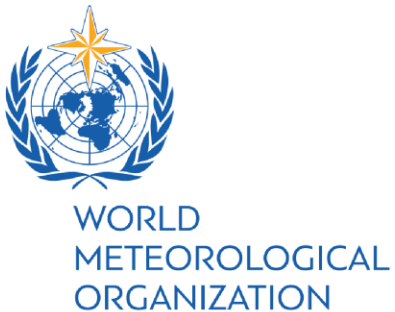


First online Rolling Review of the Observational Requirements (RRR) introductory workshop (virtual, 17 May 2023)

History and introduction to the Rolling Review of Requirements and its evolution

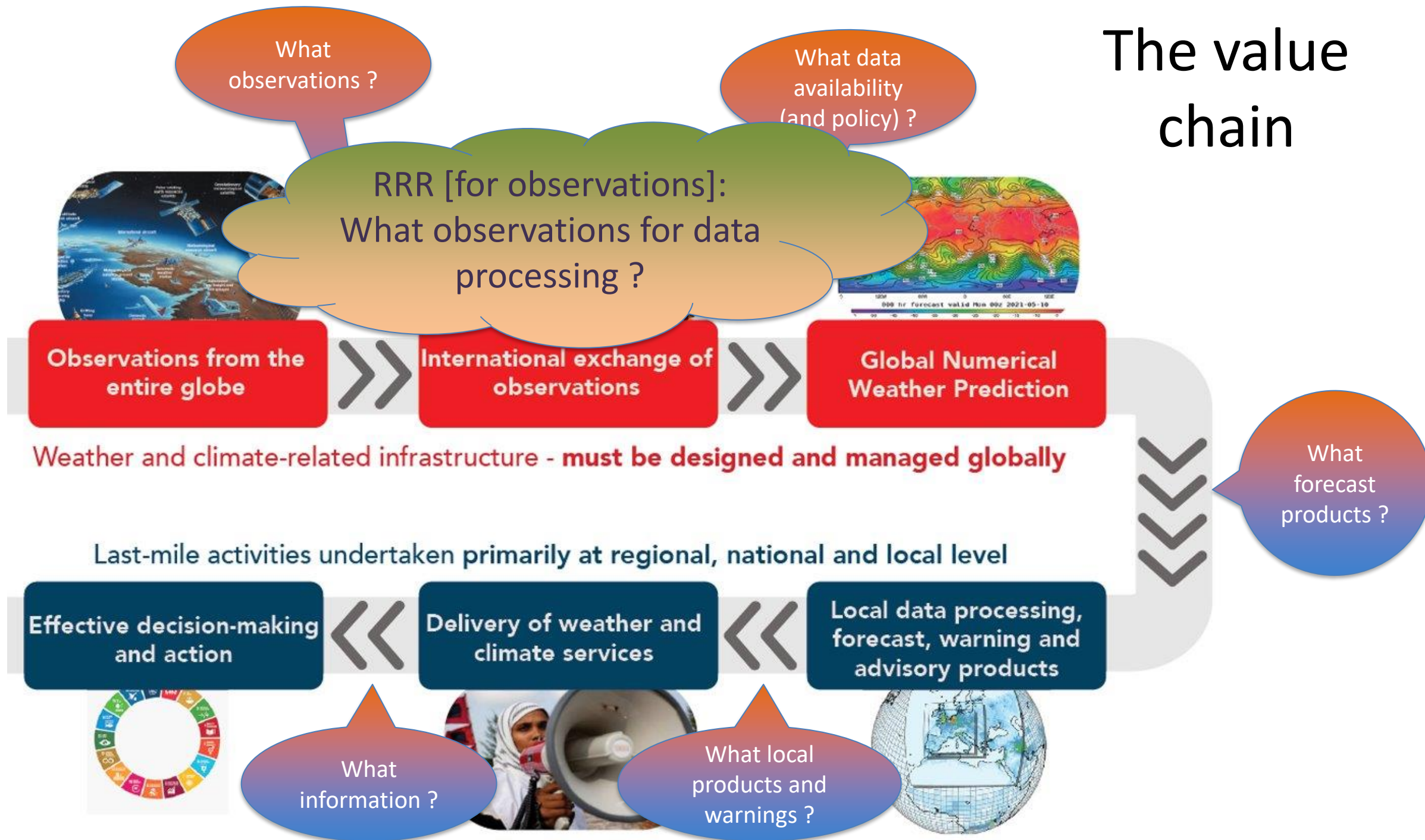
(Etienne Charpentier, H/ONM)



