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WMO Rolling Review of Requirements

(item I-3.1.2)

Etienne Charpentier
WMO Secretariat
Observing Systems Division

Background

- JCOMM Implementation goals largely based on climate requirements and GCOS-92
- Non-climate requirements implicitly included
  - By addressing climate requirements one is de facto addressing requirements for other applications and permitting collection of high quality measurements
  - However, some of the requirements are not being addressed properly

The WMO Rolling Review of Requirements (RRR)

- Addressing the requirements for all WMO applications
- Initiated through the WMO Space Programme in cooperation with CEOS
- Commission for Basic Systems (CBS) in charge of RRR
  - Expert Team on the Evolution of the GOS (ET-EGOS)
    - Chairperson, John Eyre, UK Metoffice

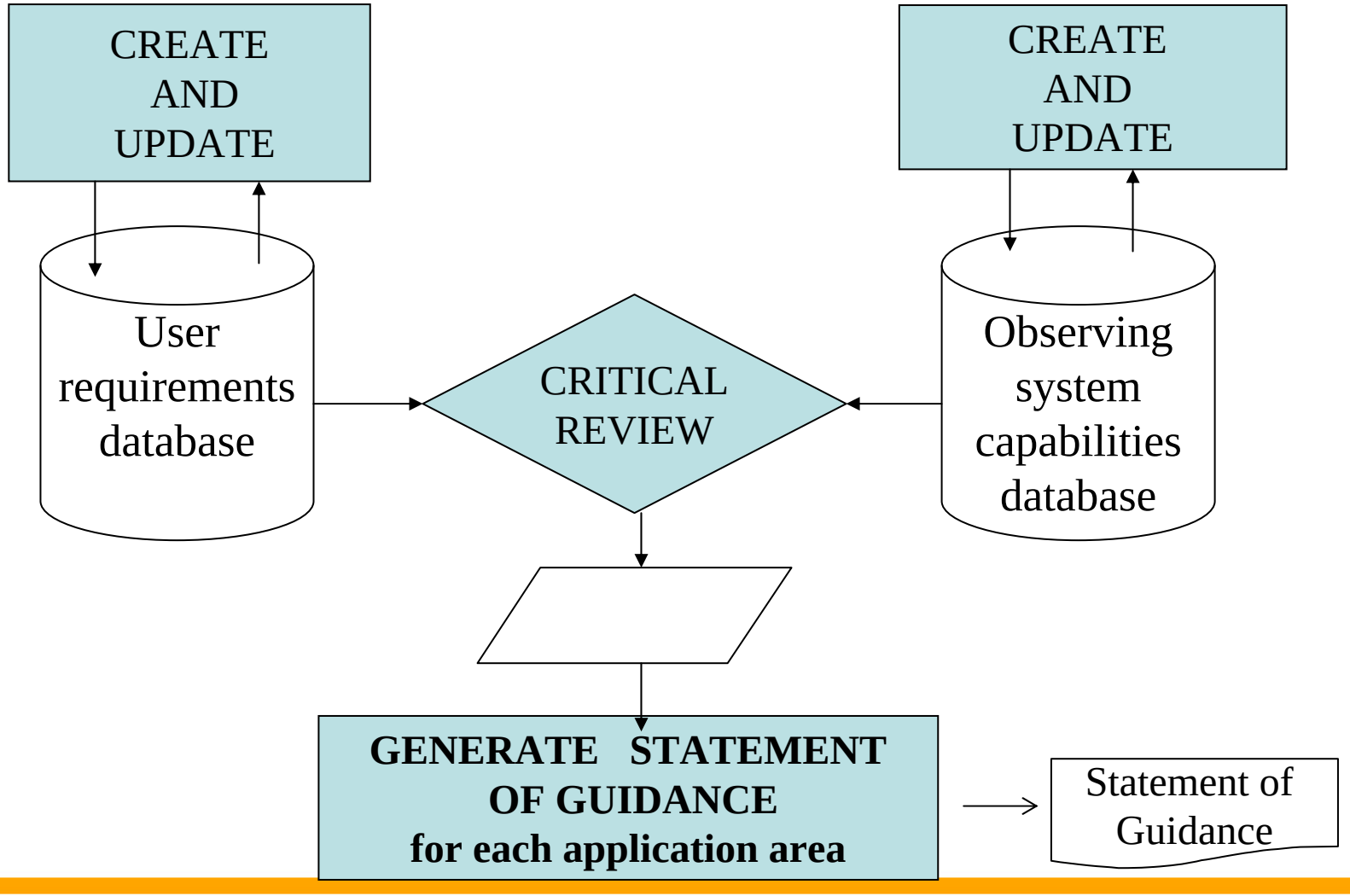
Application areas in RRR

- Seasonal to Inter-annual Forecasts
- Ocean Applications
- Global Numerical Weather Prediction
- Regional Numerical Weather Prediction
- Synoptic Meteorology
- Aeronautical Meteorology
- Atmospheric Chemistry
- Nowcasting and Very Short Range Forecasting
- Agricultural Meteorology
- Hydrology

The RRR

- WMO/CEOS Database
  - Requirements (“technology free”)
  - Performances of instruments
- Critical review
  - Critical Review Charts
  - Impact studies (OSE, OSSE)
  - Analysed by Experts to produce gap analysis and Statement of Guidance (SoG)
- SoGs reviewed by ET-EGOS
- Feeds into the ET-EGOS Implementation plan, and vision of the GOS

