World Meteorological Organization

Working together in weather, climate and water

WMO OMM

Workshop on the impact of SLP from drifters on NWP, Sedona, 21 May 2012

Rolling Review of Requirements and related DBCP issues

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WMO Rolling Review of Requirements (RRR)
http://www.wmo.int/egos

- Addressing the requirements for observations of all applications within WMO programmes
- Commission for Basic Systems (CBS) in charge of RRR
  - Expert Team on the Evolution of Global Observing Systems (ET-EGOS)
- Databases managed by WMO Space Programme in cooperation with CEOS
  - User requirements for observations
  - Observing system capabilities

Application areas in RRR

1. Global Numerical Weather Prediction (NWP)
2. High Resolution NWP (HRNWP)
3. Nowcasting and Very Short Range Forecasting (NVSRF)
4. Seasonal to Inter-annual Forecasts (SIAF)
5. Aeronautical Meteorology (CAeM)
6. Atmospheric Chemistry (CAS)
7. Ocean Applications (JCOMM)
8. Agricultural Meteorology (CAgM)
9. Hydrology (CHy)
10. Climate Monitoring (GCOS)
11. Climate Applications (other aspects – CCl)
12. Space Weather

- Cross cutting (or under discussion)
  - Global Cryosphere Watch (GCW)
  - Global Framework for Climate Services (GFCS)

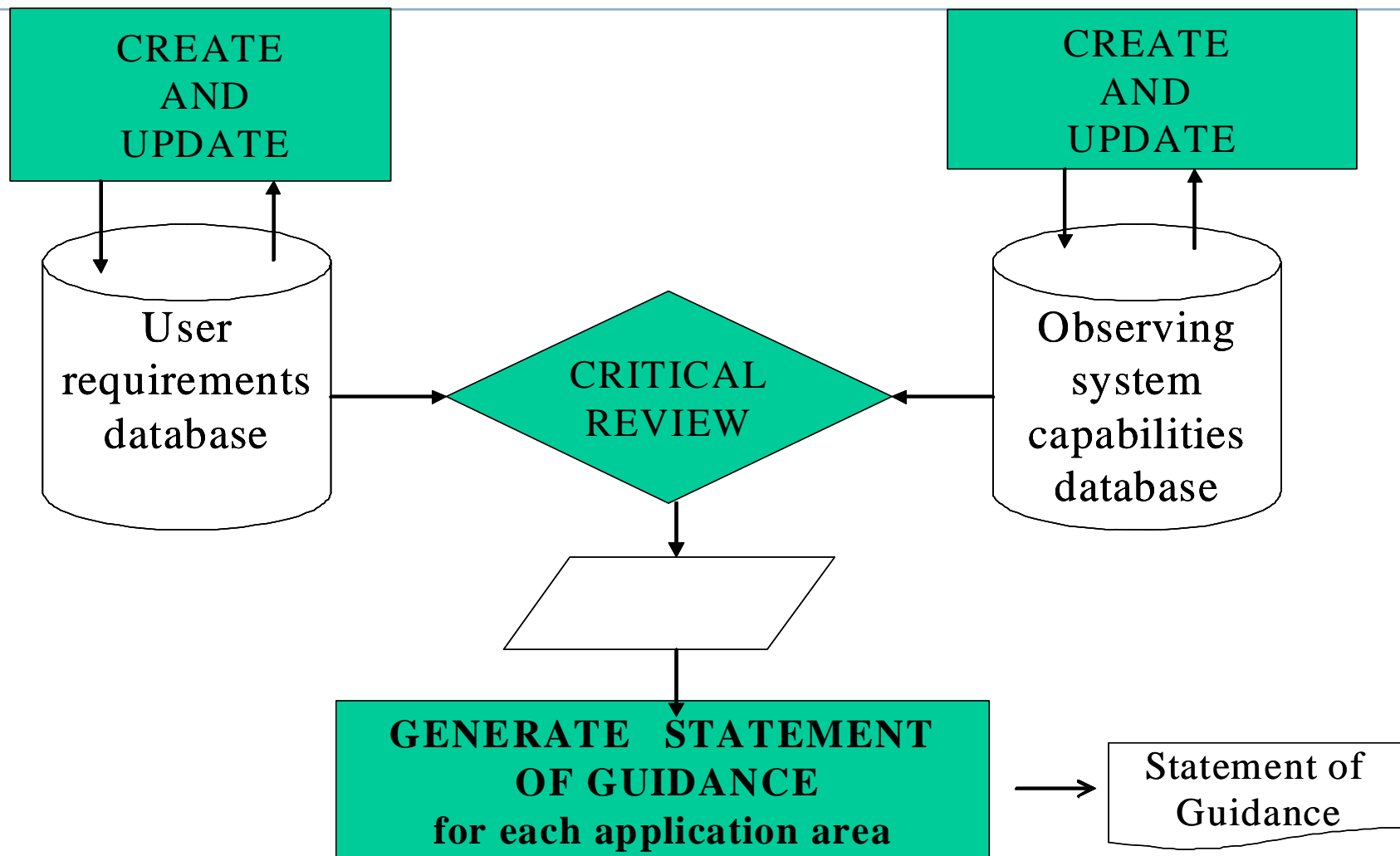- Obsolete: Synoptic Meteorology (merged into Nowcasting & VSRF)

