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| **World Meteorological Organization****Inter-Commission Coordination Group On WIGOS** **Eighth Session**Geneva, Switzerland, 24-26 January 2019 | **ICG-WIGOS-8/Doc. 4.3(2)**  |
| Submitted by:Secretariat22.01.2019**DRAFT** |

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**WMO DATABASE OF THE SPACE-BASED OBSERVING SYSTEM CAPABILITIES (OSCAR/SPACE)**

*(Submitted by* *the Secretariat)*

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| **SUMMARY AND PURPOSE OF DOCUMENT**The document provides information on progress regarding the operations, maintenance and further development of the WMO database of the space-based observing systems capabilities (OSCAR/Space). The document also provides information about recommendations taken in 2018 to make progress with regard to: 1) to strengthen the cooperation with CGMS members and observers from other space agencies through establishment of relevant advisory and support groups; and 2) to request Members and invite other interested parties to invest in OSCAR/Space. |

**ACTION PROPOSED**

The Meeting is invited to take note of OSCAR/Space developments and possibly advise on its evolution.

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**References:**

* <http://oscar.wmo.int> (OSCAR Platform)
* <https://www.wmo-sat.info/oscar/spacecapabilities> (OSCAR/Space)

**Appendices:**

**1.** Responsibility within CBS for the oversight and review of OSCAR

**2.** OSCAR/Space and OSCAR/Requirements Updating maintenance procedure

**1. The OSCAR Platform**

The Observing System Capability Analysis and Review tool (OSCAR, [oscar.wmo.int](http://oscar.wmo.int) ) is comprised of the following components:

* **OSCAR/Requirements**, which is the repository of technology-free observational user requirements recorded quantitatively for the WMO Application Areas. [www.wmo-sat.info/oscar/observingrequirements](http://www.wmo-sat.info/oscar/observingrequirements) .
* **OSCAR/Surface**, which records WIGOS metadata (i.e. description of the observing platforms and their instruments allowing to derive the surface-based observing systems capabilities). This new component developed in partnership with MeteoSwiss was deployed operationally in May 2016, and now replaces WMO No. 9, Volume A. [oscar.wmo.int/surface/](https://oscar.wmo.int/surface/).
* **OSCAR/Space**, which includes an inventory of satellite instruments, missions and programmes, and an assessment of the variables that the instruments have the potential to measure, is the subject of this document. [oscar.wmo.int/space](http://oscar.wmo.int/space).

Through Decision 16 (CBS-16), the Commission for Basic Systems decided to assign responsibility within CBS for the technical development of OSCAR as detailed in ***Appendix 1***. The CBS **Inter-Programme Expert Team on Satellite Systems (ET-SAT) and Expert Team on Satellite Utilization and Products** (IPET-SUP) are providing oversight and review for the operations and evolution of the WMO Database of the space-based observing systems capabilities (OSCAR/Space).

**2. Status of OSCAR/Space and Future Plans**

**2.1. OSCAR/Space Database Contents Maintenance**

To safeguard the long-term sustainability of OSCAR/Space database and to ensure continuous maintenance and support for keeping the database available and up-to-date with information of sufficiently high quality, WMO proposed a new scheme for strengthening the cooperation with CGMS members and observers from space agencies through newly established support group: the WMO-CGMS OSCAR/Space Support Team (O/SST). Through O/SST all relevant stakeholders will continue providing information on their satellite programmes to be recorded in OSCAR/Space, according to recommended procedures and through templates provided by the WMO Space Programme. Points of contact nominated by CGMS members are responsible for maintaining the information in the database related to their organization’s respective missions.

The 46th Meeting of CGMS (CGMS-46) in June 2018 confirm the above OSCAR/Space database maintenance scheme, which was submitted to CGMS-45 in 2027 by WMO, and CGMS members and observers were asked to support the WMO effort to maintain and update OSCAR/Space database contents. It is well recognized that the OSCAR/Space database is an essential reference tool for WMO members, CGMS members and other satellite operators for gap analysis and risk assessment. It is therefore essential to keep the information in the OSCAR/Space database up-to-date. Without this, neither gap analysis nor risk assessment will be possible.

