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CBS MANAGEMENT GROUP

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Report of the chair of the OPAG on Information Systems and Services
(Submitted by G. Hoffmann)

Summary and purpose of document

This document summarises the work of the expert teams and rapporteurs within the OPAG-ISS.

1. Introduction

During CBS – XII, the Open Programme Area Group on Information Systems and Services was re-established, and a number of Expert Teams, an Inter-Programme Task Team and a rapporteur together with their relevant memberships were set up. In the following, the different groups are presented giving their terms of reference, their initial memberships and the results achieved up to date.

2. Implementation/Coordination Team on Information Systems and Services

2.1. Terms of reference

- (a) Monitor the operational information flow in relation to the GTS and further develop operational information exchange procedures with a view to improved WWW operation, specially the GTS, including:
 - Data collection and distribution (e.g. updating abbreviated headings tables);
 - Routing and traffic management for the exchange of observational data and processed products (routine and non-routine exchange);
 - Procedures for enhanced exchange of information in the form of files (e.g. file naming, FTP flow between centres);
 - Proposal for a migration strategy to use of table-driven representation forms.
- (b) Co-ordinate and further develop recommended practices and guidance on the management of and access to operational information related to WWW information exchange, specially to the GTS operation (Abbreviated Heading tables, catalogue of bulletins and files, routing directories, etc);
- (c) Review and endorse updates to the Manual on Codes, as required and proposed by the Expert Team on Data Representation and Codes.

2.2. Membership

Chair of OPAG on ISS

Mr Malamine Sonko, Senegal, RA I, Rapporteur GTS

Mr Alexander Gusev ^(may be replaced), Russian Federation, RA II, Rapporteur GTS

Mr Jose-Mauro de Rezende, Brazil, RA III, Rapporteur GTS

Mr James Fenix, USA, RA IV, Rapporteur GTS

Mr Michael Hassett, Australia, RA V, Rapporteur GTS

Ms Pamela Dickinson, UK, RA VI, Rapporteur GTS

Mr G.H. Obua, Uganda, RA I, Rapporteur DM

Mr Atsushi Shimazaki, Japan, RA II, Rapporteur DM

Mr Ernesto Grammelsbacher, Brazil, RA III, Rapporteur DM

Mr Edward Young, (Hawaii) USA, RA V, Rapporteur DM

Mr Igor Zahumensky, Slovakia, RA VI, Rapporteur DM

Chair of ET/DR & C

Chair of ET/MTDC

Chair of ET/IDM

Chair of ET/IMTN

Chair of ET/EUDCS

Chair of SG/RFC

2.3. Results

The session is planned for July 2002, in Geneva, in order to consolidate all ISS proposals and recommendations to be submitted to CBS-Ext.2002.

3. Expert Team on Data Representation and Codes

3.1. Terms of reference

Requirements for changes to representation forms should be provided by the other OPAGS, especially IOS and DPFS.

- (a) Maintain all WMO data representation forms and further develop table driven codes by defining descriptors, common sequences and data templates, so they meet the requirements of all Members most efficiently;
- (b) Invite and assist Members to participate in the experimental exchange of data encoded in modified or new formats, in BUFR, CREX, and GRIB2 on a bilateral basis;
- (c) Define standards for meteorological information using XML as appropriate;
- (d) Produce a Guide on table driven codes as an updated version of the current Guide to BUFR and GRIB;
- (e) Determine the continuing use of the different WMO data representation forms and recommend options for their future roles or disposition.

