2018 Review of the JCOMM in situ Observations Programme Support Centre
(JCOMMOPS REVIEW 2018)

Report by:

JCOMMOPS 2018 Review Panel
NOTES

WMO Regulation 42

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

WMO Regulation 43

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

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The Terms of Reference for this Review call for an assessment of the capabilities, performance and future of JCOMMOPS, with particular attention to the issues of: ........................................12

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1. EXECUTIVE SUMMARY

JCOMMOPS is the WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology in-situ Observations Programmes Support Centre. Under Recommendation 6 from the JCOMM-5 session in Geneva in November 2017, it was agreed to conduct a review of JCOMMOPS activities in order to better capitalise on its uniqueness and strengths.

The Terms of Reference for this Review call for an assessment of the capabilities, performance and future of JCOMMOPS, with particular attention to the issues of Governance, Management, Relationships with Stakeholders, and Funding.

The Review found that JCOMMOPS has generated a high level of interest and support from its stakeholders, all of whom view JCOMMOPS as important to the success of their own activities. As a direct consequence, expectations across the various stakeholders are on the increase. Overall, the cumulative demand for JCOMMOPS services far exceeds its current capacity. At the same time, the current capacity of JCOMMOPS has become fragile. Continued uncertainty about ongoing funding has generated a climate of job insecurity, leading to high staff turnover, with significant gaps between new appointments occasioned by the lengthy recruitment process.

Key Findings of the Review are as follows:

- Given the strategic directions of both WMO though WIGOS and IOC through GOOS, there is a clear and growing need for an in situ Observing Programmes Support Centre;
- It requires a system-level focus, rather than a sum of networks approach;
- The distinctive role of JCOMMOPS does however need to be more clearly defined;
- The expectations of various stakeholders, and the JCOMMOPS team itself, need to be more actively managed and matched to available resources;
- Stable funding and staffing of the small, core JCOMMOPS team needs to be secured long-term;
- The financial situation is urgent as JCOMMOPS expenditure continues to exceed revenue, and its trust fund balances are close to being exhausted;
- Skills of the JCOMMOPS team need to be matched to a more clearly defined scope.

A total of twenty recommendations have emerged from the Review - see Section 6.

Seven of these relate to Governance, six to Management, two to Relationships with Stakeholders, and five to Funding.

The Review Panel is confident that, if acted upon, these recommendations will ensure the uniqueness and strengths of JCOMMOPS are capitalised upon for the benefit of all Stakeholders.

We would like to acknowledge all of the Stakeholders who took the time to complete questionnaires and participate in interviews, including the JCOMMOPS staff. The information generated through these processes was fundamental to the work of the Review Panel, and the helpful and constructive nature of these interactions was greatly appreciated.
2. BACKGROUND

2.1 JCOMMOPS grew out of the gradual acceptance that ocean observing networks function best in terms of delivering quality data to the end-user community and speedy resolution of operational problems if supported by dedicated technical co-ordination. The Data Buoy Co-operation Panel (DBCP) was the first network to employ a technical co-ordinator (TC) in 1987, based at CLS in Toulouse. The benefits were immediately apparent in the improvement in data quantity, quality and timeliness, and in the recruitment of the oceanographic research community into the near-real-time data exchange process. Other platform groups followed in raising the funds to recruit TCs, and it was soon realised that housing the TCs under the same roof delivered synergistic gains. The grouping of technical co-ordination capability was named ‘JCOMMOPS’ and initially resided at the CLS offices in Toulouse. This was a logical choice as CLS operated the Argos satellite data collection and location system which at that time was used by the vast majority of ocean observing systems. Within the intergovernmental framework for global oceanography and marine meteorology, JCOMMOPS became a cross-cutting theme of the JCOMM Observations Programmes Area (OPA), formally under the direction of the OPA chair.

2.2 Sitting as it did in CLS, JCOMMOPS was in the unique position to monitor data flows from the observing system (via Argos) to the Global Telecommunication System (GTS). It could act quickly to deal with any issues that arose in the data distribution chain, while maintaining excellent interaction with the user base. The unique capabilities developed by JCOMMOPS are captured in its mission statement:

1. Assist in the implementation and deployment of the observing networks through close interaction with program managers and platform operators, and through capacity development and outreach.
2. Assist in establishing, maintaining and verifying mechanisms for the timely exchange of data and metadata, including the facilitation of quality control and archival functions.
3. Develop a consistent set of tools to monitor the status of the observing system and its data and metadata distribution, in order to identify action areas and improve the overall effectiveness and development of the system.

Table 1. The JCOMMOPS mission statement

2.3 Since the early 2000s, a gradual migration of users away from Argos to the Iridium satellite system meant that the location of JCOMMOPS at CLS was more contestable. For a range of reasons, it was eventually decided to move to the L’Institut Français de Recherche pour l’Exploitation de la Mer (IFREMER) in Plouzané, near Brest, France where JCOMMOPS would benefit from enhanced contact with the oceanographic community. By this time the group had grown to six people, comprising three TCs, IT and office support, and a web developer.

2.4 The main website of JCOMMOPS is www.jcommops.org, a portal to a range of powerful functionality. Recent activities may be found at www.jcommops.org/reportcard2018. A fuller description of JCOMMOPS and the challenges facing it may be found in its 2018 report to the OPA1.

