PoC added a few sentences about scatterometer measurements that permit the retrieval of wind vectors over sea surface in the "surface wind" section. The new version was provided to ET-EGOS-7 for review. The Team agreed to post the new version of the SoG for HRNWP on the website.

Aeronautical Meteorology

8.3.2.6 The PoC for Aeronautical Meteorology, Dr Jitze van der Meulen (Netherlands) reported on the updating of the SoG for this Application Area per recommendation from ET-EGOS-6. A new version was proposed taking into account user requirements for meteorological services at airports (the terminal zone). The database table is extended with user requirements, specific for meteorological services at airports. Some variables had to be introduced into the RRR table of variables. The update/extension is largely based on existing Standards and Recommended Practices (SARPs) as documented in the WMO Technical Regulations and the knowledge and experience of the author.

Requests to a number of recommended experts to supply comments and additional material did not result in useful reply. Frequent reminders will be sent out to complete the table.

8.3.2.7 The Team agreed that the measurement uncertainty had to be consistent in the RRR framework with the WMO-No. 8 (CIMO Guide), and the recommendations from the outcome of the WMO-BIPM Report¹⁰ of the workshop on Measurement Challenges for Global Observing Systems for Climate Change Monitoring - Traceability, Stability and Uncertainty - Geneva, 30 March - 1 April 2010.

8.3.2.8 The Team requested its members to provide feedback to the PoC regarding the SoG (**action: ET-EGOS; end 2012**).

8.3.2.9 The Team requested the PoC to check the status of volcanic ash in various WMO documentation and identify whether updating will be needed (**action: PoC for Aeromet & Chair; end 2012**).

8.3.2.10 The Team agreed to post the new version of the SoG for Aeronautical Meteorology on the website.

Nowcasting and Very Short Range Forecasting (NVSRF)

8.3.2.11 The new version of the SoG for NVSRF, as submitted to ET-EGOS-7, included the following changes:

1) Changes requested by ET-EGOS-6, i.e.

- the SoG to be reorganized as following: (i) gaps in quantity and quality; (ii) new developments; and (iii) gaps in capacity building;
- duplication to be removed;
- meteorological concepts/features to be considered;
- encouraging met services to be more open regarding data policy for cross-border data exchange (not only global data exchange);
- adding new variables: e.g. fresh deposit of snow;
- new issues as proposed by the PoC to be added.

2) Some changes proposed by the ET-EGOS Chair in February 2012, and comments/questions added for the PoC to address.

3) Changes per the review of Dominique Ruffieux (Switzerland) and the PoC in March/April 2012.

8.3.2.12 The Team reviewed the SoG for NVSRF and agreed to post this new version on the website.

8.3.2.13 The Team requested the Chair to consult with the Secretariat (GDPFS) to identify a new PoC for NVSRF, and then provide him/her with guidance as appropriate (**action: Chair; July 2012**). The Team agreed that the PoC should then merge the user requirements for Synoptic Meteorology into those for NVSRF in the database (**action: new PoC NVSRF; Oct. 2012**).

Atmospheric Chemistry

8.3.2.15 Ms Oksana Tarasova reported on the latest developments with regard to the SoG for Atmospheric Chemistry. She noted that the document should be the result of a critical review showing to what extent the capabilities of current and planned observing systems meet scientifically driven and technologically independent requirements for these observations.

8.3.2.16 The Team noted that the current SoG for atmospheric chemistry originates from the

¹⁰ <http://www.bipm.org/utis/common/pdf/rapportBIPM/2010/08.pdf>

IGACO strategy. Integrated observations described in IGACO strategy constitute the essence of the GAW Programme. At the same time the GAW Programme does not cover all the variables mentioned in IGACO strategy. It also covers a number of variables that are not reflected in IGACO strategy, but which are important for atmospheric chemistry applications.

8.3.2.17 Ms Tarasova further reported that in 2011 the JSC OPAG-EPAC decided that a review should be performed for the GAW variables with the current SoG as a starting point. To implement this review, the task to establish RRR processes for different GAW focal areas was included in the Addendum to the GAW Strategic Plan: 2008-2015, which was approved by the WMO Congress in 2011. This RRR establishment task is to be implemented during 2012-2015.

8.3.2.18 The Team noted that the updated SoG will include only variables under responsibility of the GAW Programme as it is only feasible to establish the regular review process for the variables which are already coordinated by the Programme. Other (non-GAW) variables can be updated on an ad-hoc basis calling on the respective expert communities. GAW can facilitate the search for these experts.

8.3.2.19 As the GAW coordination is done via different focal areas, the respective Scientific Advisory Groups (SAGs) have been approached concerning the establishment of the RRR process. The SAG Reactive Gases (RG) has made the most substantial progress and provided updates for the list of variables and requirements for the variables included in the RG group. Other SAGs are expected to provide their contributions starting next year and finalizing this activity within the expected time limits.

8.3.2.20 The Team agreed with the proposed roadmap described by the PoC for producing a SoG. The roadmap is provided in [Annex XIV](#).

8.3.2.21 The Team requested the PoC to liaise with the Secretariat and update the user requirements database (**action: PoC; end 2012**).

Ocean Applications

8.3.2.22 The Team noted that the user requirements for Ocean Application were submitted to the database in May 2011. The SoG has been updated in Oct 2011 to take into account the ET-EGOS-5 and ET-EGOS-6 recommendations (waves, sea-level, polar regions, satellite data for non-climate variables, make ref. to requirements). Substantial changes also made for the sea surface height anomaly, for sea surface salinity, and for the gaps summary sections.

8.3.2.23 The October 2011 version was submitted to the ET-EGOS Chair for review. He provided the following comments and suggestions for improvement:

- Quantitative information on user requirements should be removed;
- New to make the document consistent with regard to the terms to be used in the gap analysis as defined in the head of section 2. Title of section 2 to be changed to reflect gap analysis;
- The detailed information on user requirements is very valuable but is incomplete - to be compatible with the UR database it should ideally be stated in terms of threshold, breakthrough and target requirements for each of: horizontal resolution, vertical resolution (for 3D fields), temporal resolution, accuracy and timeliness;
- Some of the tables go beyond the scope of "Ocean Applications" and into areas covered by the URs of other applications areas, and sometimes these statements are not consistent with the information we have from the "guardians" of these other applications. It would be helpful to delete these, and to focus only on the ocean applications.

8.3.2.24 A new version was provided in March 2012 to make the English more consistent throughout the document, and to take into account some of the comments from the ET-EGOS Chair. However, some further consultation is required by the PoC with the JCOMM community in order to

take these comments fully into account.

8.3.2.25 The Team noted that a new version of the SoG should be provided by the PoC in September 2012 to take into account the remaining issues raised by ET-EGOS as well as guidance from the fourth Session of JCOMM (Yeosu, Republic of Korea, 23-31 May 2012) (**action: PoC; Sept. 2012**).

8.3.2.26 The Team requested the Chair to review the new SoG for Ocean Applications once available, and provide feedback to the PoC (**action: Chair; end 2012**).

8.3.2.27 The Team agreed to post the new version of the SoG for Ocean Applications on the website.

Agricultural Meteorology

8.3.2.28 Ms Leslie Malone (Secretariat) reported on behalf of the PoC, Mr Robert Stefanski (Secretariat). The Team recalled that, for the ET-EGOS-6 meeting, a major revision of the SoG and table of requirements for agricultural meteorology was completed. However, after the ET-EGOS-6 meeting, the PoC realized that the first step in the RRR is to examine and then revise the table of requirements if needed. Then the SoG is written to reflect the table of requirements. This was not done for the ET-EGOS-6 version nor for the previous versions.

8.3.2.29 Based on the discussions at the ET-EGOS-6, several outstanding issues still need to be reviewed or revised by a CAgM team. These issues were presented to the Team. There has been no progress on these issues since ET-EGOS-6.

8.3.2.30 The Team noted that a CAgM / JCOMM Task Team on Weather, Climate and Fisheries will meet in 2013 and will undertake a review of requirements for the fisheries side of the Agricultural Meteorology Programme. Therefore these have not been included in this SoG but it is anticipated that the SoG will be updated once the fisheries review is completed. This review will probably not be completed until the last quarter of 2013.

8.3.2.31 The Team requested CAgM to examine all of the outstanding issues with a view to providing a revised requirements table and SoG for Agricultural Meteorology at the next session of ET-EGOS. The PoC will liaise with the WMO Secretariat involved in the ET-EGOS process to ensure that the revision is done properly.

8.3.2.32 The Team recommended that key gaps not currently reflected in the EGOS-IP regarding Agricultural Meteorology, and not overlapping with other applications areas should be added if necessary. The Team therefore invited the PoC to review the latest draft of the EGOS-IP as soon as possible, and propose changes if required (**action: PoC; ASAP**).

Hydrology

8.3.2.33 The Team recalled that ET-EGOS-6 agreed that the SoG for Hydrology required further review and updating by the CHy, and its Advisory Working Group (AWG), taking into account the following elements: (i) the Section "identification of gaps" needs to be completed; and (ii) the statement on S-Band Doppler radar needs to be addressed and written in a more generic way (following correspondence with Vaisala). The user requirements should be revised. Further comments were provided by the ET-EGOS Chair to the PoC in August 2011.

Seasonal to Inter-annual Forecasting (SIAF)

8.3.2.34 The Team recalled that a version of the SoG for SIAF (dated 13 May 2011) was submitted for approval to ET-EGOS-6, June 2011. Following feedback from ET-EGOS-6, a minor change has been introduced. (A clarification was added on the definition of sub-seasonal predictions: sub-seasonal predictions mean predictions beyond 10 days but not extending to a full season, usually

averaged and expressed as a departure from climate values for that period. Monthly prediction is a sub-sample of the sub-seasonal predictions.) A new version of the SoG was presented to the Team. No changes had been made in the user requirements database.

8.3.2.35 The Team also noted the feedback from the meeting of the CBS Expert Team on Extended- and Long-range Forecasting (ET-ELRF), Geneva, Switzerland, from 26 to 30 March 2012 as reproduced below:

4.5.1 The meeting thanked the ECMWF for the review of observational data requirements for Long-Range Forecasting. The meeting noted that there had been no need to modify the Statement of the Guidance (SoG) for Seasonal to Inter-Annual Forecasts (SIAF) prepared for the Exeter (2010) meeting, with the exception of including clarification on the definition of sub-seasonal predictions and a simplification of the text to avoid repetition with the SoG for Global NWP. The meeting noted that it would be helpful to highlight elements of the observing system that are essential for long-range forecasting such as TOGA/TAO and encouraged its members to review the SoG for SIAF with this in mind and provide comments to the Point of Contact (Dr Laura Ferranti) as appropriate, prior to the upcoming meeting of the CBS Expert Team on Evolution of the Global Observing System (ET-EGOS), which is planned to be held in May 2012. Dr Ferranti also proposed to incorporate relevant information from the plenary paper for the WCRP Open Science Conference (Denver, October 2011) on "Challenges of a Sustained Climate Observing System" (Trenberth et al, 2011), available at http://www.cgd.ucar.edu/cas/Trenberth/trenberth.papers/Trenberth%20paper%20OSC%20October%202011_v13.pdf.

4.5.2 The meeting noted the importance of Observing System Experiments to evaluate the relative impacts of elements of the observing system on the performance of seasonal forecasts, and that experiments of this kind had been conducted to evaluate the impact of the ARGO floats. The Team encouraged WCRP to coordinate more such Observing System Experiments in order to provide firm evidence of the benefits of key observation systems.

8.3.2.36 The Team agreed to post the new version of the SoG for SIAF on the website (after a typographic error in section 2.11 – aerosols – is corrected).

Climate Monitoring - GCOS

8.3.2.37 Mr Jay Lawrimore (USA) reported on the latest developments within GCOS of activities of interest to the ET-EGOS.

8.3.2.38 The Team recalled its agreement at the previous Session that the 2010 update of the GCOS-IP and its 2011 Satellite Supplement shall be treated as an updated element of the SoG for Climate Monitoring (GCOS). Both documents are updated every five years.

Climate Applications (other aspects - CCI)

8.3.2.39 Mr Jay Lawrimore (USA) reported on behalf of the PoC, Dr William Wright (Australia). The Team reviewed a revised SoG for Climate Applications submitted on behalf of CCI. The emphasis in this new version was on defining observational needs, gaps and emphases in terms of how observations are taken, in contrast to the previous version which emphasised the type of observations needed. This version of the SoG references the original SoG, and retains that document as an attachment entitled "Requirements for Climate Data", Attachment 1

8.3.2.40 The Team noted that the document attempts to do two things. Firstly, it highlights the need for observations to support climate services *apart from* climate monitoring via the GCOS networks (which emphasise observations of the GCOS *Essential Climate Variables*¹¹ at selected high quality sites). A separate SoG exists for these. The second purpose of the document is to

¹¹ Among the 50 GCOS Essential Climate Variables are the standard meteorological parameters: air temperature, precipitation, atmospheric motion (i.e winds), air pressure, humidity and solar radiation

emphasise the basic requirements for observational data that apply to both GCOS and non-GCOS variables and stations alike (e.g., the need for data backups, and ongoing collaboration between observers and climate staff). Adherence to the GCOS Climate Monitoring Principles is mandatory for GCOS, or other stations designated as “climate monitoring stations”, but is strongly encouraged for other stations.

8.3.2.41 The paper organizes the requirements into separate sections on technical requirements (e.g. the needs to minimize data loss, and how this should be addressed; ensuring adequate standards and metadata; communications and robustness; measuring extremes, among others), and whole-of-network issues (e.g. managing automation; special needs and deficiencies including distinguishing the non-GCOS requirements), as well as broader activities appropriate to climate such as effective change management, and ongoing consultation between the climate and observational programs. There is also a section on data management-related requirements, since observational and network planning often has downstream effects on how climate data is managed. For instance, changing observational technologies may involve changes to data flow, with the risk of data being lost or corrupted if climate data managers are not involved in planning the implementation of new systems.

8.3.2.42 The current document has not yet been peer-reviewed within CCI, so there may be future modifications to it. It draws on the author’s experience in both his home organization and his participation in certain data projects in developing countries and small island states within RA V, so it is anticipated most requirements will be captured here. With one or two exceptions the paper does not attempt to quantify requirements. The CCI plans to initiate a longer-term process of stakeholder engagement with its OPACEs in climate service provision, climate monitoring and prediction, and with related groups such as the Commission for Agriculture to ascertain quantitative requirements; it is anticipated this process will take a further year or two.

8.3.2.43 The Team recommended that key recommendations from the SoG not currently reflected in the EGOS-IP regarding Climate Applications, and not overlapping with other applications areas should be added if necessary. The Team therefore invited the breakout group to review the latest draft of the EGOS-IP, and propose changes if required.

8.3.2.44 The Team noted that issues dealing with quality control have to respond to WIGOS needs and Quality Management Framework (QMF) requirements, and should be addressed by the ICG-WIGOS, ICT-IOS, and other Technical Commissions as appropriate, but not in any detail in the EGOS-IP. The Team further noted that Volume-IV of the Technical Regulations is dealing with Quality Management. WIGOS Manual would also be drafted to take into account Quality Management requirements.

8.3.2.45 The Team recalled that the SoG is a gap analysis and not a discussion about qualitative requirements. It requested the PoC to further update the SoG for Climate Applications (other aspects, CCI) to take into account the issues identified by the meeting (**action: PoC; end 2012**). The Team also requested the PoC to provide quantitative requirements to the database, and further update the SoG from that perspective (**action: PoC; end 2012**).

8.3.2.46 The Team agreed to post the new version of the SoG for Climate Applications on the website.

Space Weather

8.3.2.47 The first version of the SoG for Space Weather, developed by the WMO Inter-programme Coordination Team on Space Weather (ICTSW), was made available before ET-EGOS-7 by the PoC, Mr Terrance Onsanger (NOAA, USA). The SoG is structured by (i) Ionospheric Observations, (ii) Geomagnetic Observations, (iii) Energetic Particles, (iv) Solar Observations, and (v) Solar Wind Observations, with specific recommendations for each of those types of observations on how to address gaps. Some more general recommendations are also provided. The Team agreed to use these recommendations as the basis for updating the EGOS-IP Space Weather sections, and formulating corresponding actions.

8.3.3.48 The Team thanked the authors of the SoG for their efforts; the current version already represents a substantial piece of work and a very significant contribution. The Chair agreed to provide comments to the PoC (**action: Chair; June 2012**). The Team agreed that the new version of the SoG should be posted on the website.

GTOS (i.e. the non GCOS requirements of GTOS)

8.3.2.49 The Team requested the Secretariat to write to the PoC for GTOS, and remind him about the issues that had been raised by ET-EGOS-6 (**action: Secretariat; Sept. 2012**).

Global Framework for Climate Services (GFCS)

8.3.2.50 The Team noted the good progress made in draft the GFCS Implementation Plan (GFCS-IP) and GFCS intent to embark in RRR activities. The Team encouraged GFCS to continue such developments and follow the WMO RRR in the view to eventually contribute to it.

Polar Meteorology and Global Cryosphere Watch (GCW)

8.3.2.51 The Team recalled the discussion under item 6.1, and that GCW could not be regarded as an application area. However, there are many sub-applications to be addressed in the GCW context, and the Team agreed to use the IGOS Cryosphere Theme document as a basis for addressing GCW requirements in the new EGOS-IP.

Summary

8.3.2.52 The Team agreed on a number of actions regarding the SoGs above to be updated. These are reflected in **Annex IV**.

8.3.2.53 The Team requested the Chair to write to the PoCs and thank them for their contributions (**action: Chair; ASAP**).

9. OBSERVING SYSTEM STUDIES

9.1 Update on recent OSEs/OSSEs

9.1.1 Dr Erik Andersson (ECMWF) presented an overview of the current activities with Observing System Experiments (OSEs), and Observing System Simulation Experiments (OSSEs) with emphasis on the design of the future of the GOS, including (refer to ET-EGOS-7 doc. 9 for details):

- adjoint-based sensitivity to forecast error,
- observation impact tool for ensemble Kalman filters,
- the international joint OSSE,
- advanced IR sounders in regional models,
- radio occultation data,
- use of the Chinese FY-3A and 3B data,
- accuracy of humidity observations from aircraft,
- impact of radar reflectivity and ground based GPS, and
- impact of targeting.

9.1.2 The Expert Team was pleased to note good progress with the Joint OSSE collaboration between NASA, NOAA, ECMWF, and a number of associated partners. This has provided observation impact results for Wind Lidar concepts and other prospective future satellite systems that have been presented at international meetings, e.g. the 2011 EUMETSAT Meteorological Satellite Conference, the 2012 AMS Annual Meeting and the 11th International Winds Workshop in 2012. The current work is

based on a 13-month simulation of the evolution of the global atmosphere (the nature run) at 40 km resolution. Specific impact studies for tropical cyclones and other severe weather events have been conducted with nature runs produced by higher-resolution limited-area models using boundary conditions from the global Nature Run. However, there is a need to upgrade the global nature run now that the horizontal resolution of the current generation of operational forecast systems exceeds that of the nature run.

Recommendation

9.1.3 Recognizing the value of the joint OSSE framework, the Expert Team encourages its use to assess future observing systems and the impact of network optimization scenarios, and recommends the production of a higher-resolution global Nature Run.

9.2 Proposal for new OSEs/OSSEs to be promoted by ET-EGOS

9.2.1 The meeting considered proposal for new impact studies to be promoted by ET-EGOS. A comprehensive proposal for OSEs and OSSEs of particular interest to ET-EGOS has been developed as part of the preparations for the Fifth WMO Workshop on “The impact of various observing systems on NWP”. This new list of specific studies and science questions has been distributed widely as it formed part of the invitation to the workshop. It is reproduced in [Annex X](#).

9.3 Next OSE/OSSE workshop

9.3.1 Dr Erik Andersson reported on the preparations for the Fifth WMO Workshop on “The Impact of various observing systems on NWP” (Sedona, USA, 22-25 May 2012) following CBS-Ext.(10) (2010) request to the OPAG-IOIS to develop the scope of this workshop. The Team noted with appreciation that the preparations are now nearly completed, and details can be found on the event’s website¹². The meeting is sponsored by NASA, the NOAA/NESDIS GOES-R Program Office and the THORPEX programme. Participants are expected to come from all the major NWP centres which are active in the area of impact studies. As for the first four workshops, it is planned to produce a workshop report to be published as a WMO Technical Report. The workshop will be organised in the following sessions:

- Session 1: Global forecast impact studies
- Session 2: Regional forecast impact studies
- Session 3: Specific scientific areas (including network design)
- Session 4: Workshop discussions and conclusions.

9.3.2 The Team requested Dr Andersson to bring any possible urgent matter arising from the workshop to the ICT-IOIS Seventh Session on behalf of the ET-EGOS (**action: E. Andersson; June 2012**).

9.3.3 The Team wished to thank the Dr Andersson, Dr Riishojgaard and the Secretariat for their support in preparing the workshop.