The RRR

- **WMO Database**
  - User Requirements (URs) - "technology free"
  - Observing systems capabilities (OSCs)
    - Space-based capabilities
    - Surface-based capabilities
  - New database being developed (format, hosts, ...)
- **Critical review – inputs:**
  - Comparsions of URs with OSCs
  - Analysis by experts (including results from impact studies)
- **Statements of Guidance (SoGs)** = gap analyses
- **SoG for each application area reviewed by ET-EGOS**
- **Feeds into Vision of the GOS and EGOS Implementation Plan**
  - Current EGOS-IP responding to the Vision of the GOS in 2015
  - Draft EGOS-IP responding to the Vision of the GOS in 2025

The RRR process

```
CREATE
AND
UPDATE
```
→ User requirements database

```
CREATE
AND
UPDATE
```
→ Observing system capabilities database

CRITICAL REVIEW

GENERATE STATEMENT OF GUIDANCE for each application area → Statement of Guidance
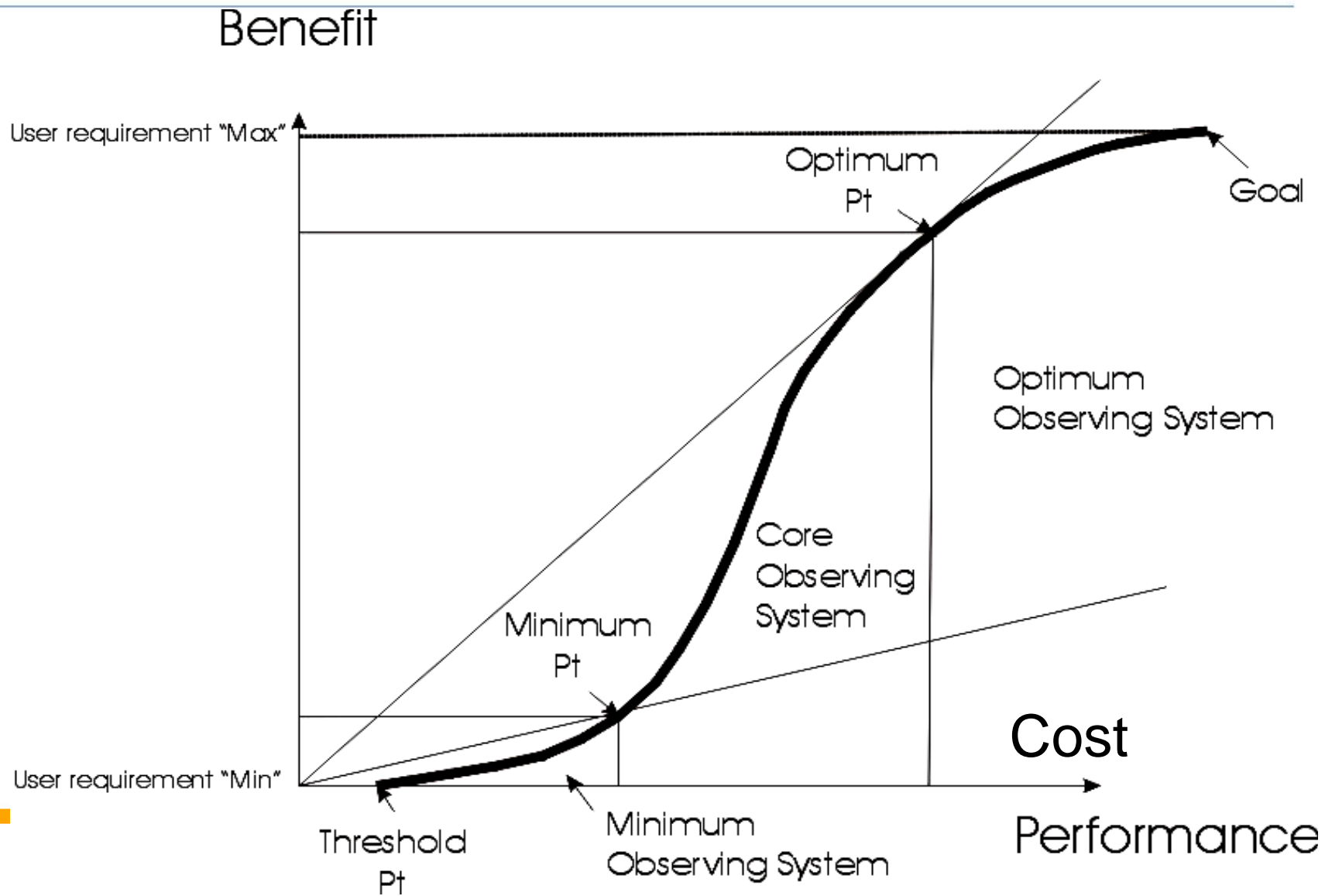
How user requirements are specified

- For each application & each geophysical variable
  - Horizontal resolution
  - Vertical resolution
  - Accuracy
  - Observing cycle
  - Timeliness (Delay)

- For each variable
  - "min" (or threshold)
    - value below which observations are worthless
  - "max" (or goal)
    - value beyond which improvement gives no additional value
  - "breakthrough"
    - proposed target for significant progress

Performance/cost v. benefit curve for an observing system for an application

Requirements database
http://www.wmo-sat.info/db/