WMO Rolling Review of Requirements (RRR) [for observations]
<https://community.wmo.int/rolling-review-requirements-process>

- Addressing the requirements for all WMO applications
- Initiated in early 2000s' through the WMO Space Programme in cooperation with CEOS
- Regulated in the WIGOS Manual (WMO No. 1160, para 2.2.4 and Appendix 2.3)
Members, both directly and through the participation of their experts in the activities of regional associations and technical commissions, shall contribute to the RRR process and assist the designated Points of Contact for each application area in performing their roles in the RRR
- Commission for Basic Systems (CBS) was in charge of RRR until 2019
 - Inter Programme Expert Team on Observing System Design and Evolution (IPET-OSDE)
- Now the Infrastructure Commission is in charge of RRR since 2020
 - Joint Expert Team on Earth Observing System Design and Evolution (JET-EOSDE)
 - Transition is underway to an evolved RRR process per WMO's Earth System Approach

The value chain



What is the RRR [for observations] about ?

- Keep track of user requirements of WMO Application Areas (objective, quantitative, technology free)
- Keep track of existing observing systems capabilities
- Assess observational gaps worldwide
- Assess impact of observations on application areas
- Consider WMO priorities (e.g. safety of life & properties, DRR)
- Consider composite nature of observing systems and their cost-effectiveness
- **Make recommendations on the long term Vision of global observing systems and their evolution in the medium term according to that Vision**