9.3.4 The Team noted that the Data Buoy Cooperation Panel (DBCP) is also organizing a 1-day workshop prior to the Fifth WMO Workshop to discuss the impact of drifter pressure data on NWP and to refine the DBCP implementation strategy. The DBCP workshop will be held in Sedona on 21 May to take advantage of the presence of international experts in NWP.

9.3.5 The Team recommended to organize a Sixth WMO Workshop on “The impact of various observing systems on NWP” in 2016.

10. IMPLEMENTATION PLAN FOR THE EVOLUTION OF GLOBAL OBSERVING

12 <http://www.wmo.int/pages/prog/www/OSY/Meetings/Wshop-Impact-NWP-5/index.html>

SYSTEMS (EGOS-IP)

10.1 Review of progress against current EGOS-IP

10.1.0 The meeting reviewed the progress and actions related to the surface-based and space-based sub-systems parts of the current EGOS-IP – responding to “The Vision of the GOS for 2015”¹³.

10.1.1 Review of feedback from NFPs

10.1.1.1 Mr Russell Stringer (Australia) presented his analysis of the 2011 national reports on progress and plans related to EGOS-IP based on the feedback received from the National Focal Points (NFPs). Since 2007, Members of WMO have been invited to nominate a NFP for reporting progress and plans related to EGOS-IP, and reports have been collected annually.

10.1.1.2 Reports received from NFPs have provided valuable information to ET-EGOS and have enabled regular assessments by the Team. As of April 2012, 82 countries have nominated an NFP. Twenty-seven NFP reports were received for 2012, including five NFPs who were reporting for the first time. This is an increase over previous years. Forty-four of the total 82 NFPs have provided a report for at least one year. However a smaller number have provided reports regularly and only 5 have provided a report in each of the five years so far.

10.1.1.3 As noted in previous analyses, most elements of EGOS-IP have been achieved or are being pursued by at least some Members. However most elements are also beyond the scope, capacity or aspiration of at least some Members. It remains evident that not all Members can contribute to global observing systems at the same level, particularly due to differing levels of resources and expertise.

10.1.1.4 One response should be to highlight and encourage technical cooperation and capacity building amongst Members and efforts by Regional Associations to highlight needs and priorities. The driving aim would be to enable all Members to contribute to global observing systems and their evolution through EGOS-IP to the greatest extent possible. Some good examples have been seen in the NFP reports over the five years so far, such as support for upper air stations.

10.1.1.5 Even where there is a widespread positive commitment to a recommendation of EGOS-IP, a long time period is typically required for some Members to make enough progress to produce a noticeable improvement in observing system capabilities.

10.1.1.6 Amongst the many comments provided by respondents against all the EGOS-IP recommendations, there were sometimes misinterpretations of the intent of the recommendation making some of the responses slightly misdirected. Also, there were some direct requests for clarification of what is expected of Members in tackling some of the recommendations.

10.1.1.7 No matter how much supporting information is provided to explain the EGOS-IP and its recommendations, a mechanism for follow up questions would be helpful to maximise the engagement and uptake by Members.

10.1.1.8 As in previous years, it may be observed that there appears to be a good degree of alignment of national plans with elements of the EGOS-IP. The many actions addressing individual recommendations provide evidence that Members are involved, capable and/or making plans relevant to the EGOS-IP. Not so clear, though, is the extent to which this alignment is due to the *influence* of the EGOS-IP.

10.1.1.8 Associated with the introduction of a new EGOS-IP, it would be timely to take actions to maximize its influence and uptake by Members and Regional Associations. This should be part of the communications strategy for the introduction of the new EGOS-IP.

13 http://www.wmo.int/pages/prog/www/OSY/Documentation/CBS-2002_Vision-GOS-2015.pdf

10.1.1.9 There was some discussion about how to keep NFPs engaged over the coming year or two during the transition to the new EGOS-IP. The Team recommended to establish an interactive exchange and feedback mechanism between ET-EGOS and the NFPs. For example, the Team recommended that the ET-EGOS reports on the feedback from NFPs (e.g. this ET-EGOS-7 doc no. 10.1.1) should be circulated to the NFPs (**action: Secretariat; Sept. 2012, and ongoing**).

10.1.1.10 The Secretariat explained that the actions in the new EGOS-IP could be referenced for the purposes of planning and reporting after they are approved by CBS in September 2012, although they wouldn't be formally approved by EC until June 2013. The Team recommended that, following expected CBS approval of the new EGOS-IP in Sept. 2012, NFPs should be requested to provide feedback for 2012 on the basis of the new EGOS-IP (**action: Secretariat; Jan 2013**). The Team therefore requested Mr Stringer to revise the Template on this basis (**action: R. Stringer; end 2012**). The Team requested Mr Stringer to reply to the NFPs who raised some questions for clarification on some of the EGOS-IP actions, and provide them with further clarification and guidance (**action: R. Stringer; ASAP**). The Team also recommended that ASECNA be given the opportunity to provide feedback on the implementation of the EGOS-IP in RA-I (**action: Secretariat & ASECNA; Jan 2013**). The Team requested Mr Stringer to compile a synthesis of the 2012 national reports (**action: R. Stringer; June 2013**).

10.1.1.11 The complete analysis of National Reports for 2011 that was provided to the meeting is included in [Annex VI](#).

10.1.1.12 The Team thanked Mr Stringer for his substantial contribution to this activity.

10.2 Development of New EGOS-IP

10.2.1 Review of inter-session activities regarding the new EGOS-IP

10.2.1.1 The meeting reviewed inter-session activities regarding the development of the new EGOS-IP. At ET-EGOS-6, the Team considered the latest draft and the comments received, taking note of guidance from Cg-XVI, of progress against actions on the old EGOS-IP and of feedback from NFPs. The version of the Plan presented at ET-EGOS-6 took account of issues raised in the SoGs of some application areas, but not all. The Team recalled that ET-EGOS-6 had agreed to perform a thorough trawl of all SoGs, to identify significant issues that should be represented in EGOS-IP by appropriate Recommendations and Actions. ET-EGOS-6 considered the latest draft, reviewed the comments, and made proposals on how to develop the Plan further to meet the goal of a submission to CBS-XV in 2012 (see Annexes XI, XII and XIII to the Report on ET-EGOS-6).

10.2.1.2 The Team reviewed the subsequent actions undertaken since ET-EGOS-6 in this regard. During July and August 2011, the Consultant and the ET-EGOS Chair prepared a new version, taking account of all input received to that point. On 2 Sept 2012, this version was sent out for review to a wide range of interested parties: Members of ET-EGOS, Chairs of CBS OPAG IOS and its Expert Teams, Chairs of CBS OPAG ISS and its Expert Teams, Presidents of Technical Commissions, RRR Application Area PoCs, EGOS-IP NFPs, contact points for GCOS, GOOS, GTOS and AMMA. They were requested to provide comments by 31 Dec 2011.

10.2.1.3 The Team noted that in response to the recommendations from the sixth meeting of the Expert Team on Satellite Systems (ET-SAT-6), a number of actions have been agreed at ET-EGOS-6 regarding the satellite-related aspects of EGOS-IP. These actions are recorded in Annex XI of the Final Report of ET-EGOS-6. *All these actions have been implemented in Versions 10 and above of EGOS-IP.*

10.2.1.4 It was also reported that, taking into account the ongoing evolution of satellite status and plans, the initial activities of the Inter-Programme Coordination Team on Space Weather (ICTSW), the deliberations of the Expert Team on Satellite Utilization and Products (ET-SUP), the draft EGOS-IP has been further reviewed within the Space Programme. The Secretariat reported on the outcome of

the seventh meeting of ET-SAT, that was held in Geneva from 17 to 19 April 2012, and had proposed additional updates to the draft EGOS-IP, mainly in its Section 6 (Space-based observing systems).

10.2.2 Review of feedback on draft EGOS-IP

10.2.2.1 Further work on the Plan in response to comments has been undertaken by the Consultant, resulting a version of the Plan (v11) available from the WMO website¹⁴. The Team noted that this version has been provided to the Chair of AOPC for review, and further considered by a small drafting group which met at WMO, 3-4 May 2012 (i.e. immediately prior to ET-EGOS-7). The small drafting group has reviewed all comments received so far, and either incorporated them in a new version v12, or added comments in the text so that the ET-EGOS-7 meeting can address them. The Team concurred with the changes proposed by the drafting group.

10.2.2.2 The Team considered feedback from ET-AWS, ET-SAT, ET-SUP, AMDAR Panel and ET-AIR, ET-SBRSO, THORPEX, GCW, AMMA, GCOS, EUCOS, and RA-I, noting that most of the comments had already been taken into account in v12 by the small drafting group. Remaining issues were considered by the ET-EGOS-7 breakout group on the EGOS-IP.

10.2.2.3 The Team reviewed a written feedback on the African Monsoon Multidisciplinary Analyses (AMMA) that has been provided by Dr Douglas Parker (UK), Co-Chair of the AMMA radiosonde group. This input was also considered by the breakout group for updating the EGOS-IP per guidance from the Team. In particular, the Team agreed that data telecommunication issues had to be better reflected in the EGOS-IP.

10.2.2.4 Mr Tetsuo Nakazawa (WMO Secretariat) reported on THORPEX Data Assimilation and Observing Strategies (DAOS) Working Group (DAOS-WG), and especially on the outcome of the last DAOS-WG meeting (Exeter, U.K. on 27-28 June 2011). The Team also recalled the report on Targeted Observations for Improving Numerical Weather Prediction: An overview¹⁵. The report includes useful findings and recommendations that have been considered by the Team when preparing the new EGOS-IP. Mr Nakazawa provided further comments regarding the EGOS-IP to be considered in the breakout group discussions.

10.2.2.5 A few discrepancies related to how the roles of the GAW and GCOS programmes are reflected in the new draft EGOS-IP were noted, and the Team recommended that these be corrected by the breakout group on the EGOS-IP. In particular, the Team recalled that the Atmospheric Chemistry is implemented through the GAW programme, and it is reflected in the GAW strategic plan. GAW is also contributing to GCOS as part of the GAW strategic plan.

10.2.2.6 The Team requested the Secretariat to check the draft EGOS-IP, and make sure that the roles and responsibilities of the different actors are properly reflected in the EGOS-IP.

10.2.2.7 The Team thanked the consultant Mr Jean Pailleux for his major contribution to the drafting of the EGOS-IP.

10.2.3 Preparation of the new version of the EGOS-IP

10.2.3.1 The meeting discussed preparation of the new version of the EGOS-IP based on the received feedback and the Team's discussions under previous agenda items. The Team considered the version v12, and further comments and revisions from the small drafting group.

10.2.3.2 The Team agreed to prepare a complete and mature version (i.e. a draft final version) for consideration by IOC-IO5-7, 18-22 June 2012. The version proposed by ICT-IO5 will be submitted CBS-XV (Jakarta, Indonesia, 10-15 September 2012). Subject to approval by CBS-XV, it will then be submitted for final approval WMO EC-LXV in mid-2013 as part of the CBS-XV Session report.

14 ftp://ftp.wmo.int/Documents/PublicWeb/www/gos/egos-ip/EGOS-IP_V11_02_JRE_120228.doc

15 http://www.wmo.int/pages/prog/arep/wwrp/new/documents/THORPEX_No_15.pdf

10.2.3.3 The Team recalled that ET-EGOS-6 also agreed that it would be important to develop and implement a strategy for the communication of the new EGOS-IP to stakeholders, including interaction with the NFPs and monitoring of progress. The Team agreed that the following points have to be addressed:

- Produce the list of stakeholders (having different communication requirements);
- Some of the stakeholders are agents for the implementation, and it is critical that we communicate well with them. ET-EGOS must elaborate what to communicate with them in order to make the ET-EGOS implementation the most effective;
- Those funding the observing networks will also have to be approached (GAW and GCOS could also advise in this regard);
- How we monitor the progress, and evaluate the performance metrics as the EGOS-IP is being implemented needs to be addressed;
- Advertising progress and achievements made with the implementation of the old EGOS-IP.

10.2.3.4 The Team therefore drafted an outline of the strategy during this Session with a view to presenting it to the ICT-IOS-7, and to elaborate the Strategy by December 2012. The Team requested Mr Stringer to lead this development (**action: R. Stringer; Dec 2012**). The outline is provided in [Annex XI](#) and includes several contributing actions which are added to [Annex IV](#).

10.2.3.5 The Team requested the Secretariat to consolidate the draft EGOS-IP, and then sent it to the Team members for their review no later than 17 May (**action: Secretariat; 17 May**). The Team suggested that the consultant also be given an opportunity to review the consolidated version at this occasion (**action: consultant; 10 June 2012**). This version will also be submitted to the ICT-IOS-7 for their review. The Chair will then take the comments from the Team, the consultant, and the ICT-IOS-7 into account for producing the version that will be submitted to the CBS XV (**action: chair; end June 2012**).

11. PREPARATION FOR THE FORTHCOMING CBS MEETINGS

11.1 Draft report to ICT-IOS-7 and CBS-XV

11.1.1 The Meeting agreed on a draft report that will be presented to the seventh session of ICT-IOS to be held in June 2012 in preparation for CBS-XV (Jakarta, Indonesia, 10-15 September 2012). The Team reviewed and discussed a draft report prepared by the Secretariat. The Team updated and agreed on the report according to the discussion during this Session. The report is provided in [Annex XII](#) and includes in particular a draft Recommendation on the adoption of the EGOS-IP, which the CBS is invited to approve.

11.1.2 The Team acknowledged that there will be a CBS focus on regulatory materials in the WIGOS framework. ET-EGOS will therefore have to look into these aspects as far as the RRR is concerned, and that could become part of its ToR. Also, the OPAG IOS will have the consideration of how to implement the WMO Quality Management Framework. The Team requested the chair to refer to the ICT/IOS and propose a mechanism such as an OPAG IOS Expert Team to take responsibility for implementation of WMO QMF across WMO component observing systems (**action: Chair; June 2012**).

11.1.3 The Team noted that the GDPFS has some of the responsibilities for monitoring the quality of received observations within OPAG-DPFS and that monitoring of observations data delivery and receipt is tackled in the OPAG-ISS. The Team invited the Chair to request that ICT IOS note this issue, and propose the best distribution of responsibilities in the WIGOS framework, while stressing that strong linkages between OPAG-ISS, OPAG-DPFS and OPAG-IOS (for RRR) should be promoted (**action: Chair; June 2012**).

12. ANY OTHER BUSINESS

The need for daily CLIMAT messages

12.1 Mr Jay Lawrimore (USA) raised the issue of the development of the principal measure of the state of the climate – the global temperature record - which has extensively depended on monthly CLIMAT data provided by NMSs. Over the last 20 years there has been a growing demand for indices and measures of the climate that also consider extremes (Jones et al. 2012). For many extreme measures, monthly CLIMAT data are insufficient and there is a need for a Daily CLIMAT message. This need is not just for timeliness, but principally for data that is compatible with long historic daily series developed and made available by NMSs.

12.2 The Team noted that attempts have been made to use SYNOP data for this purpose (e.g. by the European Climate Assessment and Dataset, ECA&D) but there are serious issues of incompatibility of SYNOP data with traditional methods of climate measurement within many NMSs (see van den Besselaar et al., 2012; Synoptic messages to extend climate data records; 117, D07101, doi:10.1029/2011JD016687). The most notable issue of incompatibility is associated with the way that daily maximum and minimum temperature are measured. Principally this is due to the fact that climate observations reflect the maximum and minimum temperatures measured over the previous 24-hour period, while daily summaries provided via SYNOP messages do not.

12.3 The Team also noted that daily summaries in SYNOP messages are based on measurements that occur between synoptic reporting times and often over a period less than 24-hours. For instance in Europe minimum temperatures are recorded over the first 12-hour period and maximum temperatures during the next 12-hour period. Measured in this way, the true daily minimum and maximum temperatures are often not reported because they occur outside those 12-hour periods. As a result SYNOP reports have been shown to significantly underestimate extremes. Minimum temperatures measured in this way are often higher than the true daily minimum temperature. Similarly, maximum temperatures reported via SYNOP messages are often lower than the true daily maximum temperature reported as 24-hour climate observation. Similar problems occur for precipitation. As a result, when SYNOP data are used to extend climate series, spurious trends can result. In other regions of the world SYNOP reporting practices can differ but problems remain. In the U.S., for example, the daily maximum and minimum temperature are reported during the 24-hour period ending at 00 UTC while a true climate observation is reported as a midnight-to-midnight local observation.

12.4 The Team invited the Chair to request the ICT/IOS to address this issue and consider the following recommendation (**action: Chair; June 2012**)

Retain SYNOP reporting (or its equivalent) for users who will continue to require max/min temps and total precipitation summarized according to the synoptic hours. For climate purposes there is a requirement for daily summaries that are consistent with national climate databases for daily maximum temperature, daily minimum temperature, precipitation, total snowfall, and daily snow depth. Each of these observations should be taken at the observing time consistent with the climate reporting practices of the NMS and reflect conditions over the previous 24 hour period. The climate convention varies from country to country so the desire would be for each country to retain its traditional observing practice in reporting daily climate summaries. For example, while the U.S. is local midnight, Australia is 9 am local, Canada is 06 UTC. These observations can be efficiently provided via daily CLIMAT messages or other methods specifically designed for climate purposes.

13. CLOSURE OF THE SESSION

13.1 The meeting tentatively agreed to have the Eighth Session of the ET-EGOS in Geneva, Switzerland, in mid-2014.

13.2 Actions decided by this meeting, are recorded in [Annex IV](#).

13.3 The session closed at 13:15 on Friday, 11 May 2012.

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SEVENTH SESSION OF THE ET-EGOS

LIST OF PARTICIPANTS

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TERMS OF REFERENCE AND MEMBERSHIP OF THE EXPERT TEAM ON THE EVOLUTION OF GLOBAL OBSERVING SYSTEMS (ET-EGOS)

The Terms of Reference below were approved by the Fourteenth Session of the CBS (Dubrovnik, Croatia, 25 March–2 April 2009). The CBS Extraordinary Session in 2010 decided to change the name of the Expert Team from Expert Team on the Evolution of the Global Observing System to Expert Team on the evolution of global observing systems while keeping the same terms of reference, acronym ET-EGOS, and membership.

1) Terms of Reference

Expert Team on the Evolution of global observing systems (ET-EGOS)

- (a) Update and report on observational data requirements of the WWW as well as other WMO and international programmes supported by WMO;
- (b) Review and report on the capability of both surface-based and space-based systems that are candidate components of the evolving composite GOS;
- (c) Carry out the rolling requirements review of several application areas using subject area experts (including atmospheric chemistry through liaison with CAS, marine meteorology and oceanography through liaison with JCOMM, aeronautical meteorology through liaison with CAeM, agrometeorology through liaison with CAgM, hydrology through liaison with CHy, and climate variability and change detection through liaison with CCI and GCOS);
- (d) Review the implications of the Statements of Guidance concerning the strengths and deficiencies in the existing GOS and evaluate the capabilities of new observing systems and possibilities for improvements and efficiencies in the GOS;
- (e) Carry out studies of real and hypothetical changes to the GOS with the assistance of NWP centres;
- (f) Develop new version of the Implementation Plan for Evolution of the GOS based on the Vision for the GOS in 2025, taking into account developments with respect to WIGOS and GEOSS; monitor progress against the Plan, report progress and updated Plan through the ICT-IO to CBS;
- (g) Prepare documents to assist Members, summarizing the results from the above activities;
- (h) Provide advice and support to the Chair of OPAG-IO on development and implementation of WIGOS concept.

2) Membership

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**EXPERT TEAM ON THE EVOLUTION OF GLOBAL OBSERVING SYSTEMS (ET-EGOS)
Updated WORK PLAN FOR the period 2009 to 2012**

(this workplan was presented to the CBS-XIV, approved by the CBS Management Group, then updated by ET-EGOS-5, ET-EGOS-6, and ET-EGOS-7 to assign responsibilities, deadlines, and indicate status)

No.	Task	Deliverable/Activity	Due	Responsible	Status	Comment
1	To contribute to the development and implementation of concept of WIGOS and provide relevant advice and support to the Chair of ICT-IOS	Address relevant items of WIGOS Implementation Activities agreed by EC-WG/WIGOS-WIS-2	Ongoing	John Eyre	CONOPS and WDIP reviewed at ET-EGOS-5; provided comments to the EC-WG WIGOS WIS. Relevant sections of WIGOS framework Implementation Plan (WIP) reviewed at ET-EGOS-7	ET-EGOS needs to recommend to ICG-WIGOS what to include in the WIGOS Manual regarding RRR
2	Survey and collate user requirements for observations for WMO and WMO-sponsored programmes	Review and update CEOS/WMO database of user requirements for observations, through Points of Contact for application areas.	Ongoing / Annual review	John Eyre	Reviewed at ET-EGOS-5, ET-EGOS-6 and ET-EGOS-7	Action continuing.
3	Survey and collate observing systems capabilities for surface-based and space-based systems that are candidate components of WIGOS	Review and update CEOS/WMO database of observing system capabilities, in collaboration with other OPAG IOS ETs.	Ongoing / Annual review	John Eyre	Reviewed at ET-EGOS-5, ET-EGOS-6 and ET-EGOS-7	Action continuing.

