SECOND MEETING
OF THE
JOINT STEERING GROUP FOR
THE IODE OCEAN DATA PORTAL
AND
THE WIGOS PILOT PROJECT FOR JCOMM

(OSTEND, BELGIUM, 15-16 OCTOBER 2009)

FINAL REPORT

JCOMM MEETING REPORT NO. 68

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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NOTES

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C O N T E N T S

EXECUTIVE SUMMARY

The second meeting of the Joint Steering Group for the IODE Ocean Data Portal and the WIGOS Pilot Project for JCOMM was held at the Project Office of the IOC International Oceanographic Data and Information Exchange (IODE) in Ostend, Belgium from 15 to 16 October 2009.

The goal of the meeting was to review the status of the WIGOS, including CONOPS, WDIP, and the Demonstration Projects, as well as the JCOMM Pilot Project itself, and to address outstanding issues, including (i) interoperability of ocean data systems with the IODE Ocean Data Portal and/or the WMO Information System (WIS), (ii) instrument practices and the review of WMO and IOC Technical Publications, (iii) quality management, and (iv) Capacity Building.

The meeting achieved consensus permitted to make progress regarding a number of issues including:

- The provision of a “Light Data Provider” function that can be used to realize interoperability of ocean data systems with the IODE Ocean Data Portal and the WMO Information System (WIS);
- Agreement for the necessary developments for the connection of some data sets to the ODP and/or WIS before the end of 2010 (e.g. WOA, GCCs, ICOADS, HF radars, GTSPP, GHRSST, Australian IMOS);
- The establishment of WMO-IOC Regional Marine Instrument Centres (RMIC), and the organizing of a metrology workshop at NOAA/NDBC in early 2010 to prove concept;
- The production by March 2010 of a Project report, including achievements of the Pilot Project, lessons learned, benefits, and recommendations for the way foreword and the Pilot Project legacy;
- A methodology for documenting instrument practices and updating WMO and IOC Publications (concept was proven through updating of the marine chapter of the CIMO guide);
- Initiation of a discussion regarding the scope of marine instrument intercomparisons in cooperation with CIMO;
- The shaping of a JCOMM/IODE standards process for ocean data management (and acceptance of one standard to prove the concept);
- Comprehensive analysis of strengths and weaknesses in the management of ocean observing systems;
- An updated Implementation Plan;
- Preparations for the reporting to the forthcoming meeting of the Sub-Group of the EC WG WIGOS-WIS (October 2009).

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE SESSION

1.1 Mr Greg Reed, Co-chair of the Joint Steering Group for the IODE Ocean Data Portal and the WIGOS Pilot Project for JCOMM opened the meeting at 0900 hours at the Project Office of the IOC International Oceanographic Data and Information Exchange (IODE) in Ostend, Belgium. Mr Reed recalled that all working documents were made available through the IODE and JCOMM web sites. Mr Reed invited all participants to introduce themselves briefly. The list of participants is available as Annex II.

1.2 Mr Reed introduced the Provisional Agenda (Document 1.2), and invited the meeting to review it and adopt it. The meeting adopted the Agenda (Annex I).
1.3 Mr Pissierssens welcomed the participants to Oostende and provided information on the working hours of the meeting and practical arrangements for the meeting.

1.4 The meeting noted that Mr Rainer Dombrowsky (USA) who recently retired from NOAA was no longer in a position to participate in the joint Steering Group, act as vice chairperson of the Steering Group and represent the WMO Commission to Instruments and Methods of Observation (CIMO). The meeting therefore expressed gratitude to Mr Dombrowsky for his contribution to the development of the Pilot Project, and welcomed the nomination of Mr Jitze van der Meulen to represent CIMO in the joint Steering Group. The meeting then unanimously elected Mr Jitze van der Meulen to the vacant position of co-Chairperson.

1.5 Mr Greg Reed presented an overview of the IODE Ocean Data Portal (ODP) and WIGOS for JCOMM Pilot Projects, and reported on progress since the first meeting of the Joint Steering Group (Geneva, September 2008). In particular, he recalled that the new Light Data Provider (LDP) had been added in the ODP, and should help resolving some of the issues raised at the previous meeting by potential data providers, including regarding IT systems security. Two training workshops on ODP have been organized for the Black Sea Region (Obninsk, Russian Federation, 20-21 March 2009); and the WESTPAC region (Seoul, Republic of Korea, 31 August - 4 September 2009). Much work has also been accomplished regarding (i) the interoperability between the WMO Information System (WIS) and the ODP (see item 4.3); (ii) the establishment of Regional Marine Instrument Centres (see item 5.1); and (iii) documenting instrument practices (see item 5.3). The meeting welcomed participation of new partners in the Pilot Project such as the Integrated Marine Observing System (IMOS, Australia).

2. STATUS OF THE IMPLEMENTATION PLAN

2.1 The meeting reviewed the Implementation Plan as adopted[1] at the first meeting of the Joint Steering Group (Geneva, Switzerland, 18-19 September 2008) and discussed actions undertaken since then according to the plan. The meeting updated the Overarching Implementation Plan for the ODP and WIGOS Pilot Project for the IODE and JCOMM accordingly. In particular, some of the deadlines have been updated in light of recent developments. Progress, status of implementation, and updated targets, for the Implementation Plan are reflected in Annex IV.

2.2 Reference was made to the review and update of Part II, Chapter 4 "Marine Observations" of the Guide to Instruments and Methods of Observations (WMO-No. 8, also known as the "CIMO Guide") . Although this update is presently foreseen as a Supplement to the 7th edition of the CIMO Guide (to be issued before the next Session of CIMO in 2010), it could be that it is issued during that session as part of a new, 8th edition of the CIMO Guide. It was noted that updates for review are made available via the WMO/IMOP website: http://www.wmo.int/pages/prog/www/IMOP/IMOP-home.html.

1 : http://www.wmo.int/pages/prog/www/wigos/documents/Impl_Plan_JCOMM.pdf

3. STATUS OF WIGOS

3.1 The meeting reviewed the status from the WIGOS framework developments and noted, in particular, that the WIGOS Concept of Operations (CONOPS), and the WIGOS "Test of Concept" Development and Implementation Plan (WDIP) have been substantially updated by the second Session of the Executive Council Working Group on WIGOS and WIS(EC-WG/WIGOS-WIS), Geneva, 6-8 May 2009, and that those changes were approved by the sixty-first Session of the WMO Executive Council (EC-LXI), Geneva, 3-12 June 2009.

3.2 The meeting noted that EC-LXI requested the relevant technical commissions to provide the Members with information on specific expected benefits for Members and with guidelines on WIGOS related activities to be implemented by Members. The meeting tasked Mr Greg Reed to compile the list of benefits expected from the Pilot Project and submit it to the Secretariat for further distribution to Members (***action; G. Reed; ASAP***).

3.3 The meeting also recalled the recommendation from EC-LXI that the current process of implementing the WIGOS concept should focus on the test-of-concept phase, building on development of WIGOS Demonstration and Pilot Projects initiated by NMHSs and technical commissions respectively. The "implementation" phase would be developed later in conjunction with the finalization of, and feedback from the Demonstration and Pilot Projects based on appropriate evaluation criteria and agreed consolidation/implementation process.

WIGOS Concept of Operations (CONOPS)

3.4 The meeting noted the current version of the WIGOS Concept of Operations (CONOPS) adopted by WMO EC LXI, agreed that the current version of the Pilot Project Implementation Plan was rather consistent with the CONOPS, and agreed that only minor changes had to be made to the Pilot Project Implementation Plan.

3.5 The meeting recommended that a future version of the CONOPS should better reflect other disciplines such as the oceans (surface and sub-surface), and how partner organizations would play a role. It requested Mr Greg Reed to raise this issue at the forthcoming second meeting of the Sub-Group of the EC-WG/WIGOS-WIS (Geneva, 19-23 October 2009) (***action; G. Reed; Oct 2009***).

3.6 The meeting looks forward to see that the list of WIS Global Information System Centres (GISC) to which a Data Collection and Production Centre (DCPC) can connect be made available as soon as possible. The meeting noted that, at the moment, there was no official designated GISC but that the process for such designation had been engaged and resulted in some likely designation by mid-2010 with trials of the first GISC by early 2010. However, connections of pilot DCPCs to GISCs running in trial mode can start before the designation becomes official. The joint Steering Group recommended ODP to work at establishing a connection to the German GISC on a trial basis.

3.7 The representative of CIMO referred to the figure presenting the "Key Areas of WIGOS Standardization". He stated that the key area of observations may not restrict to instruments and methods of observations only and therefore not only to CIMO. Functional specifications, observational requirements, representativeness and siting issues are also principle key issues to be defined or specified by the user community, *i.e.* the various disciplines in meteorology, oceanography and climatology. This topic is of particular interest when considering new types of observations. To reach optimal performance of any type of observation, these key issues should be considered too, in particular in relation with the feed back by the Active Quality Management process.

WIGOS "Test of Concept" Development and Implementation Plan (WDIP)

3.8 The meeting noted the current versions of the WIGOS “Test of Concept” Development and Implementation Plan (WDIP) as adopted by EC-LXI.

3.9 The meeting recalled that EC-LXI underlined the need for a comprehensive costed development and implementation strategy in order to take WIGOS from a concept to reality and that this strategy should address, inter alia, the technical and coordination challenges and the associated roles and responsibilities; the process for capturing the lessons learned from WIGOS projects and other activities; capacity-building requirements to ensure that WIGOS benefits reach all Members; and designation of clear responsibilities across the WMO system for the further development of WIGOS.

3.10 The joint Steering Group recalled that it had agreed at its first meeting to produce a Pilot Project Business Plan towards the end of the Pilot Project, based on experience gained with partners, other WIGOS Pilot Projects and the Demonstration Projects. The Business Plan was to focus on the National Oceanographic Data Centres (NODCs) initially, and while remaining relatively simple through a qualitative approach, the document should include the information necessary for funding to be obtained at national level for the development of interoperability arrangements between the NODCs, and in particular, the ODP and/or WIS. While noting the need to develop a comprehensive costed development and implementation strategy for taking WIGOS from a concept to reality, the meeting realized that it was difficult to produce a true Business Plan and ,decided to move the discussion to agenda item 9.3 in order to take into account all aspects of the project development.

3.11 The meeting agreed that the Pilot Project has been developed so far in line with the WDIP schedule and that it was now addressing the Test of Concept phase III for the plan. In this context, the Pilot Project should now be completed and evaluated for viability of the WIGOS concept, and experiences reflected in the draft Implementation Plan for WIGOS. The meeting tasked Mr Greg Reed to address this aspect and to report its findings to the Chairperson of the Sub-Group of the EC-WG/WIGOS-WIS (***action; G. Reed; June 2010***).

3.12 The meeting agreed that much of the success of the Pilot Project was so far due to the following:

- the intergovernmental cooperation mechanism put in place through JCOMM
- effective working relationships between WMO and IOC Secretariats, including dedicated staff in each organization
-
- funding made available by WMO and IOC that complemented existing JCOMM funding and permitted to work out the synergies between JCOMM Groups and Expert Teams in the best interest of both JCOMM activities and WIGOS developments
- well understood benefits of WIGOS in the JCOMM community

3.13 The meeting requested Mr Greg Reed to report the above information to the second meeting of the Sub-Group of the EC-WG/WIGOS-WIS, and stress that JCOMM type governance and WIGOS related functions under the JCOMM Observations as well as Data Management Programme Areas should be maintained in the future (***action; G. Reed; Oct 2009***).

Demonstration Projects

3.14 The meeting reviewed the status of the WIGOS Demonstration Projects proposed by WMO Members in all of the six WMO Regional Associations:

- Regional Association I : Kenya, Morocco, Namibia
- Regional Association II : Republic of Korea
- Regional Association III : Brazil
- Regional Association IV : United States of America

- Regional Association V : Australia
- Regional Association VI : Russian Federation

3.15 The meeting noted the following:

(i.) The progress of the Demonstration Projects in all WMO Regions, especially integration of various observing systems, standardization and quality control of observational data at the national level, with NMHSs playing the leading role and reaching out to a wide range of stakeholders is positive.

(ii.) The scope of the Demonstration Projects is very different and varied and ranges from, at one end, the arrangement for the basic operational problems dealing with traceability and building up calibration laboratories in Regional Instrument Centres (RA I); and at the other, the implementation of a comprehensive Integrated Atmosphere / Composite Observing System addressing the requirements of all regional association Members (RA IV and RA V) .

(iii.) While Demonstration Projects vary considerably in scope and character, they all provide useful perspectives on the potential impact and value at the national and/or regional level of the concept of WIGOS integration within a system of systems framework.

(iv.) In some cases (Kenya and Morocco) extra funds, e.g. WMO VCP and WIGOS Trust Fund, are needed for the successful implementation and completion of the Demonstration Project at full range.

3.16 Based on the review of the CONOPS, WDIP, and the Demonstration Projects, the meeting agreed to update the Overarching Implementation Plan for the ODP and WIGOS Pilot Project for the IODE and JCOMM. An updated version of the Implementation Plan is provided in Annex IV.

3.17 The meeting discussed the potential connections between the WIGOS Pilot Project for JCOMM and the Demonstration Projects, and noted the following:

- Morocco (RA-I):(RA I). Morocco should be invited to investigate the feasibility of acting as well as an RMIC (***action; Secretariat; ASAP***);
- Kenya (RA I), Marine observations are part of the Demonstration Project, and some exchange of information between the Demonstration Project and the JCOMM Pilot Project would be beneficial;
- Republic of Korea (RA II), Marine observations are part of the Demonstration Project, and some exchange of information between the Demonstration Project and the JCOMM Pilot Project would be beneficial;
- Brazil (RA III). It is not clear whether marine data are included in the Demonstration Project, and particularly the PIRATA array; this should be investigated (***action; Secretariat; ASAP***);
- USA (RA IV). The RMIC proposed by NOAA/NDBC as part of the JCOMM Pilot Project is independent from the Demonstration Project, which is mainly focusing on atmospheric data and NWP requirements;
- Australia (RA V). The Australian Demonstration Project is framed in to encompass the entire Bureau Composite Observing System (BCOS) which spans many elements, including a range of marine and ocean observing programs. Possible synergies exist between this Demonstration Project and the Pilot Project which will be investigated (***action; Greg Reed; ASAP***).
- Russian Federation (RA VI). It is not clear whether the ODP is considered part of the Demonstration Project; the meeting asked Mr Nick Mikhaylov to clarify this question (***action; N. Mikhaylov; ASAP***).

4. IODE OCEAN DATA PORTAL AND ITS INTEROPERABILITY WITH THE WIS

4.1 Progress report on the IODE ODP work plan, including light data provider and version 2 development

4.1.1 This agenda item was introduced by Dr Sergey Belov, referring to Document 4 (ODP and WIS Interoperability). Dr Belov recalled that the IODE Ocean Data Portal (ODP) is being developed in two stages: Version 1 (v1) followed by Version 2 (v2). The ODP v1 initial capabilities are based upon the technical specifications and software of the End-to-End Data Management (E2EDM) technology developed by the JCOMM/IODE ETDMP and Russian NODC (RIHMI-WDC, Obninsk). ODP v2 will be fully compliant with international interoperability standards and tools. ODP v1 implements the following functions: communication with data sources, discovery, visualization, content management and administration providing on-line access to and fusion of distributed marine data, at operational and delay-mode time scales, at various processing levels (observation, climate, analysis and forecast), across oceanographic and marine meteorological disciplines, and from multiple data source formats and storage systems (DBMS, structured and non structured data files).

4.1.2 The ODP V1 architecture is based upon the widespread "client-server with mediator and wrappers" concept also known as "virtual data holdings or virtual organizations". During the inter-sessional period the Data Provider, the Integration Server and Portal services were substantially improved and expanded with new functionality. In addition, a web-service communication between the Integration Server and the Data Provider was developed.

4.1.3 In order to respond to security concerns expressed by some Members/Member States, a **"Light Data Provider"** has been developed. The Light Data Provider software (L-DP) is an extension of the Data Provider functionality. The Light Data Provider can integrate data from data centres unable to install the Data Provider software for e.g. security concern reasons, but publish data and/or metadata to ftp or http servers. The overall functional architecture of the Data provider with Light Data provider capability is shown in Figure 1.

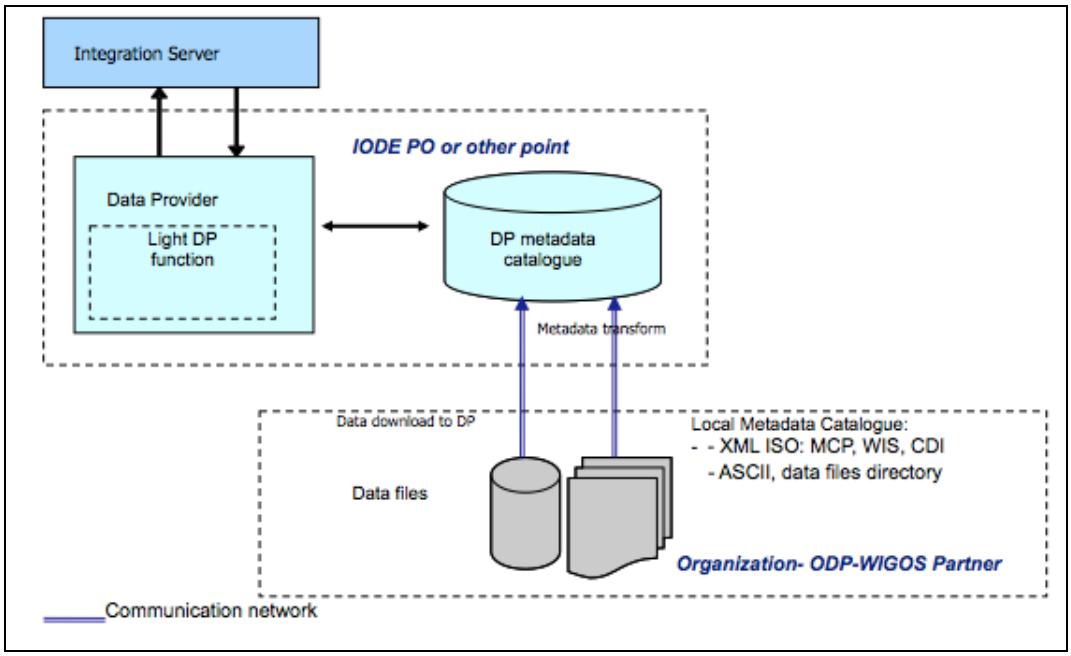

Figure 1: Overall functional architecture of Data Provider (v 1.1.5.) with "Light Data Provider" capability

4.1.4 The Light Data Provider has different approaches to handle catalogues of data and metadata: (i) remote directory with data: the metadata are created by the Data Provider based on the content of data files; and (ii) remote directory with metadata and data: metadata can be in different formats (E2E, CDI, MCP or WMO) and loaded to the Data Provider. These options are shown in Figure 2 and Figure 3.

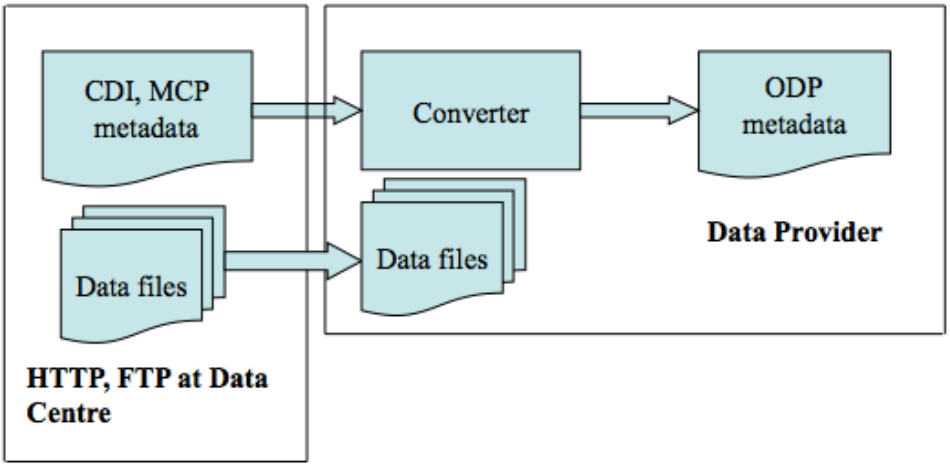

Figure 2: Remote directory with metadata and data. Metadata can be in different formats (E2E, CDI, MCP or WMO) and loaded to Data Provider

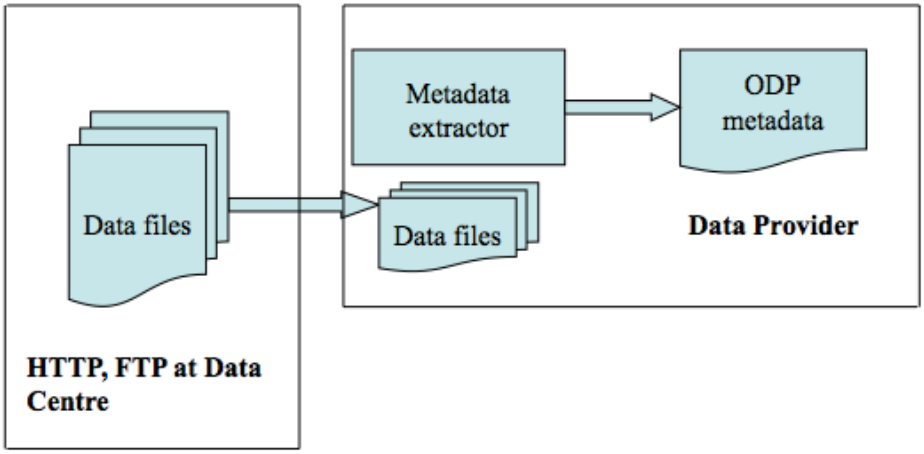

Figure 3: Remote directory with object files which have metadata in filenames.

4.1.5 The L-DP can be installed at the Integration Server location or at any data centre. It can support several remote data sources with data catalogues. Each data centre registers as a user on a Data Provider and has its own username and password to the web-interface. The user manages only his resource and instance descriptions and schedulers. Only the Data Provider (DP) administrator who has installed the DP can change the configuration of the software. A test of the L-DP was initiated during the meeting between ISDM (Canada) and a test server at the IODE Project Office. This successfully demonstrated the relative ease of using the L-DP solution.

4.1.6 The **Integration Server** (v.1.1.2) provides the following new functionality:

- Metadata conversion from E2E to WMO Core Metadata;
- Statistics about data requests;
- Monitoring of thematic federations;
- Data delivery in ASCII and NetCDF;
- Patterns creation on requests (scheduled data delivery);
- Data delivery (“push”) on FTP;
- BODC (UK) parameter dictionary support

4.1.7 Two **web sites** have now been developed for the IODE OceanDataPortal (ODP):

- The IODE Ocean Data Portal website (http://www.oceandataportal.org) provides: (i) basic information for general users (e.g. how does ODP work, how to find data, who are the data providers, etc.); (ii) technical information (Data Provider software distributable, manuals and documentation, services, formats and dictionaries); and (iii) discussion forum, FAQ and training materials.
- The IODE Ocean Data Portal data site: http://data.oceandataportal.org provides access to the data portal. This includes the discovery service, viewing service, analysis service and download service.