2.5 Under Recommendation 6 from the JCOMM-5 session in Geneva in November 2017, it was agreed to conduct a review of JCOMMOPS activities in order to better capitalise on its uniqueness and strengths. Accordingly, the OPA chair, Dr David Legler, undertook to assemble a Review Panel and drafted its Terms of Reference. The Panel convened by telephone conference twice in early 2018, and face-to-face with the JCOMMOPS team and a wide cross-section of its stakeholders at IFREMER in May 2018. Report drafting was undertaken by the Chair and Secretariat out of session, and several telephone conferences held by the Panel to finalise the Report. See section 4 for the agreed methodology of the Review Panel.

3. TERMS OF REFERENCE AND MEMBERSHIP OF THE REVIEW PANEL

3.1 The terms of reference are as follows:

1. Assess the unique contributions and strategic capabilities of JCOMMOPS in line with its mission to:
   a. Assist in the implementation and deployment of the observing networks through close interaction with program managers and platform operators, and through capacity development and outreach.
   b. Assist in establishing, maintaining and verifying mechanisms for the timely exchange of data and metadata, including the facilitation of quality control and archival functions.
   c. Develop a consistent set of tools to monitor the status of the observing system and its data and metadata distribution, in order to identify action areas and improve the overall effectiveness and development of the system.

2. Assess the overall effectiveness of management of JCOMMOPS in terms of its performance and responsiveness to stakeholders (e.g. sponsors, observing networks, and user community) as well as management a) financial administration, b) human resources administration, c) work programme

3. Make recommendations with regards to the relationship of JCOMMOPS to its sponsors, appropriate funding models for supporting future JCOMMOPS activities and any relevant future activities not currently included in ToRs.

3.2 The Review Panel is comprised of experts from the JCOMMOPS stakeholder base (WMO-WIGOS, IOC-GOOS, observing networks, funding agencies), the host country (France), and representatives from the oceanographic/marine meteorological data community. The membership is as follows

- Tim Moltmann, IMOS (chair) performance, governance, business models
- Erik Andersson, ECMWF requirements, NWP
- Paul Poli, Météo France operational services
- Toste Tanhua, GEOMAR/GOOS SC GOOS, BGC variables
- Susan Wijffels, WHOI/Argo ST observations
- Tiffany Vance, NOAA/IOOS data architecture
- David Meldrum, SAMS secretariat
- Shelby Brunner, NOAA additional secretariat assistance

4. METHODOLOGY OF THE REVIEW PANEL

4.1 The Panel met by teleconference twice in early 2018 and agreed a modus operandi. It was agreed to assemble and share all relevant documentation via a GoogleDrive link, and to identify stakeholder groups at the earliest opportunity. It was realised that most stakeholders would be represented at the upcoming Observations Co-ordination Group (OCG) meeting at IFRFEMER in May 2018, and that the opportunity should be grasped to interview as many of them as possible face to face. Those that were absent would be interviewed, if possible, by teleconference. For the list of identified stakeholders see Annex 1.

4.2 It was also agreed that a Stakeholder Questionnaire should be developed and circulated in advance of the May meeting, both to give stakeholders an opportunity to reflect on the issues raised, and to give them the opportunity to record their views. The questionnaire and responses would also form a valuable baseline on which to develop the face-to-face interviews at the upcoming OCG-9 meeting. Stakeholders not present at that meeting would be contacted by telephone or the like. The questionnaire may be found as Annex 2.

4.3 With regard to the review reporting schedule, it was agreed that a draft report would be prepared by the secretariat and circulated to Panel members by mid-July for further iterations and refinement. The draft would then be sent out to stakeholders for fact checking before forwarding to the OCG for feedback. The finalized report would then go back to the OCG, ahead of presentation to JCOMM.
5. FINDINGS OF THE REVIEW

The following Stakeholder groups were consulted by the Review Panel, and Findings of the Review are summarised accordingly.

Established Networks (Sections 5.2, 5.3 and 5.4)
- Argo – global profiling float array
- DBCP – Data Buoy Cooperation Panel
- OceanSITES - global system of long-term, deepwater reference stations
- SOT – Ship Observations Team
- GO-SHIP – Global Ocean Ship-Based Hydrographic Investigations Program
- GLOSS – Global Sea Level Observing System

Emerging Networks (Section 5.5)
- Ocean gliders
- High frequency radar
- Animal borne instruments

Intergovernmental Sponsors (Section 5.6)
- WMO – World Meteorological Organisation
- IOC – Intergovernmental Oceanographic Commission

Institutional Sponsors (Section 5.7)
- NOAA – National Oceanic and Atmospheric Administration
- IFREMER - L’Institut Français de Recherche pour l’Exploitation de la Mer
- CLS – Collecte Localisation Satellites

5.1 GENERAL OBSERVATIONS BASED ON STAKEHOLDER QUESTIONNAIRES AND INTERVIEWS

5.1.1 JCOMMOPS has a generated a high level of interest and support from its stakeholders, all of whom view JCOMMOPS as important to the success of their own activities. On the delivery side, the small JCOMMOPS team led by Mathieu Belbeoch is widely recognised as being dedicated, motivated, and committed. The wider visibility of JCOMMOPS has also been rising, and its unique contribution and strategic capabilities are being more widely recognised.