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4	Maintain Rolling Review of Requirements (RRR) for observations in several application areas, using subject area experts, including appropriate liaison with CAS, JCOMM, CAeM, CAgM, CHy, CCI and GCOS.	Continue RRR process for 12 application areas and expand to new areas as required: review and update as necessary Statements of Guidance on the extent to which present/ planned observing system capabilities meet user requirements, through Points of Contact on application areas.	Ongoing / Annual review	John Eyre	Reviewed at ET-EGOS-5; identified 2 new areas requiring SoGs (space weather and GTOS); agreed to combine SoGs for 2 application areas (nowcasting+VSRF and synoptic meteorology). Reviewed at ET-EGOS-6; agreed to review how GCW issues should be considered in SoGs. Reviewed at ET-EGOS-7	Action continuing.
5	Prepare and maintain reviews of OSEs, OSSEs and other studies undertaken by NWP centres and to provide information for consideration by ET-EGOS and OPAG-IOS	Rapporteurs on Impact Studies and NWP experts, review results of impact studies relevant to the evolution of GOS. Organize and hold next NWP Impact Studies Workshop in 2012.	May 2012: workshop	Erik Andersson	Recent OSEs and OSSEs reviewed at ET-EGOS-5, ET-EGOS-6 and ET-EGOS-7. Plans for 5th Workshop prepared: Sedona, Arizona, USA; 22-25 May 2012	
6	Promote CBS activities in support of GCOS goals	Review the implications of the 2010 update of the GCOS Implementation Plan for the activities of CBS Bring relevant issues to the attention of the ET-EGOS	End Jan 2010 (Impl. Plan) July 2010 (review GRUAN Guide)	Matthew Menne; Jay Lawrimore	GCOS-IP reviewed by ET-EGOS following ET-EGOS-5; Implementation of GCOS-IP issues in EGOS-IP considered at ET-EGOS-6 and ET-	Action continuing

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					EGOS-7.	
7	<p>Prepare a new version of the Implementation Plan for the Evolution of the global observing systems (EGOS-IP), fully responding to the "Vision for the GOS in 2025"</p> <p>Update current version of the IP during this transition period.</p>	<p>Based upon monitoring of the progress in the Evolution of the GOS and after successful endorsement of the "Vision for the GOS in 2025" by CBS-XIV, that the ET-EGOS prepare a new version of the EGOS-IP that will incorporate the information included in the Vision.</p>	<p>May 2012 (mature version of new EGOS-IP)</p>	<p>John Eyre</p>	<p>Recommendation to rename EGOS-IP to the "Implementation Plan for the Evolution of Global Observing Systems" adopted by CBS.Ext(2010); Consultancy activity to lead drafting of new EGOS-IP; draft version considered at ET-EGOS-6; improved version developed, Aug 2011; reviewed by other ETs and stakeholders, Oct 2011 - Jan 2012. ET-EGOS-7 revised EGOS-IP and prepared a version for IT-IOS-7.</p>	

ACTION SHEET RESULTING FROM ET-EGOS-7¹

Note: See also Table 1 of Annex IX for database related action items.

No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
				I. RRR PROCESS – general			
				II. RRR process – User Requirements (URs) and Statements of Guidance (SoGs)			
				1) General actions			
1	E6/8.1.11	(a)	2	Review URs in database; address the open issues (see list of actions in <u>Annex VIII</u>); report back to Chair	ET-EGOS & PoCs	end 2012 where possible	Database “Layers” to be fixed by Sept. 2012
2	E5/8.1.8	(a)	2	Update current version of UR database, which is on-line on the web	Secretariat	ongoing	
3	E4	(c)	4	Review all revised SoG	Chair	ongoing	
4	E4	(c)	4	Refer revised SoGs to appropriate “owners” for endorsement	Chair	ongoing	Ownership identified for most applications areas. Under discussion with GDPFS for the remaining 4 AAs (GNWP, HRNWP, NVSRF, SIAF).
5	E7/8.2.13	(a)	2	Refer to ICT-IOS to concur with proposed RRR database developments, and promote resource mobilization for required developments and future maintenance	Chair	June 2012	
6	E7/8.2.15	(b)	4	Review and document better the way the RRR process is described in existing documentation (i.e. website, GOS manual & guide) to reflect the reality of how the RRR is actually performed, and to show more clearly how key stakeholders can submit their views on requirements and priorities in the various WMO Application Areas	Chair	end 2012	
7	E7/8.3.2.53	(c)	4	Write to the PoCs and thank them for their contributions	Chair	ASAP	
				2) Global NWP			
8	E5/8.3.2.	(c)	4	Consider comments by the OceanOBS'09 review	E.Andersson	June 2012	Not done

1 Pending action items from ET-EGOS-6, and previous ET-EGOS Session have been merged in this table. ET-EGOS-7 action are highlighted in blue.

2 Ref: reference to paragraph number of ET-EGOS meeting reports as appropriate (e.g. E6/8.1.11 = Para 8.1.11 of ET-EGOS-6 Final Report).

3 TOR: reference to the ET-EGOS Terms of Reference to which the action item applies

4 WP: reference to the item number of the CBS work programme for ET-EGOS to which this action item applies.

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No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
	4			team and propose a response			
9	E7/8.3.2.4	(c)	4	Update SoG for GNWP with latest information from THORPEX on targeting (e.g. for tropical regions)	E Andersson	June 2012	
				3) High Resolution NWP			
10	E7/8.3.2.5	(c)	4	Update SoG as necessary	T Montmerle	Ongoing	
				4) Nowcasting and very short range forecasting			
11	E7/2.4 E7/8.3.2.13	(c)	4	Consult with Secretariat (GDPFS) with a view to identifying a new PoC for NVSRF, and then provide him/her with guidance as appropriate	Chair	July 2012	
12	E7/8.3.2.13			Merge URs for Synoptic Meteorology into those for NVSRF in database	New PoC	Oct. 2012	
13	E6/8.3.2.11	(c)	4	Review and revise SoG for NVSRF	New PoC	Oct. 2012	
14	E6/ANX-VIII	(c)	4	Confirm that it is suitable to derive atmospheric stability index from the requirement on "atmospheric temperature" and on "specific humidity", with coarse vertical resolution, and indicate the appropriate layers and vertical resolution.	PoC for NVSRF	End 2012	
				5) Seasonal to inter-annual forecasting			
15		(c)	4	Update SoG as necessary	L Ferranti	Ongoing	
				6) Aeronautical Meteorology			
16	E6/8.3.2.6 E5/8.3.2.16-19 E5/8.3.1.2 (6), 8.3.2.13	(c)	4	Further update Aeronautical Meteorology SoG to take into account issues identified by ET-EGOS-7, and consistency with new URs	J vd Meulen	July 2012	
17	E7/8.3.2.8	(c)	4	Provide feedback to PoC regarding SoG for Aeronautical Meteorology	ET-EGOS	end 2012	
18	E7/8.3.2.9	(c)	4	Check status of volcanic ash in various WMO documentation and identify whether updating will be needed	PoC for Aeromet & Chair	end 2012	
				7) Atmospheric Chemistry			
19	E6/8.3.2.16	(c)	4	Liaise with GAW community with a view to updating further the SoG, taking into account the ET-EGOS-7	O Tarasova	end 2013	Consultation made; roadmap proposed at ET-EGOS-7

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No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
				comments and the conclusions from the breakout group.			
20	E6/Anx-13	(h)	6	Establish ad hoc group on the review of satellite requirements for Atmospheric Composition; invite member from ET-SAT	L Jalkanen	end 2012	
				8) Ocean Applications			
21	E6/1.3.2, 8.1.11, 8.3.2.20	(a) (c)	4	Group sub-applications of Ocean Applications area into a smaller number. (see the 4 actions from Annex VIII under the Ocean Applications section)	A Mafimbo	end 2012	
22	E6/ANX-VIII	(a)	2	Reformulate URs using, as far as possible, agreed variable (see report of ET-EGOS-6, Annex VIII); definitions of some variables that are currently undefined to be provided by JCOMM	A Mafimbo	end 2012	
23	E6/ANX-VIII	(a)	2	Consult PoC (Ali Mafimbo) with a proposal to identify the smallest number of uses that would need to be treated as different applications. The PoC should then coordinate with JCOMM Expert Teams, and provide feedback. The distinction between <i>coast</i> and <i>open ocean</i> should be addressed through the concept of "layer" (possibly renamed) rather than by defining a specific application. Applications covered by other application areas should be removed. Applications such as "modelling" should be removed or more appropriate application to which the "modelling" is contributing should be proposed.	Secretariat	end 2012	
24	E7/8.3.2.25 E6/8.3.2.18	(c)	4	Provide a new version of SoG for Ocean Applications, to take into account the remaining issues raised by the ET-EGOS as well as guidance from the fourth Session of JCOMM	A Mafimbo	Sept 2012	
25	E7/8.3.2.26	(c)	4	Review new SoG for Ocean Applications once available, and provide feedback to the PoC	Chair	end 2012	
				9) Agricultural Meteorology			
26	E5/8.3.1.2 (9)	(a)	2	Complete user requirements	R Stefanski	end 2012	March 2011: URs also provided to the WMO Secretariat for the DB in late March 2011. Comments provided by Chair to the PoC in late March 2011. Open for completing the URs

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No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
27	E7/8.3.2.32	(f)	7	Review latest draft of EGOS-IP as soon as possible, and propose changes if required	PoC for Agromet	ASAP	
				10) Hydrology			
28	E6/8.3.2.28 E5/8.3.1.2 (10)	(c)	4	Review further the SoG for Hydrology, taking into account the issues identified by ET-EGOS-6; prepare proposal for revised URs	W Grabs	TBD according to when AWG meets	
				11) Climate monitoring (GCOS)			
				12) Climate Applications (other aspects – CCI)			
29	E7/8.3.2.45 E6/8.3.2.44 E5/8.3.2.26-27	(c)	4	Update further the SoG for Climate Applications (other aspects, CCI) to take into account the issues identified by ET-EGOS-7.	W Wright	end 2012	A GFCS-IP is being drafted with wide community review. Extraordinary Congress in 2012 on GFCS will be an opportunity to get guidance regarding the requirements for GFCS.
30	E7/8.3.2.45	(a)	2	Provide quantitative URs for the database; update further the SoG consistently with the URs	W Wright	end 2012	
				13) GTOS			
31	E7/8.3.2.49	(a) (c)	2, 4	Write to PoC for GTOS, and remind him about the issues that had been raised by ET-EGOS-6	Secretariat	Sept 2012	
32	E5/8.2.4.2	(a) (c)	2, 4	Provide user requirements for the WMO RRR Database; provide SoG	J Latham	end 2012	GCOS Secretariat proposed Dr John Latham, Programme Director, Global Terrestrial observing System (GTOS) Ongoing SoG yet to be drafted Contact to be re-established
				14) Space weather			
33	E5/3.6, 8.2.4.3	(a)	2	Review SoG for Space Weather and provide feedback to PoC	Chair	June 2012	
				15) Global Cryosphere Watch			
34	E6/8.3.3.4	(a)	2	Consult GCW community in a view to checking terminology; either remove obsolete requirements from the database or update them.	Secretariat	end 2012	This was addressed during the 1 st GCW Implementation meeting (GE, 21-24.11.2011) with subsequent follow-up
35	E7/6.1.5	(a)	2	Review how requirements for cryospheric variables and observations in polar regions are taken into	All PoCs	end 2012	

No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
				account in the UR database and in their SoGs			
36	E7/6.1.5	(a)	2	Investigate adding a new Cryosphere "Theme" in the database to facilitate management of the URS for cryospheric variables in the database	Secretariat	end 2012	
37	E7/6.1.6	(c) (d)	4	Identify key GCW documents of interest to ET-EGOS (e.g. IGOS Cryosphere Theme document, Implementation Plan, Regional groups documents)	GCW PoC	ASAP	
38	E7/6.1.7	(c) (d)	4	Review the IGOS Cryosphere Theme and other related documents	ET-EGOS	end 2013	
39	E7/6.1.8	(a)	2	Review current definitions of the cryospheric variables in the RRR Database	GCW PoC	end 2013	
				16) Global Framework for Climate Services			
40	E7/6.3.9 E7/8.1.5			Review GFCS "Observations and Monitoring" and "Research and Modelling Component" annexes to the GFCS-IP and provide feedback to Chair (see website ⁵)	ET-EGOS	end 2012	
				17) Global Ocean Observing System (GOOS)			
41	E6/8.1.12 E6/ANX-VIII	(a)	2	Remind GOOS Project Office about status of GOOS user requirements in the RRR Database; ask whether there are GOOS requirements beyond the Ocean Applications requirements from JCOMM. (Action to be done once the Ocean Applications requirements have been clarified).	Secretariat	Sept 2012	IOC confirmed its intention to update the GOOS requirements
				III. RRR PROCESS – observing system capabilities			
42	E4	(b)	3	Update of Observing System Capabilities by space agencies – seek review by ET-SAT, ET-SUP and ET-EGOS	J.Lafeuille	Ongoing	The capabilities are regularly updated (initially in the Dossier and later on in in the database), with input from agencies, in particular via CGMS. ET-SAT is reviewing this information as part of its TOR
43	E7/8.2.16 E5/6.9.5	(b)	3	Discuss with Chair ET-SBR SO the status of the weather radar database (a result from the questionnaires from ET-SBR SO)	Chair	July 2012	Questionnaire was distributed; info was collected Web-based Database is being designed by Turkey ET-SBR SO will review the database at its next meeting

5 http://www.wmo.int/pages/gfcs/ip_en.php

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No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
							SBRSO Metadata DB to feed into the RRR Database; ET-EGOS to review
44	E4	(b)	3	Pursue updates of observing capability database for remaining elements with 1st priority on WIN PROF, RADARs, and AMDAR.	R. Stringer in collab. with ICT-IOS ETs, ET-AIR, ET-SBRSO	Ongoing	
45		(a)	2	Propose some explanatory text on "uncertainty" and related terms, to be made accessible though the on line database	J. Eyre in consultation with J. vd Meulen	End 2012	
				IV. IMPACT STUDIES, OSEs, OSSEs			
46	E7/9.3.2	(e)	5	Bring any possible urgent matter arising from 5 th WMO Workshop to ICT-IOS-7, on behalf of the ET-EGOS	E Andersson	June 2012	
				V. PREPARATION OF THE NEW EGOS-IP, AND FOLLOW UP			
47	E7/10.2.3.5	(c) (d) (f)	7	Consolidate draft EGOS-IP (ET-EGOS-7 version), and send it to Team members for review	Secretariat	17 May 2012	
48	E7/10.2.3.5	(c) (d) (f)	7	Review draft EGOS-IP (ET-EGOS-7 version)	Consultant	10 June 2012	
49	E7/10.2.3.5	(c) (d) (f)	7	Take comments from Team, consultant and ICT-IOS-7 into account for producing the EGOS-IP version that will be submitted to CBS XV	Chair	30 June 2012	
50	E7/10.2.3.4	(c) (d) (f)	7	Lead development of a communication strategy on EGOS-IP (see Annex XI)	R Stringer & Chair	Dec 2012	
51	E7/Anx-XI	(c) (d) (f)	7	Propose method for stakeholder analysis for communication strategy on the EGOS-IP (see Annex XI)	R Stringer	July 2012	
52	E7/Anx-XI	(c) (d) (f)	7	Analyse progress against old EGOS-IP	J Eyre	Nov. 2012	
53	E7/Anx-XI	(c) (d) (f)	7	Agree relationship between EGOS-IP and WIGOS-IP communication plans	Secretariat	July 2012	
54	E7/Anx-XI	(c) (d) (f)	7	Agree input on EGOS-IP and its communication plan to TECO-CBS-Jakarta - discuss at ICT-IOS-7	Chair	June 2012	
				VI. OTHER ISSUES			
55	E6/6.3.4	(c) (d) (f)	1,5,6	Continue dialogue with AMMA and seek action and feedback on identified issues.	Secretariat	end 2013	Some interactions by ET-EGOS Chair with AMMA.

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No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
56	E6/10.4.8	(c) (d) (f) (g)	7	Initiate and maintain a document to keep track of additions to the Vision for the GOS in 2025, and provide references to the source of the actions proposed in the EGOS-IP (the document shall be based on content of the existing web page, while keeping the web page consistent with the document)	Secretariat	Ongoing	Underway - webpage to list proposals regarding gaps in the Vision exists. ICT/IOS to then consider a process in this regard. => Place an action for ET-EGOS-8 meeting to discuss this issue.
57	E5/11.3	(c) (d)	6	Coordinate responses to any issue regarding GRUAN implementation with regard to CBS	Secretariat with L P Riishojgaard and J Eyre	Ongoing	
58	E7/7.9	(h)	1, 6	Refer the renaming of the WIGOS Implementation Plan into WIGOS framework Implementation Plan (WIP) to the ICT-IOS	Chair	June 2012	
59	E7/10.1.1 .9	(g)	6, 7	Circulate the ET-EGOS report on feedback from NFPs (e.g. this ET-EGOS-7 doc no. 10.1.1) to the NFPs	Secretariat	Sept 2012 and ongoing	
60	E7/10.1.1 .10	(g)	6, 7	Revise the template for NFP reports	R Stringer	end 2012	
61	E7/10.1.1 .10	(g)	6, 7	Request NFPs to provide feedback for 2012 on the basis of the new EGOS-IP	Secretariat	Jan 2013	
62	E7/10.1.1 0	(g)	6, 7	Compile synthesis of 2012 national reports	R Stringer	June 2013	
63	E7/10.1.1 .10	(g)	6, 7	Reply to the NFPs who raised some questions for clarification on some of the EGOS-IP actions, and provide them with further clarification and guidance	R Stringer	ASAP	
64	E7/10.1.1 .10	(g)	6, 7	Give ASECNA the opportunity to provide feedback on the implementation of the EGOS-IP in RA-I	Secretariat & ASECNA	Jan 2013	
65	E7/11.1.2	(h)	6	Refer to ICT-IOS and propose a mechanism such as an OPAG IOS Expert Team takes responsibility for implementation of WMO QMF across WMO component observing systems	Chair	June 2012	
66	E7/11.1.3	(h)	1, 6	Request ICT-IOS note the issue of monitoring observations quality, and propose the best distribution of responsibilities in the WIGOS framework, while stressing that strong linkages between OPAG-ISS, OPAG-DPFS and OPAG-IOS (for RRR) should be promoted	Chair	June 2012	
67	E7/12.4	(h)	1, 6	Request ICT-IOS to address the issue of daily	Chair	June 2012	

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No.	Ref ²	TOR ³	WP ⁴	Action	By	Deadline	Comment/Status
				climatological observations			
68	E7/2.6	(h)	1, 6	Bring issue of identifying a CBS representative to contribute to AOPC WG-ARO (WG-GRUAN) to attention of ICT-IOS	Chair	June 2012	

VISION FOR THE GOS IN 2025
(as approved by EC LXI, Geneva, 2009)

PREAMBLE

This Vision provides high-level goals to guide the evolution of the Global Observing System in the coming decades. These goals are intended to be challenging but achievable.

The future GOS will build upon existing sub-systems, both surface- and space-based, and capitalize on existing, new and emerging observing technologies not presently incorporated or fully exploited. Incremental additions to the GOS will be reflected in better data, products and services from the National Meteorological and Hydrological Services (NMHSs); this will be particularly true for developing countries and LDCs.

The future GOS will play a central role within the WMO Integrated Global Observing System (WIGOS)¹. This evolved integrated observing system will be a comprehensive “system of systems” interfaced with WMO co-sponsored and other non-WMO observing systems, making major contributions to the Global Earth Observation System of Systems (GEOSS); and will be delivered through enhanced involvement of WMO Members, Regions and technical commissions. The space-based component will rely on enhanced collaboration through partnerships such as the Coordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites (CEOS). Portions of the surface and space-based sub-systems will rely on WMO partner organizations: the Global Terrestrial Observing System (GTOS), the Global Ocean Observing System (GOOS), the Global Climate Observing System (GCOS), and others.

The scope of these changes to the GOS will be major and will involve new approaches in science, data handling, product development and utilization, and training.

1. GENERAL TRENDS AND ISSUES**Response to user needs**

- The GOS will provide comprehensive observations in response to the needs of all WMO Members and Programmes for improved data products and services, for weather, water and climate;
- It will continue to provide effective global collaboration in the making and dissemination of observations, through a composite and increasingly complementary system of observing systems;
- It will provide observations when and where they are needed in a reliable, stable, sustained and cost-effective manner;
- It will routinely respond to user requirements for observations of specified spatial and temporal resolution, accuracy and timeliness; and,
- It will evolve in response to a rapidly changing user and technological environment, based on improved scientific understanding and advances in observational and data-processing technologies.