A procedure for updating OSCAR/Space database was originally developed and endorsed by ET-SAT and IPET-SUP in 2013 for the updating and maintenance of OSCAR/Space. Agreed updated version of the procedure for OSCAR/Space is provided in ***Appendix 2***.

**2.2. OSCAR/Space Database System Maintenance**

Compared with the development of OSCAR/Surface database, which involves several teams of experts from WMO, MeteoSwiss, and Member States and allocates a necessary budget, the first version of the OSCAR/Space database was developed with a minimum of resources by 1 JPO with the former C/SBOS as project manager and scientific consultancy support. The development of the new version was achieved through internal effort (≈3-4 months of the former C/SBOS for concept, prototype, knowledge basis, final specifications, and testing) with theoretically 3.5 months of scientific consultancy support and 2 months of IT contractor’s support under a contract managed by WMO Secretariat.

For an establishment of the sustainable scheme for the OSCAR/Space database system maintenance, a necessary budget and human resources should be allocated in WMO Space Programme in collaboration with CGMS.

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**APPENDIX 1**

**RESPONSIBILITY WITHIN CBS FOR THE OVERSIGHT AND REVIEW OF OSCAR**

**(Annex to Decision 16 (CBS-16))**

TABLE 1: PROPOSED RESPONSIBILITY WITHIN CBS FOR THE OVERSIGHT AND REVIEW OF OSCAR

|  |  |  |
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| ***CBS Team***  | ***Role*** | ***Reporting to*** |
| ICT-IOS | Lead | ICG-WIGOS |
| IPET-OSDE | 1. Functional requirements with regard to the tools required for the RRR process,
2. Review content required for the RRR process including the observational requirements from application areas
 | ICT-IOS |
| ET-SAT | Space-based observing systems capabilities (programmatic and technical updates) | ICT-IOS |
| IPET-SUP | Space-based observing systems capabilities (user assessments) | ICT-IOS |
| ET-ABO | Aircraft-based observing systems capabilities | ICT-IOS |
| ET-SBO | Surface-based observing systems capabilities | ICT-IOS |
| IPET-SWeISS | Space Weather capabilities (surface- and space-based) | ICT-IOS |
| IPET-OWR[[1]](#footnote-1) | Weather Radar Capabilities | ICT-IOS |
| C-MAR | Marine meteorological and oceanographic observing systems capabilities | ICT-IOS |

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**APPENDIX 2**

**OSCAR Updating/Maintenance Procedure [[2]](#footnote-2)**

**Proposed update to the OSCAR Updating/Maintenance Procedure [[3]](#footnote-3)**

**WIGOS Information Resource**

**OSCAR/Space updating/maintenance procedure**

**V1.6**

**Document change record**

|  |  |  |
| --- | --- | --- |
| **Date and Version** | **Description** | **Authorized by** |
| 10.04.2013 / v0.1 | Initial draft |  |
| 29.04.2013 / v0.2 | Edits by J. Lafeuille |  |
| 29.04.2013 / v0.3 | Editorial changes, paragraph on content versioning, paragraph on user feedback |  |
| 1.10.2013 / v1.0 | Implementation | J. Lafeuille C/SBOS |
| 21.2.2014 / v1.1 | Insertion of Section 3 OSCAR/Requirements updating process  |  |
| 3.4.2014 | Section 3 approved by IPET-OSDE-1 | IPET-OSDE1 |
| 29.2.2016 / v1.2 (Draft) | - Section 4.2 and Step 2.1 for OSCAR/Space V. 2- Section 8: IPET-SUP |  |
| 14.4.2016 / v1.3 | Reviewed by IPET-OSDE-2 (no change) | IPET-OSDE-2 |
| 3.11.2017 / v1.4 | Rationalization of management of variables in WIGOS context. Making it mandatory to record source of the requirements. |  |
| 1.2.2018 / v.1.5 | Point of Contacts for Application Areas are responsible for making sure that the Application Area “owner”, i.e. the relevant Commission or Expert Group, is agreeing with the proposed requirements in OSCAR/Requirements | IPET-OSDE-3 |
| 17.7.2018 / v 1.6 | Reflected the role of O/SST and O/SSAT.Reflected the role of CGMSSEC and its support in ensuring the factual content of OSCAR/space and the link to the annual CGMS Risk Assessment | CGMS-46 |