5.1.2 As a direct consequence expectations across the various stakeholders are on the increase. Expectations are highly heterogeneous, and to some extent conflicting. Some stakeholders want JCOMMOPS to focus more on system-level integration, monitoring and reporting. Others would prefer it to concentrate on its traditional role of supporting networks in operational functions, such as gathering metadata and ensuring that data exchange happens as intended. Network expectations of support vary widely, adding further complexity. Overall, the cumulative demand for JCOMMOPS services far exceeds its current capacity.

5.1.3 At the same time, the current capacity of JCOMMOPS has become fragile. Continued uncertainty about ongoing funding has generated a climate of job insecurity, leading to high staff turnover, with significant gaps between new appointments occasioned by the lengthy recruitment process. This has severely impacted the ability of JCOMMOPS to meet stakeholder expectations, particularly for those networks with operational forecasting commitments.

5.1.4 Key Findings
- Given the strategic directions of both WMO though WIGOS and IOC through GOOS, there is a clear and growing need for an in situ Observing Programmes Support Centre;
- It requires a system-level focus, rather than a sum of networks approach;
- The distinctive role of JCOMMOPS does however need to be more clearly defined;
- The expectations of various stakeholders, and the JCOMMOPS team itself, need to be more actively managed and matched to available resources;
- Stable funding and staffing of the small, core JCOMMOPS team needs to be secured long-term;
- The financial situation is urgent as JCOMMOPS expenditure continues to exceed revenue, and its trust fund balances are close to being exhausted;
- Skills of the JCOMMOPS team need to be matched to a more clearly defined scope.
5.2 **ESTABLISHED JCOMM OCG NETWORKS - OVERVIEW**

5.2.1 As outlined in the Background section, the foundations of JCOMMOPS were laid in 1987, when the DBCP recruited its first Technical Coordinator, followed by joint Technical Coordination with the Ship-of-Opportunity Implementation Panel (SOOPIP) in the early 1990s.

5.2.2 The term ‘JCOMMOPS’ was first coined in 2001, coinciding with the recruitment of a Technical Coordinator for the Argo profiling float programme. JCOMMOPS was officially established by JCOMM-1 through Recommendation 6. Argo requirements have been a major driver of JCOMMOPS development over the ensuing 17 years, with Mathieu Belbéoch holding the position of Argo Technical Coordinator throughout that entire period. He eventually assumed the role of JCOMMOPS ‘lead’, a role formally ratified by Recommendation 6 of JCOMM-5 in October 2017.

5.2.3 GO-SHIP became a JCOMMOPS network in 2014, followed by OceanSITES in 2016 (as a standalone network, though considered part of DBCP before that). The strategy employed was a cost-sharing model for technical coordination with pre-existing networks, namely OceanSITES with DBCP, and GO-SHIP with SOT.

5.2.4 GLOSS is identified as a JCOMMOPS network, but it is essentially self-contained. It sees no practical benefit from its association with JCOMMOPS, and relies on the Proudman Laboratory in the UK for the support of its observing network. It simply provides weekly status files to JCOMMOPS so that GLOSS appears on the observing system status maps.

5.3 **REVIEW FINDINGS BY NETWORK**

5.3.1 **Argo**

5.3.1.1 Overall, Argo is mostly satisfied with the performance of JCOMMOPS. JCOMMOPS hosts the Argo Information Centre (AIC). The function of the AIC is critical to Argo and its ability to operate legally under international law and conventions. Argo therefore places the highest priority on the first element of the JCOMMOPS mission, the implementation, deployment and monitoring of its global network of more than 4000 floats.

5.3.1.2 Argo is now quite satisfied with the web-accessible tools provided by JCOMMOPS to monitor the global Argo network. It was noted, however, that this took some considerable time to establish, and that a large amount its Technical Coordinator’s time and effort had been diverted away from the Argo network in order to develop a system-level monitoring and reporting system that would benefit all networks and hosting sponsors. While this is now largely in the past, it does raise questions about how JCOMMOPS priorities are set, how JCOMMOPS is accountable to its stakeholders, and how community-wide activities might be resourced without detracting from individual network imperatives.

5.3.2 **DBCP and OceanSITES**

5.3.2.1 DBCP and OceanSITES are mostly satisfied with the performance of JCOMMOPS. However the shared Technical Coordinator position has suffered from high turnover and long vacancies. This has had a significant adverse impact on the networks, particularly the DBCP, which funds the majority of the position.

5.3.2.2 An example of adverse impact from staff turnover is that moored buoy metadata is not yet integrated into the JCOMMOPS database despite this being a network priority for the last four years. This is, however, a challenging issue as there is as yet no Global Data Assembly Centre (GDAC) for moored buoy data, and no global metadata standard. While JCOMMOPS expertise might assist, it seems essential that networks themselves take responsibility for standardisation.

5.3.2.3 OceanSITES is one of the newer ‘established’ networks. The lack of an implementation plan for OceanSITES, articulating what JCOMMOPS should deliver and when, was noted. From an OceanSITES perspective, JCOMMOPS seems more geared towards networks like Argo i.e. global design, limited scope, single platform. OceanSITES has a very different mission, with far greater complexity in the range of platforms and sensors being used.