Global NWP requirements (example)

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Id	Variable	Layer	App Area	Uncert Goal	Uncert Thresh	HR Goal	HR Thresh	VR Goal	VR Thresh	OC Goal	OC Thresh	Avail Goal	Avail Thresh
244	Accumulated precipitation (over 24 h)	2D	Global NWP	0.5 mm	5 mm	10 km	100 km	N/A	N/A	60 min	12 h	24 h	30 d
245	Aerosol column burden	TC	Global NWP	10 %	50 %	15 km	250 km	N/A	N/A	60 min	24 h	6 min	6 h
246	Aerosol mass mixing ratio	HS&M	Global NWP	10 %	50 %	15 km	250 km	km	km	60 min	24 h	6 min	6 h
247	Aerosol mass mixing ratio	HT	Global NWP	10 %	50 %	15 km	250 km	km	km	60 min	24 h	6 min	6 h
248	Aerosol mass mixing ratio	LS	Global NWP	10 %	50 %	15 km	250 km	0.2 km	3 km	60 min	24 h	6 min	6 h
249	Aerosol mass mixing ratio	LT	Global NWP	10 %	50 %	15 km	250 km	0.2 km	3 km	60 min	24 h	6 min	6 h
250	Air pressure (at surface)	Over land	Global NWP	0.5 hPa	1 hPa	15 km	500 km	N/A	N/A	60 min	12 h	6 min	6 h
251	Air pressure (at surface)	Over sea	Global NWP	0.5 hPa	1 hPa	15 km	500 km	N/A	N/A	60 min	12 h	6 min	6 h
252	Air specific humidity (at surface)	Surface	Global NWP	2 %	10 %	15 km	250 km	N/A	N/A	60 min	12 h	6 min	6 h
253	Air temperature (at surface)	Surface	Global NWP	0.5 K	2 K	15 km	250 km	N/A	N/A	60 min	12 h	6 min	6 h
254	Atmospheric temperature	HS&M	Global NWP	0.5 K	5 K	50 km	500 km	km	km	60 min	24 h	6 min	6 h
255	Atmospheric temperature	HT	Global NWP	0.5 K	3 K	15 km	500 km	km	km	60 min	24 h	6 min	6 h
256	Atmospheric temperature	LS	Global NWP	0.5 K	3 K	15 km	500 km	km	km	60 min	24 h	6 min	6 h