Integration

- The GOS will have evolved to become part of the WIGOS¹, which will integrate current GOS functionalities, which are intended primarily to support operational weather forecasting, with those of other applications: climate monitoring, oceanography, atmospheric composition, hydrology, and weather and climate research;

¹ : Assuming WIGOS is adopted at Cg-XVI

- Integration will be developed through the analysis of requirements and, where appropriate, through sharing observational infrastructure, platforms and sensors, across systems and with WMO Members and other partners;
- Surface and space-based observing systems will be planned in a coordinated manner to cost-effectively serve variety of user needs with appropriate spatial and temporal resolutions.

Expansion

- There will be an expansion in both the user applications served and the variables observed;
- This will include observations to support the production of Essential Climate Variables, adhering to the GCOS climate monitoring principles;
- Sustainability of new components of the GOS will be secured, with some R&D systems integrated as operational systems;
- The range and volume of observations exchanged globally (rather than locally) will be increased;
- Some level of targeted observations will be achieved, whereby additional observations are acquired or usual observations are not acquired, in response to the local meteorological situation.

Automation

- The trend to develop fully automatic observing systems, using new observing and information technologies will continue, where it can be shown to be cost-effective;
- Access to real-time and raw data will be improved;
- Observing system test-beds will be used to intercompare and evaluate new systems and develop guidelines for integration of observing platforms and their implementation; and
- Observational data will be collected and transmitted in digital forms, highly compressed where necessary. Data processing will be highly computerized.

Consistency and homogeneity

- There will be increased standardization of instruments and observing methods;
- There will be improvements in calibration of observations and the provision of metadata, to ensure data consistency and traceability to absolute standards;
- There will be improved methods of quality control and characterization of errors of all observations;
- There will be increased interoperability, between existing observing systems and with newly implemented systems; and,
- There will be improved homogeneity of data formats and dissemination via the WIS.

2. THE SPACE-BASED COMPONENT

Instruments:	Geophysical variables and phenomena:
<i>Operational geostationary satellites. At least 6, separated by no more than 70 deg longitude</i>	
High-resolution multi-spectral Vis/IR imagers	Cloud amount, type, top height/temperature; wind (through tracking cloud and water vapour features); sea/land surface temperature; precipitation; aerosols; snow cover; vegetation cover; albedo; atmospheric stability; fires; volcanic ash
IR hyper-spectral sounders	Atmospheric temperature, humidity; wind (through tracking cloud and water vapour features); rapidly evolving mesoscale features; sea/land surface temperature; cloud amount and top height/temperature; atmospheric composition
Lightning imagers	Lightning (in particular cloud to cloud), location of intense convection.
<i>Operational polar-orbiting sun-synchronous satellites distributed within 3 orbital planes (~13:30, 17:30, 21:30 ECT)</i>	
IR hyper-spectral sounders	Atmospheric temperature, humidity and wind; sea/land surface temperature; cloud amount, water content and top height/temperature; atmospheric composition
MW sounders	

High-resolution multi-spectral Vis/IR imagers (including thermal IR water vapour absorption channel)	Cloud amount, type, top height/temperature; wind (high latitudes, through tracking cloud and water vapour features); sea/land surface temperature; precipitation; aerosols; snow and ice cover; vegetation cover; albedo; atmospheric stability
Additional operational missions in appropriate orbits (classical polar-orbiting, geostationary, others)	
MW imagers – at least 3 – some polarimetric	Sea ice; total column water vapour; precipitation; sea surface wind speed [and direction]; cloud liquid water; sea/land surface temperature; soil moisture
Scatterometers - at least 2 on well separated orbital planes	Sea surface wind speed and direction; sea ice; soil moisture
Radio occultation constellation – at least 8 receivers	Atmospheric temperature and humidity; ionospheric electron density
Altimeter constellation including a reference mission in a precise orbit, and polar-orbiting altimeters for global coverage	Ocean surface topography; sea level; ocean wave height; lake levels; sea and land ice topography
IR dual-angle view imager	Sea surface temperature (of climate monitoring quality); aerosols; cloud properties
Narrow-band high-spectral and hyperspectral resolution Vis/NIR imagers	Ocean colour; vegetation (including burnt areas); aerosols; cloud properties; albedo
High-resolution multi-spectral Vis/IR imagers – constellation	Land-surface imaging for land use and vegetation; flood monitoring
Precipitation radars operated in conjunction with passive MW imagers in various orbits	Precipitation (liquid and solid)
Broad-band Vis/IR radiometer + total solar irradiance sensor - at least 1	Earth radiation budget (supported by imagers and sounders on polar-orbiting and geostationary satellites) and collocated aerosols and cloud properties measurements
Atmospheric composition instruments constellation, including high spectral resolution UV sounder on geostationary orbit and at least a UV sounder on am + pm orbit	Ozone; other atmospheric chemical species; aerosols – for greenhouse gas monitoring, ozone/UV monitoring, air quality monitoring
Synthetic aperture radar	Wave heights, directions and spectra; floods; sea ice leads; ice shelf and icebergs
Operational pathfinders and technology demonstrators, including	
Doppler wind lidar on LEO	Wind; aerosol; cloud-top height [and base]
Low-frequency MW radiometer on LEO	Ocean surface salinity; soil moisture
MW imager/sounder on GEO	Precipitation; cloud water/ice; atmospheric humidity and temperature
High-resolution, multi-spectral narrow-band Vis/NIR and CCD imagers on GEOs	Ocean colour, cloud studies and disaster monitoring
Vis/IR imagers on satellites in high inclination, highly elliptical orbits (HEO)	Winds and clouds at high latitudes; sea ice; high latitude volcanic ash plumes; snow cover; vegetation; fires
Gravimetric sensors	Water volume in lakes, rivers, ground, etc.
Polar and geo platforms / instruments for space weather	
Solar imagery Particle detection Electron density	Solar radiation storms, high-energy particle rain, ionospheric and geomagnetic storms, radio black-out by X-ray photons

3. THE SURFACE-BASED COMPONENT

Station type:	Geophysical variables and phenomena:
Land – upper-air	
Upper-air synoptic and reference stations	Wind, temperature, humidity, pressure
Remote sensing upper-air profiling remote stations	Wind, cloud base and top, cloud water, temperature, humidity, aerosols
Aircraft	Wind, temperature, pressure, humidity, turbulence, icing, thunderstorms, dust/sandstorms, volcanic ash/activity, and atmospheric composition variables (aerosols, greenhouse gases, ozone, air quality, precipitation chemistry, reactive gases)
Atmospheric composition stations	Aerosol optical depth, atmospheric composition variables

	(aerosols, greenhouse gases, ozone, air quality, precipitation chemistry, reactive gases)
GNSS receiver stations	water vapour
Land – surface	
Surface synoptic and climate reference stations	Surface pressure, temperature, humidity, wind; visibility; clouds; precipitation; present and past weather; radiation; soil temperature; evaporation; soil moisture; obscurations
Atmospheric composition stations	Atmospheric composition variables (aerosols, greenhouse gases, ozone, air quality, precipitation chemistry, reactive gases)
Lightning detection system stations	Lightning (location, density, rate of discharge, polarity, volumetric distribution)
Application specific stations (road weather, airport / heliport weather stations, agromet stations, urban meteorology, etc)	Application specific observations
Land – hydrology	
Hydrological reference stations	Water level
National hydrological network stations	Precipitation, snow depth, snow water content, lake and river ice thickness/date of freezing and break-up, water level, water flow, water quality, soil moisture, soil temperature, sediment loads
Ground water stations	Ground water measurements
Land – weather radar	
Weather radar station	Precipitation (hydrometeor size distribution, phase, type), wind, humidity (from refractivity), sand and dust storms
Ocean – upper air	
Automated Shipboard Aerological Platform (ASAP) ships	Wind, temperature, humidity, pressure
Ocean – surface	
HF Coastal Radars	Surface currents, waves
Synoptic sea stations (ocean, island, coastal and fixed platform)	Surface pressure, temperature, humidity, wind; visibility; cloud amount, type and base-height; precipitation; weather; sea-surface temperature; wave direction, period and height; sea ice
Ships	Surface pressure, temperature, humidity, wind; visibility; cloud amount, type and base-height; precipitation; weather; sea surface temperature; wave direction, period and height; sea ice
Buoys – moored and drifting	Surface pressure, temperature, humidity, wind; visibility; sea surface temperature; 3D & 2D wave spectrum, wave direction, period and height
Ice buoys	Surface pressure, temperature, wind, ice thickness
Tide stations	Sea water height, surface air pressure, wind, salinity, water temperature
Ocean – sub-surface	
Profiling floats	Temperature, salinity, current, dissolved oxygen, CO ₂ concentration
Ice tethered platforms	Temperature, salinity, current
Ships of opportunity	Temperature
R&D and Operational pathfinders – examples	
UAVs	Wind, temperature, humidity, atmospheric composition
Gondolas	Wind, temperature, humidity
GRUAN stations	Reference quality climate variables, cloud structure
Aircraft	Chemistry, aerosol, wind (lidar)
Instrumented marine animals	Temperature
Ocean gliders	Temperature, salinity, current, dissolved oxygen, CO ₂ concentration

4. SYSTEM-SPECIFIC TRENDS AND ISSUES

4.1 Space-based

- There will be an **expanded** space-based observing **capability** both on operational and research satellites;

- There will be an **expanded community** of space agencies contributing to the GOS;
- There will be **increased collaboration** between space agencies, to ensure that a broad spectrum of user requirements for observations are met in the most cost-effective manner, and that system reliability is assured through arrangements for mutual back-up;
- Observational capability demonstrated on **R&D** satellites will be progressively transferred to **operational** platforms, to assure the reliability and sustainability of measurements;
- **R&D satellites** will continue to play an important role in the GOS; although they cannot guarantee continuity of observations, they offer important contributions beyond the current means of operational systems. Partnerships will be developed between agencies to extend the operation of functional **R&D** and other satellites to the maximum useful period;
- Some user requirements will be met through **constellations** of satellite, often involving collaboration between space agencies. Expected constellations include: altimetry, precipitation, radio occultation, atmospheric composition and Earth radiation budget;
- **Higher spatial, temporal and spectral resolution** will considerably enhance the information available, particularly to monitor and predict rapidly-evolving, small-scale phenomena, whilst increasing the demand on data exchange, management and processing capability;
- **Improved availability and timeliness** will be achieved through operational cooperation among agencies and new communications infrastructure;
- **Improved calibration and inter-calibration** will be achieved through mechanisms such as GSICS.

4.2 Surface-based

The surface-based GOS will provide:

- Improved detection of meso-scale phenomena;
- Data that cannot be measured by space-based component;
- Data for calibration and validation of space-based data;
- Enhanced data exchange of regional scale observing data and product from weather radar, hydrological networks, etc.;
- High vertical resolution profiles from radiosondes and other ground based remote-sensing systems, integrated with other observations to represent the atmospheric structure;
- Improved data quality with defined standards on availability, accuracy and quality control;
- Long-term datasets for the detection and understanding of environmental trends and changes to complement those derived from space-based systems;
- Maintenance of stations with long historically-uninterrupted observing records.

Radiosondes networks will:

- Be optimized, particularly in terms of horizontal spacing which will increase in data-dense areas, and taking account of observations available from other profiling systems;
- Be complemented by the **aircraft (AMDAR)** ascent/descents profiles and other ground-based profiling systems;
- Maintain the **GUAN** subset of stations for climate monitoring;
- Include a **GCOS Reference Upper-Air Network (GRUAN)** to serve as a reference network for other radiosonde sites, for calibration and validation of satellite records, and for other applications.

Aircraft observing systems

- Will be available from most airport locations, in all regions of the world;
- Flight-level and ascent/descent data will be available at user-selected temporal resolution;
- Will observe humidity and some components of atmospheric composition, in addition to temperature, pressure and wind;
- Will also be developed for smaller, regional aircraft with flight levels in the mid-troposphere and providing ascent/descent profiles into additional airports.

Land-surface observations systems

- Will come from a wider variety of surface networks (e.g., road networks, mobile platforms) and multi-application networks;
- Will be primarily automated and capable of reproducing or substituting for measurements previously obtained subjectively (weather phenomena, cloud type, etc.);
- Will include the **GSN** subset of surface stations for climate monitoring.

Surface marine observations

- From drifting buoys, moored buoys, ice buoys and Voluntary Observing Ships will complement satellite observations;
- With improved temporal resolution and timeliness, through reliable and cost-effective satellite data communication systems;

Ocean sub-surface observing technology will be improved, including cost-effective multi-purpose *in-situ* observing platforms, ocean gliders, and instrumented marine animals.

Remote-Sensing observing systems:

- **Weather radar** systems will provide enhanced precipitation products but with increased data coverage. They will increasingly provide information on other atmospheric variables. There will be much improved data consistency and new radar technology. Collaborative multi-national networks will deliver composite products;
- **Coastal HF Radars** will provide for ocean currents and wave data;
- **Profilers** will be developed and used by more applications. A wider variety of technologies will be used, including lidars, radars and microwave radiometers. These observing systems will be developed into coherent networks and integrated with other surface networks;
- **Global Navigation Satellite System** (e.g., GPS, GLONASS and GALILEO) receiver networks, for observing total column water vapour, will be extended;
- These systems will be integrated into “intelligent” profiling systems and integrated with other surface observing technologies.

Lightning detection systems

- **Long-range lightning detection systems** will provide cost-effective, homogenized, global data with a high location accuracy, significantly improving coverage in data sparse regions including oceanic and polar areas;
- **High-resolution lightning detection systems** with a higher location accuracy, cloud-to-cloud and cloud-to-ground discrimination for special applications.

Surface-based observations of **atmospheric composition** (complemented by balloon- and aircraft-borne measurements) will contribute to an integrated three-dimensional global atmospheric chemistry measurement network, together with a space-based component. New measurement strategies will be combined to provide near real-time data delivery.

Surface-based observations will support **nowcasting and very short-range forecasting** through the widespread integration of radar, lightning and other detection systems, with extension to continental and global scales of the networks.

SYNTHESIS OF THE REVIEW OF FEEDBACK FROM NATIONAL FOCAL POINTS (2011)

NATIONAL REPORTS FOR 2011 ON PROGRESS AND PLANS RELATED TO IMPLEMENTATION PLAN FOR EVOLUTION OF SPACE AND SURFACE-BASED SUB-SYSTEMS OF THE GOS (EGOS-IP)

CONTENTS

1. Introduction
2. Member Engagement through National Focal Points (NFPs)
3. Pattern of Reports for 2011
5. Themes and Issues

Detailed Summary of the Content of Reports for 2011 is provided as an Appendix to ET-EGOS-7 [doc 10.1.1](#).

1. INTRODUCTION

The “Implementation Plan for Evolution of Space and Surface-Based Sub-Systems of the GOS” was developed by the CBS Open Programme Area Group on the Integrated Observing Systems (OPAG-IOS) and published as WMO Technical Document WMO/TD No. 1267¹. It provides a set of specific recommendations for action in support of the “Vision for the GOS in 2015”². The WMO CBS Expert Team on Evolution of Global Observing Systems (ET-EGOS) reviews progress against the plan when it meets every year or two.

This is the fifth year of reporting by National Focal Points (NFPs). 27 reports were received in time to be included in this analysis, which was prepared in April 2012 ready for presentation to the meeting of the ET-EGOS in May 2012.

A new Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) is in development³ in response to the new “Vision for the GOS in 2025”⁴. It is nearing completion and will replace the current EGOS-IP soon. It can be expected, then, that future plans and reporting by NFPs will be related to the new EGOS-IP.

2. MEMBER ENGAGEMENT THROUGH NATIONAL FOCAL POINTS (NFPs)

Since 2007, Members of WMO have been invited to nominate a National Focal Point for reporting progress and plans related to EGOS-IP. In particular, NFPs are asked to:

1 http://www.wmo.int/pages/prog/www/OSY/Publications/TD1267_Impl-Plan_Evol-GOS.pdf
2 http://www.wmo.int/pages/prog/www/OSY/Documentation/CBS-2002_Vision-GOS-2015.pdf
3 As explained at <http://www.wmo.int/pages/prog/www/OSY/gos-vision.html> with draft versions available at <ftp://ftp.wmo.int/Documents/PublicWeb/www/gos/egos-ip/> as at mid 2012
4 http://www.wmo.int/pages/prog/www/OSY/WorkingStructure/documents/CBS-2009_Vision-GOS-2025.pdf

- Report annually on the status of the national components of the Surface- and Space-Based Sub Systems of the Global Observing System vis-à-vis recommendations of the EGOS-IP; and
- Report annually on national plans for the evolution of the national components of the Surface- and Space-Based Sub Systems of the Global Observing System taking into account recommendations of the EGOS-IP.

Reports received from NFPs have provided valuable information to ET-EGOS and have enabled assessments as follows:

- reports for 2007 were analysed in a paper for the 4th meeting of ET-EGOS in July 2008 (Doc 9.3(7))⁵;
- reports for 2008 were analysed in a paper for the 5th meeting of ET-EGOS in December 2009 (Doc 10.1)⁶;
- reports for 2009 were analysed in a paper for the 6th meeting of ET-EGOS in June 2011 (Doc 10.2(7))⁷;
- reports for 2010 were mostly available in time for the June 2011 meeting and were summarised in a presentation to the meeting. The content of reports revealed very similar themes to those of 2009.

As at April 2012, 82 countries have nominated an NFP. These are listed in Table 1 along with an indication of reports received from NFPs for 2011.

Country	NMHS	2011 Report
Algeria	Office National de la Meteorologie	yes
Argentina	Servicio Meteorológico Nacional	yes
Armenia	Armenian State Hydrometeorological and Monitoring Service	yes
Australia	Australian Bureau of Meteorology	yes
Bangladesh	Bangladesh Meteorological Department	yes
Brazil	Instituto Nacional de Meteorologia	
Belarus	Republican Hydrometeorological Centre	yes
Belgium	Institut Royal Météorologique	
Bosnia and Hercegovina	Hydro-meteorological Service of the Federation of Bosnia and Herzegovina	
Botswana	Botswana Meteorological Services	
Bulgaria	National Institute of Meteorology and Hydrology	
Cameroon	Direction de la Meteorologie Nationale	
Canada	Environment Canada - Meteorological Service of Canada (MSC)	yes
Chad	Direction des Ressources en Eau et de la Météorologie	
Chile	Direction Meteorologica De Chile	yes
China	China Meteorological Administration	
Colombia	Instituto de Hidrología y Estudios Ambientales	
Costa Rica	Instituto Meteorologico Nacional (IMN)	yes
Cyprus	Meteorological Service	yes
Czech Republic	Czech Hydrometeorological Institute (CHMI)	yes
Denmark	Danish Meteorological Institute	
Egypt	Egyptian Meteorological Authority (EMA)	
Ethiopia	National Meteorological Agency (NMA)	yes
Finland	Finnish Meteorological Institute	
France	Météo-France	
Gabon	Direction de la Météorologie Nationale	
Germany	DWD	yes
Ghana	Ghana Meteorological Agency	

5 http://www.wmo.int/pages/prog/www/OSY/Meetings/ET-EGOS_Geneva2008/documents/Doc.9.3.7.doc

6 http://www.wmo.int/pages/prog/www/OSY/Meetings/ET-EGOS_Geneva2009/documents/Doc10.1-Feedback-NFP.doc

7 http://www.wmo.int/pages/prog/www/OSY/Meetings/ET-EGOS_Geneva2011/documents/ET-EGOS-6-Doc-10.2_7-NFP-feedback.doc

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Greece	Hellenic National Meteorological Service	
Guinea-Bissau	Direcção Geral de Meteorologia Nacional	yes
Hong Kong, China	Hong Kong Observatory	yes
Hungary	Hungarian Meteorological Service	
India	India Meteorological Department	
Ireland	Met Éireann - The Irish Meteorological Service	
Islamic Republic of Iran	Islamic Republic of Iran Meteorological Organization (IRIMO)	
Italy	Stato Maggiore dell'Aeronautica	
Japan	Japan Meteorological Agency (JMA)	yes
Jordan	Meteorological Department	
Kenya	Kenya Meteorological Services	
Lao P.D.R.	Department of Meteorology and Hydrology	
Latvia	Latvian Environment, Geology and Meteorology Agency	yes
Lesotho	Lesotho Meteorological Services	
Lithuania	Lithuanian Hydrometeorological Service (LHMS)	yes
Madagascar		
Malaysia	Malaysian Meteorological Department	
Mali	Direction Nationale de la Météorologie du Mali	
Mauritius	Mauritius Meteorological Services (MMS)	yes
Mauritania	Office National de Meteorologie	
Morocco	Direction de la Meteorologie Nationale	yes
Mozambique	Instituto Nacional de Meteorologia	
Netherlands	KNMI	yes
Nepal	Department of Hydrology and Meteorology	
New Zealand	Meteorological Service of New Zealand	
Niger	Direction de la Météorologie Nationale (DMN)	
Nigeria	Nigerian Meteorological Agency	
Pakistan	Pakistan Meteorological Department	
Panama	Hidrometeorología	
Peru	Servicio Nacional de Meteorología e Hidrología	
Poland	Institute of Meteorology & Water Management -National Research Institute (IMGW-PIB)	
Portugal	Instituto de Meteorologia, I.P. Portugal	
Republic of Korea	Korea Meteorological Administration (KMA)	yes
Russian Federation	Russian Federal Service for Hydrometeorology and Environmental Monitoring	
Saint Lucia	Saint Lucia Meteorological Services	yes
Senegal	Agence Nationale de la Meteorologie du Senegal	
Seychelles	Department of Environment	
Slovakia	Slovak Hydrometeorological Institute	
Slovenia	Ministry for Environment and Spatial Planning, Environmental Agency of the Republic of Slovenia	yes
Sudan	Sudan Meteorological Authority	
Sweden	Swedish Meteorological and Hydrological Institute	yes
Switzerland	Meteo Swiss	yes
Syria	Meteorological Department	
Thailand	The Thai Meteorological Department	
The Former Yugoslav Republic of Macedonia	Hydrometeorological Service	
Togo	Direction Générale de la Météorologie Nationale	
Trinidad & Tobago	Meteorological Services, PIARCO	
Tunisia	Institut National de la Meteorologie	
Turkey	Turkish State Meteorological Service	
Ukraine	State Hydrometeorological Service	
United Kingdom	Met Office (UKMO)	yes
United Republic of Tanzania	Tanzania Meteorological Agency	

United States of America	National Oceanic and Atmospheric Administration (NOAA), National Weather Service	
Uzbekistan	The Centre of Hydrometeorological Service at Cabinet of Minister's of Republic of Uzbekistan (UZHIDROMET)	

Table 1: List of NMHS for which a National Focal Point (NFP) for reporting progress and plans related to EGOS-IP has been nominated, showing reports received for 2011.