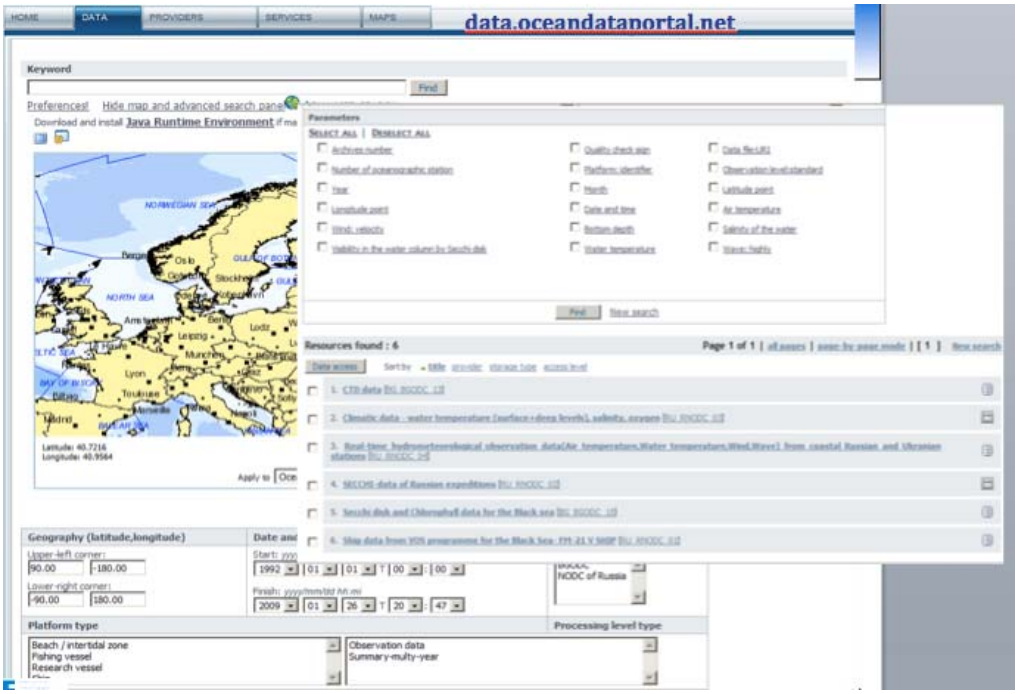

Figure 4: The Discovery service user interface provides the ability to search the metadata catalogue and access for the data online

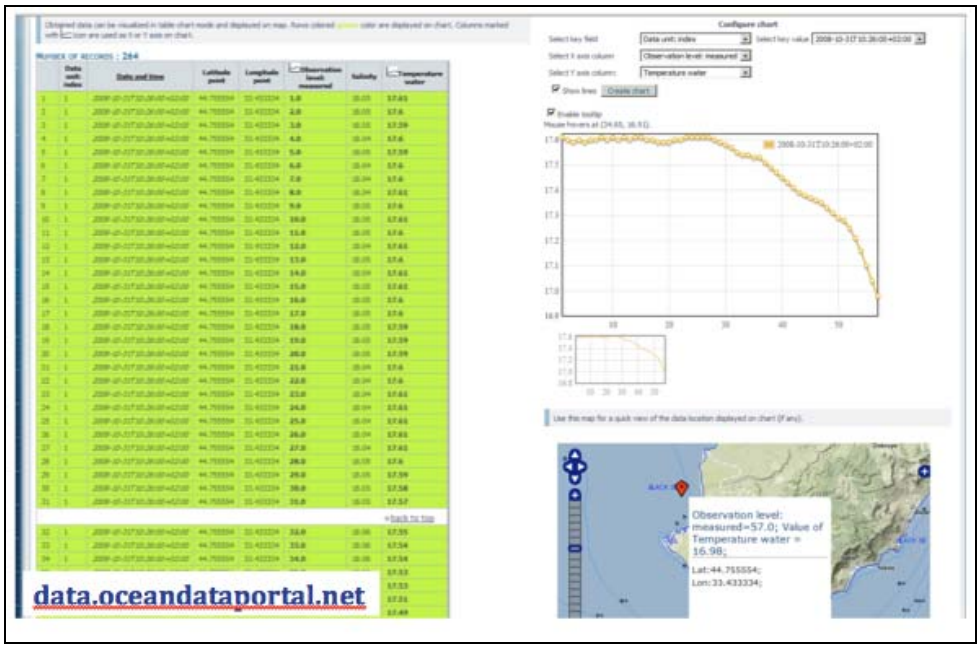

Figure 5: The Viewing service is based on a Web-based application accessible via the browser which provides data search, access to remote data sources via the Integration Server, and processing of transport data files and tabular-graphic and map visualization of data

using standard forms

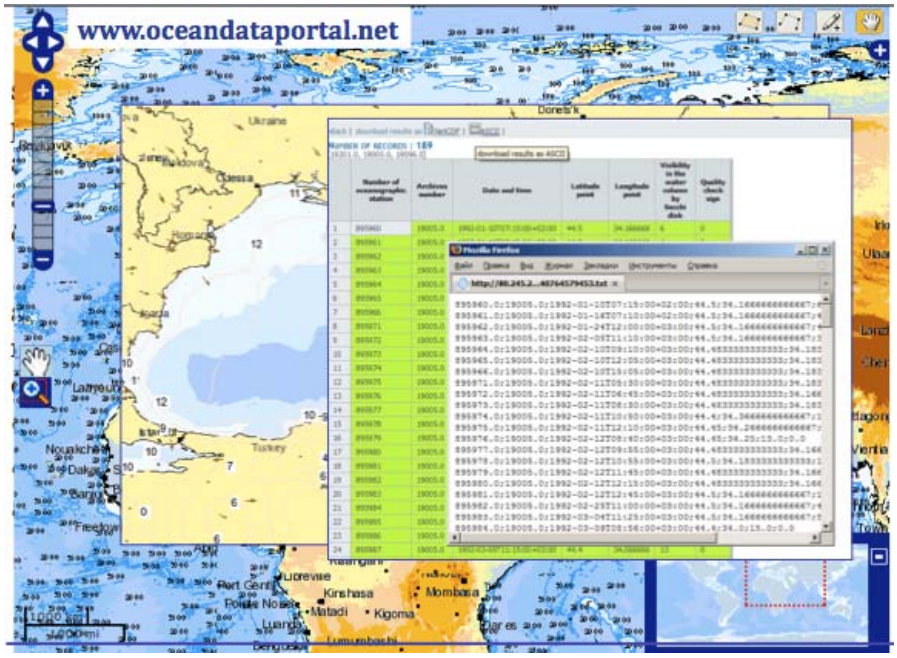

Figure 6: The Analysis service (small window) shows the Download service

4.1.8 The Analysis service (shown in Figure 6) has been developed recently. ODP now has a GIS service for interactive and fast presentation of multidisciplinary data and products on a map as well as WMS/WFS services. Moreover, the user can adjust the composition of the GIS-layers, the number of maps for viewing and other specifications. The GIS service enables a joint analysis of data to obtain conclusions about the spatial variability of marine processes.

4.1.9 The design paper “Initial IODE Ocean Data Portal Architecture” was developed with a proposal for the vision and overall architecture of the ODP (version 2), as well as the operational aspects of the development of the ODP. These documents were reviewed by the JCOMM DC MG-III meeting (March 2008, Ostend, Belgium) and ODP-WIGOS Pilot Project meeting (September 2008, Geneva, Switzerland).

4.1.10 ODP v2 will move away from stand-alone web-services, to implement and standardize methods and means of interface interaction. It will allow unified access to services that belong to the ODP organizations and systems (SeaDataNet, WIS) and will be based on international standards (OGC, W3C).

4.1.11 The meeting was further informed about an initiative launched by the Library of the Marine Biological Laboratory, Woods Hole Oceanographic Institution (MBL/WHOI, USA) that aims to publish data associated with scientific journal articles. It was noted that the system will be based upon the DSpace e-repository application using an extended Dublin Core (adding the Darwin Core elements) metadata structure. The “data” associated with a research publication can consist of any object file type. Following recent discussions between the MBL/WHOI Library Director, Assistant Library Director, ODP developers, IODE Co-Chair and Head of the IOC Project Office for IODE, it was agreed to carry out an experiment to link the repository to ODP. An operational version of the linkage is expected to be delivered by February 2010.

4.2 Interoperability between IODE ODP and SeaDataNET - Report progress on discussions with SeaDataNET

4.2.1 This agenda item was introduced by Dr. Nick Mikhaylov who stressed that the ODP should

be interoperable with other information systems. Following the IODE-XX recommendation (IODE-XX.3) high priority has been assigned to the interaction with the SeaDataNet (SDN) infrastructure.

4.2.2 It should be made clear that the IODE ODP is not competing with national or regional data portal systems but aims at federating such heterogeneous systems. Only in countries or regions where no distributed data networks are in existence will IODE ODP offer a full solution.

4.2.3 The meeting was informed that the ET-DMP Chair (Nick Mikhaylov) and MARIS (Dick Schaap) discussed compliance issues of the ODP and SDN and proposed specifications of the ODP-SDN interoperability interfaces based on portal-to-portal interaction. These proposals are summarized in the document "Technical Specifications of the IODE Ocean Data Portal and Sea Data Net Interoperability" which was considered at the SDN Technical Team meeting (2-3 September 2009, Nice, France).

4.2.4 The following actions were agreed upon between IODE ODP and SeaDataNet:

- **Metadata.** (i) Arrange a mapping and transformation from the SDN CDI v1 metadata XML to the ODP metadata XML and vice versa, including mapping between common vocabularies and other libraries, such as EDMO and EDMERP; (ii) arrange a method for assuring that the ODP / SDN portal always has the latest set of metadata from the SDN / ODP portal, taking into account new entries as well as updates of existing entries and deletions of existing entries. It was noted that both SDN and ODP will cover a large number of metadata entries. It was further recommended to exchange aggregated metadata records, reducing the number to several thousands. E.g. aggregation by discipline (= Common Vocabulary P081) and data centre (= EDMO code).

- **Data discovery.** It was agreed to provide the latest SDN / ODP metadata in the discovery service at the ODP / SDN portal, so that users can oversee the full combined offer. In addition an option will be included for users to follow the distribution link in SDN / ODP references for going to the SDN / ODP delivery service interface via a deep link.

- **Data access and delivery to users.** It was agreed that users can submit and follow the processing of their dataset requests via the SDN / ODP delivery mechanism. Options to explore are: (i) users register at SDN / ODP website independent of ODP / SDN; or (ii) achieve an exchange of user registration data from ODP / SDN to SDN / ODP, with common roles. Users can download datasets from SDN / ODP in the SDN / ODP standard data formats. It will be necessary to explore options for a simple tool for converting SDN to ODP data formats, and vice versa, if required.

- **System monitoring and report.** ODP and SDN have independent monitoring and statistics. For evaluating the interconnection between SDN and ODP it should be arranged that SDN/ODP monitors how many users and requests are forwarded from the ODP / SDN portal to SDN / ODP portal.

4.2.5 The technical work will be implemented jointly by MARIS, BODC, RIHMI-WDC and the IODE Project Office. It is expected that the implementation will be completed by 2011.

4.2.6 Some participants expressed concern over the creation of duplicate records in ODP and SDN. There are also a number of other similar portals. This may indeed generate many duplicates and may create confusion in the long term at the user level. The meeting called on the Pilot Project to consider this problem. In this regard, reference was made to similar issues faced by archives and the MERSEA Information Management (MIM) community was called upon to share their expertise.

4.3 Interoperability of ocean data systems with the IODE ODP and/or the WIS - Report on progress

4.3.1 This agenda item was introduced by Mr Eliot Christian. He recalled that the WIGOS Implementation Plan defines that ODP will play the role of DCPC under the WMO Information System (WIS). This will be a relatively easy and high-level approach for realizing the restricted interoperability requirements for achieving communication between the ODP portal and a dedicated GISC. It was noted that most of the 15 WIS technical specifications interoperability requirements are met by ODP. However, compliance will need to be demonstrated in more detail.

4.3.2 Regarding the ODP and WIS GISC interaction framework it was noted that the ODP contributes to the WMO Information System as one of the WIS prototype components, which ensures the operation of the JCOMM Data Collection and Processing Centre (DCPCs) of the WMO Information System. This WIS component has been installed on the RNODC/RIHMI-WDC (Obninsk) platform.

4.4 Report on the outcomes of the IODE ODP training courses (Russian Federation and Republic of Korea)

4.4.1 This agenda item was introduced by Dr Sergey Belovwho reported that during the inter-sessional period, two training courses were organized related to the development of IODE ODP data providers:

- The “Training Course on the Establishment of National OceanDataPortal Nodes in the Black Sea region (ODINBlackSea)” was held on 20-21 March 2009 in Obninsk, Russian Federation, immediately after the First Meeting of the ODINBlackSea Steering Group, and counted with the participation of five NODCs/DNAs, from Bulgaria, Romania, Russian Federation and Ukraine. In April 2009, in the aftermath of the course, five institutions of the ODINBlackSea group joined as IODE Ocean Data Portal data providers:the Bulgarian National Oceanographic Data Centre (BGODC/IO-BAS), the Institute of Biology of the Southern Seas National Academy of Sciences of Ukraine (IBSS), the Marine Hydrophysical Institute of the National Academy of Sciences of Ukraine (MHI), the National Institute for Marine Research and Development (NODEC/NIMRD) and the All-Russia Research Institute of Hydrometeorological Information - World Data Centre (RIHMI-WDC).

- The “First IOC/WESTPAC Training Course on the Establishment of National IODE Ocean Data Portal Nodes” was held from 31 August to 4 September 2009 in Seoul, Republic of Korea. There were ten participants from Republic of Korea, Japan, Malaysia, Thailand, Indonesia and Vietnam (China was unable to participate due to travel problems). During the training course each participant installed the Data Provider software and created 3-5 information resources (metadata records). A small local training federation with Integration Server and ten Data Providers was tested. Results were viewed through the local version of Ocean Data Portal user interface. Participants expressed their interest in contributing to the IODE ODP. Additional follow-up will be carried out to establish data provider nodes in the institutions that participated in the course, as well as China.

4.4.2 The meeting noted that the regional approach also offered the opportunity to establish regional integration servers rather than relying fully on the server at the IODE Project Office.

4.5 Review of potential data sets, and potential for establishing more data provider nodes interoperable with the IODE ODP and/or WIS

4.5.1 This agenda item was introduced by Dr. Sergey Belovwho informed the meeting that a number of potential data providers have been identified to contribute to the WIGOS Pilot Project through the IODE Ocean Data Portal (see ODP-WIGOS Implementation Plan). The primary focus will be on contributions from the National Oceanographic Data Centres (NODC) of the IOC International Oceanographic Data and Information Exchange (IODE). However, the set of data providers should be expanded to programmes that are operating through the WIS and other projects. Annex VII provides for (i) the list of datasets that will be contributed to the IODE ODP by

partner organizations and programmes as part of the WIGOS Pilot Project for JCOMM, (ii) the list of those data sets that can potentially be contributed, and (iii) those centres that recently provided positive response with information about when the connection should be established.

4.5.2 The meeting requested Dr. Belov to contact the focal points mentioned in the official letters received from some of the identified agencies in order to discuss the way forward (***action; S. Belov; ASAP***).

4.5.3 The meeting called for the identification of additional potential contributors within the marine meteorology area.

4.5.4 The meeting recommended that ODP experts from the Russian Federation visit IMOS in early 2010 in order to (i) assist Australia in becoming an ODP data provider for operational oceanography data; and (ii) benefit from IMOS technology regarding data visualization that could eventually be used by ODP. The meeting requested the Secretariat to investigate whether any funding could be made available for supporting such a visit (***action; Secretariat; Jan 2010***).

4.5.5 On the IODE side, the institutions participating in the IODE regional programmes (ODIN's) are considered as the most obvious candidates. For the Africa region, this matter will be discussed at the upcoming ODINAFRICA-IV Project Steering Committee (January 2010). For the Latin America region this could be discussed at the "ODINCARSA Latin America Strategic Planning Meeting" in December 2009; and for the Caribbean region during the "Planning Workshop for the Caribbean Marine Atlas" to be held in February 2010. Cooperation in the Black Sea and WESTPAC regions was already discussed under 4.4.

4.5.6 The meeting also thanked IMOS for their agreement to become an ODP data provider and to share their data display technology. In this regard, it was recommended that an ODP technical team member visit IMOS in January 2010.

5. INSTRUMENT BEST PRACTICES

5.1 Terms of Reference of Regional Marine Instrument Centres (RMIC)

5.1.1 The meeting discussed interactions of the WIGOS Pilot Project with the WMO Commission on Instruments and Methods of Observation (CIMO) in terms of instrument best practices in view to facilitate instrument best practices integration. In this regard, and based on CIMO's experience with regard to Regional Instrument Centres and Radiation Instrument Centres, the Pilot Project has proposed establishing WMO-IOC Regional Marine Instrument Centres (RMICs). Terms of Reference for RMICs have been drafted by both, the former co-chair of the joint Steering Group, Mr Rainer Dombrowsky (former CIMO vice-President) and the JCOMM focal point on instruments and methods of observation, Dr. Chung-Chu Teng (NDBC, USA); and further reviewed by some of the joint Steering Group members, including the Co-chair, Mr Greg Reed as well as the new co-Chair Dr Jitze van der Meulen.

5.1.2 The meeting agreed that RMICs as conceived would provide facilities for the calibration and maintenance of marine instruments and the monitoring of instrument performance. These Centres would also provide assistance with regard to instrument intercomparisons, as well as appropriate training facilities that would complement what the manufacturers are already providing. The goal is to facilitate adherence of observational data and metadata and processed observational products to higher level standards for instruments and methods of observation.

5.1.3 The WIGOS Pilot Project also proposed that a mechanism for the formal designation by WMO and IOC of RMICs through JCOMM should be incorporated into the WMO Guide to Meteorological Instruments and Methods of Observations (WMO No. 8, CIMO Guide). Candidate RMICs will be required to produce a statement of requirements, list the capabilities of the proposed

centre, make a formal commitment to voluntarily host the centre and demonstrate their capability to JCOMM. Finally, following the eventual agreement by JCOMM, the WMO and IOC Executive Councils will be invited to accept and approve the new RMIC. Review of the RMIC capabilities will be regularly organized by JCOMM. The meeting requested Dr Jitze van der Meulen to liaise with the CIMO President and the Secretariat with a view to include the relevant information in the CIMO Guide (***action; J. van der Meulen; March 2010***).

5.1.4 The meeting noted with appreciation the kind offer from the US National Data Buoy Centre (NDBC) to host an RMIC on a trial basis, to prove the concept. In order to test the RMIC concept, the meeting concurred with the proposal of Mr Dombrowsky and Dr Chung-Chu Teng to organize a small Training Workshop on Metrology on the NDBC premises with a limited number of participants from WMO Regional Association IV. It is planned to organize the Workshop in the first quarter of 2010 (***action; Secretariat+NDBC; Jan 2010***). The Workshop, should not only permit to test the RMIC concept, but should also help develop capacities of some of the RA IV countries providing ocean observations in the region. It is expected that such activities would eventually improve quality, consistency, traceability of the observations made available to end users in the region, hence improving final products and services delivered by all within the Regional Association.

5.1.5 The meeting endorsed the proposal submitted to JCOMM III for establishing RMICs under Draft Recommendation 6.5 (JCOMM III) "WMO-IOC Regional Marine Instrument Centres" which defines the Terms of Reference of an RMIC, including capabilities and corresponding functions and proposed governance. This Draft Recommendation is provided in Annex V.

5.1.6 However, noting that a JCOMM-III corresponding preparatory document had already been published, the meeting recommended that an intervention be made during the JCOMM-III Session (Marrakech, November 2009) in order to slightly adjust the proposed Terms of Reference in such a way that the scope of the RMIC activities (i.e. what ocean/marine variables an RMIC will be capable of handling) should be made clear by each candidate RMIC as part of their capabilities.

5.2 Relationship with the manufacturers

5.2.1 The meeting discussed the relationship with the instrument manufacturers, and particularly how the relationship with the Association of Hydro-Meteorological Equipment Industry (HMEI) could be enhanced. The meeting agreed that HMEI could play a role in representing the marine instrument manufacturers with WMO and IOC through JCOMM. HMEI could indeed provide assistance with regard to capacity building activities as well as evaluating instrument performance and their documentation.

5.2.2 The meeting noted that WMO already granted to a number of non-governmental organizations, including HMEI, consultative status whereby for example those organizations are entitled to be invited to Sessions of WMO Regional Associations or Technical Commission.

5.2.3 The meeting invited IOC to take similar steps so that HMEI could also enjoy similar status within IOC (***action; IOC; ASAP***). Then, if and once both Organizations would be in agreement, the WMO Secretary General and the IOC Executive Secretary would write to the HMEI for HMEI to invite the main marine meteorological and ocean instrument manufacturers to become HMEI members and inform them of the role they will be invited to play through HMEI with both Organizations, including interacting with JCOMM Expert Teams and Panels, and participating in specific activities such as pilot projects, technology development, instrument evaluation and intercomparisons. The meeting invited both Secretariats to follow up in this regard (***action; WMO + IOC; ongoing***).

5.3 Documenting instrument best practices

5.3.1 The meeting recalled that one of the goals of the WIGOS Pilot Project for JCOMM is to define methodology, governance between WMO and IOC partners as well as test the concept for agreeing on common standards for ocean observation practices (i.e. guidelines, best, mandatory

or recommended practices, or minimum specifications as appropriate), including instruments and methods of observation as well as subsequent organization and handling of the data and information to deliver consistent and better quality data to both the broad user and modelling communities and eventually have data records that are traceable to standards.

5.3.2 Technical Publications exist but are not always up to date or there is room for achieving better compatibility between WMO and IOC standards, or even higher level standards (e.g. through ISO).

5.3.3 In the process of seeking higher level standards, the mandates of both WMO and IOC will have to be respected, as well as the hierarchy of the documents (from characteristics of observing networks to instrument practices, and from standard practices to recommended practices). Duplication shall be avoided and references made to other Publications should be quoted as appropriate.

5.3.4 In particular, while noting that the Pilot Project had already been influential for the review of the CIMO Guide (WMO No. 8), the meeting agreed that the following WMO and IOC Publications required substantial review and/or updating; and should be made consistent with each other.