GOS: the evolution process

WMO-OMM

User requirements for observations

Observing capabilities

Gap Analyses

(Statements of Guidance)

Implementation Plan

Long-term Vision for the GOS

Programmes of Members and Agencies

10
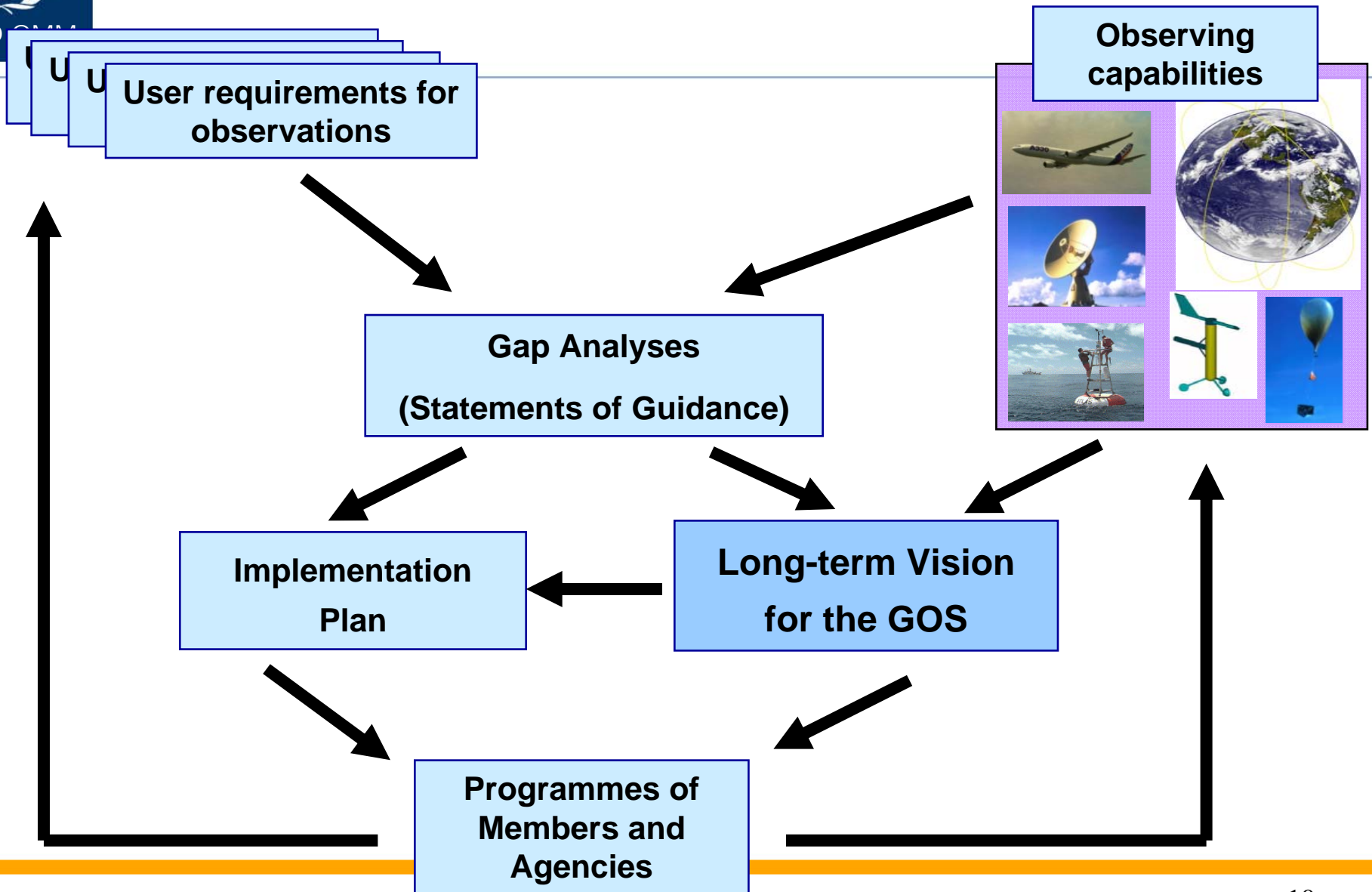
New Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP)