**OSCAR updating/maintenance procedure**

1. INTRODUCTION
	1. **Purpose and scope**

This procedure defines the roles, responsibilities and steps to be followed to update content, functionality and interface of the OSCAR/Requirements and OSCAR/Space modules with the aim to ensure that OSCAR content is up-to date, correct, quality-controlled, accessible and fit for purpose.

Note: OSCAR/Space feeds another information resource, the CGMS Satellite Status list, which is thus indirectly covered by this procedure.

* 1. **Document plan**

The document contains seven sections:

 Section 1: Introduction

Section 2: Roles

Section 3: OSCAR/Requirements updating process

Section 4: OSCAR/Space content updating process

Section 5: Updating of functionality and interface

Section 6: User feedback and evaluation

Section 7: Resources for Oscar updating and maintenance

Section 8: Evolution of the procedure

* 1. **Background documents**
* OSCAR/Space Software Requirements Specification
* WIGOS Information Resource (WIR) functional requirements specification
* ISO/IEC 14764:2006 Software Maintenance
* CIMO Guide Part 3 Chapter 1 Quality management
* [Rolling Review of Requirements (RRR) process](http://www.wmo.int/pages/prog/www/OSY/GOS-RRR.html)
	1. **Definitions**

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| **Acronym** | **Definition** |
| OSCAR | Observing System Capability Analysis and Review Tool |
| WIGOS | WMO Integrated Global Observing system |
| WIR | WIGOS Information Resource |
| CEOS  | Committee on Earth Observation Satellites |
| CGMS | Coordination Group for Meteorological Satellites |

1. Roles

The updating and maintenance processes involve the following roles. In practice, one person can take multiple roles.

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| **Role name** | **Description** |
| SP Office | Space Programme Office(Including external contractors acting by delegation of the SP Office staff and in accordance with the present procedure) |
| CGMSSEC | CGMS Secretariat, hosted by EUMETSAT (Including external contractors acting under the management of CGMSSEC and in accordance with the present procedure) |
| PoC | Point of Contact in charge of reviewing and updating the requirements for a given Application Area identified in the RRR process |
| IPET-OSDE | CBS Inter-Programme Expert Team on Observing System Design and Evolution |
| ET-SAT | CBS Expert Team on Satellite Systems |
| Satellite Operators | Satellite operators with missions recorded in OSCAR |
| Science Groups | International Science Groups that partner with WMO, e.g. IPWG, IROWG, IPT-SWeISS |
| WIR Project Manager | Person responsible for coordinating the overall WIGOS Information Resource (WIR) developments including OSCAR developments |
| OSCAR Developer | Person(s) responsible for the technical developments of the OSCAR tool |
| OSCAR Technical Administrator | Person(s) responsible for the maintenance and operation of the OSCAR tool *[Note: possibly different persons for OSCAR/Requirements, OSCAR/Space, OSCAR Surface]* |
| O/SSAT | OSCAR/Space Science and Technical Advisory Team. Representatives from International Science Working Groups and from GSICS. Primarily responsible for the mapping of mission capabilities to WMO observational requirements |
| O/SST | OSCAR/Space Support Team. Contact points at all CGMS operators. Primarily responsible for ensuring correctness and completeness of the factual content of OSCAR/Space. |

**Requirements owner**: In addition, observational user requirements in OSCAR/Requirements shall be owned by an identified body or expert group representing the relevant community (e.g. Technical Commission). The Point of Contacts for Application Areas are responsible for making sure that the Application Area “owner” is agreeing with the proposed requirements in OSCAR/Requirements.