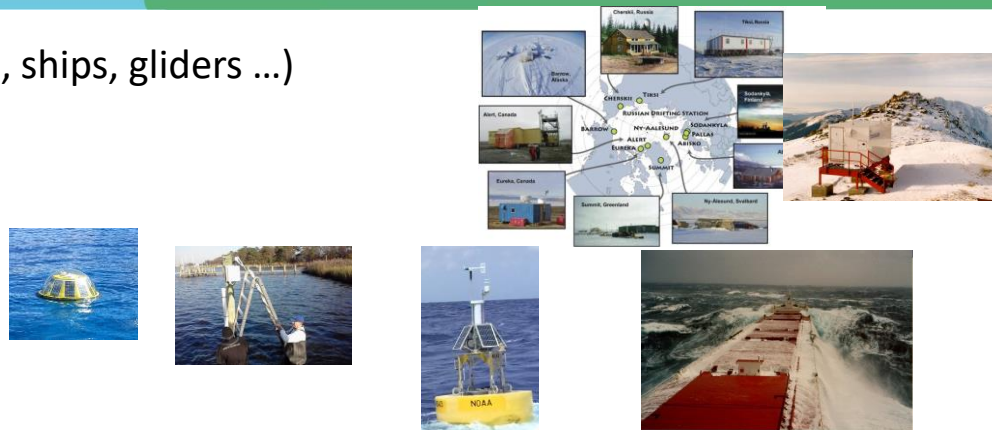
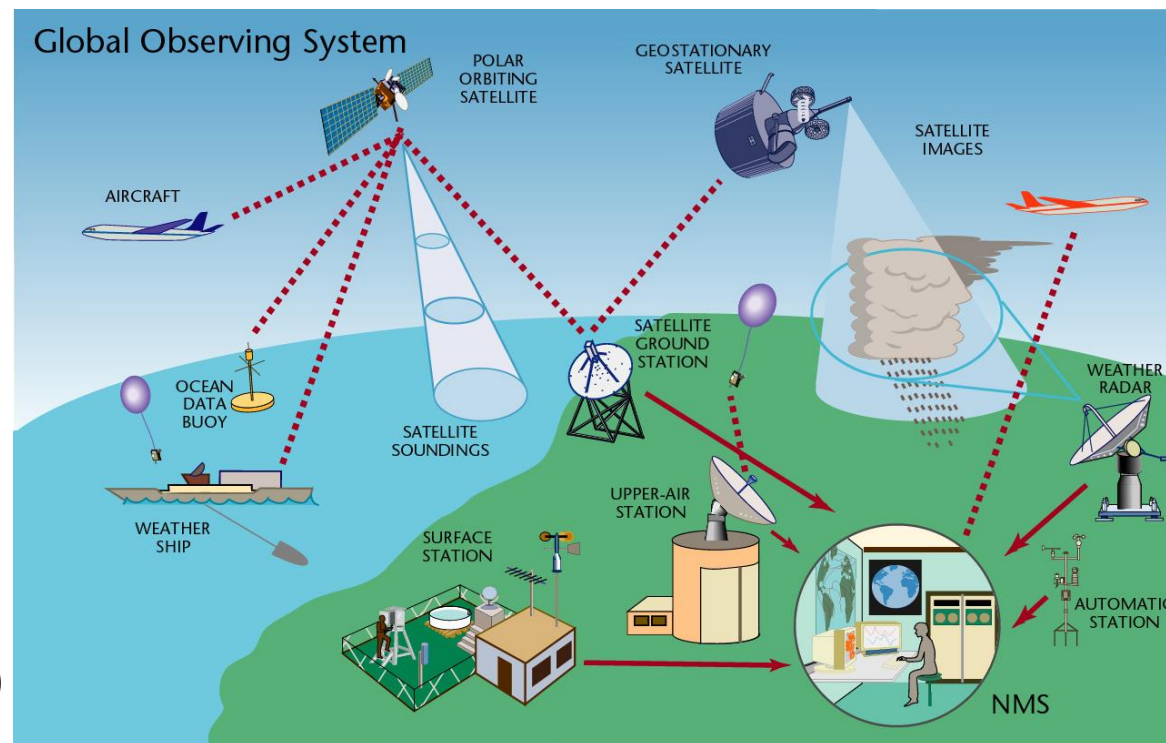
WMO Application Areas

Definition: **an activity involving primary use of observations**, in a chain of activities which allows NMHSs or other organizations to render services contributing to public safety, socio-economic well-being and development in their respective countries, in a specific domain related to weather, climate and water. The concept of a WMO Application Area is used in the framework of the WMO Rolling Review of Requirements (RRR) and describes a **homogeneous activity** for which it is possible to compile **a consistent set of observational user requirements** agreed by community experts working operationally in this area.

Global Numerical Weather Prediction	High Resolution Numerical Weather Prediction
Nowcasting and Very Short Range Forecasting	Sub-seasonal to longer predictions
Aeronautical Meteorology	Forecasting Atmospheric Composition
Monitoring Atmospheric Composition	Providing Atmospheric Composition information to support services in urban and populated areas
Ocean Applications	Agricultural Meteorology
Hydrology	Climate Monitoring (GCOS)
Space Weather	Cross cutting: Global Cryosphere Watch (GCW) and Global Framework for Climate Services (GFCS)

Observing systems contributing to WIGOS

- Space-based
 - Geostationary
 - Polar orbiting LEO
 - Elliptical orbit,
- Surface-based
 - Surface stations (RBSN, RBCN, AWS ..)
 - Climate stations (GSN)
 - Upper air soundings (incl. GUAN, GRUAN)
 - Wind profilers
 - Weather radars
 - Lightning detection systems
 - Aircrafts (e.g. AMDAR)
 - Aeronautical stations
 - Hydrological stations (WHOS)
 - Atmospheric composition, air quality monitoring (GAW)
 - Cryosphere observations (GCW)
 - Marine observations (drifters, floats, moorings, tide gauges, ships, gliders ...)
 - Terrestrial observations (GTOS)
 - Surface-based space weather observations
 - GNSS radio-occultation
 - ...