3. PATTERN OF REPORTS FOR 2011

3.1 Use of a template for NFP reports

In the first couple of years of reporting, NFP annual reports were submitted as a free-form commentary. This allowed flexibility for respondents but had a number of shortcomings. At the 5th meeting of ET-EGOS a new template was composed and has been sent to NFPs each year since then as part of the request for annual reports. The template has several goals including:

- to make it easier for NFPs to compose a report;
- to guide NFPs on which Recommendations are the highest priority for response;
- to provide some additional explanation and background for some of the Recommendations; and
- to collect responses in a structured way to better enable their collation and analysis.

Since their adoption it has been found that:

- some reports can be prepared with great simplicity, involving just a few ticks against relevant boxes;
- for the EGOS-IP Recommendations most relevant to NMHS, there was a more complete response rate than in the first couple of years. Conversely, there was a reduced response rate for the Recommendations on the space-based sub-system of the GOS, which is appropriate given that they call for action by bodies other than individual NMHS;
- less interpretation of the reports was needed in order to complete the collation and analysis.

3.2 Number and representativeness of reports

Twenty-seven NFP reports were received for 2012, including five NFPs who were reporting for the first time. This is an increase over previous years (Table 2). Forty-four of the total 82 NFPs have provided a report for at least one year, however a smaller number have provided reports regularly and only 5 have provided a report in each of the five years so far (Table 3).

This is a useful but not comprehensive level of reporting from the list of 82 NFPs. Even full reporting from those 82 would provide a useful but not comprehensive view of the progress of WMO Members who all contribute to the operation and evolution of the GOS. Nevertheless, the 82 NFPs and the 27 reports received provide an informative cross section including some larger and smaller countries, plus developed and developing countries.

Year reported on:	2007	2008	2009	2010	2011
Number of NFP reports received for that year:	13	23	20	20	27

Table 2: Number of NFP reports received each year.

Number of years	0	1	2	3	4	5
Number of NFPs that have reported for that number of years	38	16	13	4	6	5
Number of NFPs that have reported for that number of years or more	82	44	28	15	11	5

Table 3: distribution of reporting regularity.

The responses by NFPs against many of the Recommendations are unlikely to change significantly from one year to the next and this may be a reason why many NFPs do not report each year.

3.3 Responses against the EGOS-IP Recommendations

Figure 1 shows the distribution of responses received against the EGOS-IP Recommendations. The category labels are based on the responses given to each recommendation as follows:

- where the NFP report for 2011 indicated that national observing systems are currently involved in the activity and responding to the recommendation, or have capacity and plans that will lead to progress on the recommendation – the label is “responding to the Rec.”;
- where the NFP report for 2011 indicated that national observing systems are currently not involved in the activity, and/or have no capacity or plans for evolution as indicated in the recommendation – the label is “not responding to Rec.”; and
- where the NFP report for 2011 made no reference to the recommendation – the label is “no comment”.

The reporting template asked NFPs to provide responses in three prioritised groups as follows:

“The template for responses is set out below in three sections:

- *Section A (highest priority for reply) – these recommendations are relevant to all or many of the WMO Member countries, and have received the most replies in previous reports by NFPs;*
- *Section B (next priority for reply) – these recommendations have relevance for a smaller subset of WMO Member countries, have received fewer replies in previous reports by NFPs, or are not directed to WMO Member countries but nevertheless have attracted some interest and response from NFPs in previous reports; and*
- *Section C (other items) – NFPs may comment against these recommendations if they wish to, however the recommendations are not directed to WMO Member countries or the progress and plans for implementation can be monitored in other ways (for example through various groups dealing with satellite activities, or the WMO/IOC Joint Commission for Marine Meteorology, JCOMM).”*

Table 4 shows that there was a 91 per cent response rate for the highest priority group for reporting, with two-thirds of replies indicating some kind of positive response to the recommendation. The response rate fell to 79 per cent for the second priority group for

reporting, with more than half of the replies indicating that national observing systems are currently not involved in the activity, and/or have no capacity or plans for evolution as indicated in the recommendation. This distribution of responses is very similar to previous years.

<i>Distribution of NFP reports for 2011</i>	Highest priority group of Recommendations (27 NFP reports against 9 Recs)	Next priority group of Recommendations (27 NFP reports against 8 Recs)
responding to the Rec.	61% (148)	30% (65)
not responding to Rec.	30% (74)	49% (105)
No comment	9% (21)	21% (46)

Table 4: Distribution of NFP responses for the highest priority and next priority groups of recommendations.

A small number of replies were received against the third group of recommendations (for which replies were optional). Some of these are shown in Figure 1, though not shown is the group of recommendations relating to the Space-Based Sub-System of the GOS (S1 to S20, except S5). Just two NFP reports made reference to progress on a small number of the space-based recommendations.

The greatest number of “responding to the Rec.” reports were made about:

- G1 (distribution of more frequent data and more/different types of data);
- G2 (documentation – metadata, QC, monitoring); and
- G21 (enhanced AWS operations);

Followed by:

- G3 (timeliness and completeness); and
- G4 (baseline system – 12 hour profiles, winds important in tropics).

In each case, a majority of the NFP reports indicated they were responding to the Recommendation.

The greatest number of “not responding to Rec.” reports were made about:

- G20 (more atmospheric profiles in tropics);
- G12 (alternative AMDAR systems);

Followed by:

- G11 (humidity sensors on AMDAR); and
- G10 (AMDAR optimized reporting).

In each case, more than half of the NFP reports indicated they were not responding to the Recommendation.

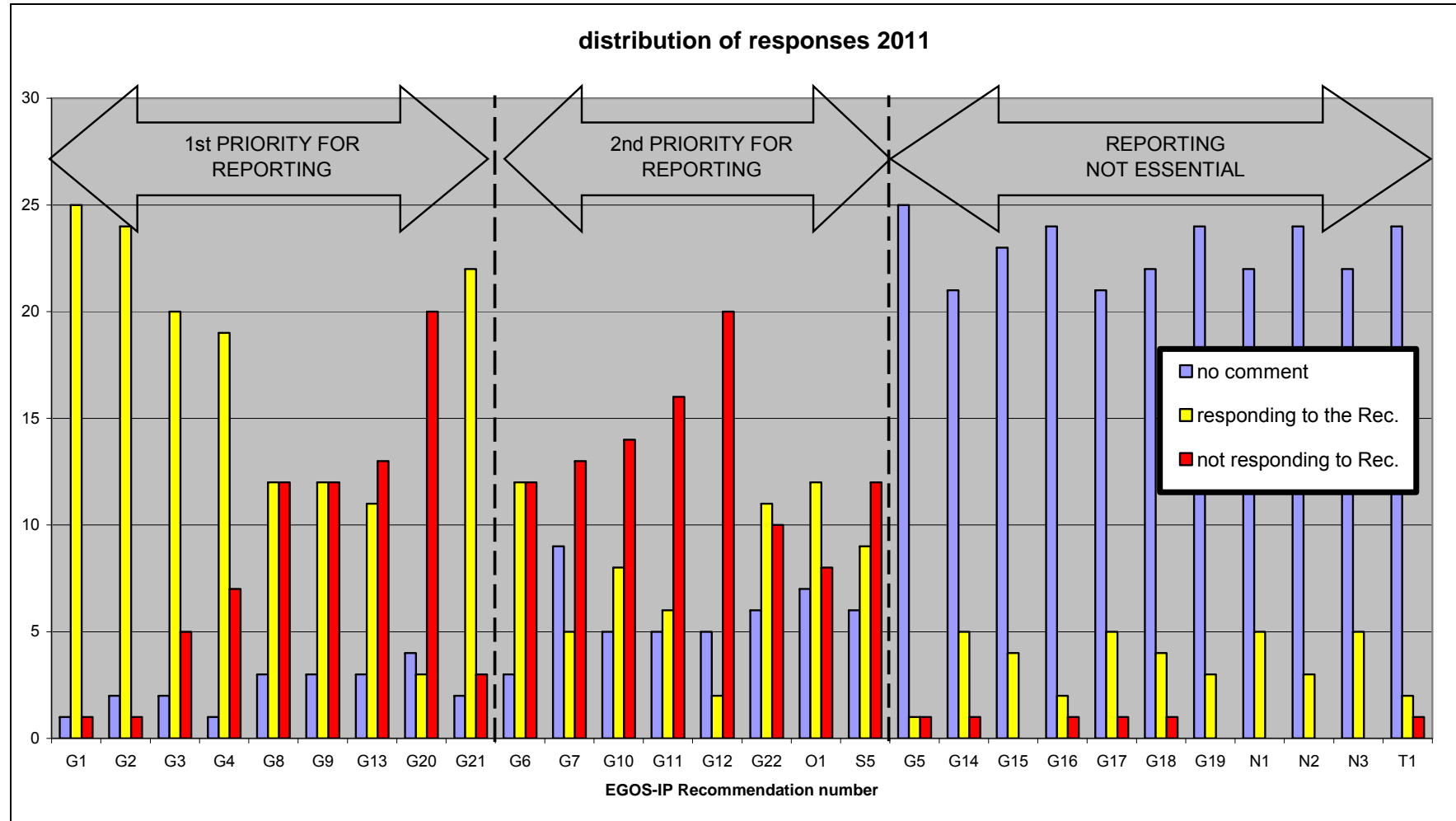


Figure 1: Distribution of responses against selected EGOS-IP Recommendations (highest priority group for reporting, followed by the next priority group for reporting and finally the optional group for reporting, not showing space-based sub-system Recommendations other than S5), classified as either “no comment” (where there was no reference to the recommendation), “responding to the Rec.” (where the report indicated that national observing systems are currently involved in the activity and responding to the recommendation, or have capacity and plans that will lead to progress on the recommendation) or “not responding to Rec.” (where the report indicated that national observing systems are currently not involved in the activity, and/or have no capacity or plans for evolution as indicated in the recommendation).

5. THEMES AND ISSUES

5.1 “Highest priority for reporting” group of Recommendations

This group of nine Recommendations includes those which are relevant to the surface-based observations of all or many of the WMO Member countries and have received the most replies in previous reports by NFPs.

The first four EGOS-IP recommendations relate to improved data coverage, quality management, distribution and coding. NFP reports reveal a very high rate of addressing these matters.

Twenty-five out of 27 reports indicated some action to distribute more frequent data and more/different types of data. The majority of reported actions involved higher frequency of surface synoptic observations, particularly taking advantage of automatic systems to exchange hourly data (even higher frequency in some cases). Other observations mentioned in this context were AMDAR data, data from moored and drifting buoys, VOS (including Automatic Voluntary Observing Ships) and research vessel observations, and radioaonde, lightning and weather radar data.

Twenty-four out of 27 reports indicated some action on metadata and quality control, including the capture of metadata on databases used nationally (CLIDATA, etc) and provision to WMO in line with the regulatory documents. Canada mentioned their collection of station information, a new Asset Lifecycle Management application, and other documentation supporting the effectiveness of QMS. Again four countries specifically mentioned implementation of ISO 9001:2008 and one metrological laboratory (Latvia) referred to accreditation in accordance with ISO/IEC 17025:2005.

Twenty out of 27 reports indicated some action on observations timeliness and completeness. A key target of this Recommendation has been the adoption by Member countries of a new BUFR format to enable radiosonde profiles to be reported in higher resolution (2 second data) together with lat./long./time for each data point. While many of the reports continue to express a positive effort on this, the number who report having achieved the change continues to be relatively small.

With respect to the Recommendation on baseline systems, which emphasises continued 12 hour profiles, there was a split of the reports into 19 which indicated action is being taken and seven which indicated no action is being taken. Some stations acquire profile observations only once per day while other radiosonde stations operate every second day or not at all due to the expense. An emerging theme appears to be the provision for ad hoc radiosonde flights in difficult weather situations, as an offset for not having regular flights. At Amsterdam Airport, it is expected that in 2 to 3 years there will be sufficient humidity data from AMDAR that only incidental radiosonde launches will be undertaken.

Recommendation G8 calls for optimization of rawinsonde distribution and launches. There was an even split of NFP reports into 12 responding to this Recommendation and 12 not responding to it. Those responding explained that they were maintaining regularity of radiosonde profiles, with some countries collecting additional profiles in significant weather such as typhoon events.

The Recommendation for AMDAR participation (G9) also attracted an even split of NFP reports into 12 responding and 12 not responding to it. Those responding explained that a national program is running, or they are contributing through E-AMDAR, or discussions and planning are underway with the aim of introducing national AMDAR programs. Those not responding to this Recommendation explained that they don't have access to AMDAR data or aeroplanes equipped to report AMDAR or the communication linkages needed to collect AMDAR data.

The Recommendation for ground-based GPS measurement of total water vapour attracted reports showing 11 countries responding and 13 countries not responding. It is evident that many Members depend on collaboration with relevant mapping and/or seismic agencies for access to data from their GPS ground stations.

The Recommendation for more atmospheric profiles over the tropics (G20) appears not to be securing much response. There were just three reports of responding, with the new automatic upper air station in the south of Morocco being a very encouraging report.

The Recommendation for enhanced AWS operations (G21), on the other hand, appears to be securing extensive response. Twenty-two out of 27 NFP reports indicated that the country was responding to this Recommendation, with a range of enhancements occurring such as additional stations, improved communication and reporting frequency, attention to monitoring and quality management and expanded range of measured parameters.

5.2 “Next priority for reporting” group of Recommendations

This group of eight Recommendations includes those which have relevance for a smaller subset of WMO Member countries, have received fewer replies in previous reports by NFPs, or are not directed to WMO Member Countries but nevertheless have attracted some interest and response from NFPs in previous reports.

The recommendation for more immediate ozone sonde data distribution (G6) attracted 12 reports indicating some action and 12 reports indicating no action on the topic.

The recommendation for greater targeting of observations (G7) appears to have drawn a small number of Members to take action so far, apart from references to ad hoc radiosonde flights in lieu of a full a program. It appears that further guidance from THORPEX will be needed to stimulate further progress.

Recommendations for AMDAR enhancements such as optimised reporting, humidity sensors, and alternative AMDAR systems (G10, G11, G12) are reported to receive attention by relatively few countries. Some data optimisation systems have been implemented; humidity sensors appear to be approaching operational usage however cost appears to be a significant factor.

The recommendation to adopt new systems (G22) has a split between those 11 countries who reported that they are pursuing the evaluation of new systems and another 10 who aren't.

Twelve out of 27 responses indicated some pursuit of observing systems studies (O1). Although the various concepts of what constitutes an observing system study appeared very broad, it continues to suggest that a proactive and evidence-based approach exists in the design of networks.

It remains clear, continuing a theme from previous years, that ATOVS Retransmission Services are attracting active collaboration and results both in the European context and in the Asia-Pacific region.

5.3 “Optional reporting” group of Recommendations

This third group of Recommendations includes those which do not call for action by WMO Member countries and/or for which the progress and plans for implementation can be monitored in other ways. This includes seven of the ground-based Recommendations, four of the five “additional” high priority recommendations, together with 19 of the 20 space-based recommendations.

From the relatively small number of reports in 2011 against these Recommendations, the following points can be made:

- Atmospheric profiles over ocean are difficult and expensive to obtain and relatively few countries contribute to this globally. European countries contribute through E-ASAP, while Japan and Korea contribute in the western Pacific. Korea has recently launched its first observation ship, which has ASAP;

- Tropical moorings are difficult and expensive to sustain and very few countries contribute to this globally. Only two of the 27 NFP reports indicated they were able to respond to this Recommendation;
- As with the other recommendations for marine/ocean observations, few reports indicated any response for the increased coverage by drifting buoys (5 reports), XBT and ARGO profiles (4 reports) or ice buoys (three reports);
- Data producers appear to be mindful of the need to provide to NWP centres early test data from new systems and from R&D satellites;
- There were 5 reports indicating an effort to respond to NWP data cut-off times. While much data is supplied in a timely manner, the 30-minute cut-off poses a challenge in some respects (for example sounding data from polar orbiting satellites);
- The recommendation for more sustained training for access to and utilisation of all the available GOS data received little comment.

With respect to the space-based recommendations (S1 to S20 excluding S5) it may simply be noted that Japan, as a satellite operating country, provided some informative comments.

5.4 Overall state of progress and planning related to EGOS-IP

As noted in previous analyses, most elements of EGOS-IP have been achieved or are being pursued by at least some Members. However most elements are also beyond the scope, capacity or aspiration of at least some Members. It remains evident that not all Members can contribute to the GOS at the same level, particularly due to differing levels of resources and expertise.

One response should be to highlight and encourage technical cooperation and capacity building amongst Members and efforts by Regional Associations to highlight needs and priorities. The driving aim would be to enable all Members to contribute to the GOS and its evolution through EGOS-IP to the greatest extent possible. Some good examples have been seen in the NFP reports over the past three years, such as support for upper air stations.

Even where there is a widespread positive commitment to a recommendation of EGOS-IP, a long time period is typically required for enough Members to make enough progress to produce a noticeable improvement in the GOS. For example, the global introduction of AMDAR programmes by WMO Members appears to be a multi-decade evolutionary change to the GOS. The adoption of a BUFR reporting format for radiosonde data that includes high resolution as well as time and location details is another change that continues to take some time.

5.5 Further guidance sought or required

Amongst the many comments provided by respondents against all the EGOS-IP recommendations, there were sometimes misinterpretations of the intent of the recommendation making some of the responses slightly misdirected. Also, there were some direct requests for clarification of what is expected of Members.

Some examples from amongst the 2011 reports are:

- (G1) Hong Kong, China: the 3-hourly SYNOP from Hong Kong International Airport is increased to hourly when a tropical cyclone is within 300km of Hong Kong and could be provided hourly at all times if considered useful. Also, the distribution of high resolution weather radar information will be reviewed after CBS develops relevant data policy, specification and formatting;
- (G2) Armenia: the National observing system is partly involved in this activity and needs additional guidance for good documentation of data;
- (G2) Cyprus: documentation for QC for both manual and Automatic Weather Stations is under preparation. Advice on the type of radiation measurements and their quality control is requested;

- (G5) United Kingdom: The Met Office would welcome advice from WMO on the extent to which high altitude observations in the stratosphere from radiosondes are valuable to NWP. There is a close relationship between the height to which an ascent is required and the total cost of the ascent. Whilst routine ascents can be planned to reach >50hPa re-assurance over the value of the additional data for non climate purposes would be greatly appreciated as economic constraints are becoming increasingly demanding.

No matter how much supporting information is provided to explain the EGOS-IP and its recommendations, a mechanism for follow up questions would be a helpful to maximise the engagement and uptake by Members.

5.6 Transition to a new EGOS-IP

As in previous years, it may be observed that there appears to be a good degree of alignment of national plans with elements of the EGOS-IP. The many actions addressing individual recommendations provide evidence that Members are involved, capable, and/or making plans relevant to the EGOS-IP. Not so clear, though, is the extent to which this alignment is due to the *influence* of the EGOS-IP.

Associated with the introduction of a new EGOS-IP, it would be timely to take actions to maximise its influence and uptake by Members and Regional Associations.