- Responds to Vision for Global Observing Systems in 2025
  - including needs of WIGOS, GFCS and polar applications
- Synthesis of all SoGs for all WMO Applications
- Includes guidelines / recommended actions to WMO Members to stimulate cost-effective evolution of observing systems
- Wide community review (V8) in 2011
- ET-EGOS-6 review and comments, July 2011
- Wide community review of (V10) from Sept 2011
- V11 discussed and updated by ET-EGOS-7 (May 2012)
- Reviewed/approved by ICT-IOS-7 (June 2012)
- Reviewed/approved by CBS in late 2012
- Approved by EC-65 in 2013

Outline of draft EGOS-IP (v10) 1/3

1. **Introduction**
     1.1. **Preamble**
     1.2. **Context**
     1.3. **Background and purpose of the new plan**
2. **The strategic approach to implementation**
     2.1. **Overall approach and relationship to WIGOS**
     2.2. **Agents for implementation**
3. **Over-arching and cross-cutting Actions**
     3.1. **Response to user needs**
     3.2. **Integration**
     3.3. **Data policy**
     3.4. **Expansion**
     3.5. **Automation**
     3.6. **Interoperability, data compatibility, consistency and homogeneity**
     3.7. **Radio-frequency requirements**
4. **Considerations for the evolution of observing systems in developing countries**

5. Surface-based observing system

    5.1. Introduction

    5.2. Generic issues: traceability, instrument calibration, data exchange

    5.3. Issues specific to each obs. system component

        5.3.1. Upper-air observing systems over land

        5.3.2. Surface observing systems over land

        5.3.3. Hydrological observing systems over land

        5.3.4. Weather radar stations

        5.3.5. Upper-air observing system over the oceans - ASAP

        5.3.6. Surface observing systems over the oceans

        5.3.7. Sub-surface oceanic observing systems

    5.4. Research & development & oper. pathfinders

        5.4.1. Unmanned Aeronautical Vehicles (UAVs)

        5.4.2. Driftsonde balloons (gondolas)

        5.4.3. GRUAN stations

        5.4.4. Aircraft atmospheric measurements

        5.4.5. Instrumented marine animals

        5.4.6. Ocean gliders

6. Space-based observing system

6.1. Introduction

6.2. Generic issues: instrument calibration, data exchange

6.3. Issues specific to each observing system component

6.3.1.	Operational geostationary satellites
6.3.2.	Operational polar-orbiting sun synchronous satellites
6.3.3.	Additional operational missions in appropriate orbits
6.3.4.	Operational pathfinders and technology demonstrators
6.3.5.	Instruments for space weather on polar and geostationary platforms

DBCP: related Actions in EGOS-IP (v11)

- **Action G49**
  - **Support the DBCP in its mission to maintain and coordinate all components of the network of over 1250 drifting buoys and 400 moored buoys, which provides measurements such as sea-surface temperature, surface current velocity, air temperature and wind speed and direction**

- **Action G50**
  - **Install barometer on all newly deployed drifting buoys**

- **Action G51**
  - **In the tropical Indian Ocean, extend the existing network of moored buoys to a data coverage similar to those of the Atlantic and Pacific tropics**

EGOS-IP - DBCP related issues (1)