3.2. Membership

Mr Jean Clochard, France (Chair), RA VI	<i>Organizations with interest</i>
Mr Scylla Silayo, United Republic of Tanzania, RA I	ECMWF
Mr Atsushi Shimazaki, Japan, RA II	EUMETSAT
Mr Jeff Ator, USA, RA IV	ICAO
Mr Charles Sanders, Australia, RA V	IOC
Ms Eva Cervena, Czech Republic, RA VI	

3.3. Results

The Meeting of the Expert Team Data Representation and Codes (ET/DR&C) was held at Météo-France in Toulouse from 23 to 27 April 2001. The Team reviewed the experimental tests of GRIB Edition 2 before its operational implementation on 7 November 2001. Further validation tests and experimental exchanges were recommended with a view to the use of GRIB 2 in 2002, especially for the exchange of Ensemble Prediction System products. The Team defined and recommended for testing and validation GRIB 2 templates for the exchange of cross-sections and Hovmöller diagrams. The Team recommended additions to BUFR/CREX tables for the transmission of automatic stations (AWS) observations, for new originating Centres, satellites, radiosondes, for height assignment method (from satellite), for a new significance qualifier on method of derivation of percentage confidence, for the representation of last known buoy position and of the ascending or descending orbit and to represent XBT, XCTD and sub-surface float information. Templates for the transmission of traditional observations in BUFR were defined. New regulations for the global harmonization of precipitation reporting were proposed in FM 12 SYNOP, with a view to their approval by CBS Ext. 02.

The Team recommended the production of new WMO guide for CREX and BUFR, for reporting practices and for GRIB Edition 2. A consultant (Dr Cliff Dey) has completed writing the new guide on BUFR/CREX. This guide is currently under review by the Team before publication (on the WMO server and hardcopy) at the beginning of 2002. The Team will meet again in April for especially new GRIB 2 validation assessment, new GRIB 2 templates requirements, finalisation of common sequences for traditional data templates in BUFR, and additions to BUFR for fast track, especially for new satellites data.

4. Expert Team on Migration to Table Driven Code Forms

4.1. Terms of reference

- (a) Develop in liaison with other Commissions (e.g. JCOMM, CCL,..) a detailed migration plan to table-driven representation forms to be presented to CBS-Ext.(2002) including options for disposition of character codes following migration;
- (b) Define a software project to specify, develop and distribute universal BUFR, CREX and GRIB encoding/decoding software, as available, to all requesting countries and propose a training programme;
- (c) Identify and analyse problems due to the migration of data representation at every step of the WWW data flow. In particular, study the impact of the migration process on the GTS and data processing centres. Develop proposals for solutions;
- (d) List in general terms the possible implications, due to the migration process, on WMO Members' resources for development and operation, and propose solutions to mitigate the impact on Members and optimize the benefit of the migration of data representation for better data acquisition and satisfaction of the requirements for more frequent observations, new parameters and new data types;
- (e) Monitor the experience gained in bi-lateral tests and incorporate lessons learned into the migration implementation plan.

4.2. Membership

Dr Fred Branski, (Chair), USA, RA IV	<i>Organizations with interest</i>
Mr Seid Amedie, Ethiopia, RA I	ECMWF
Mr Keiishi, Kashiwagi, Japan, RA II	EUMETSAT
Dr Vladimir Antsyovich, Russian Federation, RA II/VI	IOC
Mr Heinrich Knottenberg, Germany, RA VI	ICAO
Mr Dick Blaenboer, Netherlands, RA VI	
Chair of ET/DR & C	

4.3. Results

The Expert Team on Migration to Table Driven Codes Forms held its first meeting in Geneva from 7 to 11 May 2001. The Team, as its main duty, started the development of a detailed migration plan to table-driven representation forms to be presented to CBS-Ext.(2002). The Team identified technical impacts of the migration (and possible solutions) in all aspects of the World Weather Watch and associated operations (GOS, GTS, GDPS, Associated Programmes). The Team noted that all Members will not migrate at the same pace, and that it will be a slow process over a decade. To ensure access to data for all users, the constitution of the same observation in two types of format at some stage in the World Weather Watch data flow (concept of the double transmission or double dissemination), had to be considered. Prior to the migration process, information, training and encoder/decoder software will have to be provided to WMO Members. The Team developed an action plan for these projects. A new guide on BUFR/CREX has been written. The guide is structured in 3 layers: level 1: general information, level 2: data and telecommunication managers and level 3: programmers. A letter to inform WMO Member of the migration benefits has to be sent. Discussion and contacts are currently taking place trying to set up a software house for distribution of encoder/decoder software. The Team will meet again in May 2002 to assess the actions undertaken and those, which are still required. The Team will finalize the migration Plan to be presented to CBS Ext.-2002.