5.3.2.4 JCOMMOPS is seen by OceanSITES as a system ‘in transition’ towards integration of all the networks contributing to GOOS and WIGOS. It was suggested that JCOMMOPS could provide networks (like OceanSITES) with clearer guidelines as to the level of information needed to meet the requirements for integration into the global systems.
5.3.3 SOT and GO-SHIP

5.3.3.1 SOT is mostly satisfied with the performance of JCOMMOPS, though GO-SHIP is only partially satisfied. Turnover and vacancies in the Technical Coordinator position have also been an issue for these networks.

5.3.3.2 SOT emphasised the core need within JCOMM for the management of host, platform, and instrument identifiers. Managing IDs requires a central authentication provider to ensure that standards are maintained and duplicate IDs do not exist.

5.3.3.3 It was noted that the SOT network had many ideas for future developments, but were unsure if JCOMMOPS could take on the additional work.

5.3.3.4 GO-SHIP is a more recent ‘established’ network, providing a coordination mechanism for global ship-based hydrographic surveys. A clear view was expressed that JCOMMOPS was trying to do too much with limited resources. It was felt that it should focus on the second element of its mission, namely the timely exchange of metadata, with emphasis on consistent platform tracking and making proper links to CCHDO (CLIVAR and Carbon Hydrographic Data Office), the GDAC for GO-SHIP.

5.3.3.5 The SOT and GO-SHIP Technical Coordinator, Martin Kramp, on leave of absence at the time of the review, had developed good skills as a cruise coordinator that were greatly valued by GO-SHIP and other networks. Cross network coordination was considered to be an obvious opportunity for JCOMMOPS.

5.3.3.6 Finally, it was noted that the JCOMMOPS mission should be rewritten to better explain its distinctive role, rather than just ‘assisting’ – see Annex 3.

5.4 CROSS-NETWORK ISSUES

5.4.1 With respect to JCOMMOPS funding, it was noted that its central role is too important to be reliant on voluntary, network-level funding contributions. For example, many networks see JCOMMOPS as the ‘conduit’ to deliver WIGOS metadata, an important core obligation for this major WMO programme. The Panel felt very strongly that some functions of JCOMMOPS are core global observing infrastructure, which is network independent, and should be funded centrally by the WMO and IOC.

5.4.2 Core services at the system-level should be clearly defined and adequately funded on a programmatic basis through the intergovernmental systems (WMO and IOC) for the benefit of all. Network specific activities can be funded by the networks. New networks that are well organised and can interoperate with the core services could easily be included under such arrangements. If new networks require network-specific assistance with technical coordination, they need to provide the required incremental resources.

5.4.3 It was noted that JCOMMOPS does not have an agreed annual work programme at the start of each calendar/financial year. The networks meet at different times during the year, with JCOMM OCG meeting in May. It would make sense for JCOMMOPS to have its annual work programme and budget approved by no later than December each year, for implementation from 1 January.

5.4.4 It was further suggested that a rolling three year work programme could assist in managing some of this complexity, and also help to sequence priorities so as provide the JCOMMOPS team with a more consistent and manageable workload without having to concern themselves with reconciling annual network contributions against network-specific deliverables.

5.4.5 There was some confusion across the networks as to the second element of the JCOMMOPS mission i.e. ‘Assist in establishing, maintaining and verifying mechanisms for the timely exchange of data and metadata, including the facilitation of quality control and archival functions’. A consensus emerged that JCOMMOPS must focus on the exchange of metadata, linked to data wherever possible. JCOMMOPS has a great opportunity to lead the harmonisation of metadata languages across networks, noting that quality control remains the responsibility of networks, and archival functions are the responsibility of GDACs or equivalent.

5.4.6 In consulting on cross-network issues beyond the networks, WMO and IOC made the following points. Firstly, promoting data exchange has always been a key function of JCOMMOPS, and paragraph 5.4.5 should not be interpreted as narrowing its focus to just metadata. An ongoing function of JCOMMOPS is to identify observing platforms where data are not shared with WMO and IOC, to communicate with those platform owners, and convince them of the benefits of sharing data. Secondly, while noting that quality control is the responsibility of networks, JCOMMOPS plays an important role in relaying quality information from the monitoring centres back to platform operators which needs to be recognized.

5.4.7 A number of networks expressed the view that JCOMMOPS should not be trying to undertake outreach and capacity building activities in current circumstances. It was much more important to ensure the core functions were being done well to the satisfaction of all stakeholders.
5.4.8 A number of networks expressed some frustration with the JCOMMOPS website. Firstly, it was felt the home page should clearly state what JCOMMOPS is. Secondly, the approach of asking users to 'please wait, while we prepare your experience' is considered to be outdated and off-putting. Preparation of maps needed to be easier and more intuitive, and consideration should be given to delivering web map services as well as static maps, or explaining how to do that (if the facility already exists). Generally, documentation of the website is lacking.