- IOC M&G No. 4, Guide to Oceanographic and Marine Meteorological Instruments and Observing Practices
- IOC M&G No. 26, Manual of Quality Control Procedures for Validation of Oceanographic Data
- WMO No. 8, Guide to Meteorological Instruments and Methods of Observation (CIMO Guide)
- WMO No. 488, Guide on the Global Observing System (GOS)
- WMO No. 544, Manual on the Global Observing System (GOS)

5.3.5 The meeting further agreed on a strategy for the review of the WMO and IOC Technical Publications in light of the Pilot Project developments. The strategy is going beyond the time-frame of the Pilot Project but some limited realistic targets are also being proposed to prove the concept. The proposed strategy is precisely defined in Annex VI. The meeting particularly noted the kind offer from the Data Buoy Co-operation Panel (DBCP) to provide financial support for addressing "buoy" issues, and Sea Surface Temperature (SST) from drifters together with GHRSST as part of this exercise. While noting that SST is not an obvious measurement (due to different types of platforms; difficult conditions at sea surface and in the upper mixed layer for making the measurements), the meeting thanked the DBCP for this offer and invited all actors proposed in the strategy, in particular the DBCP and the SOT to play a role, to begin with, in this exercise and to collaborate effectively (***action; DBCP+SOT; ongoing***).

5.3.6 The meeting noted with appreciation that following the proposal by the Pilot Project to review the CIMO Guide (WMO No. 8), the Ship Observations Team (SOT), and then WMO Members, have already proposed substantial changes to the chapter on Marine Observations (Part II, Chapter 4). However, Part I of the guide, Measurement of Meteorological Variables, which addresses instruments and methods of observation on a variable by variable basis will have to be reviewed to take into account the changes in Part II, add the missing marine variables, and make Part I and Part II consistent with each other. The meeting invited Jitze van der Meulen to coordinate this effort, with the help from JCOMM experts, and to liaise with the Secretariat in this regard (***action; J. van der Meulen; Mar 2010***).

5.3.7 The meeting noted that IOC M&G No. 4 – originally produced by the former IGOSS - was very old (1975) and invited the IOC to propose how it could be updated (***action; IOC Secretariat; Mar 2010***).

5.3.8 The meeting invited IODE to proceed with the update of the IOC M&G No. 26 (***action; IODE; ongoing***).

5.4 Scope for instrument inter-comparisons

5.4.1 The representative of CIMO, Dr Jitze van der Meulen, informed on the history and the current status of international intercomparisons, organized by CIMO. Since 1985 intercomparisons are organized starting with intercomparing operational instruments to demonstrate biases and uncertainties. From 1990 onwards intercomparisons are organized, typically if new (more sophisticated) technologies come on the marked, largely stimulated by the wish to automize measurements. Nowadays, the focus is on methods of observations in tropical and polar regions compared to past intercomparisons that took place in moderate climate regions. It was noted that organizing an intercomparison, analyzing the data and producing the reports requires considerable human resources and budgets which are found to be limited. Therefore, at this time, only one to two intercomparisons can be organized in parallel.

5.4.2 The meeting recalled that information on why and how intercomparisons should be organized are stated in the CIMO Guide (WMO-No. 8, Part III, Chapter 4 - Testing, Calibration and Intercomparison). The annexes to this chapter being particularly relevant. There is much experience with calibration, test laboratories and on site/land intercomparisons, but experience is very limited with on site intercomparisons at sea. Moreover no international intercomparisons were organized by CIMO dealing with instruments typically developed to measure marine operational variables. Therefore it is proposed to review and update the relevant chapter in the CIMO Guide.

5.4.3 The meeting recalled that the RMICs (e.g. as a first step conducting intercomparisons within an RMIC, and as a second step between RMICs), and the manufacturers, through HMEI, should play a substantial role in the future with regard to marine instrument intercomparisions. For example, HMEI can provide equipment through Members. The meeting agreed that there was a need to develop JCOMM guidelines for marine instrument inter-comparisons. It tasked the Secretariat to approach the DBCP Pilot Project on Wave Measurement Evaluation and invite it to provide input in drafting such generic guidelines for marine inter-comparisons as a deliverable of the Pilot Project (***action; Secretariat; March 2010***). It was noted that the E-SURFMAR could also help with regard to VOS data. Efforts should also be coordinated between JCOMM and the CIMO Management Group.

5.5 Recommendations to JCOMM-III

5.5.1 The meeting noted that a presentation on the WIGOS will be made at the forthcoming JCOMM-III Session by the Chairperson of the Data Management Coordination Group (DMCG), Mr Bob Keeley. Mr Keeley will particularly report on the connections between the JCOMM Data Management Programme Area (DMPA) and WIGOS. The meeting invited Mr Keeley to stress in his presentation that much of the success of the Pilot Project was due to the inter-governmental mechanisms already in place through JCOMM.

5.5.2 Based on the discussions under agenda item 5, the meeting agreed that the document on instrument practices submitted to JCOMM-III was quite consistent with the Pilot Project approach, and accurately reflected the proposals of the Pilot Project in this regard.

6. QUALITY MANAGEMENT

6.1 Status of the JCOMM Catalogue of Best Practices and Standards

6.1.1 This agenda item was introduced by Mr Greg Reed referring to Document 6 (Quality Management). Mr Reed informed the meeting that during the inter-sessional period a contractor, Mr Bob Gelfeld (formerly of the NODC, USA), had been engaged to initiate the production of the JCOMM Catalogue of Best Practices and Standards and worked on the project, in close consultation with the coordinators of the JCOMM DMPA and OPA as well as the WMO and IODE Secretariats, from March to June 2009.

6.1.2 Sixty two documents and publications have been identified for inclusion in the Catalogue.

These were entered in an Excel spreadsheet and the categories for the spreadsheet were based on a modified Dublin Core Metadata Element Set consisting of the following:

- TITLE – title of publication or document
- CREATOR – general WMO, IOC, JCOMM Panel or Task Team
- IDENTIFIER – publication or document number
- RELATION – other associated publication or document number (including revision)
- SUBJECT – general subject descriptor
- DESCRIPTION – short abstract
- PUBLISHER – actual WMO, IOC, JCOMM Panel or Task Team
- DATE – year published
- STANDARD TYPE – text description of standard addressed
- FORMAT – hyperlink to URL where publication or document can be found
- SOURCE – specific WMO, IOC, JCOMM Panel or Task Team
- COVERAGE – geographic coverage
- STATUS – current status or recommendation

6.1.3 The contractor had made the following recommendations:

(i) JCOMM Panel and Expert Teams should review the publications and documents identified for their teams for standards development and accreditation, and in particular deficiencies, duplication, discrepancies, potential for cross-referencing, and make recommendations to address those issues;
(ii) the IOC should review the publications and documents identified for their teams for standards development and accreditation, and in particular deficiencies, duplication, discrepancies, potential for cross-referencing, and make recommendations to address those issues.

6.1.4 The catalogue has subsequently been converted by the IOC project Office for IODE into a database that allows searching on key fields with links to the document (if available) and to the document creator organization. The provisional database is available on-line at http://bestpractice.iode.org. The searching capabilities will be further refined during the next few months by the new Project Office software developer who has been recruited and will take up his position by the end of October 2009.

6.1.5 The meeting requested the IODE Project Office to make the following modifications to the on-line database in time for JCOMM-III (***action; P. Pissierssens; ASAP***):

- rename the site title to “JCOMM Catalogue of Practices and Standards”
- include the IOC, WMO and JCOMM logos in the top banner
- add a counter to the home page that provides the total number of records in the database
- add a brief mission statement for the site
- add a help link where more information is provided on how to utilize the site
- add a feedback link to the home page
- add a feedback button on the query response page
- add a functionality to allow a listing of all records, sortable by creator, title, subject or publisher name
- add a functionality to enable exporting all records in xls format

6.1.6 As a further development the meeting requested that a functionality should be added that allows for the submission of additional records/documents (with appropriate submitter registration) (***action; P. Pissierssens; Dec. 2010***).

6.1.7 The meeting further recommended investigating the possibility to add a controlled vocabulary for subject keywords (***action; P. Pissierssens; Dec. 2010***).

6.2 Report on the JCOMM/IODE Ocean Data Standards Pilot Project (ODS)

6.2.1 This agenda item was introduced by Mr Greg Reed referring to Document 6 (Quality Management). Mr Reed explained that the JCOMM/IODE Ocean Data Standards Pilot Project aims at developing a standardization process to achieve broad agreement and commitment to adopt a number of standards related to the management and exchange of ocean and meteorological data. The jointly sponsored IODE/JCOMM meeting, held in January 2008, developed a process to accept, evaluate and recommend proposals for community wide standards. This process is shown in Figure 7.

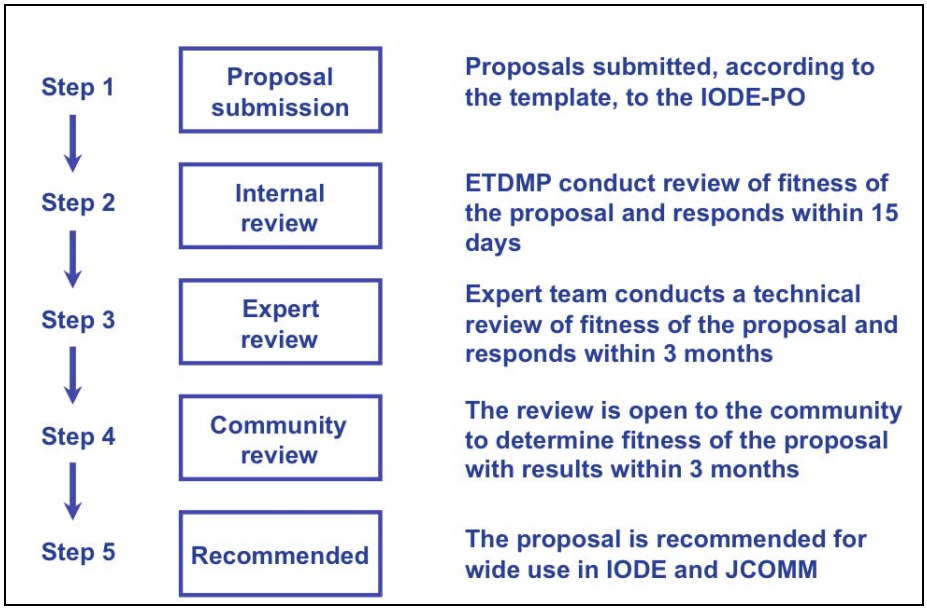

Figure 7 : Standards Process

6.2.2 The JCOMM/IODE ETDMP will play an important role in the Pilot Project. Under the new terms of reference, the ETDMP will manage the process of adopting and documenting standards and best practices to be used in JCOMM/IODE data management.

6.2.3 Mr Reed noted with regret that to date only one submission has been received: *"Proposal to Adopt ISO 3166-1 and 3166-3 Country Codes as the Standard for Identifying Countries in Oceanographic Data Exchange"*. This proposal has passed through the review process (internal review, expert review, community review) and will be published as a recommended standard.

6.2.4 The success of the development and use of standards is completely dependent on community involvement. The JCOMM and IODE communities have important roles to play to submit standards for consideration, to evaluate submitted standards, and in the implementation of the recommended standards. It was noted that the national use of the adopted standards will be an item in IODE the national reports prepared for Sessions of the IODE Committee.

6.2.5 The IODE Committee, at its 20th Session, invited Member States or regional initiatives active in the area of standardization and best practices, to submit proposals to the Ocean Data Standards Pilot Project. The BODC agreed to submit a proposal on the quality control of sea level data by June or July 2009. The IODE Committee also invited SeaDataNet to submit standards proposals to the Ocean Data Standards Pilot Project. However, no further submissions have been received.

6.2.6 Further information on the JCOMM/IODE Ocean Data Standards Pilot Project can be found at http://www.oceandatastandards.org/.

6.2.7 The meeting called for active participation of the community in the Standards Pilot Project.

6.2.8 The meeting also strongly urged that an ETDMP member be nominated to manage and coordinate the Ocean Data Standards Pilot Project (***action; ETDMP; Dec 2010***).

6.3 Publishing of Best Practices and Standards by WMO and IOC

6.3.1 This agenda item was introduced by Mr Greg Reed. Mr Reed informed the meeting that he had prepared a document for the first adopted standard (Proposal 2008/01: Proposal to Adopt ISO 3166-1 and 3166-3 Country Codes as the Standard for Identifying Countries in Oceanographic Data Exchange) as a publication in the IOC Manuals and Guides series.

6.3.2 The meeting recommended that the annex, listing all country names should be removed and, reference be made to the URL where the list is updated continuously (***action; G. Reed; ASAP***).

6.3.3 While agreeing that the adopted standards should be published in the IOC Manuals and Guides series, and in order to maximize visibility of the adopted standards, the meeting requested that they should also be identifiable as a sub-series, similar to the GOOS reports or the MIM Publication Series (***action; IOC Secretariat; Mar 2010***).

6.3.4 The meeting further agreed that (***action; IOC Secretariat; ongoing***):

(i) An introduction should be added in each document in order to identify the publication as a JCOMM output and product of the Ocean Data Standards (Pilot) Project;
(ii) The publications should be included in the IODE OceanDocs (http://www.oceandocs.net) e-repository (whereby they are attributed a DOI);
(iii) The publications should be made available as e-documents (PDF) with the option to print-on-demand for special occasions;
(iv) The publications should be widely distributed to the IODE national coordinators and the NMHSs.

7. CAPACITY BUILDING

7.1 IODE ODP Capacity building activities

7.1.1 This agenda item was introduced by Mr Peter Pissierssens, referring to Document 7 (Capacity Building). Mr Pissierssens stated that the success of the IODE Ocean Data Portal will depend on the buy-in of the data centres as data providers as well as on the users who may or may not use the system as a source to fulfil their data needs. These two factors are inter-dependent but will be driven, at least initially, by the first factor, i.e. the agreement and commitment of IODE National Oceanographic Data Centres to make their data sets available to the IODE Ocean Data Portal.

7.1.2 It was decided to implement a comprehensive training programme to:

(i) provide full information to IODE National Oceanographic Data centres as well as other data centres, as potential data providers, on the advantages of joining the IODE Ocean Data Portal network;
(ii) provide training on the establishment of IODE Ocean Data Portal Provider Nodes; and
(iii) implement and test a pilot test system of the IODE Ocean Data Portal.

7.1.3 During the inter-sessional period two training courses have been organized. Details on these courses were already provided under agenda item 4.4.

7.1.4 The meeting stressed the need to continue promotion of, and training related to, the IODE OceanDataPortal at the national and regional level. In addition to group training courses and to

ensure institutional implementation of the Data Provider (or Light Data Provider) the meeting recommended to study the possibility of using experts to visit national institutions to provide guidance and technical assistance (as applied by the USA's IOOS) (***action; Secretariat; Dec 2010***).

7.2 Possibilities for capacity building related to the WIGOS Pilot Project for JCOMM

7.2.1 The meeting recalled that EC-LXI had noted the challenges that the developing countries and LDCs will be facing when implementing WIGOS and underlined the need for relevant capacity building activities.

7.2.2 The meeting also recalled that it had discussed the implementation of ODP data provider node development through the regional IODE ODIN projects. The meeting invited IOC/IODE to collaborate on the organization of relevant training courses at this regional level to strengthen the capacity and to achieve equitable participation of developing countries in, and access to ocean data through the IODE ODP and WIS/WIGOS.

7.3 Cooperation with the IODE OceanTeacher Project

7.3.1 This agenda item was introduced by Mr Peter Pissierssens who informed the meeting that in order to standardize training and to provide self-training materials for students who attend a course, a training curriculum on IODE Ocean Data Portal has now been created and is available at: http://hosting1.iode.org/moodle/course/view.php?id=101 (login as guest).

7.3.2 The course objectives are:

- To review the current status of the IODE Ocean Data Portal
- To introduce the technology components of ODP (Integration Server, Data Provider)
- To install and configure Data Provider software
- To register participants' data resources and demonstrate data provider functionality

7.3.3 The course topics are:

- Introduction
- Current Status of the IODE Ocean Data Portal
- IODE Ocean Data Portal Technology
- IODE Ocean Data Portal Technology Components
- IODE Ocean Data Portal Data Source Design
- IODE Ocean Data Portal Light Data Provider
- Practical tasks

7.3.4 For each of the topics a PowerPoint presentation is available as well as (for topics 1-5) one or more video lectures. For the practical tasks, working documents are available. The course material will be further developed and updated based upon future courses.

7.3.5 The meeting noted that other components of the Pilot Project could also create content in OceanTeacher.

8. REPORTING TO THE WMO EC-WG/WIGOS-WIS AND ITS SUB-GROUP, JCOMM AND TO THE IODE COMMITTEE

8.1 Strengths and weaknesses in the management of the ocean observing systems

8.1.1 The meeting noted the following strengths and weaknesses of the current governance framework in the management of the ocean observing systems. It agreed that many actions have already been proposed to address weaknesses as part of the Pilot Project Implementation Plan.

The meeting agreed that a list of recommendations derived from Tables 1 and 2 below should be produced and presented to the Sub-Group of the EC-WG/WIGOS-WIS (***action: G. Reed; ASAP***). In particular, the meeting agreed that:

- The type of governance existing with JCOMM should be preserved;
- JCOMMOPS, which is providing support for the implementation, and monitoring of marine observing networks on a day to day basis should be strengthened;
- A reviewing of the WMO-IOC Technical Publications should be conducted to address a number of issues including Quality Control, the collection of instrument/platform metadata, instrument standards and intercomparisons, and satellite data telecommunication issues;
- It would be beneficial to promote establishing an international forum of users of satellite data telecommunication systems to address tariff negotiations, user requirements, and making recommendations on deficiencies and gaps related to the use of such systems;
- A communication strategy should be promoted to address (i) integration of in situ and satellite observations (use of in situ data for the calibration and validation of satellite products, merged in situ/satellite level 2 products as part of virtual constellations, bias correction, quality information feedback to observing platform operators), (ii) benefits & rationale for data exchange, (iii) benefits and rationale for collection and sharing of instrument/platform metadata.

Table 1: Strengths in the management of the ocean observing systems

Strengths	**Comment**
Implementation, coordination	
Good governance through JCOMM for the implementation of ocean observing systems (DBCP, SOT, GLOSS, Argo, OceanSITES)	Those mechanisms should be maintained and strengthened
Good implementation support through JCOMMOPS	JCOMMOPS should be strengthened
Good cooperation between research and operational agencies developed through JCOMM Panels	This facilitates the sharing of the data, including in real-time. JCOMM Panels must remain open to participation from research and operational agencies
Instruments and methods of observation	
Standards exist for meteorological instruments	Review and updating ongoing through JCOMM, CBS, and CIMO
Reliable instrumentation and technology	Technology developed thanks to strong links with the research partners and the private sector through the JCOMM observations panels and associated programmes
Scientific programmes provide for high quality observations	The Research community should feed into the development of instrument practices; some mechanisms might have to be proposed to realize this (e.g. Argo, OceanSITES)
Data collection and data processing	
Appropriate data collection and location systems available (e.g. Argos, Iridium, Inmarsat, DCP)	Satellite operators participate in JCOMM activities through DBCP, and SOT.
Integrated GTS data processing system for the drifter data (through Service Argos)	This provides for more coherent/homogeneous data especially in terms of (i) automatic real-time data quality control, (ii) platform location and quality, and (iii) exchange formats. Some guidelines could be developed under JCOMM.
Well defined data processing procedures for	This is documented in the WMO Guide on

the VOS scheme, including for delayed mode data	Marine Meteorological Services – WMO No. 471 – and the VOS Scheme framework document. This provides for more coherent/homogeneous data
Data exchange	
Open data policies are promoted by WMO and IOC (WMO Res. 40 – Cg-XII – and IOC Oceanographic Data Exchange Policy – Resolution IOC-XXII-6)	These must be communicated to platform operators through JCOMM observations panels and associated programmes
Good data distribution infrastructure and regulations through the GTS and WIS	Migration to Table Driven Codes should be completed ASAP and no later than 2012
Long term archives	
Archiving centres in place (e.g. RNDODC/DB, GDACs)	The issue of the duplication between the IODE RNODC/DB and the JCOMM SOC/DB remains to be solved and addressed by both JCOMM and IODE
Quality monitoring	
Some efficient guidelines in place for some programmes (DBCP, SOT, Argo)	Updating process ongoing; this can eventually feed into higher level standards (WMO and IOC Manuals and Guides)

Table 2: Weaknesses in the management of the ocean observing systems

Weaknesses	**Comment**
Implementation, coordination	
Sustainability of funding remains an issue for some components largely funded by Research	Partnership between operational and research agencies should be strengthened
Gaps and data sparse areas	JCOMM is contributing to the Rolling review of Requirements, and resulting recommendations must be communicated to platform operators when looking for funding nationally
Integration between in situ and satellite observations	Complementarity of in situ and satellite observations must be stressed and documented (e.g. assimilation, calibration, validation, bias correction, mixed in situ/satellite products, quality information feedback)
Instruments and methods of observation	
IOC instrument standards (e.g. M&G No. 4, No. 26) are not up to date	Review of the IOC M&G should be made
Lack of instrument/platform metadata	Some mechanisms are in place but are not used; Members must be convinced to commit resources for the routine provision of metadata to international archives so more communication is needed; assistance from the manufacturers through HMEI can help.
Traceability to standards is poor	Instrument intercomparisons are needed; this can be realized through the RMICs; metadata are needed (see above)
Instrument standards are not always used or not necessarily homogeneous between different observational components. In some cases, the standards used are not known.	More communication is needed to inform Members about requirements and guidelines, convince them to use appropriate standards, and provide information about the standards they actually use.
Data collection and data processing	

Relatively high cost of satellite data telecommunication (Argos, Inmarsat) remains an issue for platform operators	The use of cheaper satellite data telecommunication systems should be promoted; some forum could assist in this regard (see below).
Data timeliness is poor in certain areas	Users must address the issue and negotiate with satellite operators through appropriate channels (e.g. DBCP); some new forum could assist in this regard (see below).
There is an increasing number of different types of satellite data telecommunication systems being used, and a lack of coordination or standardization for the data processing of some platform data (e.g. buoy data in case other systems than Argos are used)	Some basic guidelines need to be developed; An international forum, recognized by the WMO and IOC, for the satellite data telecommunication users should be established and tasked to develop guidelines, negotiate tariff issues with the satellite operators, and address user requirements.
Data exchange	
Lack of interoperability between different data systems and ODP and/or WIS	ODP and WIS should be made interoperable; Members should be encouraged to develop interoperability between the ocean data systems they operate and the ODP and/or WIS.
There are still cases where a scientist wants to publish before willing to release the data (in other cases it is claimed that the data are not of sufficient quality)	Some communication strategy, and informational materials must be developed to explain rationale for data exchange, including the benefits to data providers (e.g. quality monitoring)
Long term archives	
Lack of interoperability between archiving centres and ODP and/or WIS	Members should be encouraged to develop interoperability between the ocean archiving centres they operate and the ODP and/or WIS
Members are not always submitting the data to the long term archives	Members should be encouraged to submit the data to the long term archives; more communication is needed and the benefits explained.
Quality monitoring	
The quality control procedures used for some data which are made available to the international community are not always known	There is a need to better document the quality control procedures for some of the observing components
The quality control guidelines are not always consistent to each other between different observing components	The is a need to review WMO and IOC related technical Publications and propose higher level standards

8.2 Lessons learned

8.2.1 The meeting reviewed a document prepared by the Secretariat on lessons learned from the Pilot and Demonstration Projects and agreed that it reflected well the lessons learned from the WIGOS Pilot Project for JCOMM.