5. Expert Team on Integrated Data Management

5.1. Terms of reference

- (a) Develop a metadata standard to be used in future WMO information systems. The standard should be defined as a WMO community profile within the context of the ISO metadata standard. This would include definition of new elements and extensions to the ISO standard and definition of keyword and code lists;
- (b) Recommend a standard Internet technology representation of the metadata for use on the World Wide Web (e.g. XML);
- (c) Advise on reorganisation of the Guide on WWW Data Management and coordinate the development of the WMO Guide on Data Management, including preparation of the sections relating to the WMO metadata standards.

5.2. Membership

Mr Steve Foreman (**Chair**), United Kingdom, RA VI
Ms Fang Zhao, China, People's Republic, RA II
Ms Irina Zhabina, Russian Federation, RA II/VI
Mr Lawrence Buja, USA, RA IV
Dr Jürgen Seib, Germany, RA VI

5.3. Results

A meeting of the CBS Expert Team on Integrated Data Management was held 5 to 8 November 2001 in Geneva. The team reviewed a number of relevant standards and examined the Dublin Core and draft ISO standard on Geographic Metadata (19115) most closely. They determined that the elements needed to meet WMO requirements could be considered to conform to Dublin Core and that the draft ISO standard could be applied to WMO requirements. The team developed a "WMO Community Core Metadata" profile. An overview of the ISO and WMO core elements and their corresponding names within the draft ISO standard is provided in the report of the meeting. Over the next several months the team will provide advice on developing a standard for comprehensive metadata that would meet the needs of all Programmes. It will also review proposed standard with respect to existing datasets, develop a draft list of keywords to describe WMO datasets, develop list of proposed extensions needed for ISO code lists, and propose an XML schema and examples.

6. Expert Team for the Improved MTN and GTS

6.1. Terms of reference

Focus on the medium-term (2-4 years) improvement of the GTS, and in particular the MTN

- (a) Develop and implement the improved MTN project, including supported applications, data transport functions, responsibilities of MTN centres, interfaces and gateways between the MTN and RMTNs, and administrative aspects, with a view to implementation by 2002;
- (b) Review and propose updates to the organisation and design principles for the GTS, to take the best benefits of ICT development;
- (c) Provide guidance on technical, operational and administrative/financial aspects of telecommunication techniques and services for WWW operations, specially for the implementation of the GTS (in particular for RMTNs), including dedicated and public services (e.g. satellite-based telecommunications, managed data-communication network services, ISDN, the Internet), including informing members of relevant developments in ITU and ISO.

6.2. Membership

Mr Peilang Shi, (**Chair**), China, People's Republic of, RA II

Mr George M. Kibiru, Kenya, RA I
Mr Hiroyuki Ichijo Japan, RA II
Mr Leonid Bezruk, Russian Federation, RA II/VI
Mr Jose-Mauro de Rezende, Brazil, RA III
Mr William Brockman, USA, RA IV
Mr Ian Senior, Australia, RA V
Mr Dominique Andre, France, RA VI
Ms Ilona Glaser, Germany, RA VI
Mr Robert Stephens, United Kingdom, RA VI

Organizations with interest

ECMWF
ASECNA

6.3. Results

The meeting held from 20-23 June 2001 (Geneva) focused its work on the analysis of the opportunities that could foster the early implementation of the Improved MTN, on the basis of the IMTN project as agreed by CBS-XII and endorsed by EC-LIII. The ET-IMTN agreed upon a plan towards the implementation of the IMTN in two folds:

- A) The implementation of a "cloud" providing the interconnectivity between RTH/WMCs Washington and Melbourne and RTHs Tokyo, Bracknell, Brasilia and Buenos Aires, taking benefit from contractual arrangements of USA administrations with a provider, including RTH/WMC Moscow in a further step; and
- B) a "cloud" extending the interconnectivity of the Region VI RMDCN between RTHs, i.e. RTHs Bracknell, Toulouse, Offenbach, Moscow with other adjacent RTHs, i.e. RTHs Nairobi, Dakar, Algiers, Cairo, Jeddah, New Delhi and Beijing.