The RRR process

- OSCAR Platform (oscar.wmo.int) includes
 - [OSCAR/Requirements](#) (“technology free”)
 - Observing systems capabilities
 - [OSCAR/Space](#): Space-based capabilities
 - [OSCAR/Surface](#): Surface-based capabilities (operated with MeteoSwiss)
- Critical review
 - Assessing gaps by comparing capabilities vs. requirements
 - Undertaking Impact Studies, e.g. OSEs, OSSEs, FEC, FSO ...
 - Analysed by Experts to produce **gap analysis** and [Statements of Guidance \(SoGs\)](#)
- SoGs reviewed/endorsed by their owners & JET-EOSDE, then approved by INFCOM MG
- Feeds into [Vision for WIGOS Component Observing Systems in 2040](#) (approved by Cg-18 in 2019), [High Level Guidance](#) on evolution of observing systems, Technical Regulations (e.g. Manual on WIGOS: [WMO-No. 1160](#), GBON, RBON)

How user requirements are specified in OSCAR/Requirements

For each application & each variable, consider the following

- Horizontal resolution
- Vertical resolution
- Uncertainty (1σ)
- Observing cycle (OC)
- Timeliness (Delay)
- Long term stability (Uncertainty/decade)

Bias & random error, combined in the root-mean square sense

For each parameter and criteria, record the following values

- **Threshold**
Value below which observations are worthless
- **Goal**
Value beyond which improvement gives no additional value
- **Breakthrough**
Proposed target where significant progress & optimal cost/benefit

Example – Global NWP Requirements in OSCAR/Requirements (example for Air Pressure near surface over land)

	Goal	Breakthrough	Threshold
Uncertainty	0.5 hPa	1 hPa	1 hPa
Stability/decade (if applicable)		HD req. for GBON	
Horizontal Resolution	15 km	100 km	500 km
Vertical Resolution	Data availability req. for GBON		
Observing Cycle	60 min	6 h	12 h
Timeliness	6 min	30 min	6 h

- **Validated:** 2009-02-10
- **Source:** John Eyre
- **Confidence:** Firm
- **Comment:** Result of impact studies of actual data used in actual applications of numerical or conceptual mode



Statements of Guidance (*gap analysis*)

- **The Statement of Guidance interprets the output of the critical review as a gap analysis and identifies priorities for action:** the most feasible, beneficial and affordable initiatives to deal with the identified gaps or shortcomings in WMO observing systems for an application area. This draws on the subjective judgement and experience of the Points of Contact, the experts and other stakeholders they consult within their application area.
- This stage of the RRR requires the **Points of Contact to coordinate** with their application area community and stakeholders, as needed, in order to produce, review and revise the Statement of Guidance for the application area.

Statement of Guidance for Global Numerical Weather Prediction ([GNWP](#))