8.2.2 The meeting agreed that the business case document (agenda item 9.3) should be produced according to the outcome of the discussion on lessons learned.

8.2.3 The meeting agreed that the WMO Rolling Review of Requirements (RRR) should be more open, and allow more substantial input from the ocean community in the critical review and production of the statements of guidance of appropriate application areas (e.g. ocean applications, seasonal to inter-annual forecasting).

8.3 Roles, responsibilities and mandates of stakeholders

8.3.1 This agenda item was introduced by Greg Reed. The meeting recalled that at JCOMM-II (Halifax, Canada, 19-27 September 2005) discussions had taken place regarding the inclusion of certain real-time biological observations and their possible transmission through the GTS. The meeting considered that such requirements would further develop which brought up the issue of ownership of WIS/WIGOS and whether WIGOS partners such as IOC/IODE would have a voice in decisions related to which data could be transported through WIS. The meeting also agreed that this issue should be addressed as part of the Business Plan (see item 9.3).

8.4 Reporting to the WMO Executive Council Working Group on WIGOS and WIS through its Sub-Group on WIGOS

8.4.1 The meeting discussed feedback to be provided to the WMO Executive Council Working Group on WIGOS and WIS (EC-WG/WIGOS-WIS) through its Sub-Group on WIGOS (SG-WIGOS). In particular, the meeting reviewed the work programme and action plan for the EC-WG/WIGOS-WIS concerning WIGOS implementation activities for the period May 2009 to March 2010, as adopted at its Second session, Geneva, 6-8 May 2009.

8.4.2 In the context described above, the meeting noted that specific agenda items had been added to this meeting of the joint Steering Group to address issues to be discussed at a later stage by the SG-WIGOS. The meeting acknowledged that Mr Greg Reed will be attending the second meeting of the SG-WIGOS, Geneva, 19-23 October 2009, and will be reporting on the outcome of this Joint Steering Group meeting (***action; Greg Reed; Oct 2009***).

8.5 Reporting to JCOMM

8.5.1 The meeting noted that several agenda items of JCOMM-III (Marrakech, Morocco, 4-12 November 2009) related directly and indirectly to WIGOS and the Ocean Data Portal. The meeting noted the following JCOMM-III preparatory documents where the Pilot Project has provided input:

- Doc/Inf 6.1, JCOMM OPA implementation goals
- Doc/Inf 6.2, Instrumentation issues (including establishment of RMICs)
- Doc/Inf 7, Information systems and services (data management) (including ODP and WIS)
- Doc/Inf 10.2, WIGOS Pilot Project for JCOMM
- Doc/Inf 11, Quality management (including Best practices and standards)
- Doc/Inf 12, Review of technical publications of interest to the Commission, including guides and other technical publications

8.6 Reporting to the IOC Committee on IODE

8.6.1 This agenda item was introduced by Mr Greg Reed. The IODE Committee met for its 20th Session in Beijing, China in May 2009 where Mr Greg Reed, in his capacity of IODE Co-chair reported on the WIGOS Pilot Project for JCOMM. The Committee had thanked the Republic of Korea for its kind offer to sponsor the "WESTPAC Training Course for IODE Ocean Data Portal data providers" held 31 August - 4 September 2009, Seoul, Republic of Korea.

8.6.2 The Representative of the WMO, Mr Bob Keeley, had expressed WMO's appreciation and great satisfaction with the cooperation with IODE in general, and with the IODE ODP contribution to the WIGOS Pilot Project for JCOMM in particular. Mr Keeley had noted that the JCOMM Pilot Project is a lead activity amongst the Pilot Projects and WMO is very appreciative to IOC and its IODE in this regard. WMO recognized IOC's ownership of the IOC/GOOS components and that some of the standards promoted under WIGOS have been developed in the oceanography realm. WMO stressed the importance of equitable cooperation in this regard.

8.6.3 The Delegate from the United Kingdom had informed the Committee that sea level data would be contributed to WIGOS by the Permanent Service for Mean Sea Level (PSMSL).

8.6.4 The IODE Committee had adopted the work plan of the WIGOS Pilot Project for JCOMM for 2009-2011.

8.7 GOOS and WIGOS: relationships, intersection and boundaries

8.7.1 This agenda item was introduced by Mr Greg Reed. The meeting attempted to discuss the intersections and boundaries between the GOOS and WIGOS programmes. Mr Reed informed the meeting that at the SG-WIGOS meeting the following week, one of the agenda items would discuss governance of WIGOS for the next phase (2011-2015). Also to be discussed will be targeting priority areas that will meet the needs of WMO co-sponsored programmes such as GOOS.

8.7.2 The meeting requested Mr Reed to contact Mr Keith Alverson, Director of the GOOS Project Office for his input (***action; G. Reed; Oct 2009***).

8.8 Beyond the Pilot Project: plans for follow-up

8.8.1 The Joint Steering Group discussed the legacy of the Pilot Project and its follow up as much work will remain to be done beyond the end of the Pilot Project in order to achieve the vision expressed in the WIGOS CONOPS. The meeting recognized that the Pilot Project permitted (or is expected) to prove the concept for a certain number of things but that it did not cover the full spectrum of marine observing systems integration. Amongst the areas where the concept can still be proven, the following can be listed:

- establishment of RMICs, and organization of a metrology workshop;
- updating the chapter on Marine Observations of the CIMO Guide;
- providing WIS and/or ODP interoperability for certain ocean data sets;
- providing interoperability between the WIS and the ODP;
- promoting one particular standard through the JCOMM/IODE standards process.

8.8.2 The meeting agreed that there was a need to explore possible future governance through which the principles developed under WIGOS will permit continued progress and managing the sustainability of the integrated observing system. There is also a need to propose methodologies for data exchange, instrument practices, quality management and standards. The meeting proposed to include under the Business Case item a list of recommendations regarding the future work and governance. Further discussion is expected in this regard under agenda item 9.3.

9. COMMUNICATION ACTIVITIES ON THE IODE ODP AND WIGOS PILOT PROJECT FOR JCOMM

9.1 Web site(s)

9.1.1 This agenda item was introduced by Mr Peter Pissierssens who identified the following web sites:

- The JCOMM web site (http://www.jcomm.info) :
    - in the menu there is an entry for “Standards and best practices” but there is no content yet
    - under “Data Management”, under “Activities: there is the sub-header “Data Management Practices” and under this heading there are links to brief information on End to end Data Management (E2E), WIGOS Pilot Project for JCOMM, and Ocean Data Standards process (this link goes directly to the ODS site)

  - under “Data Management”, under “Data and information access” there are links to IODE Ocean Data Portal (needs to be linked to http://www.oceandataportal.org), page on WIS
  - under “Data Management”, under “Education and Training” there is a link to http://www.oceanteacher.org and to the web page of the WMO Education and Training Programme.
- The IODE web site (http://www.iode.org) contains a page dedicated to the WIGOS Pilot Project for JCOMM (http://www.iode.org/wigos). In addition, the following pages are associated with the Pilot Project
  - the IODE Ocean Data Portal (http://www.iode.org/oceandataportal)
  - the Ocean Data Standards Pilot Project (http://www.iode.org/oceandatastandards)
  - JCOMM Catalogue of Practices and Standards (http://bestpractice.iode.org)
  - Training materials on the IODE Ocean Data Portal (http://hosting1.iode.org/moodle/course/view.php?id=101) - login as guest
- The WMO web site has the following pages available:
  - WIGOS: http://www.wmo.int/pages/prog/www/wigos/index_en.html
  - WIGOS PP for JCOMM: http://www.wmo.int/pages/prog/www/wigos/marine_pp.html

9.1.2 The meeting decided that in both the www.iode.org and www.jcomm.info web sites there should be a web page on “WIGOS Pilot Project for JCOMM” where all sub-activities and URLs as listed above are provided together with brief descriptions (***action; Secretariat; ASAP***).

9.2 Brochures and other promotional materials

9.2.1 The meeting was informed that so far no specific brochures have been prepared for the WIGOS Pilot Project for JCOMM. A brochure has been prepared by the Russian NODC on the IODE Ocean Data Portal.

9.2.2 The meeting decided that the IODE ODP brochure should be distributed to all IODE NODCs, WMO NMHSs, potential partners (listed under agenda item 4.5) as well as to the participants to this meeting (***action; Secretariat; ASAP***).

9.3 Business Case

9.3.1 This agenda item was introduced by Mr Greg Reed who recalled that one of the expected deliverables of the Pilot Project reads: “*to be used by the Directors of interested agencies to make the case at the national level for becoming a partner in the Pilot Project, and therefore engaging in the necessary developments, funded nationally, to meet the requirements eventually proposed under the Pilot Project*”.

9.3.2 However, the meeting recognized that no substantial progress was made in this regard since the last Joint Steering Group meeting. Considering the complexity of the exercise, the reduced availability of the Joint Steering Group members to address this issue, and the remaining time for the Pilot Project to be completed, the meeting agreed that the production of a true business plan was too ambitious at this point and unrealistic to produce.

9.3.3 At the same time, the meeting agreed that the term “business plan” was a misnomer and should be replaced by “report”. The report should basically address the following:

i. provide details about the Pilot Project activities and its main achievements and deliverables, as well as rational explaining its success;
ii. what are the lessons learned from the Pilot Project;
iii. what should be the Pilot Project legacy, and what can be recommended in the future to address integration of marine and other appropriate observations as part of the WIGOS framework, in terms of instrument practices, data exchange, quality management, and

governance.

9.3.4 In doing so, the benefits of WIGOS integration for NMHSs, NODCs, but also ocean data users should be detailed, justified, as well as quantified whenever possible (e.g. what are the benefits of providing interoperability with the WIS of some data sets). The impact of the marine observing systems integration, and use of recommended standards on the operations of NMHSs, and NODCs should also be listed and detailed.

9.3.5 The report could also include a proposed work plan, responsibilities and costing. If the Pilot Project is followed by a "Project" then the suggested outcome could result in a Business Case document.

9.3.6 The meeting noted with concern that the report will be required by June 2010 for consideration by the WMO Congress XVI (Geneva, 16 May - 1 June 2011). The meeting agreed that the Secretariat will prepare a draft of the document and submit it to the Co-chairs for their review and additional input. Subsequently the document will be circulated to all members of the Steering Group for final approval (***action; Secretariat; Mar 2010***).

The document should be concise and be based, mainly, on information already produced by the Pilot Project (Project Plan, Implementation Plan, Joint Steering Group meeting reports) as well as input from various national initiatives (e.g. USA IOOS, Russian Federation) and members of the Joint Steering Group as appropriate.

10. CLOSURE OF THE SESSION

10.1 Updating the Implementation Plan

10.1.1 The meeting updated the Overarching Implementation Plan for the ODP and WIGOS Pilot Project for the IODE and JCOMM, according to the discussions during this meeting. Progress, status of implementation and updated targets for the Implementation Plan are provided in Annex IV.

10.2 The Meeting reviewed and agreed on the actions arising from the meeting. These are summarized in Annex VIII.

10.3 Mr Greg Reed thanked all for participating and for their comments and support to the Pilot Project, as well as the Secretariat. Mr Reed stressed that there is still a substantial amount of work to be completed for the required reporting to the sixty-second Session of the WMO Executive Council (Geneva, 8-18 June 2010) and for the remainder of the Pilot Project scheduled to finish in late 2010. He recalled that good progress will be presented at JCOMM-III (Marrakech, 4-11 November 2009), and in particular regarding the JCOMM catalogue of Practices and Standards, the standards process, the establishment of RMICs, and the ODP.

10.4 The Meeting of the Joint Steering Group of the IODE Ocean Data Portal and the WIGOS Pilot Project for JCOMM closed at 16h00 hours on 16 October 2009.

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ANNEX I

AGENDA

1. ORGANIZATION OF THE SESSION

1.1 Opening of the meeting
1.2 Adoption of the agenda
1.3 Working arrangements
1.4 Election for the vacant co-Chairperson's position

2. STATUS OF THE IMPLEMENTATION PLAN

3. STATUS OF WIGOS

3.1 WIGOS Concept of Operations (CONOPS)
3.2 WIGOS "Test of Concept" Development and Implementation Plan (WDIP)
3.3 Demonstration Projects

4. IODE OCEAN DATA PORTAL AND ITS INTEROPERABILITY WITH THE WIS

4.1 Progress report on the IODE ODP work plan, including light data provider and version 2 development
4.2 Interoperability between IODE ODP and SeaDataNET - report progress on discussions with SeaDataNET
4.3 Interoperability of ocean data systems with the IODE ODP and/or the WIS - report on progress
4.4 Report on the outcomes of the IODE ODP training courses (Russian Federation and Republic of Korea)
4.5 Review of potential data sets, and potential for establishing more data providers' nodes interoperable with the IODE ODP and/or WIS

5. INSTRUMENT BEST PRACTICES

5.1 Terms of Reference of Regional Marine Instrument Centres (RMIC)
5.2 Relationship with the manufacturers
5.3 Documenting instrument best practices
5.4 Scope for instrument inter-comparisons
5.5 Recommendations to JCOMM-III

6. QUALITY MANAGEMENT

6.1 Status of the JCOMM Catalogue of Best Practices and Standards
6.2 Report on the JCOMM/IODE Standards Pilot Project (ODS)
6.3 Publishing of Best Practices and Standards by WMO and IOC

7. CAPACITY BUILDING

7.1 IODE ODP Capacity building activities
7.2 Possibilities for capacity building related to the WIGOS Pilot Project for JCOMM
7.3 Cooperation with the IODE OceanTeacher Project

8. REPORTING TO THE WMO EC WG WIGOS-WIS AND ITS SUB-GROUP, JCOMM AND TO THE IODE COMMITTEE

8.1 Strength and weaknesses in the management of the ocean observing systems
8.2 Lessons learned

8.3 Roles, responsibilities and mandates of stakeholders
8.4 Reporting to the WMO Executive Council Working Group on WIGOS and WIS through its Sub-Group on WIGOS
8.5 Reporting to JCOMM
8.6 Reporting to the IOC Committee on IODE
8.7 GOOS and WIGOS: relationships, intersection and boundaries
8.8 Beyond the Pilot Project: plans for follow-up

9. COMMUNICATION ACTIVITIES ON THE IODE ODP AND WIGOS PILOT PROJECT FOR JCOMM

9.1 Web site(s)
9.2 Brochures and other promotional materials
9.3 Business plan

10. CLOSURE OF THE SESSION

10.1 Updating the Implementation Plan
10.2 Review of Action Items arising from the meeting
10.3 Closure

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ANNEX II

LIST OF PARTICIPANTS

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ANNEX III

THE WIGOS PILOT PROJECT FOR JCOMM (OUTLINE)

(16 October 2009)

"Integration of marine meteorological and other appropriate oceanographic observations into the WMO Integrated Global Observing Systems"

Project Name	WIGOS Pilot Project for JCOMM
Acronym	N/A
Project Type	Pilot
Project Status	The pilot has defined a detailed implementation plan at the meeting of the joint Steering group for the IODE Ocean Data Portal (ODP) and the WIGOS Pilot Project for JCOMM (Geneva, 18-19 September 2008). The Project plan was defined at the *ad hoc* planning meeting for the JCOMM Pilot Project for WIGOS (Ostend, Belgium, 29 March 2008). The Implementation Plan was reviewed at the second meeting of the joint Steering Group (Ostend, Belgium, 15-16 October 2009). Mechanisms have been defined for reviewing WMO and IOC Publications, as well as and other appropriate JCOMM documentation. Specific review was conducted regarding the marine chapter of the CIMO Guide (WMO No. 8). A standards process for developing ocean data standards is being established in cooperation with IOC, and one particular standard has been proposed. The development of a JCOMM Catalogue of Best Practices and Standards has been made with the help from a consultant funded by IOC. Thirteen key potential partners have been identified (see below) for providing data through WIS; they have been approached and some already replied favourably. Workshops were held in March 2009 in Obninsk, Russian Federation, and in Seoul, Republic of Korea in September 2009 to address interoperability between ocean data systems in those regions and the ODP. The Obninsk workshop also addressed interoperability between the ODP and the WIS. The Pilot Project is proposing establishing Regional Marine Instrument Centres (RMIC); Terms of Reference have been drafted and one centre offered to act as such on a trial basis. It is engaging in a stronger cooperation with HMEI.
Project Overview	Development of the Pilot Project is coordinated by a Steering Group, providing liaison with appropriate WMO Programmes and Technical Commissions, the WMO EC-WG on WIGOS-WIS (and its sub group), and the International Oceanographic Data and Information Exchange (IODE) of IOC. The Steering Group is responsible for producing the Pilot Project Plan and promoting the continued development and implementation of a system of interoperable systems that provides consistent, documented data and information of known quality from a sustained and coordinated global ocean observing system. Three components are proposed in the development of the Pilot Project: (i) promote and document instrument best practices and related standards, (ii) build marine data systems that are interoperable with WIS, and (ii) promote quality management and standards. The Project will recognize and respect the ownership of all partner organizations as well as the WMO and IOC data policies.

Project Aims	Enable the integration of marine and other appropriate oceanographic observations (in situ, surface marine and satellite), real time and delayed mode data and products (e.g. models) within the oceanographic marine community. The Pilot Project will also consider assembled in situ fields, biochemistry, model outputs, surface and underwater marine climatologies and measurements. The Pilot Project will aim at making the appropriate identified data sets interoperable with the wider WMO and IOC communities. It will develop and agree on consistent standards to be used across the community. It will increase accessibility of data; ensure standards and best practices; as well as set guidelines regarding Capacity Building and training programme.
Partners/Participants	• International organizations co-sponsoring GOOS: WMO, IOC, UNEPand ICSU • WMO and IOC Technical Commissions and Programmes (e.g. CIMO, CBS, GOOS and IODE) • WMO Information Systems and its Expert Teams, ICT-WIS • Ocean Data Portal and ETDMP Task Team on ODP/JCOMM Pilot Project WIGOS • ETDMP Task Team on standards process • IODE Ocean Data and Information Networks (ODINs) • JCOMM E2E prototype (Russian Federation NODC, Obninsk) • Instrument centres • Observing Panels • Association of Hydro-Meteorological Equipment Industry (HMEI) • Partners hosting relevant data sets (*in situ*, space based ocean observations data sets, as well as products) o Integrated data sets ▪ The World Ocean Atlas (WOA); ▪ SeaDataNet; ▪ The Global Temperature and Salinity Profile Programme (GTSPP); ▪ The Australian Integrated Marine Observing System (IMOS) o Data from specific networks ▪ Argo profiling float data; ▪ RNODC/DB (drifter data); ▪ XBT data; ▪ Instrument / platform metadata (META-T, ODASMS); o Remote sensing ▪ The Virtual constellation for Ocean Surface Vector winds; ▪ The GODAE High-Resolution SST (GHRSST) Pilot Project; ▪ Surface based remote sensing (e.g. HR Radar); o Climatologies ▪ Marine Climatological Summaries, e.g. Delayed-mode VOS data collected by the Global Collecting Centres (GCCs) ▪ Blended quality climatology products such as the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) o Metadata about the platforms/instruments (e.g. META-T) • Additional participants and partners to be discussed and defined

Funding Source(s)	The project will, to the maximum extent possible, make use of the expertise to be provided through the working structure of JCOMM, IOC IODE, and its WIGOS partners. Additional support will be required through the WMO budget and/or WIGOS-WIS Trust Fund. Implementation costs will be met by the Members.
Project Timescale	2007 – Mid-2008: Establishment of the Pilot Project and proposal for its Steering Group Terms of Reference and Membership; Sept 2008: First meeting of the Pilot Project joint Steering Group; Adoption of the project implementation plan Nov. 2008: Reporting to the SG of the WMO EC WG WIGOS-WIS; End 2008 – 2009: discussions with partner observing programmes (DBCP, SOT, GLOSS, Argo, etc.) and organizations (IOC and IODE); Mar. 2008: Presentation of the Pilot Project at TECO-WIGOS May 2009: Reporting to the WMO EC WG WIGOS-WIS; Oct. 2009: Second meeting of the Pilot Project joint Steering Group; updating of the implementation plan; proposal to establish WMO-IOC Regional Marine Instrument Centres (RMIC) and to organize a workshop to prove concept; methodology proposed for reviewing WMO and IOC Publications regarding instrument practices; Oct. 2009: Reporting to the Sub-Group of the EC WG on WIGOS and WIS; Nov. 2009: Reporting to the third Session of JCOMM; 2010-2011: Implement the projects; End 2010: Report to Congress XVI finalized; Implementation schedule will depend upon how well WIS is progressing.
Expected Key Deliverables	The Pilot Project will address Result Based Management of WMO and IOC (i.e. it will link its deliverables to the Expected Results). The Pilot Project will have the following deliverables: (i) Project document (formerly called business plan) to be used by the directors of NMHS and Oceanographic institutes to make the case at the national level for engaging in the necessary developments, funded nationally, to meet the requirements for the Pilot Project; (ii) Project Plan; (iii) Implementation Plan; (iii) Documenting and integrating instrument best practices and related standards among the marine meteorological and oceanographic communities; (iv) Build marine and oceanographic data systems that are interoperable with the WMO Information System (WIS) in close cooperation with the IOC ocean community; (v) Promote quality management and standards and establishing compliance with the WMO Quality Management Framework (QMF); (vi) Participation in the CBS Rolling Review of Requirements (RRR) process and provide input to the WMO Database (instrument performances and requirements).