The ET-IMTN established two ad-hoc groups (respectively led by RTH Washington and RTH Offenbach, with the support of ECMWF) and agreed upon an action schedule to ensure real progress towards an early implementation of the IMTN. A WMO letter to Members concerned on proposed implementation is foreseen by the end of 2001.

The **ET-IMTN session** was immediately followed by **an ICM on the MTN** (Geneva, 25-28 June 2001), with the participation of experts from a larger number of MTN centres (14 RTHs or WMCs), that fully endorsed the plan and working programme for the Improved MTN developed by the ET-IMTN. The meeting reviewed the MTN implementation and operation, and noted the significant progress of the migration to TCP/IP on the MTN and other GTS circuits. Several RTHs make also extensive use of the Internet to retrieve and exchange observational data with NMCs. With a view to facilitating consistent implementation and operation, the meeting recommended that the ET-EUDCS and ICT-ISS urgently develop guidelines on relevant procedures and also consolidate guidance on adequate security measures. The meeting identified and made proposals for a number of improvements of GTS operational procedures. It stressed the urgent need for agreed conventions for filenaming and metadata for WMO Programmes in general, and for the WWW in particular, in order to promote the transfer of files on the GTS, and take full benefit of the improved GTS infrastructure. The meeting urged the ISS/ET-EUDCS and ICT-ISS to develop and consolidate respective recommendations for their submission to CBS-Ext.2002. These requirements, proposals and recommendations are addressed to the ISS/ET-EUDCS and ICT-ISS for follow-up. The meeting also reviewed the activities related to Operational Information matters, including Pub.9-Volume C (meteorological bulletins and transmission programmes) and RTHs' routing catalogues, and to the Annual global monitoring (AGM), the Special MTN Monitoring (SMM) and the Integrated WWW monitoring (CBS-XII).

7. Inter-Programme Task Team on Future WMO Information Systems

7.1. Terms of reference

Focus on the long-term (4+ years) development of WMO information systems with a view toward development of implementation plans.

- (a) Review data exchange requirements (volume, timeliness, connectivity) of the WWW and other WMO Programmes as well as other information system requirements, from the view of the end user, in an "applications oriented manner";
- (b) Review the current and anticipated capabilities of public and dedicated data communication networks and services (the Internet, FR & ATM networks, satellite-based distribution, etc) and conduct pilot studies;
- (c) Develop a vision for future WMO information systems to cost-effectively meet WMO requirements for real and non real-time data exchange. This would include:
 - Basic concepts for information handling systems (Data Bases, servers, etc.);
 - More efficient data collection, exchange and distribution mechanisms (store-and-forward, multicast, download, etc.);
 - cost-effective utilisation of public and dedicated data communication networks and services.
- (d) Develop a project plan including proposed applications and responsibilities of centres. Propose steps toward implementation of the improved information system.

7.2. Membership

Chair of OPAG on ISS (Chair)	Organizations with interest
Dr Alexander Frolov, Russian Federation, RA II/VI	CAGM
Dr Ted Tsui, USA, RA IV	CAeM
Mr Kevin Alder, New Zealand, RA V	CAS (No nomination)
Dr Kok Seng, Yap, Malaysia, RA V	CHy
Dr Robert Stanek, Germany, RA VI	CCI
Mr Tom Potgieter, South Africa, RA I	JCOMM (No nomination)

7.3. Results

I chaired the third meeting of the Inter-programme Task Team on Future WMO Information Systems, which was held 25-29 June 2001 in Langen, Germany. During its deliberations the team dedicated most discussion to the requirements and capabilities of less developed versus more developed NMHS. It noted that NMHS span a range of capabilities and developed a description of how the capabilities of centres could evolve in response to increasing capabilities and requirements as the Future WMO Information System is implemented. The team also clarified and expanded the presentation of the functions of the three levels of centres developed at its previous meeting. Finally, it developed a preliminary outline of an implementation plan and timetable for the Future WMO Information System and proposed that phased implementation begin in 2006. Pilot tests to evaluate some of the most promising technologies will be conducted over the next year.