5.5 **EMERGING JCOMM OCG NETWORKS**

5.5.1 The emerging networks consulted under this review are Ocean Gliders and High Frequency Radar. Animal-Borne Instrumentation did not respond to requests for input. Overall, the emerging networks were not able to make much if any comment on the contributions and capabilities of JCOMMOPS as they were still mostly in the early stages of understanding the WMO and IOC systems.

5.5.2 The emerging networks did express some confusion about roles of the various bodies, and endorsed comments elsewhere re the need to more clearly define the distinctive role of JCOMMOPS. Specifically, it was felt that it was a WMO and IOC responsibility, through JCOMM, GOOS and the OCG to determine how and when emerging networks can become accepted parts of the global observing systems. It is not expected that JCOMMOPS will be working with any emerging networks until this happens.

5.5.3 The Ocean Gliders community is well advanced in the process of forming as global network. There is clear potential for engagement with JCOMMOPS in the medium to long term, and there were obvious synergies with Argo and other networks. The Ocean Glider involvement with JCOMMOPS under the EU ATLANTOS programme was seen as a very positive development.

5.5.4 The High Frequency Radar (HFR) community is quite well organised globally. There is one dominant vendor (CODAR), and a small number of vendors overall. At this stage their only requirement is to be able to display the global HFR network metadata and data. They did not foresee a need for technical coordination at the global level.

5.5.5 Consultations with the emerging networks highlighted an important point with respect to the interplay between JCOMMOPS core services and network-specific activities, which had already been raised in consultation with the established networks. The point was that for JCOMMOPS to be effective in its mission to monitor status of the global systems and ensure timely exchange of metadata and data, it needed the networks to be well organised and taking responsibility for standardisation, quality control, and data assembly and archiving. JCOMMOPS should not assume any of these responsibilities. Nonetheless, core services needed to be supported by sustained central funding: a key recommendation of this review.

5.5.6 The emerging networks were clearly taking responsibility for network-specific activities, and were taking a global view. Argo had been the forerunner in this, but established networks with a legacy of diversity in metadata and data standards remain the most challenging for JCOMMOPS to engage with.

5.6 **HOSTING SPONSORS OF JCOMMOPS (INTERGOVERNMENTAL)**

5.6.1 Overall, the intergovernmental sponsors were mostly satisfied with the performance of JCOMMOPS. Nonetheless, the views expressed by WMO and IOC did however differ somewhat in their emphasis, which is potentially significant for JCOMMOPS as a jointly sponsored entity.

5.6.2 WMO placed highest priority on the first and second elements of the JCOMMOPS mission i.e. metadata and data exchange, and promoting participation in observing networks, including assisting with identifying deployment opportunities. It was noted that recent attention to the third element of system monitoring had resulted in very useful outputs. The questions raised were about prioritisation of this effort relative to the level and sources of funding. This was consistent with feedback received from the long standing networks i.e. DBCP, SOT, and (more recently) Argo.

5.6.3 The complexities around governance and funding were highlighted. It was felt that some fund raising efforts by the JCOMMOPS team had directed attention away from the core mission.

5.6.4 IOC placed highest priority on the system monitoring tools, the third element of the mission JCOMMOPS mission. It was noted that the status of all networks cannot yet be reported on. It was further noted that the relationship between metadata exchange and eventual flow of data (both near real time, and delayed mode) could be strengthened.

5.6.5 JCOMM OCG and JOCMMOPS sit at the intersection of WMO/WIGOS and IOC/GOOS interests. These interests will increasingly be aligned through the need for coupled ocean-atmosphere NWP, operational oceanography services and Earth system prediction.
5.6.6 There will however be differences. Getting data onto the Global Telecommunication System (GTS) is much more important for the weather community, though the JCOMM OCG ‘open GTS’ pilot project has potential to increase its utility to the ocean community. IOC/GOOS also has interest in ocean health which is less important for WMO/WIGOS. The ocean biogeochemistry community is engaging with JCOMM OCG and JCOMMOPS and this integration makes sense from both scientific and operational perspectives. The point is that prioritisation of relative effort by JCOMOPS staff needs to be transparent across the stakeholder base. It is essential that JCOMMOPS receives clear and consolidated advice on priorities.

5.7 HOSTING SPONSORS OF JCOMMOPS (INSTITUTIONAL)

5.7.1 NOAA is mostly satisfied with the performance of JCOMMOPS. NOAA is a major sponsor of ocean observing networks that utilise JCOMMOPS services, and it directly supports JCOMMOPS staff through its majority funding input. NOAA’s Chief of Climate Observations (David Legler) is Chair of JCOMM OCG. Critically, it was noted that JCOMMOPS had demonstrated the value of investment in observing system coordination in line with its mission, and that these capabilities were increasingly recognised by WMO in planning for WIGOS and by IOC in planning for GOOS. These endorsements had to be translated into sustained funding of core JCOMMOPS activities.

5.7.2 As noted by other stakeholders, delivery across networks is quite uneven, in terms of completeness of metadata and data flow, and information available via the system monitoring tools. An example given was that it is possible to learn a lot about Argo, whereas information for GO-SHIP is outdated and incomplete.

5.7.3 It was questioned whether JCOMMOPS could complete its current mission for established networks based on the available level of resourcing. A clear view was expressed that no additional responsibilities should be accepted for emerging networks without additional resourcing.