Project Links	http://www.wmo.int/pages/prog/www/wigos/marine_pp.html http://www.oceandataportal.net http://www.oceandatastandards.org http://bestpractice.iode.org
Project Summary	The Pilot Project is an interdisciplinary exercise seeking the integration of *in situ* and space based observing systems. These will be implemented and sustained by the WMO and IOC Members through JCOMM in order to make appropriate data sets available in real-time and delayed mode to WMO and IOC applications through interoperability arrangements with the WIS and ODP. The data sets will be produced according to agreed upon standards and the quality control procedures documented according to QMS principles. This integration will enhance the coherence and consistency of the data sets and the availability of relevant instrument/platform metadata. More timely and better quality data will be expected while duplicates will be minimized. **-1- Documenting and integrating best practices and standards**. The goal is to define and agree on common standards between the meteorological (WMO) and oceanographic (IOC) communities for instruments and methods of observation as well as subsequent organization and handling of the data and information to serve consistent and better quality data to both the broad user and modelling communities. **-2- Making marine data systems and WIS interoperable**. The goal is to provide access to marine meteorological and oceanographic data and information to serve a number of applications, including climate. This shall be done in an integrated way via the WIS and thereby facilitating access to well documented and standardized data. Much work remains to develop interoperability between the WMO and IOC communities at both the data discovery (metadata) and data level (compatible formats). The Pilot Project will address these two aspects. **-3- Quality Management**. The goal is to coordinate the development of cost-effective Quality Management Systems by Members and to propose practical solutions or examples. At different steps of the data production line, it is expected that improved quality management will result in better, timelier data, minimized duplication, and an operational data delivery system. This will be achieved through the compilation of regulatory documentation in a way consistent with the eight Quality Management Principles developed under ISO/TC176/SC2/WG15 (User/customers focus, Leadership, Involvement of people, Process approach, System approach to management, Continual improvements, Factual approach for decision making and, Mutually beneficial supplier relationships).
Date of Last Update	16/10/2009
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ANNEX IV

PROGRESS, STATUS OF IMPLEMENTATION, AND UPDATED TARGETS, ON THE OVERARCHING IMPLEMENTATION PLAN[1] FOR THE ODP AND WIGOS PILOT PROJECT FOR THE IODE AND JCOMM

(updated version of Annex I of the Implementation Plan[1] adopted at the second meeting of the joint Steering Group for the IODE Ocean data Portal and the WIGOS Pilot Project for JCOMM, Ostend, Belgium, 15-16 October 2009)

ACTION ITEMS AND RELATED SUB-TASKS OF THE ODP-WIGOS PILOT PROJECT FOR IODE AND JCOMM

Deliverable 1: Documenting and integrating instrument best practices and related standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
PP Steering Group Representative to coordinate with the ETMC, SOT, DBCP, GLOSS and Argo.	**Action 1.1 "Information on marine meteorological parameters":** Review the marine chapter of the *CIMO Guide*. Provide updates and additions on meteorological instruments and methods of observation, as necessary.	Agreement is being secured for some changes. Strategy for updating WMO and IOC Technical Publications proposed at the ODP-WIGOS meeting in Oct. 2009.	Done	for coordination
	Sub-tasks:			
PP Steering Group	**1.1.1** Monitor progress, make adjustments and refine targets of action.	Ongoing / Some adjustments have been made already. Establish links to *JCOMM Catalogue*.	Done	
Chairperson OCG to liaise with OPA Panels and address additions to *Guide* at OCG-III.	**1.1.2** Secure agreement on proposed changes from within the marine community, including WMO Members, regarding the operation, of marine instruments and methods of observation.	Changes from SOT now considered in WMO No. 8; letter sent to Members to review changes; more changes received from Members, included and to be submitted to CIMO. Strategy for updating WMO and IOC documentation related to instrument practices discussed and agreed upon at the ODP-WIGOS PP meeting in October 2009. Standards level can be raised to ISO via WMO-ISO agreement.	Mar 2010	

1 : http://www.wmo.int/pages/prog/www/wigos/documents/Impl_Plan_JCOMM.pdf

Chairperson OCG	**1.1.3** Conduct discussions with the Data Buoy Co-operation Panel at its twenty-fourth session (Cape Town, South Africa). Expected outcome is progress regarding integration of best practices and standards for buoy observations and a submission to the IODE / JCOMM Standards Process.	Discussed at DBCP-24. DBCP Task Team on Instrument Best Practices and Drifter Technology Development will address the issues. More discussed at DBCP-25 (Sept 2009) including participation of DBCP in test-of-concept phase for proposed strategy; DBCP to commit funding for a consultant to address instrument practices in WMO and IOC Publications ($10k)	Done	$10k from DBCP $10k from WMO
Co-chairpersons PP	**1.1.4** Co-chairpersons will participate in discussions with the JCOMM Ship Observations Team at its fifth Session.	WIGOS discussed at SOT-V meeting 18-22 May 2009. SOT input to be provided via the SOT TT on Instrument Standards. SOT proposed to integrate VOSClim and AWS in VOS Classes; requires updating WMO No. 544, 488, 8, and 471	Done	
Jitze van der Meulen, Chung-Chu Teng	**1.1.5** Coordinate changes with the Rapporteur on the *CIMO Guide*.	Initial is Mr R. Dombrowsky, later on Mr Jitze Van der Meulen, and Dr Teng.	Done	

Deliverable 1: Documenting and integrating instrument best practices and related standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
PP Steering Group, Secretariats, contractor, CIMO Guide Rapporteur, Chairperson OCG	**Action 1.2 "Information from the JCOMM Observations Programme Area (OPA) Panels":** Assemble reference material on instrument best practices and standards available from the JCOMM OPA Panels and associated observing programmes for inclusion in the JCOMM catalogue of best practices and standards.	Pending. (a) Contractor hired in early 2009 to coordinate production of the *JCOMM Catalogue* (3-4 months total for the *Catalogue*). Table of content will be presented to JCOMM-III.(b) Catalogue with some 60 Publications now available and to be made available on-line in November 2009	Done	$30k
	Sub-tasks:			
Chairperson OCG	**1.2.1** Monitor progress, make adjustments and refine targets of action.	Reviewed at the 2nd meeting of the joint Steering Group; recommendations to be made at JCOMM-III	Done	
Chairperson OCG	**1.2.2** Begin assembly of relevant documentation and / or references.	Complete. Contractor engaged Feb 2009 and work done	Done	
Chairperson OCG	**1.2.3** Work with CIMO, WMO and IOC Representatives to determine what material is appropriate for CIMO, for WMO or IOC *Manuals* and *Guides.*	Recommendations made by contractor. Strategy for updating WMO and IOC documentation related to instrument practices discussed at the ODP-WIGOS PP meeting in October 2009.	Done	

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Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Dr Chung-Chu Teng, ET-DMP, Chairperson OCG, CIMO Guide Rapporteur	**Action 1.3 "Documenting Instrument Best Practices":** As standards are adopted, editors from the Pilot Project and CIMO will need to work together to prepare the material for inclusion in the marine chapter of the *CIMO Guide.*	Pending. OCG Chairperson to Coordinate in liaison with Dr Teng of NOAA's National Data Buoy Center. SOT Standards submitted for inclusion in CIMO Guide. Strategy for updating WMO and IOC documentation related to instrument practices proposed at the ODP-WIGOS PP meeting in October 2009. Test of concept by DBCP (SST and/or met. Variables)	Initial standards: Done Continuing to 4Q 2010	
	Sub-tasks:			
Chair ET-DMP, Chairperson OCG, CIMO Guide Rapporteur	**1.3.1** Monitor progress, make adjustments and refine targets of action.	Ongoing.	Ongoing	
Chair ET-DMP, Chairperson OCG	**1.3.2** Collect standards.	Underway through the contractor hired for the JCOMM Catalogue of best practices and standards.	Done	
Chairperson ET-DMP, Chairperson OCG	**1.3.3** Reconcile differences in standards.	Contract recommended who should address specific publications. JCOMM/OCG to request specific observations panels to review publications as part of the proposed strategy	4Q 2009	
Dr Chung-Chu Teng, ET-DMP, Chairperson OCG, CIMO Guide Rapporteur	**1.3.4** Prepare agreed upon standards for inclusion into *CIMO Guide.*	SOT proposals being included; as well as additional changes from WMO Members	Done	

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Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Dr Teng, OPA Panel Chairpersons, Chairperson OCG, CIMO Guide Rapporteur	**Action 1.4 "Instrument Centres":** Dr Teng will discuss with CIMO about ocean instrument centres, and liaise with appropriate OPA experts, such as the Chairperson of the SOOPIP, the DBCP and other appropriate Panels. The Project may need to propose and agree on Terms of Reference (ToR) for the JCOMM Instrument Centres, and develop guidelines for running them. It should propose guidelines regarding the costs involved for setting up and running such centres.	Underway; TOR have been drafted by C.C.Dr Teng and Mr R. Dombrowsky and were discussed and agreed upon by the joint Steering Group. These will be submitted to JCOMM-III for establishing WMO-IOC Regional Marine Instrument Centres (RMIC). Workshop planned in USA in Jan 2010 to prove concept.	Jan 2010	
	Sub-tasks:			
Dr Teng	**1.4.1** Monitor progress, make adjustments and refine targets of action.	Ongoing.	Ongoing	
PP Steering Group	**1.4.2** Begin collaboration with CIMO, the WIGOS/WIS Development Team, and other program representatives involved in WIGOS and prepare for the potential future development of ocean instrument centres.	Started.	Done	
Dr Teng, R. Dombrowsky, J. Gorman	**1.4.3** Investigate the need for and if required develop a proposal for the creation of regional ocean instrument centres (and address the level of operations of instrument centres to include Terms of Reference to be presented at the next OCG meeting.	Done	Done	
Dr Teng, R. Dombrowsky, J. Gorman	**1.4.4** Following OCG agreement to the proposal, identify potential Ocean Instrument Centres and select one of the candidate centres as the initial demonstration prototype.	NDBC willing to act as RMIC on a trial basis. Workshop planned in Jan 2010 for RA-IV to prove concept (USA committing $17k in support of the workshop))	Done	$17k

Dr Teng, R. Dombrowsky, John Gorman	**1.4.5** Prepare and present a report on the project.	Report submitted to the joint Steering Group meeting (Oct 2009), and proposal made at JCOMM-III Proposal to organize a metrology workshop at NDBC to test concept.	Nov. 2009 Workshop: 2Q 2010	

Deliverable 1: Documenting and integrating instrument best practices and related standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Co-chairperson PP, Chairperson Meta-T, S. Belov and E. Christian	**Action 1.5 "Platform/Instrument metadata":** The Pilot Project should determine if and how the information assembled by the JCOMM META-T Project can be included, as well as propose a strategy for including other variables than SST and water temperature profiles in the platform / instrument metadata collection, distribution, and archiving system being developed.	Pending. Asking META-T to develop a proposal for the IODE / JCOMM Standards process. Discussed at SOT-V (May 2009). More discussion needed. Will be discussed at JCOMM-III, and Recommendation proposed.	Initial response: 2Q 2009, Demonstrate: 2010	
	Sub-tasks:			
D. Snowden	**1.5.1** Monitor progress, make adjustments and refine targets of action.	Ongoing. Report was submitted to SOT-V XBT BUFR template reviewed for inclusion of metadata, and approved for validation by IPET/DRC. VOS and buoy templates progressing Buoy template needs minor tuning (to be reviewed by DBCP) Recommendation submitted to JCOMM-III to request Members to submit metadata to China and USA servers	Ongoing	
S. Belov, D. Snowden, J. Chen, B. Burnett	**1.5.2** Begin collaboration with the Chairperson of the META-T, Russian experts, ET-AWS, ET-DRC, and the WIS IPET-MI Expert Teams on how information should be assembled within WIGOS / WIS.	Pending. Proposal to have Pub47 metadata included in WIS, as well as regulatory part included in the future WIS manual, was made at SOT-V. JCOMM and CBS should work together to make proposal at CBS Session in 2011	2011	
D. Snowden, J. Chen, B. Burnett	**1.5.3** Develop a proposal for meeting the requirements for such data collection, distribution and archival.	META-T users survey underway per SOT-V recommendation	End 2009	
J. Chen, B. Burnett	**1.5.4** Following acceptance of the	Pending.	End 2008	

	proposal, begin the implementation of the proposed strategy.			
D. Snowden	**1.5.5** Prepare a report on the status of the implementation.	Pending.	End 1Q 2009	
J. Chen, B. Burnett	**1.5.6** Demonstration by JCOMM-III.	Pending.	Nov. 2009	
S. Belov	**1.5.7** Demonstrate ODP connectivity.	Pending.	2010	

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Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Co-chairperson PP, Chairperson VOS / VOSClim , S. Belov, WIS Support Team	**Action 1.6 "VOS Metadata":** The Pilot Project should determine if and how the information assembled by the VOS and VOSClim Projects can be included.	Pending. SOT-V discussed and agreed on a proposal to consider VOSClim as an additional class of VOS. This will imply updating WMO No 471 (Guide to Marine Met Services) WMO No. 544 (Manual on the GOS, to be updated by CBS in 2011) WMO No. 488 (Guide on the GOS, to be updated by CBS in 2011) JCOMM TD No.4 (VOS Scheme framework document) SOT-V proposed to copy Pub47 submissions to JCOMMOPS. Changes to WMO Publications proposed at JCOMM-III	Nov. 2009	
	Sub-tasks:			
S. Woodruff, J. Fletcher, N. Scott	**1.6.1** Monitor progress, make adjustments and refine targets of action.	Ongoing.	Ongoing	
S. Woodruff, J. Fletcher, N. Scott, N. Mikhaylov, S. Belov	**1.6.2** Begin collaboration with the VOS / VOSClim and Russian experts and WIS Support Team.	Pending.	4Q 2008	
S. Woodruff, J. Fletcher, N. Scott, N. Mikhaylov, S. Belov	**1.6.3** If determined to be feasible, prepare a proposal for inclusion of VOS and VOSClim projects.	WMO Technical Regulation to be updated as part of the proposed strategy (target CBS Session in 2011)	2011	
S. Woodruff, J. Fletcher, N. Scott, N. Mikhaylov, S. Belov	**1.6.4** Begin implementation.	Test-phase started (target CBS Session in 2011)	2011	

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Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
WMO and IOC Secretariats	**Action 1.7 "Cooperation with the manufacturers":** WMO and IOC Secretariats to write to the marine instrument manufacturers and invite them to be represented through the Association of Hydro-Meteorological Equipment Industry (HMEI), to consider organizing training workshops and developing cooperation with the Pilot Project.	Pending. Discussion underway with HMEI; letter to Members drafted but pending discussions with IOC about HMEI status	Mar 2010	
	Sub-tasks:			
WMO Secretariat	**1.7.1** Monitor progress, make adjustments and refine targets of action.	Ongoing. HMEI participated at SOT-V; and manufacturers were invited through HMEI.	Ongoing	
WMO and IOC Secretariats	**1.7.2** Initiate correspondence with HMEI and resolve any concerns HMEI and non-HMEI may have with establishing a process by which manufacturers become more actively involved with WIGOS activities.	Pending. Discussions underway. HMEI has consultative status with WMO; IOC to investigate whether such as status can be granted to HMEI as well	1Q 2010	
WMO Secretariat	**1.7.3** Invite HMEI representative(s) within the WMO to future Steering Group session.	Done	Done	
WMO and IOC Secretariats	**1.7.4** Secure agreements similar to those that CIMO has with HMEI, through which HMEI assists, in conducting instrument training workshops.	Pending.	Mar 2010	

Deliverable 2: Build marine data systems that are interoperable with the WIS

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Review Group (G. Reed, R. Keeley, S. Belov), WIS Support Team	**Action 2.1 "ODP software documentation":** Complete the editorial review of software documentation and make this widely available.	This is an ongoing activity. Documentation will be reviewed for duration of the project	December 2010	
	Sub-tasks:			
Review Group, WIS-PO	**2.1.1** Monitor progress, make adjustments and refine targets of action.	Ongoing.	Ongoing	
Review group, DMCG, PP Steering Group, WIS-PO	**2.1.2** Review software documentation.	Ongoing. 4 documents reviewed	December 2010	
WIS-PO, E. Christian	**2.1.3** Organize E2E Workshop with WIS PO to address E2E and WIS technologies and interoperability issues in order to refine ODP v1, and produce plan for ODP v2. In collaboration with the WIS Project Office, prepare a summary of the results and making them widely available.	Meeting held March 2009	Done	CHF 5000 (from WIS-PO)

Deliverable 2: Build marine data systems that are interoperable with the WIS

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Candidate centre representatives, WIS Support Team, PP Support Team	**Action 2.2 "Potential data-sets":** Each contributing centre to carry out the necessary steps (as listed in deliverable 2 of the document) to provide access to their data or information.	E. Christian met with NODC IT specialist, and attended the Obninsk workshop. Pending: Visits to be conducted by PP Support Team (S. Belov, N. Mikhaylov) as required.	December 2010	
	Sub-tasks:			
PP Steering Group	**2.2.1** Monitor progress, make adjustments and refine targets of action.	Ongoing. New ODP Light Data Provider should permit to accelerate things	Ongoing	
Candidate centre representatives, PP Support Team	**2.2.2** Coordinate with contributors to identify which data sets they will offer to the Pilot Project. Consider developing virtual infrastructure for connecting specific data sets.	Pending.	Mar 2010	
WMO and IOC Secretariats, S Belov	**2.2.3** Determine which contributors will be utilizing the E2E technology and direct them to technical experts from the Russian Data Centre to identify exactly what they must do in order for their data sets to become available via ODP. This includes software to be installed, the creation of information files and where data collections must be placed for visibility and user access.	(a) Secretariats wrote to Members (WMO PRs, IOC action addressees, cc to Directors of the agency proving data-sets) asking what they could contribute (b) Questionnaire completed. And online in March 2009 (c) Need to send second letter with questionnaires to those who responded (Secretariat). Pending	(a) Done (b) Done (c) 2Q 2009	
WMO and IOC Secretariats, PP Support Team	**2.2.4** Identify local contacts for the project.	Done for some data sets.	Mar 2010	
PP Support Team	**2.2.5** Discuss with each contributor what commitment is needed to WIS, as well as the level of resources required to make their data collections available.	Pending. Underway with US NODC, ISDM, GCCs	Mar 2010	
PP Support Team	**2.2.6** As needed visit candidate centres for	Pending.	Feb 2010	PP Budget

	completion of implementation that is no later than end of 2Q 2009.	US NODC visited by E. Christian. Workshop held in Obninsk (March 2009) Visit of ODP experts to IMOS (Australia) proposed at the 2nd meeting of the joint Steering Group (Oct 2009)		
PP Steering Group	**2.2.6** Insure that implementation is completed by December 2010, the end of this Pilot Project.	Pending.	December 2010	

Deliverable 2: Build marine data systems that are interoperable with the WIS

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Candidate centre representatives, WIS Support Team, PP Support Team, ODP	**Action 2.3 "ODP-WIS interoperability":** Define a work plan for making the ODP and WIS interoperable, and ODP (v1) acting as a WIS DCPC.	Discussions ongoing between WIS and ODP	Mar 2010	
	Sub-tasks:			
PP Steering Group	**2.3.1** Monitor progress, make adjustments and refine targets of action.	Worskhop held in Obninsk in March 2009	Ongoing	
B. Burnett, E. Christian, S. Belov	**2.3.2** Contributors who wish to develop or use specific infrastructure, tools and software to consult with WIS experts to identify exactly what they must do in order for their data sets to become available via WIS.	Pending. The installation of Geonetwork on top of a data center's metadata catalog would satisfy most of the TechSpec requirements of a WIS DCPC	End 2009	

Deliverable 3: Promote Quality Management standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
PP Steering Group, IODE Officers, CIMO Representative	**Action 3.1 "Review of standards":** An editor and reviewers are needed to assemble the documentation on standards and best practices of contributors to this project. Their task is also to recommend where such material should be stored and how it can be made available.	Pending. Strategy for updating WMO and IOC documentation related to instrument practices proposed by the ODP-WIGOS PP meeting in October 2009.	4Q 2009	
	Sub-tasks:			
IODE Officers	**3.1.1** Monitor progress, make adjustments and refine targets of action.	Ongoing.	Ongoing	
J. van der Meulen, IODE Officers	**3.1,2** Identify the ad hoc working group of editors and reviewers of IOC / IODE materials.	Editors and reviewers identified (IODE Officers and Jitze van der Meulen/Chung-Chu Teng for CIMO Strategy reviewed at the 2nd meeting of the ODP-WIGOS joint Steering Group (Oct 2009)	4Q 2009	
IODE Officers	**3.1.3** Identify IOC /I ODE material requiring an update.	Done	Done	
IODE Officers	**3.1.4** Discuss and prepare materials for publication.	Pending.	3Q 2009	
IODE Officers	**3.1.5** Publish material.	Pending.	Start: 4Q 2009	

Deliverable 3: Promote Quality Management standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Contractor, Chairperson OCG, Chairperson DMCG	**Action 3.2 "JCOMM Catalogue of Best Practices and Standards":** The organizational task identified in action 3.1 should also assume the task of providing appropriate references to the *JCOMM Catalogue of Best Practices and Standards*.	Bob Gelfeld recruited in Feb. 2009. Catalogue produced and recommendations made	Done	
	Sub-tasks:			
IODE-PO, Chairperson OCG	**3.2.1** Monitor progress, make adjustments and refine targets of action.	Report by consultant to be presented at JCOMM-III	Done	
Contractor	**3.2.2** Assemble existing materials.	Done	Done	
Contractor	**3.2.3** Identify and resolve differences in the materials assembled.	Recommendations made by contractor; these now need to be addressed by JCOMM	1Q 2010	
ET-DMP	**3.2.4** Submission of new standards or updates to existing standards for review and approval.	Pending. This needs to be addressed by the new ETDMP after JCOMM-III	2Q 2009	
Chairperson DMCG	**3.2.5** Collaborate with WMO and IODE to determine the appropriate disposition of all submitted materials.	Pending.	3Q 2009	

Deliverable 3: Promote Quality Management standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Contractor, CIMO, IODE-PO and ETRP.	**Action 3.3 "JCOMM/IODE Standards process":** The person responsible for organizing documentation as referenced in action 3.1 should also resolve the most appropriate location for documentation to be held, between the IODE OceanTeacher, WIGOS website and *CIMO Guide*.	Pending. See action 3.1. Some recommendations made by contractor but more discussion needed	4Q 2009	
	Sub-tasks:			
IODE-PO, Chairperson OCG	**3.3.1** Monitor progress, make adjustments and refine targets of action.	Ongoing. Standards process needs to be stimulated; Only one standard submitted through the process so far	Ongoing	
IODE-PO, R. Dombrowsky	**3.3.2** Begin collaboration with the IODE OceanTeacher, WIGOS development team and CIMO on the development of a strategy for organizing documentation on ocean monitoring instruments, methods of observation, data and products.	Strategy for updating WMO and IOC documentation related to instrument practices proposed at the 2nd meeting of the joint Steering Group of ODP-WIGOS (October 2009).	Done	
Contractor	**3.3.3** Develop a proposal for the cross-referencing ocean related information on monitoring instruments, methods of observation, data and products.	To be realized as part of the proposed strategy	Done	
PP Steering Group	**3.3.4** Acquire approval of proposal.	Done	Done	
PP Steering Group	**3.3.5** Begin Proposal Implementation process.	Pending.	3Q 2009	

Deliverable 3: Promote Quality Management standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
PP Steering Group, Chairperson OCG, Chairperson DMCG	**Action 3.4 "Marine climatology, NODCs, IOC/IODE Information":** Assemble the documentation or references that describe data management procedures carried out at MCSS centres and at NODCs that contribute to this Pilot Project. There is also material in IOC Manuals and Guides and other such publications that are relevant and should be considered.	Pending. ODP procedures (E2E docs) need to be made available to the NODCs and / or other JCOMM Agencies contributing data sets. For those committing data sets, documentation describing the datasets must be made available to the Pilot Project Steering Group. GCCs have begun work on compiling docs and refs of data management procedures at MCSS. MCSS part of action 3.4 completed.	First draft: 2Q 2009, Final 3Q 2009 (should meet deadline) MCSS done	
	Sub-tasks:			
PP Steering Group	**3.4.1** Monitor progress, make adjustments and refine targets of action	Ongoing.	Ongoing	
PP Steering Group , S. Belov	**3.4.2** Begin assembly of relevant documentation and / or references	Ongoing. 2 documents updated.	3Q 2009	
Chairperson DMCG	**3.4.3** Consult with the appropriate groups to assemble existing materials, identify differences to be resolved, encourage submission of documentation and standards.	Pending.	2Q 2009	
Dr Teng, CIMO Guide Rapporteur	**3.4.4** Work with CIMO to determine what material is appropriate for the WMO *CIMO Guide* and what lies outside.	Part I of the CIMO guide (by variable) needs to be reviewed. Elements on marine instrument inter-comparisons to be added in CIMO Guide. Strategy for updating WMO and IOC documentation related to instrument practices proposed at the 2nd meeting of the joint Steering Group for ODP-WIGOS.	Done	