8. Expert Team on Enhanced Utilisation of Data Communication System

8.1. Terms of reference

- (a) Develop recommended practices and technical guidance material for the implementation of data communication facilities (GTS and Internet) at WWW centres, including security aspects, with a view to ensuring efficient and safe operations of information systems;
- (b) Review current and anticipated telecommunication and information system requirements of the WWW and other WMO Programmes that can be effectively met by the Internet;

- (c) Review standard TCP/IP procedures and applications, including new developments (e.g. IPv6) that are relevant to WWW and other WMO programmes requirements, and develop recommended practices;
- (d) Develop recommendations on coordinated use of the Internet to meet in the relevant short term (1-3 years) requirements of all WMO Programmes and update the Guide on Internet Practices as required.

8.2. Membership

Mr Jean-François Gagnon (**Chair**), Canada, RA IV
Ms Xiang Li, China, People's Republic, RA II
Mr Walter Mussante, USA, RA IV
Mr Niyazi Yaman, Turkey, RA VI
Mr Dave Tinkler, United Kingdom, RA VI
Mr Hans Janssen, Germany, RA VI

Organizations with interest
ECMWF
ITU

8.3. Results

A session of the ET-EUDCS has not been held yet. It is planned to hold a joint meeting of the ET-EUDCS and ET-IMTN in early April 2002, tentatively in Montreal (Canada). The expected benefits of a joint meeting are to extend the expertise and experience (most ET-EUDCS experts are quite new in CBS work) in view of the significant tasks, and enable actual progress in the IMTN implementation.

The translation of the Guide on Internet Practices into Russian has been completed and the Russian version is now available on the WMO Web site. The Spanish version is still undergoing translation.

9. Steering Group on Radio-Frequency Coordination

9.1. Terms of reference

- (a) Keep under review allocations of radio-frequency bands and assignments of radio-frequencies to meteorological activities for operational requirements (telecommunications, instruments, sensors, etc.) and research purposes, in coordination with other technical commissions;
- (b) Co-ordinate with WMO Members, with the assistance of the WMO Secretariat, to:
 - ensure the proper notification and assignment of frequencies used for meteorological purpose;
 - determine their future use of the radio spectrum for meteorological purpose.
- (c) Keep abreast of the activities of the Radio communication Sector of the International Telecommunication Union (ITU-R), and in particular of the Radio communication Study Groups, on frequency matters pertaining to meteorological activities, and assist the WMO Secretariat in its participation in ITU-R work;
- (d) Prepare and co-ordinate proposals and advice to WMO Members on radio-regulation matters pertaining to meteorological activities with a view to ITU Radio communication Study Groups, Radio communication Assembly, World Radio communication Conferences and related regional/global preparatory meetings;
- (e) Facilitate the coordination between WMO Members for the use of frequency bands allocated to meteorological activities with respect to:
 - Coordination of frequency use/assignments between countries;
 - Coordination of frequency use/assignments between various radio communication services (e.g. meteorological aids and DCPs) sharing the same band.
- (f) Facilitate the coordination of WMO with other international organizations which address radio-spectrum planning, including specialized organizations (e.g. CGMS, SFCG) and regional telecommunication organizations (e.g. CEPT, CITELE, APT);

- (g) Assist WMO Members, upon request, in the ITU coordination procedure of frequency assignment for radio communication systems sharing a frequency band with meteorological radio communication systems.