1. OSCAR/REQUIREMENTS UPDATING PROCESS
	1. Explanations

This section applies to the updating of the contents of OSCAR/Requirements. For changes to the functionality of OSCAR, please refer to Section 5.

The variables registered in OSCAR are generally shared by several application areas. Each variable has the following attributes, which can only be updated by the administrator.

TABLE 1: Attributes of a variable in OSCAR

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| **Attribute** | **Example** |
| Name  | *Sea surface temperature* |
| Applicable cross-cutting tags | *Cryosphere, Tropical Meteorology* |
| Domain or sub-domain | *Ocean* |
| Definition  | *Temperature of the sea water at surface. The “bulk” temperature refers to the depth of typically 2 m, the “skin” refers to within the upper 1 mm*. |
| Comment  | *Detailed SST definitions are available from GHRSST: https://www.ghrsst.org/ghrsst-science/sst-definitions/* |
| Measuring unit | *K* |
| Uncertainty unit  | *K* |
| Stability unit per decade  | *K* |
| Unit for horizontal resolution  | *km* |
| Unit for vertical resolution  |  |
| Applicable layers | *Sea surface, Bulk* |

* 1. New variables or changes to the attributes of a variable

The following steps shall be followed when entering a new variable or updating any attribute of an existing variable:

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| **Step** | **Description** | **Responsibility** | **Frequency** |
| 1 | When identifying the need to either register a new variable or amending the attributes of an existing variable, the Point of Contact or a relevant expert submits the proposed attributes (as listed in Table 1) to the administrator with a brief justification. | PoC or other expert | When needed |
| 2  | The administrator checks the formal consistency of the recommended change, seeking clarification from the initiator if necessary.If the change is minor (e.g. adding a layer, or editorial correction on the definition, etc.) the administrator jumps to step 6.  | Administrator | When contacted by a PoC or other expert |
| 3 | If the recommended change is substantial and/or has a potential impact on the requirements of several applications, the administrator seeks confirmation from the IPET-OSDE Chair  | Administrator | When appropriate |
| 4 | The IPET-OSDE Chair reviews the proposed change, may contact the expert for further discussion, or submits the proposal to discussion by IPET-OSDE, and then submits proposal to the chair of the WIGOS TT-WMD for decision | IPET-OSDE Chair | When appropriate |
| 5 | The TT.WMD Chair either confirms the proposed change or consults with TT-WMD and/or other experts for clarification or alternate proposal | TT-WMD Chair | When appropriate |
| 6 | Upon confirmation by the TT-WMD Chair, or if the recommended change is minor, the OSCAR/Requirements administrator implements the change. | Administrator | When a proposed change is confirmed |

* 1. Requirements applicable to an existing variable

The provisions below are applicable when a requirement is updated, or a new requirement is entered, for a variable which is recorded in OSCAR, without changing the definition, unit, or applicable layers of this variable.

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| **Step** | **Description** | **Responsibility** | **Frequency** |
| 1 | The PoC reviews the requirements of his/her application area in consistency with the Statement of Guidance, taking into account the evolution occurred in the application area. | PoC | Yearly |
| 2  | If updates are necessary, the PoC logs in as Editor, and updates the requirements or enters new requirements as appropriate. If necessary he/she contacts the administrator for assistance. Information about the source of the requirement ought to be added in the database in the corresponding field. | PoC | Yearly |
| 3 | When the update is ready, the PoC informs the OSCAR/Requirements administrator that requirements are in draft status | PoC | When update is ready for validation |
| 4 | The administrator checks the formal consistency of the new or updated requirement. If the updates are purely editorial or a factual correction, the administrator jumps to step 7 | Administrator | When requested |
| 5 | If the updates are substantial, the administrator seeks confirmation from the IPET-OSDE Chair | Administrator | When relevant |
| 6 | The IPET-OSDE Chair either confirms the updated requirement, or contacts the PoC for further discussion, or submits the proposed update to IPET-OSDE for discussion. | IPET-OSDE Chair | When relevant |
| 7 | Upon confirmation by the IPET-OSDE Chair, or endorsement by IPET-OSDE, or if the draft update is minor, the OSCAR/Requirements administrator validates the update. | Administrator | When confirmed |