Deliverable 3: Promote Quality Management standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
PP Steering Group, Secretariats, Contractor	**Action 3.5 "Information from Oceanographic Observing Projects - GDACs":** Assemble material or references that describe operations of the various GDACs contributing to the Pilot Project, include them in the *JCOMM Catalogue of Best Practices and Standards*, and make reference to relevant parts as appropriate to WMO and / or IOC *Manuals* and *Guides*	*JCOMM Catalogue* as it stands now does not include specific information about GDACs. The review of GDAC documentation remains to be conducted.	1Q 2010	
	Sub-tasks:			
Chairperson OCG	**3.5.1** Monitor progress, make adjustments and refine targets of action.	Ongoing.	Ongoing	
Chairperson OCG	**3.5.2** Begin assembly of relevant documentation and / or references.	Documentation on GDACs exists on the web and needs to be added in the JCOMM Catalogue	1Q 2010	
Chairperson OCG	**3.5.3** Work with WMO and IOC Representatives to determine what material is appropriate for WMO or IOC *Manuals* and *Guides.*	Pending	1Q 2010	

Deliverable 3: Promote Quality Management standards

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
DMPA, ET-DMP, Contractor	**Action 3.6 "Information about Data Management Projects":** Assemble material or references that describe operations of national or multi-national data management projects particularly as they develop standards. Encourage the authors of the documented practices of contributors to this Pilot Project to submit these to the joint IODE / JCOMM Standards Process.	One Member of the new ETDMP to be responsible for this task. New ETDMP (after JCOMM-III) will address two sub-tasks: ODP and standards process.	Initial documents: 2Q 2009 Then 1Q 2010	
	Sub-tasks:			
Chairperson DMCG, Chairperson ET-DMP	**3.6.1** Monitor progress, make adjustments and refine targets of action.	Some contacts with IODE experts by Chair of ETDMP on how to organize the work. Expertise from JCOMM needed.	1Q 2010	
ET-DMP	**3.6.2** Secure and compare inputs provided by contributors to the Pilot Project.	Pending.	1Q 2010	
ET-DMP	**3.6.3** Mediate differences for resolution.	Pending.	1Q 2010	
IODE-PO	**3.6.4** Post an updated document stating the IODE / JCOMM Standards Process.	Pending.	2Q 2010	

Deliverable 4: Project Management

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
PP Steering Group	**Action 4.1 "Business Plan":** Refine the business plan and initiate a cost / benefits analysis.	Second meeting of the joint Steering Group (Oct 2009) decided to produce a project report instead of a business plan	End 2010	
	Sub-tasks:			
PP Steering Group	**4.1.1** Monitor progress, make adjustments and refine targets of action.	Secretariat to draft first version of the project report	1Q 2010	
PP Steering Group	**4.1.2** As an element of the Business Plan prepare a cost/benefit analysis.	Some cost estimates might be included in the project report	1Q 2010	

Deliverable 4: Project Management

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Secretariat, contributing centre representatives, WIS Support Team	**Action 4.2 "Follow up of potential data-sets":** Nominate Pilot Project Steering Group members to follow up integration of specific data-sets and the development of synergies with specific demonstration projects.	Pending. Done for some specific data sets: 1) WOA - Kenneth Casey. 2) SeaDataNet - Nikolay Mikhaylov, in liaison with Robert Keeley. 3) Argo - Candyce Clark. 4) RNODC/DB - Robert Keeley, in liaison with Nikolay Mikhaylov. 5) GHRSST- Kenneth Casey. 6) XBTs - Greg Reed. 7) ICOADS - Robert Keeley to consult with Scott Woodruff. 8) GCCs - Nicola Scott. 9) META-T, ODASMS - Bill Burnett, and Robert Keeley. 10) GTSPP - Kenneth Casey. 11) Virtual const SVW - Kenneth Casey in liaison with Paul Cheng and Stan Wilson. 12) HF Radars - Jack Harlan	Initial: September 2008 Begin: implementation of others: 2Q 2009	
	Sub-tasks:			
PP Steering Group	**4.2.1** Monitor progress, make adjustments and refine targets of action.	List of potential data sets, and those accepting to make developments maintained	End 2010	
PP Steering Group	**4.2.2** Nomination of Steering Group Members.	Complete, joint Steering Group established Sept 2008	Done	
PP Steering Group	**4.2.3** Identify specific data sets, which have the greatest potential for developing synergies with WIGOS pilot and demonstration projects.	Complete, datasets identified.	Done	
PP Steering Group	**4.2.4** Approach these projects to see how the ODP-WIGOS Pilot Project for IODE	Pending. Solicit responses from agencies whether or not they will	Done	

	and JCOMM could assist / partner through the integration of data sets.	contribute. Positive & practical feedback from : 1) Australian AODCJF (XBTs) 2) Australia IMOS. 3) Canada ISDM: upper-ocean T & S gridded in situ fields; and ocean currents derived from surface drifters; 4) Russian Federation NODC: data extracted from ESIMO – real-time GTS data and product (air temperature, wind, wave, sea level, current, water temperature, salinity, oxygen) 5) UK BODC: sea level data from PSMSL; 6) UK Met Office: Marine Climatological Summaries and Global Collecting Centres (GCCs); 7) US NODC: World Ocean Atlas; GTSPP; and Global High-Resolution Sea Surface Temperature Pilot Project (GHRSST-PP) 8) US NDBC: Surface currents from HF radar; 9) US NOAA/ERSL: Blended-quality climatology products (e.g., ICOADS)		
Individual contributors, N. Mikhaylov	**4.2.5** Prepare a strategy for data collaboration with the identified projects.	To be defined by the new ETDMP	1Q 2010	
Individual contributors, N. Mikhaylov	**4.2.6** Implement the agreed upon strategy.	Pending.	End 2010	

Deliverable 4: Project Management

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
Chairperson PP Steering Group	**Action 4.3** "**Reporting to parent bodies**" Steering Group Reports, Presentations and Meetings	Pending.	As required	
	Sub-tasks:			
Chairperson of PP Steering Group, R. Dombrowsky	**4.3.1** Prepare and provide periodic status reports on the progress of the PP to the Sub-Group WIGOS-WIS per EC-WIGOS WIS Working Group requirements.	Pending. Report provided to WMO EC WG WIGOS-WIS and its SG. Initial report 10-13 November 2008 and as required, and then to successive meetings	Done	
R. Keeley or G. Reed	**4.3.2** Report pilot project progress to JCOMM Management Committee.	Progress reported to MAN-VII, Dec 2008	Done	
R. Dombrowsky	**4.3.3** Attend Working-Group WIGOS-WIS planning and reporting sessions.	Reported to EC WG SG-WIGOS, Nov 2008 and May 2009	Done	
G. Reed	**4.3.4** Presentation to IODE-XX: Expected outcome: formal endorsement and Resolution from IODE on participation of ODP in this Pilot Project.	Presentation made at IODE-XX	Done	
PP Steering Group	**4.3.5** Meeting to assess progress and address (Action 6.1) Steering Group to address legacy of WIGOS PP.	Pending.	1Q 2010	
R. Keeley	**4.3.6** Presentation to JCOMM-III. Expected outcome: formal endorsement and Resolution calling the WMO and IOC Members to participate and contribute to the Pilot Project.	Report submitted. Bob Keeley to present report at JCOMM-III. Recommendation to establish WMO-IOC Regional Marine Instrument Centres	Nov 2009	
PP Steering Group	**4.3.7** Meeting to assess progress and address (Action 6.1) Steering Group to address legacy of PP.	Pending.	1Q 2010	
	4.3.8 Presentation to JCOMM Management Committee meeting (after JCOMM-III) reporting PP progress.	Pending.	End 2010	

Chairperson of PP Steering Group	**4.3.9** Draft report for WMO Cg-XVI. Legacy of WIGOS proposed by the Pilot Project.	Pending.	1Q 2010	
	4.3.10 Report to WMO Cg-XVI on legacy of WIGOS proposed by the Pilot Project.		Early 2011	

Deliverable 5: Demonstration projects and capacity-building

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
JCOMM, ODP representatives in collaboration with ETRP	**Action 5.1 "Capacity Building":** Address capacity-building Issues according to the guidelines provided within the document.	Pending. ODP to identify representatives.	3Q 2009	
	Sub-tasks:			
JCOMM, ODP representatives in collaboration with ETRP	**5.1.1** Monitor progress, make adjustments and refine targets of action	Ongoing. Education of staff at RMIC. Production of training material. Workshop planned in Jan 2010	Ongoing	
S. Belov, CIMO Representative	**5.1.2** Review existing training materials, updating the E2E documentation, and reviewing the marine chapter of the WMO Publication No. 8 (*CIMO Guide*) and update, as appropriate.	Pending. Review of E2EDM documents complete.	1Q 2010	
IODE-PO, PP Support Team	**5.1.3** Organize training courses at the IODE Project Office. Suggested themes for training courses to include such topics as E2E technology, WIS interoperability, best practices and standards, instrument evaluation and intercomparisons.	Ongoing. Training workshop for ODIN Black Sea held March 2009. Training course for ODINWESTPAC held in Sept 2009.	Done (1st and 2nd workshop)	
IODE-PO	**5.1.4** Approach the WMO Education and Training Programme (ETRP) for promoting WIGOS and the JCOMM Pilot Project in developing countries by providing training materials and training courses for their delivery.	Pending. COMET is another resource to consider.	3Q 2009	

Deliverable 6: Legacy

Responsibility:	Actions and related Sub-Tasks:	Status / Comments:	Deadline	Cost :
PP Steering Group	**Action 6.1 "Legacy":** Address legacy issues in the view to make proposals for the WMO Cg-XVI through the WMO EC WG on WIGOS-WIS and its sub-group, as appropriate.	Pending. To be included in the project report	1Q 2010	
	Sub-tasks:			
PP Steering Group	**6.1.1** Monitor progress, make adjustments and refine targets of action.	Ongoing.	Ongoing	
PP Steering Group	**6.1.2** Prepare its final report for WMO Cg-XVI through the WMO EC WG on WIGOS-WIS and its Sub-group.	Project report being drafted by Secretariat; will be reviewed by the Co-Chairs, and the whole Steering Group	1Q 2010	
PP Steering Group	**6.1.3** Conduct meeting to assess pilot progress and address legacy of ODP-WIGOS Pilot Project for IODE and JCOMM and prepare presentation.	Same as above	1Q 2010	
Chairperson of PP Steering Group	**6.1.4** Provide presentation of progress to JCOMM Management Committee.	Pending.	End 2010	

ANNEX V

PROPOSED TERMS OF REFERENCE FOR REGIONAL MARINE INSTRUMENT CENTRES

DRAFT RECOMMENDATION

Rec. 6.5 (JCOMM-III) — WMO-IOC Regional Marine Instrument Centres (RMIC)

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting,

(1) The JCOMM Terms of Reference and especially those related to
(i) the development of observing networks,
(ii) The provision of capacity building to Member States
(iii) Assistance in the documentation and management of the data in international systems;

(2) The abridged final report with resolutions of the WMO fifteenth Congress, Geneva, Switzerland, 7-25 May 2007, WMO-No. 1026, and particularly Resolution 30 (Cg-XV) “Towards enhanced integration between WMO observing system”;

(3) The final report of the first Session of the WMO Executive Council Working Group on WIGOS and WIS, Geneva, Switzerland, 4-7 December 2007

(4) The final report of the *ad hoc* planning meeting for the JCOMM Pilot Project for WIGOS, Ostend, Belgium, 29 March 2008, JCOMM Meeting report No. 57;

(5) The final report of the meeting of the joint Steering Group for the IODE Ocean Data Portal (ODP) and the WIGOS Pilot Project for JCOMM, Geneva, Switzerland, 18-19 September 2008, JCOMM Meeting Report No. 62;

(6) The final report of the twenty-fourth Session of the Data Buoy Cooperation Panel, Cape Town, Republic of South Africa, 13-16 October 2008, JCOMM Meeting Report No. 61;

(7) The final report of the first Session of the Sub-Group of the WMO Executive Council Working Group on WIGOS and WIS, Geneva, Switzerland, 10-13 November 2008

(8) The final report of the seventh Session of the JCOMM Management Committee, Melbourne, Australia, 8-12 December 2008, JCOMM Meeting Report No. 62;

(9) The final report of the second Session of the WMO Executive Council Working Group on WIGOS and WIS, Geneva, Switzerland, 6-8 May 2009

(10) The final report of the fifth Session of the JCOMM Ship Observations Team (SOT), Geneva, Switzerland, 18-22 May 2009;

Noting further,

(1) The WIGOS Concept of Operations (CONOPS) as adopted by EC-LXI;

(2) The WIGOS Development and Implementation Plan (WDIP) as adopted by EC-LXI;

(3) The Project Plan of the WIGOS Pilot Project for JCOMM;

(4) The overarching Implementation Plan for the Ocean Data Portal (ODP) and WIGOS Pilot Project for the IODE and JCOMM;

(5) The proposal from USA to run an RMIC on a trial basis at the NOAA National Data Buoy Centre (NDBC);

Having considered,

(1) Members/Member States need for high quality marine meteorology and oceanographic measurements from the world oceans to address the requirements of WMO and IOC programmes and co-sponsored programmes;

(2) The need for facilities for the regular calibration and maintenance of marine instruments and the monitoring of instrument performance, on a regional basis in order to address adherence of ocean observations and associated metadata to high level standards for instruments and methods of observation;

(3) The need for documenting methods of measurements, for understanding biases introduced by each type of instrumentation, and for developing methods to correct such biases, in order to achieve delivery and use of coherent data sets;

(4) That RMICs would facilitate fulfilling these requirements;

(5) The role that RMIC could play with regard to instrument comparisons and evaluations, as well as for the training of marine meteorology and oceanography instrument experts;

Recognizing

(1) The experience gained by the WMO Commission for Instruments and Methods of Observation (CIMO) regarding establishment and operations of Regional Instrument Centres (RIC) and World and Regional Radiation Centres (WRC and RRC);

(2) Expertise of WMO Members and IOC Member States with regard to marine meteorology and oceanography instrument best practices, as well as the dedicated facilities they operate;

(3) Experience and capabilities of the global ocean research community for developing, evaluating, and refining new ocean observing technology;

(4) The excellent facilities and long experience of the National Data Buoy Centre (NDBC) regarding ocean instrument calibration, evaluation, and deployment;

Recommends

(1) To establish a network of Regional Marine Instrument Centres (RMIC) and a mechanism for formal WMO and IOC designation of RMIC where:

- (a) Governance for defining the functions and adoption of RMIC is proposed by JCOMM and endorsed by the WMO and IOC Executive Councils;
- (b) Candidate RMIC will be required to produce a statement of compliance, list capabilities of the proposed centre, state the formal commitment to voluntarily host the centre, and demonstrate capability to JCOMM;
- (c) Following possible agreement by JCOMM, the WMO and IOC Executive Councils will be invited to accept and approve new RMICs;
- (d) Terms of Reference of RMIC will become part of the WMO Guide to Meteorological Instruments and Methods of Observations (WMO No. 8, CIMO Guide);

(2) That the Terms of Reference of MRIC, including capabilities, and corresponding functions should be as given in the Annex to this Recommendation;

(3) That the National Data Buoy Centre (NDBC) of USA undertakes the functions of an RMIC on a trial basis and reports on the results to JCOMM with a view to eventually become an RMIC under the mechanism defined above;

Invites

(1) WMO Members and IOC Member States to consider taking advantage of the RMIC resources offered by NDBC on a trial basis as appropriate;

(2) Based on experience gained with the trial RMIC, WMO Members and IOC Member States consider proposing new RMICs as they see fit;

Requests

(1) the secretary General of WMO and the Executive Secretary of IOC to facilitate implementation of this recommendation and provide appropriate technical advisory assistance to Members/Member States concerned as required, in the operations of RMICs;

ANNEX TO RESOLUTION 6.5

WMO-IOC Regional Marine Instrument Center
Terms of Reference

WMO-IOC Regional Marine Instrument Centers (RMIC) should have the following capabilities to carry out their corresponding functions:

Capabilities:

(a) An RMIC must have, or have access to, the necessary facilities and laboratory equipment to perform the functions necessary for the calibration of meteorological and related oceanographic instruments deployed to address the common requirements of WMO and IOC programmes and co-sponsored programmes3;

(b) An RMIC must maintain a set of meteorological and oceanographic standard instruments or references and establish the traceability of its own measurement standards and measuring instruments to the International System of Units (SI);

(c) An RMIC must have qualified managerial and technical staff with the necessary experience to fulfill its functions;

(d) An RMIC must develop its individual technical procedures for the calibration of meteorological and related oceanographic instruments using calibration equipment employed by the RMIC;

(e) An RMIC must develop its individual quality assurance procedures;

(f) An RMIC must participate in, or organize, inter-laboratory comparisons of standard calibration instruments and methods;

(g) An RMIC must utilize the resources and capabilities of its region of interest4 according to the region's best interests, when appropriate;

(h) An RMIC must apply international standards applicable for calibration laboratories, such as ISO/IEC 17025, to the extent possible;

(i) A recognized authority5 must assess an RMIC, at least every five years, to verify its capabilities and performance;

Corresponding functions:

(j) An RMIC must assist Members/Member States of its region of interest[2] in calibrating their national meteorological standards and related oceanographic monitoring instruments according to the RMIC capabilities;

(k) An RMIC must participate in, or organize, JCOMM and/or regional instrument inter-comparisons, following relevant JCOMM recommendations;

(l) An RMIC must make a positive contribution to Members/Member States regarding the quality of measurements;

3: Basically in situ geo-physical instruments deployed in the surface marine environment or sub-surface
4: The region of interest is proposed by the candidate RMIC and normally covers all Members / Member States with a common interest regarding instrument deployed in a given ocean basin and/or enclosed sea.
5: JCOMM will be the body that formally proposes new RMICs and proposes any authority to do evaluations

(m) An RMIC must advise Members/Member states on enquiries regarding instrument performance, maintenance and the availability of relevant guidance materials;

(n) An RMIC must actively participate, or assist, in the organization of regional workshops on meteorological and related oceanographic instruments and measurements;

(o) The RMIC must cooperate with other RMICs in the standardization of meteorological and related oceanographic measurements and sensors;

(p) An RMIC must regularly inform Members/Member States and report, on an annual basis, to the JCOMM Management Committee on the services offered to Members/Member States and the activities carried out. JCOMM should, in turn, keep the Executive Councils of WMO and IOC regularly informed of the status and activities of the RMICs, and propose changes, as required.

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ANNEX VI

PROPOSED STRATEGY FOR THE REVIEW OF THE WMO AND IOC TECHNICAL PUBLICATIONS IN LIGHT OF THE PILOT PROJECT DEVELOPMENTS

4.1 One of the goals of the WIGOS Pilot Project for JCOMM is to define methodology, governance between WMO and IOC partners, and test concept for agreeing on common standards for ocean observation practices (i.e. guidelines, best, mandatory or recommended practices, or minimum specifications as appropriate), including instruments and methods of observation as well as subsequent organization and handling of the data and information to deliver consistent and better quality data to both the broad user and modelling communities. Data records must be traceable to standards, i.e. thanks to collected instrument/platform metadata, it must be possible to identify what standards were used to make the measurements and perform quality monitoring. Maintenance and calibration are critical for ensuring stability and sustainability of systems. To understand system and component performance, a thorough documentation of observing platform siting and history as well as the recording and updating of metadata are critical in the elimination of inhomogeneities in data records.

4.2 The two domains of marine meteorology and oceanography have different histories that have resulted in different practices. For marine meteorology, there is a long history of working within the framework of the WMO and the various regulations and observing practices that have been established. Meanwhile, oceanographic observations are largely originated from research initiatives, during rather the recent period; new methods and procedures are frequently being developed, tested and applied to the regular observing activities. It is therefore important to develop and agree on the use of up-to-date standards and best (or minimal) practices.

4.3 It must also be noted that instrument practices, calibration procedures, operating / implementation / deployment procedures and guides, quality control procedures and / or guidelines (delayed-mode, real-time, automatic, or manual), data processing techniques, and formats (e.g., data collection formats) have been developed over the years by the different marine observing systems whose implementation is now coordinated through the JCOMM Observations Programme Area (OPA). The ocean observation Panels under OPA include the Data Buoy Co-operation Panel (DBCP), the Global Sea Level Observing System (GLOSS), the Ship Observations Team (SOT). The ocean observation Panels associated with OPA include the Ocean Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES), the Argo Steering Group (AST), and the IOC International Ocean Carbon Coordination Project (IOCCP).

4.4 All these Panels are maintaining documentation on methods of observation, and there is benefit in reviewing the relevant information on instrumentation best (or minimal) practices and standards, addressing integration issues, i.e. identifying compatibilities, avoiding duplication of information, proposing higher levels of standards, including joint WMO-ISO standards. Documentation should be updated accordingly, higher level standards proposed and integrated into relevant parts of the appropriate WMO and / or IOC Manual and Guides, and appropriate cross-references made between the various documents. However, experimental or research observational methods shall not be considered in this exercise.

4.5 From a WMO perspective, and as part of the WIGOS framework, the agreed-upon standards and recommended practices, and procedures will apply to all WMO observing systems and Programmes. WMO will work with IOC to achieve maximum commonality of standards and practices across GOOS and GCOS. Strong cooperation and collaboration is therefore needed with IOC. The Twenty-fifth Session of the IOC Assembly, Paris, 16-25 June 2009, noted and endorsed as a priority to be considered by JCOMM-III the development of standards and best practices for operational ocean and marine meteorological data, products and services.

4.6 In this context, the purpose of promoting higher level standards is to review and update WMO and IOC Technical Publications in such a way to (i) facilitate cooperation amongst Members/Member States for the implementation of ocean observing systems and the making of

observations, (ii) specify obligations (for a Manual) or recommendations (for a Guide) of/to Members/Member States in addressing the requirements of WMO and IOC Programmes, and co-sponsored Programmes, and (iii) ensure adequate uniformity and standardization in the practices and procedures employed.

4.7 In the process of going towards higher level standards, the mandates of WMO and IOC will have to be respected, as well as the hierarchy of the documents (from characteristics of observing networks to instrument practices, and from standard practices to recommended practices). Duplication shall be avoided, and references made to other Publications as appropriate.

4.8 The review of such documentation has started as part of the development of the *JCOMM Catalogue of Best Practices and Standards* in early 2009 and some recommendations have already been made.

Existing Publications and References

4.9 The standards and practices used in observing the atmosphere and ocean need to be well documented and ensure that sufficient detail accompanies observations so that a user can interpret the measurements correctly.

4.10 Commonly agreed standards and best practices for observing ocean sub-surface and surface parameters were documented as IOC Manual and Guides No. 4 (Guide to Oceanographic and Marine Meteorological Instruments and Observing Practices), and IOC Manual and Guides No. 26 (Manual of Quality Control Procedures for Validation of Oceanographic Data). There are other publications addressing specific ocean variables or observing platform types, such as IOC Manual and Guide No. 14 for sea level data.