**THE PROCEDURE FOR UPDATE, VALIDATION AND APPROVAL
OF STATEMENTS OF GUIDANCE WITHIN THE WMO ROLLING
REVIEW OF REQUIREMENTS PROCESS**

(As of: 11 May 2012)

1. The Point-of-Contact (PoC) for the Application Area reviews the latest version of the SoG and proposes amendments, in the form of a Microsoft Word document using the “track changes” option. (If there is no pre-existing version, then the PoC drafts the first version of the SoG.) In performing this update, the PoC is expected to refer to some or all of the following: (i) the latest version of the user requirements for the Application Area; (ii) the latest version of the database Observing System Capabilities; (iii) his / her own expertise on the Application Area; (iv) advice from other international experts on the Application Area including, where relevant, WMO constituent bodies, and WMO Programmes and co-sponsored Programmes);
2. The PoC refers the new draft version of the SoG to the Chair of the ET-EGOS, with copy to the WMO Secretariat staff responsible for ET-EGOS;
3. The Chair of the ET-EGOS decides the appropriate review process for the new draft. If a meeting of ET-EGOS is imminent, the new draft becomes a document for this meeting and is reviewed by the Meeting. If a meeting is not imminent, the new draft may be referred to the ET-EGOS for comment(s) by correspondence;
4. The Chair of the ET-EGOS refers the comments of the ET-EGOS to the PoC, either by reference to the report of an ET-EGOS meeting or otherwise, as appropriate;
5. The PoC updates the draft to take account of comments received. Contentious issues are discussed with the Chair of ET-EGOS, as necessary. Microsoft Word “track changes” option continues to be used at this stage;
6. The PoC refers the revised draft version of the SoG to Chair of ET-EGOS, with copy to WMO Secretariat staff responsible for the ET-EGOS;
7. The Chair of the ET-EGOS considers the revised draft and adopts it, or refers it back to the PoC with comments for further revision (by steps 5 and 6 mentioned above);
8. The Chair of the ET-EGOS informs the WMO Secretariat staff responsible for the ET-EGOS when the revised version has been adopted;
9. The WMO Secretariat staff responsible for the ET-EGOS updates the WMO documentation (website, etc.) with the new version of the SoG, with due attention to version control procedures; and
10. At each ET-EGOS meeting, the WMO Secretariat staff responsible for the ET-EGOS reports to the ET on changes since the last meeting, in relation to the SoG version and its review and adoption status.

STATUS OF EXISTING STATEMENTS OF GUIDANCE
(24 June 2012)

This document provides for an overview of the status of statements of guidance regarding the WMO Application Areas.

No.	Application	Contact	Formal version – web (date)	New version (date)	Comment
1	Global NWP	Erik Andersson (ECMWF)	10 May 2011 (approved by ET-EGOS-6)	28 March 2012 (new official version)	<p>Consider comments by OceanObs'09 review team and consider implications for SoG.</p> <p>Consider the need to update the SoG to take account of recent NWP developments including the findings of recent observation impact studies. ET-EGOS-7 requested the PoC to update the SoG for GNWP with the latest information from THORPEX on targeting (e.g. for tropical regions)</p>
2	High Resolution NWP (previously Regional NWP)	Thibaut Montmerle (France)	Aug 2011	7 March 2012 (new official version)	In March 2012, the point of contact added a few sentences about scatterometer measurements that permit retrieval of wind vectors over sea surface in the "surface wind" section.
3	Nowcasting and Very Short Range Forecasting	Aurora Bell (Romania)	26 Jan 2009 Approved ET-EGOS-5 (Dec 2009)	February 2012 (new official version)	<p>New version submitted by the PoC in June 2011 included the changes requested by ET-EGOS-6. Some changes proposed by the chair in February 2012, and comments/questions added for the PoC to address. Further changes were then made by Dominique Ruffieux (Switzerland) and the Point of contact in March/April 2012.</p> <p>ET-EGOS-7 requested the Chair to consult with Secretariat (GDPFS) with a view to identifying a new PoC for NVSRF, and then provide him/her with guidance as appropriate. The Team requested the PoC, then to merge the user requirements for Synoptic Meteorology into those for NVSRF in the database.</p>
4	Seasonal to Inter-annual Forecasts	Laura Ferranti (ECMWF)	April 06/April 08 Approved ET-EGOS-4 (July 2008)	22 March 2012 (new official version)	Based on ET-EGOS-6 comments, the PoC added a clarification on the definition of sub-seasonal predictions. By sub-seasonal predictions we mean predictions beyond 10 days but not extending to a full season, usually averaged and expressed as a departure from climate values for that period. Monthly prediction is a sub-sample of the sub-seasonal predictions. The clarification is incorporated in a revised version (dated 22 March 2012).
5	Aeronautical Meteorology	Jitze van der Meulen (NL)	August 2009 (approved by	May 2011 (new official	A new version was proposed taking into account user requirements for meteorological services at airports (the terminal zone). The database table is

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			ET-EGOS-5)	version)	<p>extended with user requirements, specific for meteorological services at airports. Some variables had to be introduced for the RRR Database table of variables. The update/extension is largely based on existing Standards and Recommended Practices (SARPs) as documented in the WMO Technical Regulations and the knowledge and experience of the author. Requests to a number of recommended experts to supply comments and additional material did not result in useful reply. Frequent reminders will be sent out to complete the table.</p> <p>ET-EGOS-7 agreed that the measurement uncertainty had to be consistent in the RRR framework with the WMO-No. 8 (CIMO Guide), and the recommendations from the outcome of the WMO-BIPM Report¹ of the workshop on Measurement Challenges for Global Observing Systems for Climate Change Monitoring - Traceability, Stability and Uncertainty, Geneva, 30 March - 1 April 2010.</p> <p>ET-EGOS-7 requested the PoC to update the user requirements database, and to check the status of volcanic ash in various WMO documentation and identify whether SoG updating will be needed.</p>
6	Atmospheric Chemistry	Oksana Tarasova (WMO)	July 2004 Approved ET-EGOS-1 (Dec 2005)	No	<p>The current SoG for atmospheric chemistry originates from the IGACO strategy. Integrated observations described in IGACO strategy constitute the essence of the GAW Programme. At the same time the GAW Programme does not cover all the variables mentioned in IGACO strategy. It also covers a number of variables, which are not reflected in IGACO strategy but which are important for atmospheric chemistry applications.</p> <p>The JSC OPAG-EPAC decided that a review should be performed for the GAW variables with the current SoG as a starting point. To implement this review, the task to establish RRR processes for different GAW focal areas was included in the Addendum to the GAW Strategic Plan: 2008-2015, which was approved by the WMO Congress in 2011. This RRR establishment task is to be implemented during 2012-2015. Roadmap for producing new SoG was proposed during ET-EGOS-7.</p> <p>The updated SoG will include only variables under responsibility of the GAW Programme as it is only feasible to establish the regular review process for the variables which are already coordinated by the Programme. Other (non-GAW) variables can be updated on an ad-hoc basis calling on the respective expert communities. GAW can facilitate the search for these experts.</p>
7	Ocean Applications	Ali Mafimbo	Nov 2009	March 2012	Requirements for Ocean Application were submitted to the Database in May

¹ <http://www.bipm.org/utis/common/pdf/rapportBIPM/2010/08.pdf>

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		(Kenia)	(approved by ET-EGOS-5)	(new official version)	<p>2011. The SoG has been updated in Oct 2011 to take into account the ET-EGOS-5 and ET-EGOS-6 recommendations (waves, sea-level, polar regions, satellite data for non-climate variables, make ref. to requirements). Substantial changes also made for the sea surface height anomaly, sea surface salinity, and for the gaps summary sections.</p> <p>The new SoG was reviewed by the Chair who made further comments and recommendations for changes. Some of the required changes have been implemented, and the English/style of the document refined for consistency. New version taking into account all ET-EGOS comments is expected to be submitted before the end of September 2012 per ET-EGOS-7 and JCOMM-IV guidance.</p>
8	Agricultural Meteorology	Mr Robert Stefanski (WMO)	Mar 2011 (approved by ET-EGOS-6)	June 2011	<p>User Requirements have been provided to the WMO Secretariat for the Database in late March 2011, and the SoG updated (official March 2011 version). ET-EGOS-6 requested the PoC to address outstanding issues (Appendix B of ET-EGOS-6 doc 8.3.2(7); plus comments from the CAgM ET-WCF) and produce an updated version of the SoG. New variables to be considered: soil temperature & soil moisture.</p> <p>ET-EGOS-7 noted that a CAgM / JCOMM Task Team on Weather, Climate and Fisheries will meet in 2013 and will undertake a review of requirements for the fisheries side of the Agricultural Meteorology Programme. Therefore these have not been included in this SoG but it is anticipated that the SoG will be updated once the fisheries review is completed. This review will probably not be completed until the last quarter of 2013.</p>
9	Hydrology	Wolfgang Grabs (WMO)	July 2008 Approved ET-EGOS-4 (July 2008)	June 2011	<p>ET-EGOS-6 agreed that SoG required further review and updating by the CHy, and its Advisory Working Group (AWG), taking into account the following elements: (i) the Section "identification of gaps" needs to be completed; and (ii) the statement on S-Band Doppler radar needs to be addressed and written in a more generic way (following correspondence with Vaisala). The user requirements should be revised. Further comments were provided by the ET-EGOS Chair to the PoC in August 2011.</p>
10	Climate Monitoring	GCOS Secretariat	ET-EGOS-2 (July 2006) accepted GCOS Adequacy Reports and the	2010 (GCOS IP) and 2011 (Sat. supplement)	<p>ET-EGOS-2 (July 2006) accepted as SOG the following documents: (i) GCOS Report on the Adequacy of the global climate observing systems (GCOS-48, October 1998); (ii) GCOS Second Adequacy Report (GCOS-82, 2nd, April 2003) GCOS Implementation Plan (GCOS-92, October 2004); (iii) Satellite Supplement to the GCOS Implementation Plan (GCOS-107, September 2006); and (iv) Progress Report on the Implementation of the Global Observing System for</p>

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			Implementation Plan as SOG		Climate in Support of the UNFCCC 2004-2008 (GCOS-129, August 2009). The 2010 update of the GCOS-IP is treated as an updated element of the SoG. ET-EGOS drafted a response to make sure the EGOS-IP reflects the GCOS IP-10. AOPV-XVI (2/2011) noted that revision would be necessitated in part from the updating of the Satellite Supplement but that there were other matters to be clarified. The AOPC Chair undertook to discuss these with other interested parties.
11	Climate Applications (other aspects - CCI)	William Wright (Australia)	April 2010	April 2012 (new official version)	<p>A revised Statement of Guidance (SoG) is submitted on behalf of CCI (Appendix A). The emphasis here is on defining observational needs, gaps and emphases in terms of how observations are taken, in contrast to the previous version which emphasised the type of observations needed. This version of the SoG references the original SoG, and retains that document as an attachment entitled "Requirements for Climate Data", Attachment 1.</p> <p>The document attempts to do two things. Firstly, it highlights the need for observations to support climate services <i>apart from</i> climate monitoring via the GCOS networks (which emphasise observations of the GCOS <i>Essential Climate Variables</i>² at selected high quality sites). A separate Statement of Guidance exists for these. The second purpose of the document is to emphasise the basic requirements for observational data that apply to both GCOS and non-GCOS variables and stations alike (e.g., the need for data backups, and ongoing collaboration between observers and climate staff). Adherence to the GCOS Climate Monitoring Principles (Annex 1) is mandatory for GCOS or other stations designated as "high quality monitoring stations", but is strongly encouraged for other stations.</p> <p>ET-EGOS-7 recalled that the SoG is a gap analysis and not a discussion about qualitative requirements. It requested the PoC to further update the SoG for Climate Applications (other aspects, CCI) to take into account the issues identified by the meeting. The Team also requested the PoC to provide quantitative requirements to the Database, and further update the SoG from that perspective.</p>
12	GTOS	John Latham (GTOS Programme Director)	No	No	These requirements include the non GCOS requirements of GTOS. The PoC was asked to provide User Requirements and a Statement of Guidance but no feedback has been received so far.
13	Space Weather	Terry Onsager	May 2012	May 2012	ET-EGOS-5 proposed to add Space Weather as a new Application Area. Mr

² The GCOS Essential Climate Variables are air temperature, precipitation, atmospheric motion (i.e winds), air pressure, humidity and solar radiation

		(USA)		(first official version)	Terry Onsager (NOAA, USA) has been nominated as Point of Contact for Space Weather Application Area, and has been discussing the variable names, user requirements, and issues with the ET-EGOS Chair in early 2011. The Inter-Programme Coordination Team on Space Weather (ICTSW) has been finalizing the initial requirements for Space Weather observations, and submitted a first version of the Statement of Guidance in April 2012.
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Notes:

ET-EGOS-6 responded to the requirements of CBS-Ext.(2010) to ensure that any particular requirements of Polar Meteorology are captured through the ongoing RRR process. The Team agreed that the Global Cryosphere Watch (GCW) should not to be regarded as this stage as a specific Application Area. Instead, the Team requested the Points of Contact of all Application Areas to review the information provided by the Secretariat during the meeting (ET-EGOS-6 doc 8.3.2(10/3)) and revise their user requirements and SoGs if necessary. ET-EGOS-6 proposed to adopt the same approach than for GCOS, i.e. regarding a list of documents maintained by the GCW as Statement of Guidance. Such documents include for example the Integrated Global Observing Strategy (IGOS) Cryosphere Theme ("CryOS") report.

Per ET-EGOS-5 recommendation, the Synoptic Meteorology Application Area has been merged into the Nowcasting and Very Short Range Forecasting Application Area.

ET-EGOS-5 suggested that the following applications should be addressed:

- (i.) Space Weather. Space weather events affect the meteorological infrastructure through their impact on environmental satellites, navigation satellites (e.g. GPS) and space-based telecommunication systems; they also represent a potential hazard for aviation and some large ground-based facilities. Critical phenomena to be monitored include solar radiation storms, high-energy particle rain, ionospheric and geomagnetic storms, and radio black-out by X-ray photons. This requires permanent measurements in the area of e.g. Solar imagery, High- and Low-energy particle detection, and Electron density. Refining these observation requirements is a prerequisite towards the standardization of Space Weather instruments that WMO is now expected to support.;
- (ii.) GTOS requirements for understanding the global carbon cycle and related climate change issues. For consistent and comprehensive monitoring of the carbon cycle, ecosystems, forests and land dynamics in general, both long-term sustained observations of Essential Climate Variables as well as regionally-focussed, intermittent measurements of other variables (and their fluxes) for process-type studies are required. A comprehensive gap analysis of existing capabilities in relation to needs is yet to be undertaken. Such an analysis should build on the existing SoG for Climate Monitoring (ie. the GCOS Second Adequacy Report, the GCOS IP and its 2010 Update) as well as the status reports on the development of standards for terrestrial ECV (<http://www.fao.org/gtos/topcECV.html>).

ET-EGOS-5 recognized that many GTOS requirements are being already considered by GCOS, but not all of them. The Team requested the Secretariat to identify PoC who should be invited to identify those requirements that are not covered by GCOS (i.e. the non GCOS requirements of GTOS) (action: Secretariat; Mar 2010).

ET-EGOS-5 invited the Inter-programme Coordination Team on Space Weather (ICTSW) to address user requirements on space weather, and provide feedback to the ET-EGOS Chair on the list of relevant Applications.

Reference: Current versions of Statements of Guidance
<http://www.wmo.int/pages/prog/sat/RRR-and-SOG.html>

OUTSTANDING ISSUES CONCERNING THE RRR DATABASE

Report of the ET-EGOS-7 Break-out Session on this issue (Geneva, 9-10 May 2012)

Participants: E. Andersson, E. Charpentier, N. Hettich, J. Lafeuille, O. Tarasova

The scope of this break-out session was to review the issues arising from plenary discussions on items 8.1 and 8.2. A summary list of actions is provided in Table 1 below.

1. Adequacy of general terminology on uncertainty and related concepts

Concern had been raised that “uncertainty” was not precisely defined in the database. It is not a trivial concept, entire books are written on the subject. What is currently stated in the DB is:

The "uncertainty" characterizes the estimated range of observation errors on the given variable.

The definition should be in accordance with BIPM and ISO recommendations, in particular with the Guide to the expression of uncertainty in measurements (GUM), which states for instance:

uncertainty (of measurement): parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand. *NOTE 1: The parameter may be, for example, a standard deviation (or a given multiple of it), or the half-width of an interval having a stated level of confidence.*

standard uncertainty: uncertainty of the result of a measurement expressed as a standard deviation

expanded uncertainty: quantity defining an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand.

(See: http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf):

It is agreed to complete the current definition for the RRR process as follows, and to inform PoCs accordingly:

“The "uncertainty" characterizes the estimated range of observation errors on the given variable, with a 68% confidence interval (1 σ).”

=> See Actions 1, and 2 in Table 1

2. Granularity of applications, sub-applications, and cross-cutting applications

Some application areas (e.g. ocean applications, atmospheric chemistry) have identified different requirements for the same variables, because of different uses. This can be clarified in defining “sub-applications”, whilst keeping the number of such applications at a reasonable level. Several options to represent such sub-applications:

- a) in the “Comment” field,
- b) in an additional field using a controlled vocabulary (keywords) for each application,
- c) as separate applications, with a common segment in the name to facilitate their identification (e.g. Ocean/coastal, Ocean/mesoscale forecasting).

Option (c) is the easiest to implement (no change in the data model).

A similar question arises for “Cryosphere”, which is not an application or a sub-application per se, but rather cross-cutting to several applications. The following options are considered:

- d) using the “Comment” field with “Cryosphere” as comment, and proceeding in the same way for other cross-cutting applications, with other keywords, if need arises;
- e) replacing the current concept of theme (theme = a parent class of variables in the database) by a list of keywords (from a controlled vocabulary) or flags (binary attributes to check) without imposing any hierarchy between theme and variables;

It is agreed to clarify the need for sub-applications, in particular for Ocean Applications, and for Atmospheric Chemistry (including Air quality and possibly “Climate”, in consultation with GCOS), to implement sub-applications as needed, and to investigate how the reflect cross-cutting applications.

=> See Actions 3, 4, 5, and 6

3. Layer concept and ways to address requirements for local observations

The “layer” concept needs to be adjusted. The layers used for the atmosphere don’t meet the needs of all atmospheric applications. For instance, Atmospheric Chemistry uses: PBL, Free Troposphere (FT), Upper Troposphere and Low Stratosphere (UTLS), Stratosphere (ST), Mesosphere (MS). It is suggested to replace “HT, LT, LS” by “PBL, FT, UTLS, MST”, where MST would be a new layer (Mid-Stratosphere), and the HSMS would remain unchanged.

=> See Action 7

The requirements in the database are implicitly applicable to the global domain; there are difficulties to record requirements for local measurements (i.e. point measurement, or high horizontal resolution required over a limited area). This is the case e.g. for agriculture meteorology on particular fields, for hydrology on rivers and lakes, etc. In aeronautical meteorology some WMO/ICAO requirements are related to the runway, other (METAR) to the aerodrome and its vicinity (WMO TR 49 Vol. 2, or ICAO Convention Annex 3). For Atmospheric Chemistry, there are local requirement for air quality in cities, typically applicable over 10x10 km. The concept of “horizontal resolution” is not fully relevant in this case unless qualified by special explanation.

Different options had been considered to represent such requirements with limited coverage:

- defining a specific application /sub-application with qualification explaining that this application is only applicable over a limited area;
- defining a particular “layer” to characterize the limited domain (e.g. “coastal ocean” layer);
- defining particular variables that are applicable on limited areas (e.g. “wind speed over land surface”)
- adding a “flag” to identify non-global requirements, with an explanation
- adding a dimension in the requirements in order to specify the coverage.

It is agreed to pursue the last option, with a controlled set of possibilities, from “global” to “point”.

=> See Action 8

4. Regionally/locally dependent requirements and capabilities

How can we reflect regional differences in either the capabilities, which are distributed regionally, or the requirements, to the extent they are dependent on the climatology of the region (e.g. tropical cyclones, sea ice, sand-dust)?

Requirements: Will the PoCs be able to submit requirements at such detailed level? In the case of Atmospheric chemistry, it is suggested that regional requirements would be easier to express than global requirements.

Capabilities: For surface-based capabilities, a template was shown (of e.g. 5 deg. X 5 deg. boxes) and should be investigated further.

=> See Actions 9, and 10

5. Introduction of new variables

The need was expressed to include the following variables:

- Gustiness: "wind gust" is in the database but not defined. The CIMO Guide defines gustiness by "3s peak wind speed" and "standard deviation of wind speed and direction". The Manual on Codes recommends that the "peak gust" measures "a 3 s average".
- Volatile organic compounds (VOCs). A list of VOCs mole fraction variable shall be included.

=> See Actions 11, and 12

6. Detailed functionalities of the requirements database

A contact box should be included to enable sending feedback to the PoCs without directly exposing their email address. The updating process should be well controlled and documented through a quality management document.

=> See Actions 13, and 14

7. Liaison with various communities and integration within WIGOS

- Methodology, metadata collection for capabilities
- Synchronization with other existing databases of metadata of surface-based observing stations
- Common ID numbering scheme for capabilities.
- Full integration with WIGOS information resources

It should be a priority to achieve interoperability among the various central databases of the WIGOS system, and to organize consistent handling of observation metadata. Action should be taken at OPAG-IO level with the ICG WIGOS.