5.7.4 It was noted that while capacity building and outreach were laudable objectives, they should never be more than a subsidiary mission of JCOMMOPS, to be addressed on an opportunistic basis where the costs were low compared to the added value accrued.

5.7.5 With respect to metadata and data exchange, it was questioned whether JCOMMOPS was trying to do too much itself rather than leveraging developments in NOAA’s Ocean System Monitoring Centre (OSMC), the Copernicus Marine Environment Monitoring Service (CMEMS) etc.

5.7.6 The requirement for dedicated, continuous and supportive management of JCOMMOPS was noted. In the absence of this, JCOMM OCG had increasingly been drawn into tactical and operational decision making, which was neither sustainable, nor desirable at any level, including for the staff. The endorsement of a JCOMMOPS ‘lead’ role at JCOMM-5 was seen as a positive outcome that recognised the group needed a more vertically integrated structure with closer day-to-day oversight.

5.7.7 Resourcing of the ‘lead’ role needed to be resolved, as did its span of control. The idea that TCs on the JCOMMOPS team would report independently to network panel chairs is problematic. The JCOMMOPS lead needs to be accountable for performance of the team in delivering to an annual work programme approved by the stakeholders. It was also noted that staffing JCOMMOPS with WMO employees in Brest has many limitations.

5.7.8 In summary, the unique contributions of JCOMMOPS were considered to be focused on supporting the coordination and execution of a highly efficient ocean observing system, and ensuring that critical data and metadata were complete and flowed smoothly to the first delivery stops of those data. Tools to manage and monitor such a system would always be required, and that was the fundamental and unique JCOMMOPS niche. Others would provide tailored access to the data and metadata for applications and use, but JCOMMOPS occupied a unique place in the data and metadata delivery and monitoring process. Furthermore, JCOMMOPS should adopt a more strategic position with respect to integration and interoperability with other ocean observing, data and metadata systems. The future demanded an integrated and interoperable ocean observing system. For JCOMMOPS to continue to be relevant, it must position itself to have a distinctive role.

5.7.9 IFREMER and CLS are completely satisfied with the performance of JCOMMOPS. The move from Toulouse to Brest was considered to be highly positive by the local stakeholders. Benefits included interactions and synergies with local Coriolis partners, IFREMER teams and the Euro Argo ERIC. There were also greater synergies with EU activities, such as ATLANTOS, EMODNET, and Copernicus. JCOMMOPS had received funding from the local authority in Brest, as well as from the ATLANTOS project. Risks associated with the quest for project funding diverting JCOMMOPS from its core mission were however acknowledged.

5.7.10 CLS continues to provide operational hosting of the JCOMMOPS data centre infrastructure, and to supply IT resources (staff and hardware) and tools at what is considered to be less than full cost i.e. includes in-kind support for JCOMMOPS. Notwithstanding satisfaction with current IT arrangements, it was suggested that a review of the costs and benefits of moving these services to IFREMER in Brest should be undertaken.
IT was the largest operating expenditure for JCOMMOPS (i.e. other than staff costs) and would rise at 5-6% per annum over the next three years with no commensurate rise in revenue yet secure.

5.7.11 The Review Panel observed that JCOMMOPS has insourced its software development through employment of a single developer. The potential benefits of outsourcing at least some activities to access a broader base of skills should be considered.

5.7.12 Notwithstanding satisfaction at the institutional level, greater coordination within the current host country on how to best host JCOMMOPS would be beneficial. Progress needs to be made on several key issues, such as posting of international staff in Brest, and realizing synergies in the IT system.

6.   RECOMMENDATIONS

The Terms of Reference for this Review call for an assessment of the capabilities, performance and future of JCOMMOPS, with particular attention to the issues of:
1. Governance,
2. Management,
3. Relationships with Stakeholders, and
4. Funding.

A total of twenty recommendations are made under these four headings.

6.1   GOVERNANCE

6.1.1 The governance of JCOMMOPS is currently vague. It requires clear guidance on priorities from across a diverse stakeholder base. It is most logical for this to come via JCOMM OCG, through its Chair or a delegated office bearer.

6.1.2 JCOMMOPS needs a longer term (five-year) strategy, with a vision. It would timely to develop this during 2019, in response to the GOOS Strategy, WMO reforms and other key drivers. The strategy should be guided and approved by JCOMM OCG to ensure coherence across the JCOMMOPS Stakeholder base.

6.1.3 The mission statement of JCOMMOPS needs to be revised so as to clearly articulate its distinctive role, and remove potential confusion about its scope. A suggested revision to the JCOMMOPS mission is included as Appendix 3.

6.1.4 WMO and IOC, through JCOMM, OCG and the WMO technical commissions, should determine how and when emerging networks become accredited parts of global systems. JCOMMOPS should not work with any emerging networks until this happens.

6.1.5 For practical reasons, and to take full advantage of the capabilities of the JCOMMOPS team, guidance from JCOMM OCG should be at the strategic (vs tactical) level. This could be achieved by annual approval of a rolling, three-year work programme (see next recommendation), with quarterly reports against major milestones. Note that implementation of the system monitoring tools across all networks will, of itself, provide a form of progress reporting.