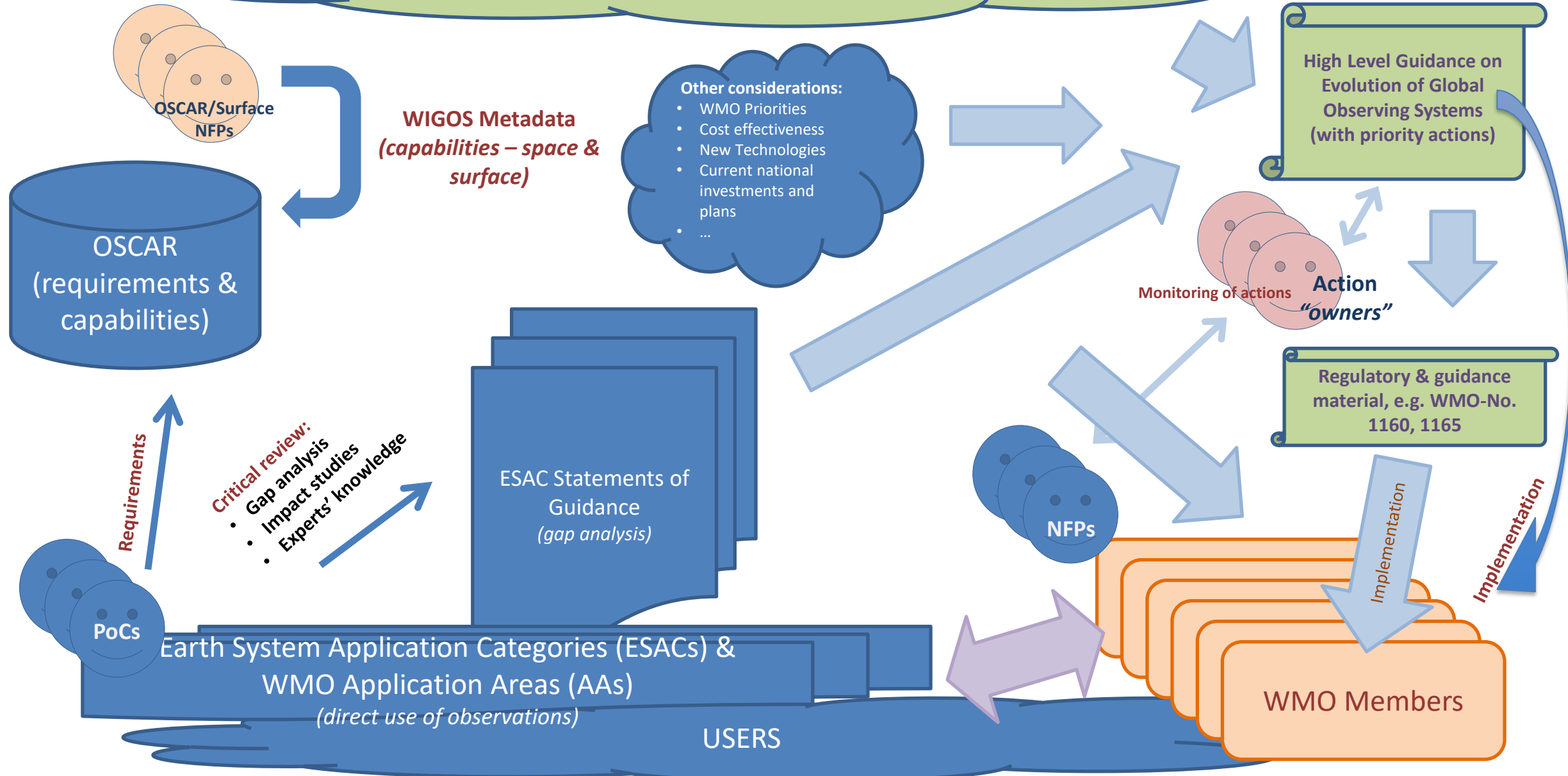
The critical atmospheric variables that are not adequately measured by current or planned systems are (in order of priority):

- Wind profiles at all levels outside the main populated areas
- Temperature and humidity profiles of adequate vertical resolution in cloudy areas, particularly over the poles and sparsely populated land areas
- Satellite based rainfall estimates
- Snow equivalent water content

Evolution of RRR Process per WMO's Earth System approach

- [High Level Guidance document](#) responding to WIGOS Vision 2040
- New definition of an Application Area
- Grouping of Application Areas (AAs) into Earth System Application Categories (ESACs)
- Introducing prioritization of requirements
- Better consideration of regional requirements
- Approved by EC-76 for inclusion in WIGOS Manual, WMO-No. 1160 ([here](#), See Appendix 2.3)
- Full description of new draft RRR process available [here](#)

WIGOS Vision 2040
(multidisciplinary)



More information

Website:

<https://community.wmo.int/rolling-review-requirements-process>

Includes:

Document describing current [old] RRR process ([pdf](#))

[WIGOS Vision 2040](#)

Statements of Guidance

[High Level Guidance document](#) (Cg-19 version)

Description of new RRR process (INFCOM-2 [INF 6.1\(3\)](#))

OSCAR: <http://oscar.wmo.int>

Contact : kpremec@wmo.int

Thank you



WORLD
METEOROLOGICAL
ORGANIZATION



wmo.int