- Requirements for ocean surface pressure observations
  - OceanOBS'09 paper by Eyre *et al.* on NWP requirements for ocean data
    - Improved coverage of surface pressure observations, particularly in Southern Oceans
    - Higher temporal frequency and more widespread exchange of data
    - Improved metadata
    - More timely availability of observations from ocean systems
    - Improvements in marine observation telecommunications
    - Sea surface wind from low Earth orbiting (LEO) satellites

- Evolution of observing systems in developing countries
  - High priority to projects to introduce/use new observing equipment and systems, including (where cost-effective) surface-based AWSs, AMDAR, ASAP and drifting buoys

EGOS-IP - DBCP related issues (2)

Requirements for observations of ocean surface pressure

- Long-standing issue in ET-EGOS discussions
- Proposed topic for the 5th NWP Impact Workshop:

- What density of surface pressure observations over ocean is needed to complement high-density surface wind observations from satellites?

- Suggestions:
  - network density reduction OSE in N.Atlantic
  - southern oceans OSSE

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Thank You

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Critical Review Chart Q(p) sfc to 500 hPa Global NWP

Humidity profile 1000-500 hPa (LT)

Analysis for Global NWP

1. Requirement Summary and assessment key

Note:
This chart is a comparison between a requirement and expected observing system performances. It is a component of the Critical Review and Statement of Guidance used by the CBS OPAG IOS Expert Team on Data Requirements and Redesign of the GOS.

Colour key		Hor	Vert	Cycle	Delay	Acc
		km	km	h	h	%
Optimum		50.0	0.4	1.0	1.0	5.0
		85.5	0.7	2.3	1.6	7.9
Median						
		146.2	1.2	5.2	2.5	12.6
Threshold		250.0	2.0	12.0	4.0	20.0

Cycle colour assessment based on a constellation of 2 polar-orbiting satellites (1 geostationary)

2. Instruments for humidity profile 1000-500 hPa (LT)

Showing relevant instruments for which details are available

Instrument	Hor		Vert		Cycle		Delay		Acc		Mission name	rating	Orbit
	km		km		h		h		%				
SOUNDER	50.0		1.0		1.0		0.5		12.00		Goes-9,,M		G1
SOUNDER	50.0		1.0		1.0		0.5		12.00		Goes-8,L		G2
VAS	100.0		1.0		1.0		0.5		15.00		Goes-7		G2
IMAGER	50.0		2.0		1.0		0.5		20.00		Goes-9,,M		G1
IMAGER	50.0		2.0		1.0		0.5		20.00		Goes-8,L		G2
SEVIRI	50.0		2.0		1.0		0.5		20.00		Msg-1,,3		G3
VISSR (GMS-5)	50.0		2.0		1.0		0.5		20.00		Gms-5		G5
Raobs RA-VI WE	218.0		0.2		12.0		1.5		5.00		WWW_in situ		G3
CrIS	25.0		1.0		12.0		2.0		10.00		Npoess-1,3		P
IASI	25.0		1.0		12.0		2.0		10.00		Metop-1,,3		P
AIRS+	25.0		1.0		12.0		3.0		10.00		EOSpm-1		P
AMSU-B	15.0		1.0		12.0		2.0		15.00		Noaa-15,,16		P
ATMS	15.0		1.0		12.0		2.0		15.00		Npoess-1,3		P
MHS	15.0		1.0		12.0		2.0		15.00		Metop-1,,3		P
MHS	15.0		1.0		12.0		2.0		15.00		Noaa-N,N'		P
HIRS/2	40.0		1.0		12.0		2.0		20.00		Noaa-9,,10		P
HIRS/3	40.0		1.0		12.0		2.0		20.00		ESA Future Mis		P

Community(ies) contributions to the RRR

- Review requirements (database)
- Estimate obs. Systems capabilities
- Identify gaps
- Review all Statements of Guidance (SoGs) and provide feedback to the points of contact
- Review draft EGOS-IP V10 (now V11)
- Provide feedback to their respective communities
- Chairs/Focal points to consolidate feedback on the above and provide comments