6.1.6 A rolling, three year, JCOMMOPS work programme should be developed, and updated and approved on an annual basis. This should occur by no later than December each year, for implementation from 1 January.

6.1.7 As part of the multi-year planning process, JCOMMOPS should develop service level agreements (SLAs) with each of the networks. The agreements should clearly state both the core services and the network specific activities that JCOMMOPS is committed to undertaking, and by when. They should also clearly state what JCOMMOPS needs from the networks, by when, in order to undertake the agreed activities. All agreements should be made available to all stakeholders so as to promote cross network collaboration and ensure transparency. They should not need to be long or complicated documents, but should clearly express the delineation between core and network services.

6.2   MANAGEMENT

6.2.1 JCOMMOPS requires dedicated management and arrangements need to be formalised, building on the endorsement of a JCOMMOPS 'lead' at JCOMM-5. The idea that Technical Coordinators on the JCOMMOPS team report independently to network panel chairs is considered to be challenging from a
The JCOMMOPS lead needs to be accountable for performance of the team in delivering to a work programme approved by the stakeholders.

6.2.2 Funding arrangements (see Section 6.3) and organisational processes need to address the issues that have been causing job insecurity, high staff turnover, and long vacancy periods in JCOMMOPS staffing. It is desirable for JCOMMOPS staff providing the core services to be co-located in Brest. Inclusion of remotely located staff does however need to be considered, as it could open up new opportunities for sponsorship, both in cash and in kind.

6.2.3 The JCOMMOPS Office needs to enhance its project management capability, which was clearly a major stressor in assigning priorities amongst competing demands. This might be done with support from the sponsors and/or training and development of the relevant staff.

6.2.4 The obligations for networks to enable JCOMMOPS to monitor status and ensure timely exchange of metadata and data need to be clearly articulated. Where networks do not currently meet these requirements it should be a network responsibility to address the gap. If JCOMMOPS can assist, the effort required needs to be funded as a network-specific activity.

6.2.5 The software systems and tools developed and maintained by JCOMMOPS should be standards-based and open source. The aim should be to encourage broader ownership of the infrastructure by the ocean observing community, and to ensure that JCOMMOPS is taking full advantage of both its unique capabilities and developments within the global ocean-observing community.

6.2.6 A review of the costs and benefits of having the JCOMMOPS IT infrastructure and services remain at CLS in Toulouse or move to IFREMER in Brest should be undertaken. JCOMMOPS has insourced its software development through employment of a single developer, and the potential benefits of outsourcing at least some activities to access a broader base of skills should also be considered.

6.3 RELATIONSHIPS WITH STAKEHOLDERS

6.3.1 JCOMMOPS should focus its communication and engagement activities on the networks and sponsors. Broader outreach activities were considered to be beyond the scope of JCOMMOPS as currently staffed and resourced.

6.3.2 The website needs to be redesigned so that the distinctive role of JCOMMOPS is clear on its homepage, and the delivery of network maps is easier and more intuitive. Consideration should be given to delivering web map services as well as static maps.

6.4 FUNDING

6.4.1 JCOMMOPS core services at the system-level (vs network-level) should be clearly defined and adequately funded on a programmatic basis through the intergovernmental systems i.e. WMO and IOC. The core services need to serve the needs expressed by these bodies, through WIGOS and GOOS.

6.4.2 For JCOMM OCG networks, specific activities that are over and above the core services should be funded by those networks.

6.4.3 Networks that were well organised and could interoperate with the core services alone could easily be included under such arrangements once accepted by the JCOMM OCG. If new networks required network-specific assistance with technical coordination they need to provide the additional resources required.

6.4.4 The support base for cash funding to pay for staff salaries and operating costs needs to be broadened, as it is currently overly reliant on one institutional partner from one country.

6.4.5 The mechanisms for making resources available to JCOMMOPS also need to be simplified. This includes the ability for cash funding to be contracted, and for in kind staff resources to be provided.
ANNEX 1 – JCOMMOPS Stakeholder Groups

1. Established Networks
Data Buoy Co-operation Panel (DBCP)
Ship Observations Team (SOT)
Argo
OceanSITES
Global Sea-Level Observing System (GLOSS)
Global Ocean Ship-based Hydrographic Investigations Program (GO-SHIP)

2. Emerging Networks
Ocean gliders
High frequency radar
Animal borne instruments

3. Hosting sponsors
World Meteorological Organization (WMO)
Intergovernmental Oceanographic Commission (of UNESCO) (IOC)
National Oceanic and Atmospheric Administration (NOAA)
L'Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER)
Collecte Localisation Satellites (CLS)

4. Other
JCOMMOPS management and staff
ANNEX 2 – JCOMMOPS Stakeholder Questionnaire

2018 Review of JCOMMOPS
(the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
in situ Observing Programmes Support Centre)

As you are aware, a review of JCOMMOPS is being undertaken during 2018. The terms of reference for the review cover (a) assessing the contributions and capabilities of JCOMMOPS in delivering on its mission (see below), (b) assessing the effectiveness of management of JCOMMOPS, and (c) making recommendations for the future.