1. OSCAR/SPACE Content updating Process

There are two levels of content updates:

* First level: updates based on non-controversial factual evidence,
* Second level: other updates, resulting of expert assessment.
	1. **First level: updating of factual content**

**Scope**: Refers to update, insertion or deletion of factual content, based on non-controversial factual evidence (e.g. satellite launch dates, new satellite plans, start or end of operational service, orbit characteristics, instrument specifications, ground segment and programme description).

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| **Step** | **Description** | **Responsibility** | **Frequency** |
| 1 | SP Office and CGMS secretariat keeps track of publicly available information from official satellite operator sources and updates OSCAR accordingly[If necessary, updates are confirmed with Satellite Operator focal points] | SP Office and CGMSSEC | Continuous, Delay of max 2 months |
| 2  | Satellite Operators inform CGMS secretariat of important changes or factual errors in OSCAR | O/SST | As necessary |
| 3 | CGMS satellite operators regularly validate factual information within their responsibility through annual reports to CGMS and as part of the annual Risk Assessment performed by CGMS | O/SST | yearly |
| 4 | For non-CGMS members, updates are collected either via CEOS or, if relevant (e.g. non-CEOS Members), through direct call from the SP Office | SP Office in consultation with CEOS | yearly |

* 1. **Second level: updating of assessments**

**Scope**: Refers to assessments of the suitability of certain instruments for fulfilling pre-defined capabilities or measuring specific variables. Since these assessments can be subject to discussion, effort is made to seek endorsement by representative or authoritative experts. As of OSCAR/Space Version 2, these assessments rely on expert rules based on remote sensing science principles. Expert groups will be invited to engage in the validation and update of this knowledge basis.

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| **Step** | **Description** | **Responsibility** | **Frequency** |
| 1 | Instruments are classified and assessed according to objective design features | SP Office and CGMSSEC | As new satellites/instruments are added |
| 2.1 | Thematic science groups and IPET-SUP are invited to review the rules determining the instrument rating per product, in their respective fields of expertise | O/SSAT | Typically 2-yearly, or when major updates are entered  |
| 2.2 | ET-SAT validates the assessments and other details in their field of expertise  | ET-SAT | yearly |
| 3 | SP Office and CGMSSEC implements changes requested by ET-SAT and/or science groups, | SP Office | yearly |
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* 1. **Traceability of updates**

All operations (insert, update, delete) are automatically recorded by the system. An administrator can access these logs and reverse changes if necessary.

A list of major content updates (e.g. structural changes, assessments) is maintained by the SP Office.

1. Updating of functionality and interface of the tool

Conceptual and/or technical changes to the structure, functionality and interface of the tool can be differentiated in “system maintenance”, “adaptive/corrective maintenance” and “feature updates”.

* 1. **System maintenance**

**Scope**: Maintenance tasks necessary to provide 24/7 accessibility and recovery services in case of failure. Includes the regular maintenance of hosted server environment.

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|  | **Description** | **Responsibility** | **Frequency** |
| Process 1 | Ensure maintenance of application backups and keep recovery versions. (Application and Content) | OSCAR Technical Administrator | Continuous |
| Process 2 | Monitor and configure technical platform (web server, database systems etc) Inform OSCAR Developer of any significant changes in environment | OSCAR Technical Administrator | As needed, at least bi-annually, or if necessary  |
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* 1. **Adaptive/corrective maintenance**

**Scope**: Refers to analysis and correction of discovered bugs or incompatibilities arising through the use of new devices and browsers, as well as minor changes to the presentation (wording, layout).