The RRR process



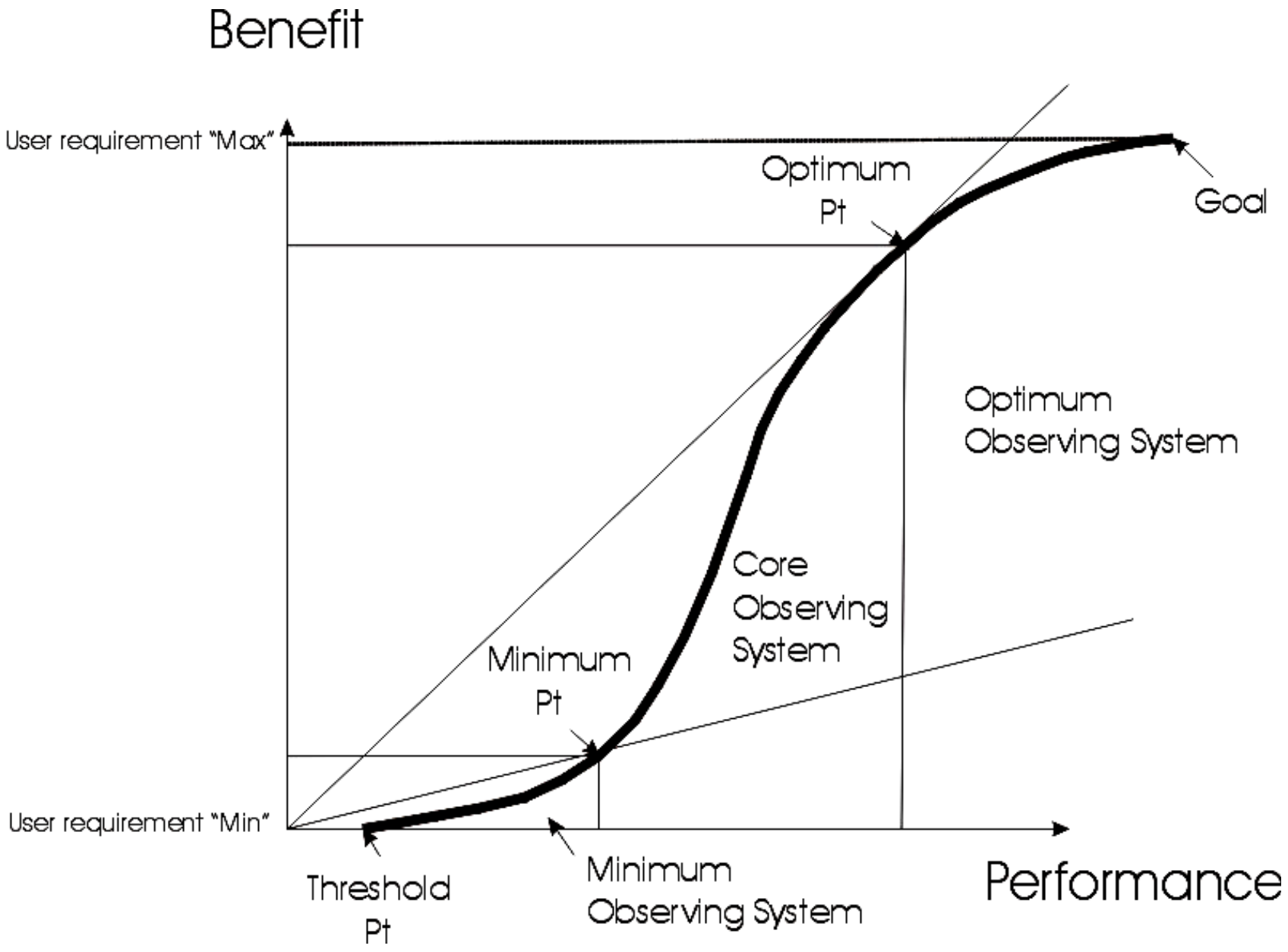
How user requirements are specified

- For each application & each geophysical variable
  - Horizontal & Vertical resolution
  - Accuracy
  - Observing cycle
  - Timeliness (Delay)
- For each parameter
  - “min” (or threshold)
    - value below which observations are worthless
  - “max” (or goal)
    - value beyond which improvement gives no additional value
  - “breakthrough” (or optimum)
    - proposed target for significant progress ; optimal cost/benefit

Global NWP Requirements (example)

		Horizontal Resolution			Vertical Resolution			Observing Cycle			Delay of Availability			Accuracy		
Requirement	Appl.	Goal	Opt.	Thr.	Goal	Opt.	Thr.	Goal	Opt.	Thr.	Goal	Opt.	Thr.	Goal	Opt.	Thr.
Wind vector over sea surface	Glob. NWP	15 km	100 km	250 km				1h	6h	12h	0.1h	0.5h	6h	0.5 m/s	2 m/s	3 m/s
Air pressure over sea surface	Glob. NWP	15 km	100 km	500 km				1h	6h	12h	0.1h	0.5h	6h	0.5 hPa	0.99 hPa	1 hPa
SST	Glob. NWP	5km	15 km	250 km				3h	24h	120h	3h	24h	120h	0.3K	0.5K	1K
T profile (lower troposphere)	Glob. NWP	15 Km	100 km	500 km	0.3 km	1 km	3 km	1h	6h	24h	0.1h	0.5h	6h	0.5K	1K	3K
T profile (higher troposphere)	Glob. NWP	15 km	100 km	500 km	0.3 km	1 km	3 km	1h	6h	24h	0.1h	0.5h	6h	0.5K	1K	3K

Performance-benefit curve for an observing system



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

Colour key	Hor km	Vert km	Cycle h	Delay h	Acc %
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

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.

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

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

Showing relevant instruments for which details are available