=> See Actions 15, 16, 17 and 18

8. General RRR database issues

The database plays a pivotal role for WIGOS and its sustainability should be secured, which requires a commitment from both the Secretariat and the experts and points of contacts. A specific server and proper domain (or sub-domain) name are recommended to ensure visibility and technical robustness, especially given the expected growth of the DB with the space and surface.

Some refinements are suggested (e.g. historical record of station status).

=> See Actions, 19, 20, 21, 22, and 23

9. Requirements updating issues

Information should be renewed towards the PoCs in order to mobilize them, draw their attention on new features (uncertainty definition, layers, sub-applications, coverage type, contact box, etc.), and on changes requiring actions on their side (new variables or units), guide on use of <source>, etc.

=> See Actions 24, and 25

10. ET-EGOS Feedback on the prototype space-based capabilities database

The prototype of the space-based capabilities is seen as potentially a remarkable tool. More detailed feedback shall be provided after some testing.

=> See Action 26

Table 1: Summary list of actions

No.	Ref. ¹	TOR ²	WP ³	Action	By	Deadline	Comment
1	E7/Anx-IX/A1	(a)	2	Indicate in the definitions section of the database that measurement uncertainty is reported at 68% confidence interval (1 sigma)	Secretariat / N Hettich	June 2012	
2	E7/Anx-IX/A 2	(a)	2	Check that uncertainty requirements are expressed with this understanding	All PoCs	End 2012	
3	E7/Anx-IX/A 3	(a)	2	Investigate whether it is appropriate to represent their application in several sub-applications	PoCs	June 2013	
4	E7/Anx-IX/A 4	(a)	2	Investigate further the feasibility of the options to represent cross-cutting applications (e.g. cryosphere) in the database	Secretariat / N Hettich	End 2012	
5	E7/Anx-IX/A 5	(a)	2	Clarify whether Atmospheric Chemistry requirements for climate are managed within the GAW and could be recorded as a sub-application "Climate" of Atmospheric Chemistry, and to update DB accordingly	Secretariat (D/GCOS, C/ARE, C/SBOS), including GCOS, GAW and SAT	Sept 2012	
6	E7/Anx-IX/A 6	(a)	2	Propose for "Ocean applications" a set of sub-applications with homogeneous requirements.	PoC for Ocean applications	End 2012	
7	E7/Anx-IX/A 7	(a)	2	Check with relevant PoCs whether "PBL/FT/UTLS/MST" would be agreeable to replace "LT/HT/LS" without changing the highest layer (HS&MS)	Secretariat / J Lafeuille	Sept. 2012	
8	E7/Anx-IX/A 8	(a)	2	Implement an additional field in the requirements database in order to specify the required "coverage" for each requirement, with a drop-down list (e.g. global by default, 1000x1000 km, 100x100 km, 10x10 km, less than 10x10 km, point)	Secretariat / N Hettich	Sept. 2012	
9	E7/Anx-IX/A 9	(a)	2	Investigate feasibility of representing regionally dependent requirements in the requirements database	Secretariat / N Hettich	Sept. 2012	
10	E7/Anx-IX/A 10	(a) (b)	2, 3	Investigate further the feasibility of representing regional distribution of surface-based capabilities	Secretariat / E Charpentier	Sept. 2012	
11	E7/Anx-IX/A 11	(a)	2	Investigate existing definitions for gustiness and 3s peak gust; check the RRR database list; make proposal	J vd Meulen	Sept. 2012	
12	E7/Anx-IX/A 12	(a)	2	Provide a list of mole fraction variables to J Lafeuille	O Tarasova	June 2012	
13	E7/Anx-IX/A 13	(a)	2	Include contact box to the PoCs in the UR database	Secretariat / N Hettich	June 2012	
14	E7/Anx-	(a)	2, 3	Write a Quality Management document, including description	Secretariat	June 2013	

¹ Ref: reference to paragraph number of ET-EGOS meeting reports as appropriate (e.g. E6/8.1.11 = Para 8.1.11 of ET-EGOS-6 Final Report).

² TOR: reference to the ET-EGOS Terms of Reference to which the action item applies

³ WP: reference to the item number of the CBS work programme for ET-EGOS to which this action item applies.

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No.	Ref. ¹	TOR ²	WP ³	Action	By	Deadline	Comment
	IX/A 14	(b)		of processes for the management and operations of the operational parts of the database			
15	E7/Anx-IX/A 15	(a)	2	Request ICG-WIGOS TT on Metadata to address the issues of observation metadata collection, in consultation with ET-AWS, ET-SBRSO, ET-AIR, JCOMM, CAS, CHy, GCOS, in order to collect the set of metadata required to derive observing systems capabilities (e.g. using WMO No. 9 Vol. A for the surface-based meteorological stations)	OPAG-IOS Chair	June 2012	
16	E7/Anx-IX/A 16	(a)	2	Investigate how to interface with existing metadata databases (e.g. GAW SIS, CCI, ET-AWS) to be made available (e.g. web service allowing to access stations individual reports)	Secretariat / E Charpentier	June 2013	
17	E7/Anx-IX/A 17	(a)	2	Investigate feasibility for implementing a platform identification scheme for the database, based on existing schemes, with prefix to provide meta-scheme that guarantees uniqueness across all networks	Secretariat / E Charpentier	End 2012	
18	E7/Anx-IX/A 17	(a) (b)	2, 3	Request ICG-WIGOS to take into account existing databases, and building upon them, as well as existing plans for the RRR database when developing the WIGOS Operational Resource	OPAG IOS Chair	June 2012	
19	E7/Anx-IX/A 19	(a) (b)	2, 3	Raise CBS's attention on the need to secure resources for technical development and maintenance of the RRR Database as a key element of the WIGOS implementation;	OPAG IOS Chair	June 2012	
20	E7/Anx-IX/A 20	(a) (b)	2, 3	Raise CBS's attention on the need to secure resources (e.g. WMO/in-house or consultant) and for an active involvement of the expert community, and Members with regard to the management of the RRR database content;	OPAG IOS Chair	June 2012	
21	E7/Anx-IX/A 21	(a) (b)	2, 3	Consider moving the RRR Database to a dedicated server (together with the WIGOS Operational Resource), with a dedicated wmo.int sub-domain	Secretariat / N Hettich	June 2012	
22	E7/Anx-IX/A 22	(b)	3	Consider adding a platform operational status field in the capabilities part of the RRR database (operational/planned/silent...)	Secretariat / E Charpentier	Sept 2012	
23	E7/Anx-IX/A 23	(b)	3	Give high priority to adding a functionality in the technical specifications of the capabilities part of the RRR Database with a view to record the historical status of the stations	Secretariat / E Charpentier	Sept 2012	
24	E7/Anx-IX/A 24	(a) (b)	2, 3	Prepare a short document describing the rationale for maintaining RRR Database content by PoCs, and reminding them about the availability of the RRR database guide , and their usernames/passwords. PoCs should also be reminded	Secretariat / J Lafeuille & E Charpentier	Sept 2012	

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No.	Ref. ¹	TOR ²	WP ³	Action	By	Deadline	Comment
				that (i) some of the breakthrough values in the UR database have been entered as place-holders, and should be reviewed and corrected; and (ii) the source field should be filled-in properly (guidance to be provided in this regard; especially explanations should be provided on the context where the information has been obtained)			
25	E7/8.1.4 E7/Anx-IX/A 25	(a)	2	Request PoCs to review UR where there has been change of units or variables; and alerting them that if no feedback is received within 3 months, then the corresponding records will be emptied.	Secretariat / J Lafeuille	Sept 2012	
26	E7/8.2.6 E7/Anx-IX/A 26	(b)	3	Invite ET-EGOS members, PoCs (national and Application Area) to beta-test the SOCRAT tool ⁴ and provide feedback.	Secretariat / N Hettich	Sept 2012	

⁴ www.wmo-sat.info/db2

**PROPOSED TOPICS FOR NWP IMPACT STUDIES RELEVANT TO THE
EVOLUTION OF GLOBAL OBSERVING SYSTEMS**

Short name: Full name	Science question
Surface-based	
S1MarinePs: Surface pressure over ocean	What density of surface pressure observations over ocean is needed to complement high-density surface wind observations from satellites? Suggestions: (a) network density reduction OSE in N.Atlantic, (b) southern oceans OSSE.
S2Strat: In situ observations of the stratosphere	What network of in situ observations is needed in the stratosphere to complement current satellite observations (including radio occultation)? What about the tropics?
S3AMDAR: Coverage of AMDAR	What is the impact of current AMDAR observations? What are the priorities for expansion of the network?
S4ASAP: Coverage of ASAP	What is the impact of current coverage of profiles from the Automated Shipboard Aerological Programme (ASAP)? How might coverage be optimised for a given level of resources?
S5Radar: Radar observations	What are the impacts of current radar observations, including radial winds and reflectivities?
Space-based	
S6RO: Radio occultation saturation	At what level, in terms of profiles per day, does the impact of radio occultation observations start to saturate?
S7SatLand: Satellite radiances over land	What is the impact of new developments in the assimilation of radiance data over land?
S8Sounders: Impact of multiple satellite sounders	What benefits are found when data from more than one passive sounder are available from satellite in complementary orbits, e.g. multiple AMSU-As, AIRS + IASI ?
S9AMVs: AMVs	What impacts are currently found from AMVs?
General	
S10Thinning: Data density and data thinning	What impacts/benefits are found from data density/thinning strategies from various observation types?
S11PBL: Observations of the PBL for regional / high-resolution NWP	What should be the focus of improvements for observations of the PBL in support of regional/high-resolution NWP? Which variables and what space-time resolution?
S12UA: EUCOS-like upper air OSEs	Can EUCOS-like upper air studies be performed for other regions?
S13AdjEns: Regional application and adjoint and ensemble methods	What insights can be gained from more tailored use of adjoint- and ensemble-based measures of observation impact, for example, in the tropics or at the meso-scale where metrics other than global energy may be appropriate?

S14ExtRange: Impact of observations on extended range forecasts	Which observations are particularly important for the 7-14 day forecast range?
S15Targeting: Targeted observations	What do experiments on targeted observations tell us about observing system design?
S16aAMMA, S16bIPY: AMMA and IPY legacy	What impacts/benefits could be expected by sustained components of the AMMA and IPY special observing systems?

OUTLINE OF THE STRATEGY FOR THE COMMUNICATION OF THE NEW EGOS-IP TO STAKEHOLDERS, INCLUDING INTERACTION WITH THE NFPS AND MONITORING OF PROGRESS

EGOS-IP Communication Plan - Issues

Stakeholders

- List them
- Different communication needs for different types of stakeholder
- Develop method of analysis (R.Stringer has examples)

Agents for implementation

- Important class of stakeholders
- Need to elaborate our method of interaction with them

Resource holders - as above

Monitoring progress against EGOS-IP

- Use experience from GCOS and GAW
- Perform evaluation of progress against old EGOS-IP

WIGOS communication strategy

- Ensure EGOS-IP communication plan fits in with overall WIGOS communication strategy

How to engage the audience?

- Communicate “what is EGOS-IP?” and “why should I do these Actions?”
- Persuade audience of benefits to them of engagement

National Focal Points

- Use same NFPS for WIGOS-IP and EGOS-IP?

Phases

- Part A – launch of new EGOS-IP – complete plan by Dec 2012
- Part B – ongoing communication and monitoring – not so urgent

Tools

- Possible tools: web pages, emails, newsletters, meetings, technical forums/conferences, brochures, posters, ...

ACTIONS

- Propose method for stakeholder analysis. Lead: R.Stringer. Deadline: July 2012
- Analyse progress against old EGOS-IP. Lead: J.Eyre. Deadline: Nov. 2012
- Agree relationship between EGOS-IP and WIGOS-IP communication plans. Lead: Sec. Deadline: July 2012
- Agree input to TECO-CBS-Jakarta. Lead: J.Eyre – discuss at ICT-IO5-7. Deadline: June 2012

Table: EGOS-IP Stakeholder Analysis (in support of an ET-EGOS Communication Strategy)

WHO		WHAT: COMMUNICATION GOALS, KEY MESSAGES				HOW			
Stakeholder	Their interest/role in EGOS-IP	Inform (y/n)	Gain support (y/n)	tackle actions (y/n)	Key message/s	Documents and resources	Information channels	Forums	Other notes
PRs of Member countries	Sponsor and prioritise the implementation of the plan in their country	y	Y		<ul style="list-style-type: none"> • Takes global observing systems in direction of Vision 2025; • Every Member can tackle at least some of the actions (as prioritised); • There are benefits (they are...). 	<ul style="list-style-type: none"> • EGOS-IP • Vision 2025; • EGOSIP-1 report; • Summary brochure? • Impact study w/shop reports • FAQs; • other..... 	<ul style="list-style-type: none"> • web; • Q/A feedback mechanism ; • letters; • reports; • presentations; • Other 	<ul style="list-style-type: none"> • WMO mtgs, sessions , conferences; • Other 	
NMHS (list elements within NMHS ...?)	Sponsor and prioritise the implementation of the plan in their country	y	y	Y	<ul style="list-style-type: none"> • Takes global observing systems in direction of Vision 2025; • Every Member can tackle at least some of the actions (as prioritised); • There are benefits (they are...). 				
Other national agencies (list ... examples?)	Sponsor and prioritise the implementation of the plan in their country	y	y	Y	<ul style="list-style-type: none"> • Takes global observing systems in direction of Vision 2025; • Every Member can tackle at least some of the actions (as prioritised); • There are benefits (they are...). 				
NFPs	Report annually on progress and plans for EGOS-IP in their country	y	y			tailored extract from plan	NFP mail list		

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CBS ICT-IOS	Guide, review and endorse the plan	y	y		<ul style="list-style-type: none"> • Extensive and robust development process undertaken; • Takes global observing systems in direction of Vision 2025; • x 				
CBS									
EC									
Congress									
Other Technical Commissions (list ...)									
Other groups, teams, experts in CBS (list ...)									
Regional Associations (list ...) and EC-PORS									
AMMA									
ASECNA									
EUMETNET									
ASEAN									
Co-sponsors of obs systems (GCOS, GOOS, GTOS)									

**ET-EGOS REPORT TO THE SEVENTH SESSION OF
ICT-IOS (GENEVA, SWITZERLAND, 18-22 JUNE 2012) IN PREPARATION FOR
CBS-XV (JAKARTA, INDONESIA, 10-15 SEPTEMBER 2012)**

1. Introduction

Since the fourteenth CBS Session (CBS-XIV, Dubrovnik, Croatia, 25 March–2 April 2009), the ET-EGOS met in Geneva in December 2009 (ET-EGOS-5), in June 2011 (ET-EGOS-6), and in May 2012 (ET-EGOS-7), and has been addressing all of its Terms of Reference.

In the last two Sessions, focus was placed on the drafting of the Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) responding to the Vision of the Global Observing System in 2025, as well as to plans for the WMO Integrated Global Observing System (WIGOS) and to Global Framework for Climate Services (GFCS) needs. Wide community review was undertaken to achieve this goal.

2. Achievements

In relation to its Terms of Reference (Appendix I), the ET-EGOS achieved the following:

- (a) Guided the development and update of the WMO database of user requirements. Database content was updated through the Points of Contact of WMO Application Areas;
- (b) Developed a strategy and negotiated with key partners regarding the development and updating of the database of observing systems capabilities. The space-based part of the capabilities database has been set up as a “Satellite Observation Capabilities Review and Analysis Tool” which is currently in a test and validation phase. The surface-based part of the capabilities database is being designed.
- (c) Continued the Rolling Review of Requirements (RRR) for several application areas. This has been done in close consultation with the Application Areas Points of Contact as well as with the relevant Technical Commissions, WMO programmes, and co-sponsored programmes. Statements of Guidance (SoGs) for Global NWP, High-resolution NWP, Nowcasting and Very Short Range forecasting (NVS RF), Seasonal to Inter-Annual Forecasting, Aeronautical Meteorology, Ocean Applications, Agricultural Meteorology and Climate Applications have been updated. The Application Area of Synoptic Meteorology was merged with the NVSRF. GCOS Progress Reports and Implementation Plan are regarded as the SoG for Climate Monitoring. SoG for Atmospheric Chemistry, Hydrology, and Climate Applications remain to be updated according to the latest developments in those areas. The Team also considered its interactions with the activities of the Global Cryosphere Watch (GCW) and the Global Framework for Climate Services (GFCS). A very significant achievement has been the production of a new SoG for Space Weather by the Inter Programme Coordination Team on Space Weather;
- (d) Reviewed the implications of the Statements of Guidance concerning the strengths and deficiencies in existing observing systems and evaluated the capabilities of new observing systems and possibilities for improvements and efficiencies. The SoGs are essentially gap analyses, and their findings have been considered by the Team when drafting the new Implementation Plan for Evolution of Global Observing Systems (EGOS-IP);
- (e) Considered results from studies of real and hypothetical changes to observing systems with the assistance of NWP centres. In particular, the Team has been promoting impact studies, and actively assisting in the preparation of the fifth international workshop on the impact of various observing systems on NWP (Sedona, USA, 22-25 May 2012);

- (f) Undertaken wide consultation with WMO Application Areas experts, and developed a new version of the EGOS-IP based on the Vision for the GOS in 2025, taking into account developments with respect to WIGOS and GEOSS. The draft EGOS-IP is submitted to the ICT-IO-7 (Geneva, 18-22 June 2012) with a view to having it endorsed by CBS-XV (Jakarta, 10-15 September 2012), and EC-65 in mid-2013. The Team monitored progress against the existing EGOS-IP, and reported progress against the Plan through the ICT-IO to CBS;
- (g) Prepared documents to assist Members, summarizing the results from the above activities (see in particular the ET-EGOS Session reports, and ET-EGOS reports to the ICT-IO-6 and ICT-IO-7 meetings). Feedback from National Focal Points (NFPs) on the implementation of EGOS-IP at national level has improved considerably and has been well documented. It is planned to circulate the 2012 report on feedback to NFPs to acknowledge their contributions to date and to share experience between countries;
- (h) Provided advice and support to the Chair of OPAG-IO on development and implementation of WIGOS concept.

3. Issues

In addition to the issues covered by Recommendations in Section 4, the ET-EGOS has identified the following issues for consideration by the ICT-IO:

3.1 WMO Integrated Global Observing System (WIGOS) and WIGOS Implementation Plan (WIP)

3.1.1 As noted during ET-EGOS-6 in 2011 (CBS/OPAG-IO/ET-EGOS-6/Doc.3), the relationship between WIGOS and the Global Observing System and the work of ET-EGOS in particular has been in need of clarification for some time. Thanks to the progress made by ICG-WIGOS, a common understanding is now emerging across both ICG-WIGOS and the Secretariat staff responsible for WIGOS support. In essence this means that the work of ET-EGOS will continue along the current lines, but with continued expansion into the “new” Application Areas for WIGOS, e.g. climate applications within GFCS, and elaboration of requirements and gaps in Application Areas for which the analysis is less mature, e.g. atmospheric composition, oceans, hydrology, agricultural meteorology. ET-EGOS (or its successor, depending on the outcome of the next CBS Session) will thus continue to focus primarily on collecting, vetting and documenting observational requirements for all WIGOS Application Areas and will have primary responsibility for the Rolling Review of Requirements (RRR). This will include activities related to the Implementation Plan on the Evolution of Global Observing Systems (EGOS-IP), and particularly the monitoring of progress against the plan, and proactive pursuance of its actions.

3.1.2 Many of the integrating activities that are promoted by WIGOS, such as the development of standards for observational metadata, will not be included in the ET-EGOS Work Plan and it appears likely that responsibility for these areas will be given to an Expert Team yet to be created.

3.1.3 ET-EGOS-7 agreed that the following will have to be considered in order to ensure complementary roles of the EGOS-IP and the WIP; (i) the EGOS Implementation Plan will focus on the long-term evolution of WIGOS component observing systems, while the WIP will focus on the integration of these components; (ii) avoiding duplication between the EGOS-IP and the WIP; and identify required regulations, processes, and implementation activities; and (iii) addressing the GFCS requirements.

3.1.4 A draft WIGOS Implementation Plan (WIP) has been developed in preparation for EC-LXIV. ET-EGOS-7 reviewed this document and provided comments to the WIGOS Programme Office. It noted the importance of the RRR process, and its supporting databases within the WIGOS framework and suggested:

- a more prominent and higher priority role for EGOS-IP in the activities described at Regional and National/Sub-regional level;
- the importance of feedback to CBS on any departures between user requirements identified at

regional/national level and those documented in the RRR database (in place of or in addition to any regional/national activities on user requirements for observations).

3.1.5 There is a need to update documentation on the RRR process: on the WMO web site, and in GOS/WIGOS manuals and guides.