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| **Step** | **Description** | **Responsibility** | **Frequency** |
| 1 | Recording, prioritizing and validating requests  | SP Office | continuous |
| 2 | Implementation and test of update, inform users (if applicable / relevant) | OSCAR Developer | as applicable, with delay of max 2 months |
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* 1. **New features, new functionalities and presentation**

**Scope**: This refers to adding new functionalities, or significantly changing current behaviour of the tool, including presentation and user interface.

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| **Step** | **Description** | **Responsibility** | **Frequency** |
| 1 | Recording of general feedback and feature requests from O/SST and OSSAT, CGMS WG-III, other users, OSCAR development team | SP Office | Continuous |
| 2 | ET-SAT provides guidance on evolution of functionality and interface[WIR development team is consulted if requests have effects on other OSCAR modules] | ET-SAT[WIR project manager] | yearly |
| 3 | Approved features are recorded in the Software Requirements Specification for OSCAR/Space | SP Office |
| 4 | Changes are implemented in accordance with overall OSCAR procedures and schedules | OSCAR Developer |
| 5 | OSCAR manual(s) are updated as necessary | SP Office, OSCAR Developer |

* 1. **Traceability**
* A list of discovered bugs, incompatibilities and problems, along with their priority and status is maintained by the OSCAR Developer
* A list of all feature requests is maintained by the WMO SP
* Approved functionalities/ features or changes of such are recorded in the Oscar “Software Requirements Specification” (SRS) Document.
1. User feedback and evaluation

User feedback is collected through an email address indicated on the OSCAR homepage, which is checked on a regular basis by the administrator.

User emails are responded and appropriate actions are taken in accordance with the processes outlined in Section 3 and Section 4, for instance:

- an explanation is provided to the user, added in OSCAR views or in the user manual;

- a modification is brought to the interface or the functionality;

- contents are corrected, or a proposal for correction submitted to a satellite operator or a science group for validation.

Structured online surveys are used at regular intervals (every 1-2 years, as appropriate) to collect information on visitor characteristics and feedback on user satisfaction and possible areas for improvement.

Visitor statistics (number, origin, access characteristics) are collected. These statistics are reviewed on an annual basis within the SP Office.

1. Resources for Oscar updating and maintenance

The CBS Recommendation 1 (CBS-15) on Implementation and Sustainability of the Database of Observation Requirements and Observing Capabilities states:

*(1) That resources be assigned with high priority within the Secretariat to complete the software development and, on a sustained basis, for technical maintenance, first-level contents updating and, through consultancy, for technical-level updating and quality control, as a key activity of the WMO Integrated Global Observing System;*

*(2) That Members, expert teams of the Open Programme Area Group on Integrated Observing Systems, satellite operators including the Expert Team on Satellite Systems and members of the Coordination Group for Meteorological Satellites, support the database updating process through submitting inputs and providing reviews and feedback.*

1. Evolution of the Procedure

This procedure is maintained by the SP Office, in consultation with the WIR development team, IPET-OSDE, IPET-SUP and ET-SAT.

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1. Note: IPET-OWR is an Inter-programme Expert Team established jointly by CBS and CIMO with team members from both Commissions, and the team reports to CIMO. [↑](#footnote-ref-1)
2. Note: the OSCAR/Requirements parts added to the ET-SAT approved document are highlighted in green. IPER-OSDE concurred with the Space part, and approved the Requirements part. [↑](#footnote-ref-2)
3. Note: the OSCAR/Requirements parts added to the ET-SAT approved document are highlighted in green. IPER-OSDE concurred with the Space part, and approved the Requirements part. [↑](#footnote-ref-3)