Instrument	Hor km	Vert km	Cycle h	Delay h	Acc %	Mission name	Mission rating	Orbit
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
HIRS/3	40.0	1.0	12.0	2.0	20.00	Metop-1,2		P
HIRS/3	40.0	1.0	12.0	2.0	20.00	Noaa-15,,N'		P

Looking at ocean variables

- Application areas considered
  - Seasonal to Inter-annual Forecasts
  - Ocean Applications
  - Global Numerical Weather Prediction
  - Regional Numerical Weather Prediction
  - Synoptic Meteorology
- For each ocean variable
  - What instrument (in situ, satellite)
  - For each application, review of SoG
    - How observations (variables) are being used
      - Assimilation, analysis, sat correction, model/sat validation
    - What are the critical needs (gaps), priority for improvement

Critical needs (gaps)

	Global NWP	Regional NWP	Synoptic Meteo.	Ocean applications
Sea level				Assimilation in ocean circulation models; Validation of sat/models Maritime safety
SLP	Assimilation	Assimilation	Isolated platforms may play important role	Maritime safety; Assimilation (isolated platforms may play important role)
Precipitation	Assimilation Validation	Assimilation Validation	Used by forecasters	Maritime safety
Visibility	Assimilation (experimental)	Assimilation (experimental)		Maritime safety (Search & rescue); Deduced from regional models
Waves	Sat/Model Validation Sat bias corr.	Sat/Model Validation Sat bias corr.		Sat/Model validation; Sat bias correction; Assimilation; Marine services; Key satellite variable
Snow	Analysis Assimilation	Analysis Assimilation		Maritime safety
Atmospheric profiles	Assimilation; Info needed to derive target	Assimilation	Used by forecasters	Maritime safety