3.1.6 The chair was invited by ET-EGOS-7 to refer to the ICT/IOS (i) the renaming of the WIGOS Implementation Plan into WIGOS framework Implementation Plan (WIP); and (ii) the proposal to have an OPAG IOS Expert Team to take responsibility for implementation of WMO QMF across WMO component observing systems.

3.1.7 ET-EGOS-7 also considered the relationship between the EGOS-IP and the several other plans and development strategies for WMO component observing systems. A need was identified within WIGOS planning for a diagrammatic representation showing all such plans and the relationship between them. It was noted that the EGOS-IP invokes the actions of some other plans through cross-references to them.

3.2 Observational requirements for the Global Framework for Climate Services (GFCS)

3.2.1 The Team agreed that the ET-EGOS (or its successor) should consider through the RRR process additional requirements for observations in response to applications covered by GFCS. The Team recognized that the GFCS development is a long process, and that no specific requirements have been submitted by the GFCS to the RRR and the EGOS-IP yet. The Team stressed that a direct and routine dialogue will have to be established in the GFCS framework with those operational agents who directly use the observations for elaborating the products and services that the end users need.

3.3 WMO Quality Management Framework (QMF)

3.3.1 ET-EGOS-7 noted that issues dealing with quality control have to respond to WIGOS needs and Quality Management Framework (QMF) requirements, and should be addressed by the ICG-WIGOS, ICT-IOS, and other Technical Commissions as appropriate, but not in any detail in the EGOS-IP.

3.4 Observational requirements for WMO Polar activities, including the Global Cryosphere Watch (GCW)

3.4.1 ET-EGOS-7 agreed on the following:

- Implementation agents for observations in polar regions (noting that there is no WMO Regional Association for the Antarctic area) need to be mentioned in the EGOS-IP, e.g. EC-PORS, GCW Advisory Board, Cryonet Team;
- The practice for reporting “Snow” and “No snow” in FM-12 SYNOP reports will have to be addressed, for example by using BUFR, which allows to avoid the reporting ambiguity;
- The scope of GCW is very different from RRR Application Areas. GCW concerns many applications and could also be treated as a component observing system (e.g. similar to how AMDAR is treated in the RRR context). Also GCW extends to service provision whereas the RRR process deals only with Application Areas that have direct requirements for observations;

3.4.2 ET-EGOS-7 has requested the Points of Contact (PoCs) of all application areas to review how requirements for cryospheric variables and observations in polar regions are taken into account in the user requirements database and in their SoGs. Review of GCW plans may also reveal new Application Areas that should be included in the RRR process. ET-EGOS-7 also requested the Secretariat to investigate adding a new Cryosphere “Theme” in the database to facilitate management of the cryosphere observational user requirements in the database.

3.4.3 The PoC for GCW was requested to identify the key GCW documents of interest to the ET-EGOS (e.g. IGOS Cryosphere Theme document, Implementation Plan, Regional groups documents), and ET-EGOS members were requested to review them.

3.5 Capacity Building

A section on considerations for the evolution of observing systems in developing countries has been included by the Team in the EGOS-IP. The proposed action is for National Meteorological and Hydrological Services (NMHSs) with Regional Associations (RAs) and regional training centres, the Commission for Basic Systems (CBS), and the Commission on Climatology (CCI) in collaboration with international programmes (initiation and supervision to be led by the RAs, including timetable) to establish capacity building strategies in developing countries. This may include establishing training programmes through engagement within the targeted country, e.g. data management and observing practices.

3.6 Other issues

3.6.1 ET-EGOS-7 noted that the fifth international workshop on the impact of various observing systems on NWP (Sedona, USA, 22-25 May 2012) takes place following ET-EGOS-7 but before ICT-IO-7. It will therefore be necessary for the Rapporteur on OSEs/OSEs to bring any urgent issues raised by the workshop directly to ICT-IO-7.

3.6.2 There is an annual request to NFPs for reports on progress against EGOS-IP. In January 2013, ET-EGOS proposed to request reports against the new EGOS-IP, assuming it has been endorsed by CBS. Noting that this will be before its formal approval by EC, ICT-IO is invited to advise on this proposal.

3.6.3 There is a request from AOPC and the CBS Rapporteur for GCOS Matters that ICT-IO-7 consider a new requirement for daily reporting of additional climate observations, and that this be achieved through daily CLIMAT reports. The GCOS Secretariat will bring this issue directly to ICT-IO-7.

4. Recommendations

The ET-EGOS is proposing the following recommendations to the ICT-IO and the CBS-XV:

- Recommendation 1 – Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) – See Appendix IV
- Recommendation 2 – RRR databases. ET-EGOS strongly supports the strategy proposed by the Secretariat for the development and maintenance of the databases of user requirements and observing systems capabilities which support the RRR process. However, it recognises the significant commitment of resources required to sustain these activities. Accordingly it recommends to CBS to ensure adequate resourcing of these activities for the next inter-sessional period.
- Recommendation 3 – Interactive exchange with NFPs. ET-EGOS notes the improvements in obtaining useful feedback from NFPs on progress against EGOS-IP. In order to drive forward implementation activities in the next inter-sessional period, ET-EGOS recommends enhanced interactions with NFPs, including advice on problems encountered and the encouragement of links to successful activities. These activities will require resource mobilization.
- Recommendation 4 – ET-EGOS supports the request from the international community conducting Observing System Simulation Experiments (OSSEs) for a high-resolution “nature run” in support of more realistic simulation of proposed new space-based observations, particularly those affected by convective cloud.

- Recommendation 5 – ET-EGOS recommends organizing the 6th WMO Workshop on the Impact of Various Observing Systems on NWP in 2016, and CBS to support the allocation of appropriate resources for this event.

5. Proposal for the Terms of reference of the Expert Team

The ET-EGOS proposes some changes to its Terms of Reference. These are provided in Appendix III.

6. Work plan

A draft Work Plan for the ET-EGOS for the period 2012-2014 is at Appendix II.

APPENDIX I – TERMS OF REFERENCE OF THE EXPERT TEAM FOR THE EVOLUTION OF GLOBAL OBSERVING SYSTEMS (ET-EGOS)

The Terms of Reference below were approved by the Fourteenth Session of the CBS (Dubrovnik, Croatia, 25 March–2 April 2009). The CBS Extraordinary Session in 2010 decided to change the name of the Expert Team from Expert Team on the Evolution of the Global Observing System to Expert Team on the evolution of global observing systems while keeping the same terms of reference, acronym ET-EGOS, and membership.

1) Terms of Reference

Expert Team on the Evolution of global observing systems (ET-EGOS)

- (a) Update and report on observational data requirements of the WWW as well as other WMO and international programmes supported by WMO;
- (b) Review and report on the capability of both surface-based and space-based systems that are candidate components of the evolving composite GOS;
- (c) Carry out the rolling requirements review of several application areas using subject area experts (including atmospheric chemistry through liaison with CAS, marine meteorology and oceanography through liaison with JCOMM, aeronautical meteorology through liaison with CAeM, agrometeorology through liaison with CAgM, hydrology through liaison with CHy, and climate variability and change detection through liaison with CCI and GCOS);
- (d) Review the implications of the Statements of Guidance concerning the strengths and deficiencies in the existing GOS and evaluate the capabilities of new observing systems and possibilities for improvements and efficiencies in the GOS;
- (e) Carry out studies of real and hypothetical changes to the GOS with the assistance of NWP centres;
- (f) Develop new version of the Implementation Plan for Evolution of the GOS based on the Vision for the GOS in 2025, taking into account developments with respect to WIGOS and GEOSS; monitor progress against the Plan, report progress and updated Plan through the ICT-IO to CBS;
- (g) Prepare documents to assist Members, summarizing the results from the above activities;
- (h) Provide advice and support to the Chair of OPAG-IO on development and implementation of WIGOS concept.

APPENDIX II - DRAFT WORK PLAN FOR THE ET-EGOS FOR THE PERIOD 2012-2016

(this workplan is to be presented to the CBS-XV, then updated by the Team to assign responsibilities, deadlines, and indicate status)

No.	Task	Deliverable/Activity	Due	Responsible	Status	Comment
1	To contribute to the implementation of WIGOS, including WIGOS Manual, and provide relevant advice and support to the Chair of ICT-IO <i>Expected Result 4</i>	Address relevant items of WIGOS Implementation Activities agreed by Congress XVI, and then ICG-WIGOS	Ongoing	Chair ET-EGOS		GOS Manual and Guide to be reviewed, and made consistent with WIGOS Manual and Guide while avoiding duplication
2	Survey and collate user requirements for observations for WMO and WMO-sponsored programmes <i>Expected Result 4</i>	Review and update WMO database of observational user requirements, through Points of Contact for application areas.	Ongoing / Annual review	Chair ET-EGOS		
3	Survey and collate observing systems capabilities for surface-based and space-based systems that are components or candidate components of WIGOS <i>Expected Result 4</i>	Review and update WMO database of observing system capabilities, in collaboration with other OPAG IOS ETs and other Technical Commissions as appropriate.	Ongoing / Annual review	Chair ET-EGOS		
4	Maintain Rolling Review of Requirements (RRR) for observations in several application areas, using subject area experts, including appropriate liaison with Technical Commissions and programmes and co-sponsored programmes (e.g. CAS, JCOMM, CAeM, CAgM, CHy, CCI, GCOS, GFCS, and GCW) <i>Expected Result 4</i>	Continue RRR process for the listed application areas and expand to new areas as required: review and update as necessary Statements of Guidance on the extent to which present/ planned observing system capabilities meet user requirements, through Points of Contact on application areas.	Ongoing / Annual review	Chair ET-EGOS		

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5	<p>Prepare and maintain reviews of observation impact studies undertaken by NWP centres and provide information for consideration by ET-EGOS and OPAG-IOS</p> <p><i>Expected Result 4</i></p>	<p>Rapporteurs on Impact Studies and NWP experts, review results of impact studies relevant to the evolution of observing systems.</p> <p>Organize and hold next NWP Impact Studies Workshop in 2016.</p>	2016: workshop	Rapporteurs on Scientific Evaluation of Impact Studies undertaken by NWP Centres		
6	<p>Promote CBS activities in support of GCOS goals</p> <p><i>Expected Result 4</i></p>	<p>Review the implications of the progress on the GCOS Implementation Plan for the activities of CBS</p> <p>Bring relevant issues to the attention of the ET-EGOS</p>	2013	Rapporteur on GCOS matters		
7	<p>Promote CBS activities in support of GFCS goals</p> <p><i>Expected Result 4</i></p>	<p>Review the implications of the GFCS IP for the activities of CBS</p> <p>Bring relevant issues to the attention of the ET-EGOS</p>	2016	Chair ET-EGOS		
8	<p>Promote CBS activities in support of GCW goals</p> <p><i>Expected Result 4</i></p>	<p>Review the implications for the activities of CBS of the GCW developments, including the GCW Implementation Strategy, and the Cryosphere theme report for the IGOS partnership</p> <p>Bring relevant issues to the attention of the ET-EGOS</p>	2016	Chair ET-EGOS		
9	<p>Monitor progress and actions by Members and partner Organizations per the approved Implementation Plan for the Evolution of the global observing systems (EGOS-IP), fully responding to the "Vision for the GOS in 2025", and promote activities in support of progress</p> <p><i>Expected Result 4</i></p>	<p>Seek feedback from National Focal Points, Expert Teams, relevant Technical Commissions, and other groups on the implementation of EGOS-IP, and keep the EGOS-IP progress report up to date.</p> <p>Initiate and monitor activities which promote progress.</p>	Ongoing / Annual review	Chair ET-EGOS		

APPENDIX III – PROPOSED CHANGES TO THE TERMS OF REFERENCE OF THE ET-EGOS

1) Terms of Reference

Expert Team on the Evolution of global observing systems (ET-EGOS)

- (a) Review and report on the observational data requirements of application areas¹ within the scope of WIGOS;
- (b) Review and report on the capability of both surface-based and space-based systems that are components or candidate components of the evolving observing systems within the scope of WIGOS;
- (c) Carry out the rolling requirements review of application areas covered by (a) using application area experts and leading to Statements of Guidance concerning the extent to which present and planned observing systems meet user requirements for observations;
- (d) Review the implications of the Statements of Guidance concerning the strengths and deficiencies in the existing observing systems and evaluate the capabilities of new observing systems and possibilities for improvements and efficiencies;
- (e) Carry out studies of real and hypothetical changes to observing systems with the assistance of NWP centres;
- (f) Monitor and report progress against the new version of the Implementation Plan for Evolution of Global Observing Systems, based on the “Vision for the GOS in 2025”; identify new actions as necessary, taking into account developments with respect to WIGOS and GEOSS;
- (g) Promote activities which enhance progress against the Implementation Plan for Evolution of Global Observing Systems;
- (h) Prepare documents to assist Members, summarizing the results from the above activities;
- (i) Provide advice and support to the Chair of OPAG-IOS on development and implementation of WIGOS.

¹ WMO Application Areas include Global Numerical Weather Prediction (NWP), High Resolution NWP, Nowcasting and Very Short Range Forecasting (NVSRF), Seasonal to Inter-Annual Climate Prediction (SIAF), Aeronautical Meteorology, Atmospheric Chemistry, Ocean Applications, Agricultural Meteorology, Hydrology and Water Resources, Climate monitoring (GCOS), Climate (other aspects, CCI), Space Weather, and GTOS (non GCOS requirements of GTOS)

**APPENDIX IV - DRAFT CBS-XV RECOMMENDATION ON THE
IMPLEMENTATION PLAN FOR THE EVOLUTION OF GLOBAL OBSERVING SYSTEMS
(EGOS-IP)**

THE COMMISSION FOR BASIC SYSTEMS,

Noting:

- (1) The Vision for the Global Observing System (GOS) in 2025 approved by the Sixty-First Session of the Executive Council through Resolution 6 (EC LXI);
- (2) Resolution 3 (Cg-XVI) – Global Observing System;
- (3) Resolution 10 (Cg-XVI) – Global Atmosphere Watch;
- (4) Resolution 14 (Cg-XVI) – World Hydrological Cycle Observing System;
- (5) Resolution 29 (Cg-XVI) – Global Climate Observing System;
- (6) Resolution 48 (Cg-XVI) – Implementation of the Global Framework for Climate Services;
- (7) Resolution 50 (Cg-XVI) – Implementation of the WMO Integrated Global Observing System (WIGOS);
- (8) Resolution 55 (Cg-XVI) – Antarctic Observing Network;
- (9) Resolution 60 (Cg-XVI) – Global Cryosphere Watch;
- (10) The Final Report of the Seventh Session of the CBS Implementation/Coordination Team on Integrated Observing Systems (ICT-IOS) based on recommendations from the CBS Expert Team on the Evolution of Global Observing Systems;

Considering:

- (1) The need for surface and space-based observations to address the requirements of WMO application areas;
- (2) The need to consider WIGOS and GFCS requirements and implementation aspects regarding the evolution of global observing systems, WMO priorities, and cost-effectiveness of observing systems;
- (3) The need to provide Members with clear and focused guidelines and recommended actions in order to stimulate cost-effective evolution of the observing systems to address in an integrated way the requirements of WMO programmes and co-sponsored programmes;

Recognizing:

- (1) The importance of global observing systems to address all the requirements of WMO application areas;
- (2) The quantitative observational user requirements documented in the WMO Database;
- (3) The critical review performed by experts in each WMO application area, and the identified observational gaps as documented in Statements of Guidance of those application areas;
- (4) The wide CBS lead consultation process with the Technical Commissions, Regional Associations, Programmes, co-sponsored Programmes, and relevant experts leading to the drafting and review of the draft Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) based on the Statements of Guidance, WMO priorities, and cost-effectiveness;

Recommends that:

- (1) The Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) provided in the Annex to this Recommendation be adopted;
- (2) Members, in collaboration with partner organizations, and identified agents in the EGOS-IP to address the actions listed in the EGOS-IP;
- (3) The Technical Commissions, and Regional Associations to take the EGOS-IP into account in their work programmes, and promote its effective implementation;

Requests that the Secretary-General to bring the EGOS-IP to the attention of Members and identified

agents;

Annex 1 to Recommendation No. ??? (CBS-XV)

IMPLEMENTATION PLAN FOR THE EVOLUTION OF GLOBAL OBSERVING SYSTEMS

[ICT-IOOS-7 approved version of the EGOS-IP to be included here in due course]

ET-EGOS PREPARATORY MEETING ON THE EGOS-IP, GENEVA, 3-4 MAY 2012

Participants

John Eyre (ET-EGOS Chair, Met Office, UK)	Heng Zhou (ET-EGOS member, CMA, China)
Russell Stringer (ET-EGOS member, BOM, Australia)	Karl Monnik (ET-AWS Chair, BOM, Australia)
Stuart Goldstraw (ET-SBR SO Chair, Met Office, UK)	Jean Pailleux (Consultant, France)
Luiz Machado (ET-SUP Chair, Brazil)	Etienne Charpentier (Secretariat)
Wenjian Zhang (Secretariat)	

Introduction

Expected output from the meeting:

- updated EGOS-IP document for discussion at ET-EGOS-7,
- Space Wweather to be separated from surface-based and space-based observing systems in the EGOS-IP,
- proposal on relationships between EGOS-IP and other IPs (e.g. GCOS, WIGOS, GCW, ...)
- proposals on guidelines to Members on how to use the various IPs

Documents available: ET-EGOS-7 documents 10.2.1, 10.2.2 (*), and Space Weather SoG (doc 8.3.2(12))

Status of EGOS-IP, and development history

Status of latest version was presented by Jean Pailleux.

What comments / contributions do we have?

After v11.02, comments have been recorded separately and need to be included in a new version. First draft of the Executive Summary has been produced by the Consultant.

Scope of EGOS-IP and relationship with WIGOS IP

- WIGOS IP is about implementing the processes to manage the observing systems.
- EGOS-IP to focus on evolution of observing systems, being specific on addressing gaps
- Integration aspects to be part of WIGOS-IP.
- EGOS-IP can make references to WIGOS-IP integration aspects & actions.
- Integrated products are out of the scope of OPAG-IOS, and therefore of ET-EGOS. Such issues/actions in the EGOS-IP should be labeled for deletion. Other CBS Teams to consider RRR for products. However there are some related elements in the Vision for the GOS in 2025 that cannot be ignored.
- Evolution of Volume A and RRR Database.

Detailed input, and comments on the latest version

The meeting discussed mechanisms for the update of the EGOS-IP. The meeting reviewed comments from ET-AIR, ET-AWS, ET-SBR SO, ET-SAT, ET-UP, THORPEX, Space Weather, GCOS, and updated the EGOS-IP accordingly into version v12.00. Some outstanding issues will have to be discussed by ET-EGOS-7.

BRIEF STRATEGY FOR UPDATING THE STATEMENT OF GUIDANCE FOR ATMOSPHERIC CHEMISTRY APPLICATIONS

The current SoG for Atmospheric Chemistry was prepared in 2004 based on the IGACO strategy and was approved by ET-EGOS-1 in December 2005. It has not been updated since that time. It has some limitations and focuses mostly on ozone and ozone-related species in the stratosphere.

In WMO atmospheric chemistry is covered by the GAW Programme. The IGACO strategy does not overlap completely with the GAW Programme focal areas, and so the next review of SoG will cover GAW variables only. Non-GAW variables could be assessed by an ad-hoc expert group and this exercise is unlikely to take place within GAW.

To update the SoG on GAW variables the following task was accepted in the Addendum to the GAW Strategic Plan: "Begin to establish the rolling review of requirements (RRR) 4-stage process for each GAW focal area, starting with a review of scientifically defensible users' requirements, with the objective of updating the statement of guidance, considering both satellite and non-satellite observations" with implementation timeline 2012-2015.

Based on the discussion during ET-EGOS-7 meeting and taking into consideration the approach of sub-application areas the following steps could be foreseen for implementing the task in the Addendum:

- 1) The list of Atmospheric Chemistry variables will be checked and extended where necessary to include GAW variables.
- 2) The applications (significance) of the each GAW variable (e.g. greenhouse gases, reactive gases or aerosols) are formulated in the GAW Strategic Plan. A sub-application list will be formed for each variable (e.g., air quality, oxidation capacity, long-range pollutants transport, stratospheric ozone depletion, climate etc.), if of relevance.
- 3) GAW Scientific Advisory Groups (SAGs) will be contacted to provide the requirements for the particular variable observations in particular sub-applications.
- 4) Review of the observational capacity will be based on the material of SoG and the IGACO strategy.

A critical review would take into consideration the gaps identified in the current version of SoG for the GAW variables. As mentioned above, the updated SoG will NOT include non-GAW variables even if those are essential for Atmospheric Chemistry applications (e.g. H₂O, chlorine and bromine oxides etc.).

The critical review is planned to be performed separately for the GAW variables which were not reflected in original SoG. An attempt will be made to consider critical review at the respective SAGs and expert meetings (e.g. at the SAG reactive gases, SAG aerosol, SAG Greenhouse gases and SAG ozone, VOC expert meeting, CO₂ expert meeting etc). A number of these meetings is planned in 2012-2015.

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