The mission of JCOMMOPS is to:

1. Assist in the implementation and deployment of the observing networks through close interaction with program managers and platform operators, and through capacity development and outreach.
2. Assist in establishing, maintaining and verifying mechanisms for the timely exchange of data and metadata, including the facilitation of quality control and archival functions.
3. Develop a consistent set of tools to monitor the status of the observing system and its data and metadata distribution, in order to identify action areas and improve the overall effectiveness and development of the system.

This brief questionnaire is designed to solicit input from JCOMMOPS stakeholders in advance of face to face meetings, telephone discussions etc. conducted as part of the review.

1. What is the nature of your involvement with JCOMMOPS?

2. How long have you been associated with JCOMMOPS?

3. To what extent do you think that current JCOMMOPS activities are matched to its mission?

| Completely | Mostly | Partially | Can’t say |

Please place an ‘X’ in one of the shaded boxes, and provide clarifying comments.

4. To what extent do you think that JCOMMOPS has been effective in meeting the objectives defined in its mission?

| Completely | Mostly | Partially | Can’t say |

Please place an ‘X’ in one of the shaded boxes, and provide clarifying comments.

5. Are there any activities JCOMMOPS is undertaking that are inconsistent with its mission statement, or could be better done by others? If yes, please specify.
6. Are there any new activities you would like to see JCOMMOPS assume? If yes, please specify.

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7. To what extent do you think current JCOMMOPS management arrangements support the delivery of its mission?

- Completely
- Mostly
- Partially
- Can’t say

Please place an ‘X’ in one of the shaded boxes, and provide clarifying comments.

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8. Do you have any suggestions to improve current JCOMMOPS management arrangements?

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9. To what extent do you think current funding for JCOMMOPS supports the delivery of its mission?

- Completely
- Mostly
- Partially
- Can’t say

Please place an ‘X’ in one of the shaded boxes, and provide clarifying comments.

---

10. Do you have any suggestions for changing the current funding model for JCOMMOPS?

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11. Overall, do you think the current JCOMMOPS mission is appropriate for the future? If not, what changes would you propose?

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12. Overall, how satisfied are you with the current performance of JCOMMOPS?

- Completely
- Mostly
- Partially
- Can’t say

Please place an ‘X’ in one of the shaded boxes, and provide clarifying comments.

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ANNEX 3 – A REVISED JCOMMOPS MISSION

The mission of JCOMMOPS is to:

1. Develop and maintain a consistent set of tools to monitor the status of the JCOMM in situ observing system and its metadata and data distribution, in order to identify action areas and improve the overall effectiveness and efficiency of the system.

2. Ensure the mechanisms for timely exchange of metadata and data are established, maintained and verified for all JCOMM networks.

3. Where opportunities are identified through monitoring and data exchange activities, assist in the implementation and deployment of JCOMM observing networks through close interaction with program managers and platform operators, with an emphasis on cross network coordination.

4. Identify existing sources of ocean data, which are not shared with WMO and IOC, and take steps to promote and facilitate their sharing and exchange in real-time and delayed mode.
ACRONYMS and ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AIC</td>
<td>Argo Information Centre</td>
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<tr>
<td>ATLANTOS</td>
<td>Atlantic Ocean Observing System</td>
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<td>CLS</td>
<td>Collecte Localisation Satellites</td>
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<tr>
<td>CMEMS</td>
<td>Copernicus Marine Environment Monitoring Service</td>
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<tr>
<td>CODAR</td>
<td>Coastal ocean Dynamics Applications Radar</td>
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<tr>
<td>DBCP</td>
<td>JCOMM Data Buoy Co-operation Panel</td>
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<tr>
<td>EMODNET</td>
<td>European Marine Observation and Data Network</td>
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<tr>
<td>ERI/C</td>
<td>European Research Infrastructure Consortium</td>
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<td>EU</td>
<td>European Union</td>
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<td>GLOSS</td>
<td>Global Sea Level Observing System (of the IOC)</td>
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<td>GOOS</td>
<td>Global Ocean Observing System (of the IOC)</td>
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<td>GO-SHIP</td>
<td>Global Ocean Ship-based Hydrographic Investigations Program</td>
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<td>GTS</td>
<td>Global Telecommunications System (of the World Meteorological Organization)</td>
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<td>HFR</td>
<td>High Frequency Radar</td>
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<td>IFREMER</td>
<td>L'Institut Français de Recherche pour l'Exploitation de la Mer</td>
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<td>IOC</td>
<td>Intergovernmental Oceanographic Commission (of UNESCO)</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>JCOMM</td>
<td>Joint Technical Commission for Oceanography and Marine Meteorology (of WMO and IOC)</td>
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<td>JCOMMOPS</td>
<td>JCOMM in situ Observations Programme Support Centre</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration (of the USA)</td>
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<td>OCG</td>
<td>JCOMM Observations Coordination Group</td>
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<td>JCOMM Observations Programme Area</td>
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<td>OSMC</td>
<td>NOAA Observing System Monitoring Center</td>
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<td>SOOPIP</td>
<td>The Ship-of-Opportunity Implementation Panel</td>
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<td>JCOMM Ship Observations Team</td>
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<td>TC</td>
<td>Technical Coordinator</td>
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<td>TOR</td>
<td>Term of Reference</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<td>WIGOS</td>
<td>WMO Integrated Global Observing System</td>
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