4.11 Observations for traditional ocean surface, atmospheric surface, and upper atmospheric parameters have basically been addressed and documented by the following WMO publications, including; (i) WMO Publication No. 544, Manual on the Global Observing System (GOS)6, (ii) WMO Publication No. 488, Guide on the GOS7, and (iii) the WMO Publications No. 8, Guide to Meteorological Instruments and Methods of Observation8. All three Publications contain marine sections or parts dedicated to ocean variables, or ocean observing platform types. The WMO Commission for Basic Systems (CBS) is responsible for updating WMO No. 544, and WMO No. 488. Proposed changes will have to be submitted to the CBS Rapporteur on Regulatory Material for review then to the CBS Implementation Coordination Team on Integrated Observing Systems (ICT-IOS), then to the CBS Session. The WMO Commission for Instruments and Methods of Observation (CIMO) is responsible for updating WMO No. 8 and proposed changes will have to be submitted through the Rapporteur on the CIMO Guide.

4.12 Both the IOC M&G No. 4 (published in 1975) and No. 26 (published in 1993) require update – during the IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards (Ostend, Belgium, 21-25 January 2008), participating experts reviewed large part of the M&G No. 26 where the concerned parameters were addressed (e.g. temperature/salinity profiles, sea level, surface waves), and agreed on the plan for update in short term.

4.13 Taking into account the limited resources available within JCOMM, updating this guide will be a long exercise. At the same time, one could consider doing this in conjunction with the updating of the WMO No. 544, WMO No. 488, and WMO No. 8. But the WMO Publications updating should be faster because they are more up to date. The WMO process should not be slowed down. So it is recommended to undertake the updating process of the WMO and IOC

6 : The Manual on the GOS addresses standard practices and procedures that WMO Members have to follow. It essentially specifies what is to be observed, where and when in order to meet the relevant observational requirements of Members.
7 : The guide on the GOS addresses recommended practices and procedures which it is desirable that Members follow or implement. It provides detailed guidance on how to establish, operate, and manage networks of stations to make these observations.
8 : The Guide to Meteorological Instruments and Methods of Observation addresses recommended practices and procedures which it is desirable that Members follow or implement. It contains comprehensive and up to date guidance on the most effective practices for making meteorological observations and practices.

Publications in parallel at different speeds – with the ultimate goal to achieve common, complementary, or compatible standards - bearing in mind that the results will be delivered separately and with different time scales.

Proposal for near-term work

4.14 Based on the current situation, the following two-step approach is being proposed in order to properly integrate Instrument Methods of Observations of interest to JCOMM as part of the WMO and IOC Technical Publications.

(1) Step 1 – Agree on contents of WMO and IOC Publications according to the mandates of both Organizations;

(2) Step 2 – Seeking expertise within JCOMM, in cooperation with associated programmes, to effectively conduct the updating of relevant WMO and IOC Publications;

4.15 Step 1 – Agree on content of WMO and IOC Publications according to the mandates of both Organizations

4.15.1 The goal is to seek agreement on what should be included in each Publication in order to minimize duplication. WMO and IOC Publications should make references to each other. This approach should also simplify future updates. Table 1 is summarizing the variables of interest to JCOMM, which are addressed in IOC M&G No. 4, WMO No. 544, WMO No. 488, WMO No. 8, and IOC M&G No. 14. To reach agreement, the following principles could be proposed:

(i.) JCOMM would be focusing, at least initially, on the geo-physical sub-surface, and ocean/marine surface variables. So the atmospheric upper air variables can probably be left out of this exercise, and perhaps also the biological ones (WMO and IOC therefore addressing these two domains separately);

(ii.) The WMO Publications would probably continue to address what they have been addressing so far (i.e. the meteorological variables plus some usual surface marine variables);

(iii.) The WMO Publications would not specifically address the sub-surface variables, or platform types such as XBTs, and Argo; but references would be made to the IOC M&G provided these will indeed be documented;

(iv.) Some of the atmospheric variables can be addressed in the IOC M&G No. 4 but references should be made to the WMO Publications;

(v.) There are some variables (e.g. SST, SSS, waves, surface currents, sea level) that shall probably be addressed in both WMO and IOC Manual and Guides but one should make sure that there is some level of consistency between the two although they don't have to be identical as different applications might be targeted (applications targeted should be mentioned in that case).

Variable	IOC M&G No. 4	IOC M&G No. 26	WMO No. 8	WMO No. 544	WMO No. 488	IOC M&G No. 14
Ocean sub-surface						
Sub-T	X	X				
Sub-Sal	X	X				
Sub Currents	X	X				
Ocean Surface						
Surface-Currents	X	X				
Waves	X	X		X	X	
SST	X			X	X	
SSS	X					
Water transparency and colour	X					
Sea-Ice			X	X	X	
Sea level						X
Ship's course and speed				X	X	
Atmospheric Surface						
Air T	X		X	X	X	
Wind	X	X	X	X	X	
Air pressure (and tendency)	X		X	X	X	
Air humidity	X		X	X	X	
Precipitation	X		X	X		
Visibility	X		X	X	X	
Radiation			X	X		
Sunshine duration			X	X		
Present, past weather			X	X	X	
Clouds			X	X	X	
Ozone			X			
Atmospheric composition			X			
Special phenomena			X	X	X	
Upper Air						
Upper air P, T, U			X	X	X	
Upper wind			X	X	X	

Table 1: Variables of interest to JCOMM addressed in IOC Manual and Guides No. 4, IOC M&G No. 26, WMO No. 544, WMO No. 488, WMO No. 8, and IOC Manual and Guides No. 14 (JCOMM TR No. 31).

4.15.2 Based on those principles, one could for example propose initially to address some variables of interest to JCOMM as shows in Table 2 (in bold where the variable would be added in the corresponding Publication).

Variable	IOC M&G No. 4	IOC M&G No. 26	WMO No. 8	WMO No. 544	WMO No. 488
Ocean sub-surface					
Sub-T	X	X			
Sub-Sal	X	X			
Sub Currents	X	X			
Ocean Surface					
Surface-Currents	X	X	**X**	**X**	**X**
Waves	X	X	**X**	X	X
SST	X	**X**	**X**	X	X
SSS	X	**X**			
Water transparency and colour	X	**X**			
Sea-Ice			X	X	X
Sea level	**X**	**X**	**X**	**X**	**X**
pCO_2	X	**X**			
Atmospheric Surface					
Air Temperature	X	**X**	X	X	X
Wind speed and direction	X	X	X	X	X
Air pressure (and tendency)	X	**X**	X	X	X
Air humidity			X	X	X
Precipitation			X	X	
Visibility			X	X	X
Radiation			X	X	
Present and past weather			X	X	X
Clouds			X	X	X
Ozone			X		
Atmospheric CO_2 at the surface					
Special phenomena			X	X	X

Table 2: Variables of interest to JCOMM that could be addressed in future versions of IOC M&G No. 4, IOC M&G No. 26, WMO No. 544, WMO No. 488, and WMO No. 8.

4.16 Step 2 – Seeking expertise within JCOMM, coordinating with associated programmes, to effectively conduct the updating of relevant WMO and IOC Publications

Once agreement is reached regarding what shall be included in each Publication, some extensive consultation will be required within JCOMM and beyond in order to effectively conduct the review of the relevant WMO and IOC Publications. It is proposed to run the following activities in parallel:

(1) Working on an observed variable basis;
(2) Working on an observing platform type basis; and
(3) Addressing the more general issues.

4.16.1 Working on an observed variable basis

4.16.1.1 The strategy proposes to split the work for each variable, and develop a workplan accordingly. The workplan will be focusing initially on important ocean variables, or variables where it is believed it will be easier to reach consensus more quickly.

4.16.1.2 Some references are made below to the Community White Papers (CWP) submitted to the OceanOBS'09 symposium9, Venice, 21-25 September 2009, and which are relevant to ocean instrument and methods of observation. It is recommended to consult with those experts during the course of this exercise.

4.16.1.3 The publications listed in Appendix A are also addressing methods of observation on a platform type basis and input from them can be used to address the variables below or address the platform-based sections of the WMO No. 544, WMO No. 488, and WMO No. 8:

a) Sea-level

Sea level instrument standards are well document in IOC M&G No. 14 (JCOMM TR No. 31), Manual on Sea Level Measurement and Interpretation - Volume IV: An Update to 2006, which is up to date. However, the guide is very detailed, and more general recommendations potentially acceptable to all Members/Member States will have to be extracted. Some information is also available in IOC M&G No. 26 but the publication should be updated.

The Global Sea Level Observing System (GLOSS) Group of Experts (GLOSS-GE) should be invited to address this issue and make recommendations for inclusion of appropriate information in the IOC M&G No. 4, and No. 26.

OceanOBS'09 Community White Papers:

- Bernard et al., Sustaining and integrating the tsunami observing networks
- Lafon et al., The SWOT (Surface Water Ocean Topography) Mission
- Merrifield et al., The Global Sea Level Observing System (GLOSS)
- Shum et al., Geodetic observations of ocean surface topography, ocean currents, ocean mass, and ocean volume changes
- Wilson et al., Ocean Surface Topography Virtual Constellation

b) Sea Surface Temperature (SST)

SST should be addressed by the Group on High Resolution SST (GHRSST) in collaboration with the Data Buoy Cooperation Panel (DBCP). Some work has already been initiated in this regard and should be pursued.

The following publications can also be used:

- DBCP No. 8, Guide to moored buoys
- DBCP No. 4, Barometer Drifter Design Reference
- IOC M&G No. 20, Guide to drifting data buoys (outdated)

OceanOBS'09 Community White Papers:

- Donlon et al., Successes and Challenges for the Modern SST Observing System
- Meldrum et al., Data buoy observations: the status quo and anticipated developments over the next decade

c) Waves

Waves should be addressed by the DBCP and the JCOMM Expert Team on Wind Waves and Storm Surges (ETWS). Some information is also available in IOC M&G No. 26 but the publication should be updated.

The following publications can also be used:

9 : http://www.oceanobs09.net/

- WMO No. 702, Guide to Wave Analysis and Forecasting, 1998, second edition - Chapter 8
- JCOMM TR No. 9, Estimation of extreme wind wave heights
- IOC M&G No. 18, User Guide for the Exchange of Measured Wave Data

OceanOBS'09 Community White Papers:

- Swail et al., Wave measurements, needs and developments for the next decade

d) Surface currents

Surface currents should be addressed by the DBCP and OceanSITES. Some information is also available in IOC M&G No. 26 but the publication should be updated.

OceanOBS'09 Community White Papers:

- Lagerloef et al., Measuring the global ocean surface circulation with satellite and in situ observations
- Send et al., A global boundary current circulation observing network
- Shum et al., Geodetic observations of ocean surface topography, ocean currents, ocean mass, and ocean volume changes

e) Sea-ice

Sea-ice should be addressed by the JCOMM Expert Team on Sea-Ice (ETSI), the International Arctic Buoy Programme (IABP), and the WCRP-SCAR International Programme for Antarctic Buoys (IPAB).

The following publications can also be used:

- JCOMM TR No. 8, Oceanographic and Marine Meteorological Observations in the Polar Regions – A report to JCOMM
- WMO No. 259, WMO sea-ice nomenclature
- Electronic chart Systems Ice Object catalogue

OceanOBS'09 Community White Papers:

- Breivik et al., Remote sensing of sea ice
- Lee et al, The Ocean and Sea-Ice Components of the Arctic Observing Network
- Calder et al., An Integrated International Approach to Arctic Ocean Observations for Society (A Legacy of the International Polar Year)

f) Sub surface water temperate, and salinity

Sub-surface water temperature and salinity should be addressed by the Argo Steering Team (AST), the Ship Of Opportunity Programme (SOOPIP), and the Tropical Moored Buoy Implementation Panel (TIP). Some information is also available in IOC M&G No. 26 but the publication should be updated.

The following publications can also be used:

- SOOPIP XBT Best Practices
- SOOPIP XBT/XCTD Standard Test Procedures
- SOOPIP QC Cookbook for XBT data
- Procedures used at AOML to QC real time XBT data collected in the Atlantic Ocean
- IOC M&G No. 22, GTSPP real-time QC manual

OceanOBS'09 Community White Papers:

- Goni et al., Ship Of Opportunity Program
- McPhaden et al., The Global Tropical Moored Buoy Array
- Roemmich et al., Argo: Observing the global ocean

g) Sub surface Currents

JCOMM should consult with Acoustic Doppler Current Profiler (ADCP) experts in order to take this variable into account. Some information is also available in IOC M&G No. 26 but the publication should be updated. The International Ocean Carbon Coordination Project (IOCCP) is currently conducting a review of the Hydrography Manual which includes a chapter on WOCE ADCP as well as a chapter on acquiring Lowered Doppler Current Profiler Data.

h) Sea Surface Salinity (SSS)

SSS should be addressed by the IODE/JCOMM Global Ocean Surface Underway Data Pilot Project (GOSUD).

The following publications can also be used:

- SOOPIP User Guide for Thermosalinographs (TSG) installation and maintenance
- IOC M&G No. 44, Algorithms for the Computation of Fundamental Properties of Seawater
- WOCE Sea Surface Salinity user's manual

OceanOBS'09 Community White Papers:

- Lagerloef et al., Resolving the global surface salinity field and variations by blending satellite and in situ observations

i) Water transparency and colour

JCOMM should consult with Ocean Color experts in order to take this variable into account.

OceanOBS'09 Community White Papers:

- Yoder et al., The Ocean Colour Radiance Virtual Constellation (OCR-VC)

j) Ocean Carbon (pCO_2)

Ocean Carbon should be considered by the International Ocean Carbon Coordination Project (IOCCP).

OceanOBS'09 Community White Papers:

- Byrne et al., Sensors and Systems for Observations of Marine CO2 System Variables
- Schuster et al., A global sea surface carbon observing system: assessment of sea surface CO2 and air-sea CO2 fluxes

k) Surface atmospheric variables

Recommended practices for the following surface atmospheric variables are documented in the WMO No. 544, WMO No. 488, WMO No. 8, and WMO No. 471. A review of these Publications for those variables can be undertaken by a small group including representatives from the SOT, the DBCP, the TIP, and the OceanSITES.

- Air Temperature

- Wind speed and direction
- Air pressure (and tendency)
- Air humidity
- Precipitation
- Visibility
- Radiation
- Ozone
- Atmospheric CO_2 at the surface

In conducting this exercise, the group shall also propose to move relevant parts of Chapter 6 (the Voluntary Observing Ships' Scheme) of WMO Publication No. 471, Guide to marine meteorological services into the following Publications:

- WMO Publication No. 544, Manual on the Global Observing System (GOS)
- WMO Publication No. 488, Guide on the Global Observing System (GOS)
- WMO Publications No. 8, Guide to Meteorological Instruments and Methods of Observation

The following publications can also be reviewed:

- DBCP No. 4, Barometer Driver Design Reference
- DBCP No. 8: Guide to Moored Buoys and Ocean Data Acquisition Systems
- JCOMM TR No. 4, The Voluntary Observing Ships Scheme – A Framework Document - Revision 1
- JCOMM TR No. 5, Voluntary Observing Ships (VOS Climate Subset Project (VOSCLIM) – Project Document
- SOR Basic ship visit and rider rules
- Tropical Moored Buoy array publications

OceanOBS'09 Community White Papers:

- Meldrum et al., Data buoy observations: the status quo and anticipated developments over the next decade
- Kent et al., The Voluntary Observing Ship Scheme
- Send et al., OceanSITES

r) Present and past weather

This variable can only realistically be manually observed in the marine environment from ships or sea stations. Unless new requirements arise, or new technology is proposed, it is not proposed to update the WMO Manuals and Guides No. 544, 488, 8, and 471 at this point.

s) Clouds

This variable can only realistically be manually observed in the marine environment from ships or sea stations. Unless new requirements arise, or new technology is proposed, it is not proposed to update the WMO Manuals and Guides No. 544, 488, 8, and 471 at this point.

v) Special phenomena

This variable can only realistically be manually observed in the marine environment from ships or sea stations. Unless new requirements arise, or new technology is proposed, it is not proposed to update the WMO Manuals and Guides No. 544, 488, 8, and 471 at this point.

4.16.1.4 Table 3 below provides for a summary of variables to address, and groups to be involved, Publications to review, and OceanOBS'09 experts to consult.

Variable	Group(s) to consult	Publication to use	OceanOBS'09 CWP
Sea level	GLOSS-GE	IOC M&G No. 14 IOC M&G No. 26	Bernard et al., Lafon et al., Merrifield et al., Shum et al., Wilson et al.
SST	GHRSST, DBCP	DBCP No. 4 DBCP No. 8 IOC M&G No. 20	Donlon et al., Meldrum et al.
Waves	ETWS, DBCP	IOC M&G No. 26 JCOMM TR No. 9 IOC M&G No. 18 WMO No. 702	Swail et al.
Surface current	DBCP, OceanSITES	DBCP No. 8 IOC M&G No. 20 IOC M&G No. 26	Lagerloef et al., Send et al., Shum et al.
Sea-ice	ETSI, IABP, IPAB	JCOMM TR No. 8 WMO No. 259 Electronic chart Systems Ice Object catalogue	Breivik et al., Lee et al, Calder et al.
Sub-surface temperature and salinity	AST, SOOPIP, TIP	SOOPIP XBT Best Practices SOOPIP XBT/XCTD Standard Test Procedures SOOPIP QC Cookbook for XBT data Procedures used at AOML to QC real time XBT data collected in the Atlantic Ocean IOC M&G No. 22 IOC M&G No. 26	Goni et al., McPhaden et al., Roemmich et al.
Surface currents	ADCP experts	IOC M&G No. 26 IOCCP Hydrography Manual	
SSS	GOSUD	SOOPIP User Guide for Thermosalinographs (TSG) installation and maintenance IOC M&G No. 44 WOCE Sea Surface Salinity user's manual	Lagerloef et al.
Ocean color	Ocean color experts		Yoder et al.
Ocean carbon	IOCCP		Byrne et al., Schuster et al.
Surface atmospheric variables	SOT, DBCP, TIP, OceanSITES	WMO No. 8 WMO No. 544 WMO No. 471 DBCP No. 4 DBCP No. 8 JCOMM TR No. 4 JCOMM TR No. 5 SOT Basic ship visit and rider rules Tropical moored buoy array publications	Meldrum et al., Kent et al., Send et al.

Table 3: Summary of variables to address, and groups to be involved, Publications to review, and OceanOBS'09 experts to consult.

4.16.2 Working on an observing platform type basis

4.16.2.1 It is proposed to focus initially on the following types of ocean observing platforms. As JCOMM Panels are platform based, the relevant ones should be at least consulted for reviewing IOC M&G No. 4, WMO No. 544, 488, 8 and providing input as required. Other associated programmes should be consulted as appropriate.

Platform type	**Panel**
Drifters	DBCP
Moored buoys	DBCP, OceanSITES, TIP
Ships	SOT, IOCCP
Profiling floats	AST
Tide gauges	GLOSS
Tsunameters	ITP

Table 4: Platform types and ocean observations Panel to consult.

4.16.2.2 It is proposed to recruit a consultant who would consult with these Panels, and suggest changes to the Publications. These changes would then be reviewed by each Panel, hopefully endorsed, and then submitted to the appropriate WMO and IOC bodies.

4.16.3 Addressing the more general issues

4.16.3.1 A task team designated by the JCOMM Observations Coordination Group (OCG) shall be responsible for reviewing the general sections of the following Publications, consulting other expert groups, and providing input as appropriate:

- IOC Manual and Guides No. 4, Guide to Oceanographic and Marine Meteorological Instruments and Observing Practices
- IOC Manual and Guides No. 26, Manual of Quality Control Procedures for Validation of Oceanographic Data
- WMO Publication No. 544, Manual on the Global Observing System (GOS)
- WMO Publication No. 488, Guide on the Global Observing System (GOS)
- WMO Publications No. 8, Guide to Meteorological Instruments and Methods of Observation

4.16.3.2 The Task Team shall then submit its recommendations for updating the above Publications to the WMO and IOC Executive Councils through JCOMM for approval.

4.17 Summary of recommendations

4.17.1 Work required is ambitious, and resources limited. Things will therefore have to be prioritized, and achieved in several steps in the next few years. A workplan, focusing initially on priority ocean variables/platform types, or where we believe it will be easier to reach consensus more quickly will have to be proposed. To execute the workplan, the following is proposed:

- Specific Task Teams (TT) to address what observing platform types are the most appropriate for observing specific ocean variables, and for the standardization of instruments and methods of observation for these variables (one Task Team for one or more variables).
- A Consultant to work on an observing platform type basis (one consultant for one or more platform types).
- An OCG Task Team on standardization of ocean observations to look at the more general issues.

4.17.2 Each Task Team and the consultant will have to consult each other, as well as experts who have submitted appropriate Community White Paper (CWP) to the OceanOBS'09 symposium. They will also have to review and extract appropriate information from existing JCOMM Publications or documents addressing observing networks, observing platform types, instrument

issues and methods of observation. Generic Terms of Reference for the Task Teams and the consultant are proposed in Appendix B.

4.17.3 In this process, the mandates of WMO and IOC will have to be considered, as well as the hierarchy of the documents (from characteristics of observing networks to instrument practices, and from standard practices to recommended practices). Duplication shall be avoided, and references made to other Publications as appropriate. Standard or recommended best (or minimal) practices and procedures concerning Observing Systems, methods of observations, and instruments shall be made sufficiently generic and potentially acceptable to all WMO Members and IOC Member States. They shall properly translate the requirements of WMO and IOC Programmes and co-sponsored Programmes in terms of observing systems characteristics, platform type typical configurations, essential instrument features, and methods of observation. Recommendations shall be limited to the generally accepted common characteristics of observing networks or existing configurations. Some of the technical details will therefore be avoided in order to limit the documentation's dependency vis a vis existing technology, or to avoid hindering technological advances. Similarly, experimental or research observational methods shall not be considered in this exercise.

4.17.4 The work will have to be conducted according to the WMO and IOC regulation cycle (typically four years), and can be repeated as long as there is a need to review and update the documentation (Table 5). However, the cycle proposed in Table 5 is just given as an example of how things could be developed. In other words, one shall not necessarily have to wait for the end of a cycle to start working on other variables or platform types; work can also be done in parallel if possible.

<table>
<tr><td colspan="4">——————————————————Time ——————————————————► …</td></tr>
<tr><td colspan="2">Cycle 1 (4 years)</td><td colspan="2">Cycle 2 (4 years)</td></tr>
<tr><td>TT for variable a
TT for variable b</td><td rowspan="3">Changes proposed to WMO & IOC bodies</td><td>TT for variable c
TT for variable d</td><td rowspan="3">Changes proposed to WMO & IOC bodies</td></tr>
<tr><td>Consultant for platform type α
Consultant for platform type β</td><td>Consultant for platform type γ
Consultant for platform type δ</td></tr>
<tr><td>TT for general issues</td><td>TT for general issues</td></tr>
</table>

Table 5: Regulatory cycle

4.17.5 In the context of the WIGOS Pilot Project for JCOMM, and to prove concept, it is proposed to start the first cycle with the following:

- Variables: SST, and/or surface meteorological variables (one or two Task Teams)
- Platform types: drifters, moored buoys (one consultant)
- General issues (one Task Team)

4.17.6 It is proposed to invite the Data Buoy Cooperation Panel (DBCP) to consider supporting this work through financially supporting the consultant. The twenty-fifth Session of the DBCP (Paris, France, 28 September – 1 October 2009) may discuss this issue, and outcome may be presented at this meeting of the Joint Steering group for the IODE Ocean Data Portal and the WIGOS Pilot Project for JCOMM. With the acceptance of this proposal, the OCG will be invited to establish the Task Teams.