9.2. Membership

Mr Hans Richner (Chair) Switzerland, RA VI	<i>Organizations with interest</i>
Mr JixinYu, China, People's Republic, RA II	EUMETSAT
Mr Yuichi Sakoda, Japan, RA II	ITU-R
Ms Elena Manaenkova, Russian Federation, RA II/VI	
Mr Wilson Sandoval, Brazil, RA III	
Mr David Franc, USA, RA IV	
Mr John Beard, Australia, RA V	
Mr Guy Rochard, France, RA VI	
Dr John Nash. United Kingdom, RA VI	

9.3. Results

The SG-RFC held a session from 3-8 May 2001 (WMO Geneva), just prior to a session of ITU-R/Working Party 7C "Earth exploration satellite systems and meteorological systems" (9-18 May 2001, ITU Geneva). The group reviewed all the radio frequency bands allocated to Meteorological Aids (radiosondes), Meteorological Satellites, Weather Radars, Wind Profiler Radars and spaceborne remote sensing.

Particular attention was given to the issues that are included in the agenda for the next ITU World Radiocommunication Conference in 2003 (WRC-2003). An issue of particular concern addresses possible Mobile Satellite Service allocations (for portable mobile terminals) in portions of the band 1670–1690 MHz, which is crucial for MetAids and MetSat operations; such an MSS allocation may in particular hamper the development of GOES/GVAR and GMS/S-VISSR stations. The meeting developed contributions to ITU-R in this respect. Issues related to safeguarding bands allocated to weather radars (in particular 2700-2900 MHz) and to protecting passive remote sensing bands from new systems, such as HAPS, were reviewed in details. Several experts from the SG-RFC, including the Secretariat (J.-M. Rainer) participated in the ITU-R/Working Party 7C to support WMO interests.

Very long and tough discussions took place in the relevant ITU-R group (WP8D in May and October 2001) for the ITU-R preparatory report to WRC-2003 (CPM text) related to possible MSS allocations in the band 1670–1690 MHz, with a rather limited meteorological representation (USA, EUMETSAT and WMO). On the other hand, it is interesting to note that the threat on the 401-406 MHz band is apparently closed. Crucial forthcoming ITU-R meetings are WP 7C (11-15.II.2002), WP 8D (08-14.V.2002), which will finalize relevant CPM contributions, and the final CPM (18-29.XI.2002). Another **SG-RFC session** (6-8 February 2002, Geneva) is planned to consolidate WMO's position and contributions on all WRC-2003 issues

The SG-RFC also finalized *the Handbook on use of radio frequency spectrum for meteorology*, which was endorsed by WP 7C; the process for its joint publication by WMO and ITU is on going.

10. Rapporteur on Monitoring

10.1. Terms of reference

- Coordinate operational trial of the proposed Integrated WWW Monitoring;
- Assess the impact of the implementation of the proposal, in particular as regards the resources needed at RTHs and NMCs;
- Review and adapt the proposed Integrated WWW Monitoring in view of experience gained.

10.2. Rapporteur

Mr Jean-Pierre Bourdette, France, RA VI

10.3. Results

It has not been yet possible to set up a trial of the proposed integrated WWW monitoring. A plan is being currently developed, with the assistance of the Secretariat (P. Kerhervé), for a possible trial early 2002 involving RTH Toulouse and NMCs Madrid and Lisbon. Progress has been made in the development of a dedicated PC for monitoring applications.

11. Summary and outlook

The work of the OPAG on ISS has started well. There has been some promising progress in the most important areas:

- the plan for the migration to table-driven codes;
- the establishment of a meta-data standard to be used for the Future WMO Information System;
- the implementation of an improved MTN;
- the definition of the Future WMO Information System, in particular with regard to less developed countries;
- the co-ordination of radio-frequencies.

In the coming year, these initial steps have to be followed up with actions, in particular the plans for the improved MTN have to be implemented and the Future WMO Information System has to be co-ordinated with other on-going efforts in the environmental community aiming for a similar goal, especially the UNIDART¹ project in Europe and the Earth System Grid² in the USA.

¹ <http://www.dwd.de/UNIDART>

² <http://www.earthsystemgrid.org>