4.17.7 With progress through this proposed work, changes and updates proposed for WMO No. 544 and WMO No. 488 will be submitted to the CBS Rapporteur on Regulatory Material (Alexander Vasiliev, Russian Federation), for review before March 2010 in order for such changes to be considered by the CBS Implementation Coordination Team on Integrated Observing Systems (ICT-IOS) (Sept. 2010) and approved by the CBS in 2011. Changes proposed for WMO No. 8 will have to be submitted through the Rapporteur on the CIMO Guide.

APPENDIX A

PUBLICATIONS OF INTEREST

No.	Title	URL
WMO No. 8	Guide to Meteorological Instruments and Methods of Observation (CIMO Guide)	http://www.wmo.int/pages/prog/www/IMOP/publications/CIMO-Guide/CIMO_Guide-7th_Edition-2008.html
WMO No. 259	WMO sea-ice nomenclature	http://www.aari.nw.ru/gdsidb/XML/sea_ice_nomenclature.html
WMO No. No. 471	Guide to marine meteorological services (regulates the Voluntary Observing Ship Scheme)	
WMO No. 488	Guide on the Global Observing System (GOS)	ftp://ftp.wmo.int/Documents/MediaPublic/Publications/WMO488_GOSguide/488_Guide_2007.pdf
WMO No. 544	Manual on the Global Observing System (GOS)	http://www.wmo.int/pages/prog/www/OSY/Manuals_GOS.html
WMO No. 702	WMO No. 702, Guide to Wave Analysis and Forecasting, 1998, second edition - Chapter 8	http://www.wmo.int/pages/prog/amp/mmop/documents/WMO%20No%20702/WMO702.pdf
IOC M&G No. 4	Guide to oceanographic and marine meteorological instruments and observing practices	http://unesdoc.unesco.org/images/0005/000599/059947eo.pdf
IOC M&G No. 14	Manual on Sea Level Measurement and Interpretation - Volume IV: An Update to 2006	ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-31/JCOMM-TD-31.pdf
IOC M&G No. 18	User Guide for the Exchange of Measured Wave Data	http://unesdoc.unesco.org/images/0007/000785/078593eb.pdf
IOC M&G No. 20	Guide to drifting data buoys (outdated)	http://unesdoc.unesco.org/images/0008/000813/081353eo.pdf
IOC M&G No. 22	GTSPP real-time QC manual	http://unesdoc.unesco.org/images/0008/000878/087850eb.pdf
IOC M&G No. 26	Manual of Quality Control Procedures for Validation of Oceanographic Data	http://unesdoc.unesco.org/images/0013/001388/138825eo.pdf
IOC M&G No. 44	Algorithms for the Computation of Fundamental Properties of Seawater	http://unesdoc.unesco.org/images/0005/000598/059832eb.pdf
JCOMM TR No. 4	The VOS Ships Scheme, a framework document – Revision 1	ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-4-VOS-Framework-Document/JCOMM-TR-4-VOS-Framework-Document-REV1.pdf
JCOMM TR No. 5	Voluntary Observing Ships (VOS) Climate Subset Project (VOSCLIM) – Project Document, Revision 2	http://www.jodc.go.jp/info/ioc_doc/JCOMM_Tech/TR05_2_VOS_Rev2.pdf
JCOMM TR No. 8	Oceanographic and Marine Meteorological Observations in the Polar Regions - A Report to JCOMM	ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-8-Holland-Report/JCOMM-TR-8.doc
JCOMM TR No. 9	Estimation of extreme wind wave heights	http://www.jodc.go.jp/info/ioc_doc/JCOMM_Tech/TR09.pdf
DBCP No. 4	Barometer Driver Design Reference	http://www.jcommops.org/doc/DBCP/svpb_design_manual.pdf
DBCP No. 8	Guide to Moored Buoys and Ocean Data Acquisition Systems	
	SOT Basic ship visit and rider rules	http://www.jcommops.org/soopip/soopog-ship-visit.html
	SOOPIP XBT Best Practices	http://www.jcommops.org/soopip/doc/manuals/best_guide/SOOP_best_guide.pdf
	SOOPIP XBT/XCTD Standard Test Procedures	http://www.jcommops.org/soopip/doc/manuals/soopog/XBT-XCTD-

		standard-test-procedures.doc
	SOOPIP QC Cookbook for XBT data	http://woce.nodc.noaa.gov/woce_v3/wocedata_1/woce-uot/document/qcmans/csiro/csiro.htm
	SOOPIP User Guide for Thermosalinographs (TSG) installation and maintenance	http://www.legos.obs-mip.fr/en/observations/sss/publications/others/rapports_en_pdf/TSG_Guide_UK.pdf
	Procedures used at AOML to QC real time XBT data collected in the Atlantic Ocean	http://woce.nodc.noaa.gov/woce_v3/wocedata_1/woce-uot/document/qcmans/aoml/aoml_1.htm
	Tropical moored buoy array publications	http://www.pmel.noaa.gov/tao/proj_over/proj_over.html
	Electronic chart Systems Ice Object catalogue	http://www.jcomm-services.org/modules/documents/documents/si3_gdsidb11_Doc_2.6.4_Appendix_Ice_Objects_Catalogue.doc
	WOCE Sea Surface Salinity user's manual	http://www.ifremer.fr/gosud/doc/cordo-mut-02-047.doc

APPENDIX B

PROPOSED GENERIC TERMS OF REFERENCE OF THE TASK TEAMS AND THE CONSULTANT

1) Generic Terms of Reference of a Task Team on standardization of ocean "Variable V" measurements

The Task Team shall:

(a) Review ocean observation practices concerning ocean variable "V" as documented in IOC M&G No. 4, WMO No. 544, WMO No. 488, and WMO No. 8;
(b) Review other documentation produced by JCOMM observations Panels and associated programmes and relevant to the measurement of ocean variable "V";
(c) Consult with JCOMM experts from those groups as appropriate;
(d) Consult with relevant OceanOBS'09 experts;
(e) Propose revisions, as appropriate, to IOC M&G No. 4, WMO No. 544, WMO No. 488, and WMO No. 8 in the view to (i) facilitate cooperation amongst Members/Member States for the implementation of ocean observing systems routinely measuring ocean variable "V", (ii) specify obligations (for a Manual) or recommendations (for a Guide) of/to Members/Member States in addressing the requirements of WMO and IOC Programmes, and co-sponsored Programmes requiring routine observations of ocean variable "V", and (iii) ensure adequate uniformity and standardization in the practices and procedures employed;
(f) Report to the JCOMM Observations Coordination Group.

Members of the Task Team will be appointed by the Observations Coordination Group with relevant experts from JCOMM observations panels, associated programmes, and beyond.

2) Terms of Reference of the Task Team on standardization of ocean observations

(a) Review the sections of IOC M&G No. 4, WMO No. 544, WMO No. 488, and WMO No. 8 concerning ocean observation practices that are not specific to any ocean variable;
(b) Review other relevant documentation produced by JCOMM observations Panels and associated programmes;
(c) Consult with JCOMM experts from those groups as appropriate;
(d) Propose revisions, as appropriate, additions, or deletion to the sections of IOC M&G No. 4, WMO No. 544, WMO No. 488, and WMO No. 8 that are no specific to any ocean variable in the view to (i) facilitate cooperation amongst Members/Member States for the implementation of ocean observing systems and the making of observations, (ii) specify obligations (for a Manual) or recommendations (for a Guide) of/to Members/Member States in addressing the requirements of WMO and IOC Programmes, and co-sponsored Programmes, and (iii) ensure adequate uniformity and standardization in the practices and procedures employed;
(e) Report to the JCOMM Observations Coordination Group.

Members of the Task Team will be appointed by the Observations Coordination Group with relevant experts from JCOMM observations panels, associated programmes, and beyond.

3) Terms of Reference of the Consultant on a Platform Type "P"

The consultant shall:

(a) Review ocean observation practices concerning Platform type "P" as documented in IOC M&G No. 4, WMO No. 544, WMO No. 488, and WMO No. 8;
(b) Review other documentation produced by JCOMM observations Panels and associated programmes and relevant to Platform Type "P";

(c) Consult with JCOMM experts from those groups as appropriate;
(d) Consult with relevant OceanOBS'09 experts;
(e) Propose revisions, as appropriate, to IOC M&G No. 4, WMO No. 544, WMO No. 488, and WMO No. 8 in the view to (i) facilitate cooperation amongst Members/Member States for the implementation of Platform Type "P", (ii) specify obligations (for a Manual) or recommendations (for a Guide) of/to Members/Member States in addressing the requirements of WMO and IOC Programmes, and co-sponsored Programmes requiring deployment and operations of Platform Type "P", and (iii) ensure adequate uniformity and standardization in the practices and procedures employed;
(f) Report to the JCOMM Observations Coordination Group.

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ANNEX VII

POTENTIAL DATA-SETS TO CONSIDER IN THE WIGOS FRAMEWORK FOR THE PILOT PROJECT

1) List of datasets that will be contributed to the IODE ODP by partner organizations and programmes as part of the WIGOS Pilot Project for JCOMM

Data sets	***Agency(ies)***	***Target***[1]
Global Temperature and Salinity Profiles from the GTSPP	US NODC	End 2010
World Ocean Atlas	US NODC	End 2010
Surface currents from HF radar	US NDBC	End 2010
High Resolution Sea Surface Temperature from GHRSST	US NODC	End 2010
Data extracted from ESIMO – real-time GTS data and product (air temperature, wind, wave, sea level, current, water temperature, salinity, oxygen)	Russian Federation NODC	
Upper-ocean T & S gridded in situ fields	Canada ISDM	Jan 2010
Ocean surface observations measured from surface drifters	Canada ISDM	Jan 2010
Sea level data from PSMSL	UK BODC	
Marine Climatological Summaries and Global Collecting Centres (GCCs)	UK Met Office, and DWD, Germany	End 1Q 2010[2]
Blended-quality climatology products (ICOADS monthly summaries) - currently extending through May 2007 in NetCDF format	US NOAA/NCDC, and NOAA/ESRL	End 2010
Ocean data-sets from IMO	Un. Tasmania, Australia	Feb 2010

2) List of those additional data sets that can potentially be contributed

- Profiling floats (Argo);
- Deep ocean time-series reference stations (OceanSITES);
- Tropical moorings (TAO);
- Drifters (DBCP);
- Ship-based observations in the SOT (ASAP, VOS, XBTs);
- Tide gauges (GLOSS);
- Surface underway data (GOSUD); and
- Ocean carbon (IOCCP),
- Ocean Tracking Network (OTN);
- OBIS;
- Ocean Surface Vector Wind virtual constellation (OSVW) from CEOS
- etc.

1 : Date when the connection should be realized for those centres that recently provided positive response
2 : For the UK GCC

ANNEX VIII

ACTION ITEMS ARISING FROM THE MEETING

No.	Ref.	Action	By	Deadline
1	3.2	to compile the list of benefits expected from the Pilot Project to the Secretariat for further distribution to Members	G. Reed	ASAP
2	3.5	to raise the issue of CONOPS better reflecting other disciplines at the forthcoming second meeting of the Sub-Group of the EC WG WIS-WIGOS (Geneva, 19-23 October 2009)	G. Reed	Oct 2009
3	3.11	to address the aspect of Pilot Project to be evaluated for viability of the WIGOS concept, and experiences reflected in the draft Implementation Plan for WIGOS, and to report its findings to the Chairperson of the Sub-Group of the EC WG WIGOS-WIS.	G. Reed	June 2010
4	3.13	to report information to the second meeting of the Sub-Group of the EC WG WIGOS-WIS, and stress that JCOMM type governance, and WIGOS related functions under the JCOMM Observations and Data Management Programme Areas should be maintained in the future	G. Reed	Oct 2009
5	3.17	Morocco (RA-I): Morocco should be invited to investigate feasibility of acting as an RMIC as well	Secretariat	ASAP
6	3.17	Brazil (RA-III): It is not clear whether marine data are included in the Demonstration Project, and particularly the PIRATA array; this should be investigated	Secretariat	ASAP
7	3.17	Australia (RA-V): The Australian Demonstration Project is framed in to encompass the entire BCOS which spans many elements, including a range of marine and ocean observing programs. Possible synergies exist between this Demonstration Project and the Pilot Project which will be investigated.	Greg Reed	ASAP
8	3.17	Russian Federation (RA-VI): It is not clear whether the ODP is considered part of the Demonstration Project; the meeting asked Mr Nick Mikhaylov to clarify this	N. Mikhaylov	ASAP
9	4.5.2	to contact the contact points mentioned in the official letters received from some of the identified agencies to discuss the way forward	S. Belov	ASAP
10	4.5.4	to investigate whether any funding could be made available for supporting a visit of ODP experts to IMOS (Australia)	Secretariat	Jan 2010
11	5.1.3	to liaise with the CIMO President and the Secretariat in the view to include appropriate RMIC information in the CIMO Guide	J. van der Meulen	March 2010
12	5.1.4	to organize a metrology workshop in early 2010	Secretariat+NDBC	Jan 2010
13	5.2.3	to take similar steps so that HMEI can also enjoy similar consultative status within IOC	IOC	ASAP
14	5.2.3	Secretariats to follow up HMEI issue and writing to Members	WMO & IOC	ongoing
15	5.3.5	to play a role in reviewing WMO and IOC Publications and collaborate effectively	DBCP+SOT	ongoing
16	5.3.6	to coordinate the effort of updating the CIMO guide (part I) with the help from JCOMM experts and to liaise with the Secretariat in this regard	J. van der Meulen	Mar 2010
17	5.3.7	to propose how IOC M&G No. 4 could be updated	IOC Secretariat	Mar 2010)

18	5.3.7	to make sure the IOC M&G No. 26 is updated	IODE	ongoing
19	5.4.3	to approach the DBCP Pilot Project on Wave Measurement Evaluation and invite it to provide input in drafting such generic guidelines for marine inter-comparisons as a deliverable of the Pilot Project	Secretariat	March 2010
20	6.1.5	to make the modifications of JCOMM Catalogue web database in time for JCOMM-III	P. Pissierssens	ASAP
21	6.1.6	functionality should be added that allows submission of additional records/documents in JCOMM Catalogue (with appropriate submitter registration)	P. Pissierssens	Dec. 2010
22	6.1.7	to study the possibility to add a controlled vocabulary in the JCOMM Catalogue for subject keywords	P. Pissierssens	Dec. 2010
23	6.2.8	ETDMP member to be nominated to manage and coordinate the Ocean Data Standards Pilot Project	ETDMP	Dec 2010
24	6.3.2	The annex, listing all country names should be removed and, reference should be made to the URL where the list is updated continuously	G. Reed	ASAP
25	6.3.3	adopted standards published in the IOC Manuals and Guides series should also be identifiable as a sub-series, similar to the GOOS reports or the MIM Publication Series	IOC Secretariat	Mar 2010
26	6.3.4	To take into account recommendations from the joint Steering group regarding adopted standards published in the IOC Manuals and Guides series	IOC Secretariat	ongoing
27	7.1.4	to study the possibility of using experts to visit national institutions to provide guidance and technical assistance (as applied by the USA's IOOS)	Secretariat	Dec 2010
28	8.1.1	A list of recommendations derived from Strengths and Weaknesses should be produced and presented to the Sub-Group of the EC WG WIGOS-WIS	G. Reed	ASAP
29	8.4.2	to report meeting outcome to the second meeting of the SG, Geneva, 19-23 October)	Greg Reed	Oct 2009
30	8.7.2	to contact Mr, Keith Alverson, Director of the GOOS Project Office for his input	G. Reed	Oct 2009
31	9.1.2	in both the IODE.org and JCOMM.info web sites there should be a "WIGOS Pilot Project for JCOMM" page where all sub-activities and URLs as listed above are provided together with brief descriptions	Secretariat	ASAP
32	9.2.2	the IODE ODP brochure should be distributed to all IODE NODCs, WMO NMHSs, potential partners (as listed under agenda item 4.5) as well as to the participants in this meeting	Secretariat	ASAP
33	9.3.6	to prepare a draft of the project report and submit it to the Co-Chairs for their review and additional input. Subsequently the document will be circulated to all members of the Steering Group for final approval	Secretariat	Mar 2010)

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ANNEX IX

ACRONYM LIST

AOPC	Atmospheric Observation Panel for Climate
Argo	International profiling float programme
ASAP	Automated Shipboard Aerological Programme
ASAP	As soon as possible
BCOS	Bureau Composite Observing System (Australia)
BODC	British Oceanographic Data Centre (UK)
BOM	Bureau of Meteorology (Australia)
CB	Capacity-Building
CBS	WMO Commission for Basic Systems
CDI	SeaDataNET Common Data Index
Cg	WMO Congress
CIMO	WMO Commission on Instruments and Methods of Observation
CONOPS	WIGOS Concept of Operations
DBCP	Data Buoy Co-operation Panel
DBMS	Database Management System
DCD	Data Collection Platform
DCPC	Data Collection and Production Centre (of WIS)
DMAC	IOOS Data Management and Communications (USA)
DMCG	JCOMM Data Management Coordination Group
DMPA	JCOMM Data Management Programme Area
DOI	Digital Object Identifier
DP	Data Provider
DWD	Deutscher WetterDienst
E2E	End-to-End Data Management
E2EDM	End-to-End Data Management Pilot Project
EC	Executive Council
EC WG WIGOS-WIS	Executive Council working Group on WIGOS and WIS
EDMERP	European Directory of Marine Environmental Research Projects
EDMO	European Directory of Marine Organisations
ET-EGOS	CBS Expert Team on the Evolution of the Global Observing System
ETRP	WMO Education and Training Programme
ET-WISC	CBS Expert Team on WIS GISCS and DCPCs
ET-DMP	JCOMM Expert Team on Data Management Practices
FAQ	Frequently Asked Questions
FTP	File Transfer Protocol
GAW	Global Atmosphere Watch
GCC	Global Collecting Centre
GDAC	Global Data Assembly Centre
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GHRSST	Group for High Resolution SST Pilot Project
GIS	Geographical Information System
GISC	Global Information System Centres (of WIS)
GLOSS	JCOMM Global Sea-level Observing System
GODAE	Global Ocean Data Assimilation Experiment
GOOS	IOC-WMO-UNEP-ICSU Global Ocean Observing System
GOS	WMO Global Observing System
GOSUD	Global Ocean Surface Underway Data Pilot Project
GTS	Global Telecommunication System
GTSPP	Global Temperature and Salinity Profile Programme
HMEI	Association of Hydro-Meteorological Equipment Industry
ICOADS	International Comprehensive Ocean-Atmosphere Data Set
ICG-WIS	Inter-commission Coordination Group on the WMO Information System

ICSU	International Council for Science
ICT IOS	Implementation-Coordination Team on IOS
ICTT-QMF	Inter Commission Task Team on Quality Management Framework
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
IOOS	Integrated Ocean Observing System (USA)
IOS	Integrated Observing Systems
IMOP	WMO Programme for Instruments and Methods of Observation
IMOS	Integrated Marine Observing System (Australia)
INSPIRE	Infrastructure for Spatial Information in Europe
IOCCP	IOC International Ocean Carbon Coordination Project
IODE	IOC International Oceanographic Data and Information Exchange
IP	Implementation Plan
IPET-MI	CBS Inter Programme Expert Team on Metadata Implementation
ISDM	Integrated Science Data Management (Canada)
ISO	International Organization for Standardization
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM *in situ* Observing Platform Support Centre
LDCs	Least Developed Countries
LDP	ODP Light Data Provider
MAN	JCOMM Management Committee
MARIS	Maris Technologies, Ltd (UK)
MCP	Marine Community Profile
MCSS	Marine Climatological Summaries Scheme
MCS	Marine Climatological Summary
MERSEA	Marine Environment and Security for the European Area (of EU)
META-T	Water Temperature metadata Pilot Project
M&G	Manual and Guides
MIM	MERSEA Information Management
MQCS	Minimum Quality Control Standards
NCDC	National Climate Data Centre
NDBC	National Data Buoy Centre (of NOAA, USA)
NetCDF	Network Common Data Form
NMHS	National Meteorological and Hydrographic Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	IODE National Oceanographic Data Centre
NWP	Numerical Weather Prediction
OBIS	Ocean Bio-geographical Information System
OceanSITES	OCEAN Sustained Interdisciplinary Timeseries Environment observation System
OCG	JCOMM Observations Coordination Group
ODAS	Ocean Data Acquisition System
ODIN	IOC Ocean Data and Information Network
ODINAFRICA	ODIN for Africa
ODINBlackSea	ODIN for the Black Sea
ODINCARSA	ODIN for the Caribbean and South America
ODP	IODE Ocean Data Portal
ODS	Ocean Data Standards process
OGC	Open Geospatial Consortium
OPA	JCOMM Observations Programme Area
OPAG	Open Programme Area Group
OT	OceanTeacher
PA	Programme Area (of JCOMM)
PDF	Portable Document Format
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PO	Project Office

PSMSL	Permanent Service for Mean Sea Level
QA	Quality Assurance
QC	Quality Control
QMF	WMO Quality Management Framework
QMS	Quality Management System
RA	WMO Regional Association
RIHMI-WDC	Russian Research Institute of Hydrometeorological Information – World Data Center
RMIC	WMO-IOC Regional Marine Instrument Centre
RNODC	(IODE) Responsible National Oceanographic Data Centre
RNODC/DB	RNODC for Drifting Buoys
RRR	Rolling Review of Requirements
SDN	SeaDataNet
SeaDataNet	Pan-European infrastructure for Ocean and Marine Data Management
SOC	JCOMM Specialized Oceanography Centre
SOC/DB	SOC for Drifting Buoys
SOT	JCOMM Ship Observations Team
SST	Sea Surface Temperature
TAO	Tropical Atmosphere Ocean network of tropical moorings
VCP	Voluntary Cooperation Programme
VGISC	Virtual GISC (Europe)
VOS	Voluntary Observing Ship
W3C	World Wide Web Consortium
WDC	ICSU World Data Centre
WDIP	WIGOS “Test of Concept” Development and Implementation Plan
WESTPAC	IOC Sub-Commission for the Western Pacific
WFS	Web Feature Service
WG	Working Group
WHOI	Woods Hole Oceanographic Institution
WIGOS	WMO Integrated Global Observing Systems
WIS	WMO Information System
WMO	World Meteorological Organization
WMS	Web Map Service
WOA	World Ocean Atlas
XBT	Expendable Bathythermograph
XML	Extensible Markup Language

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