WEATHER CLIMATE WATER

Climate Services Information System and Climate Services Toolkit

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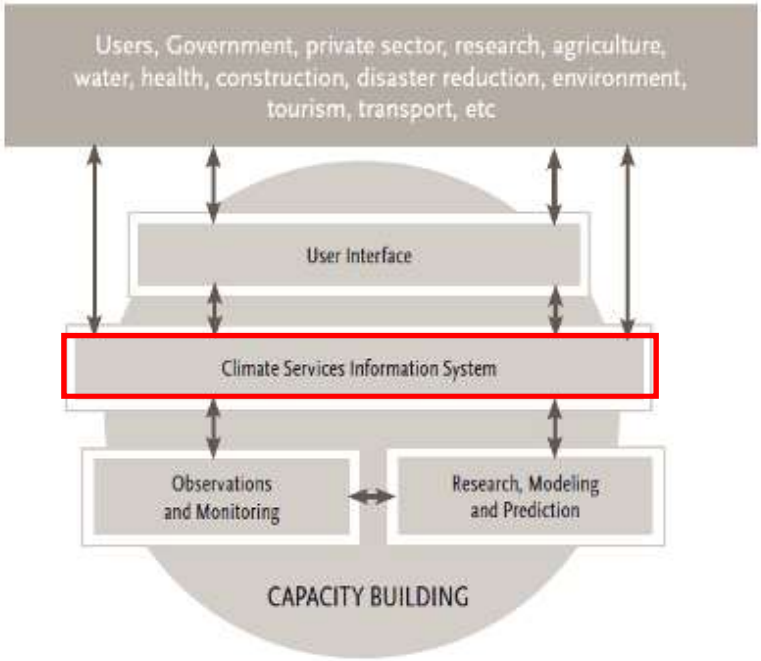
World Climate Applications and Services

WMO

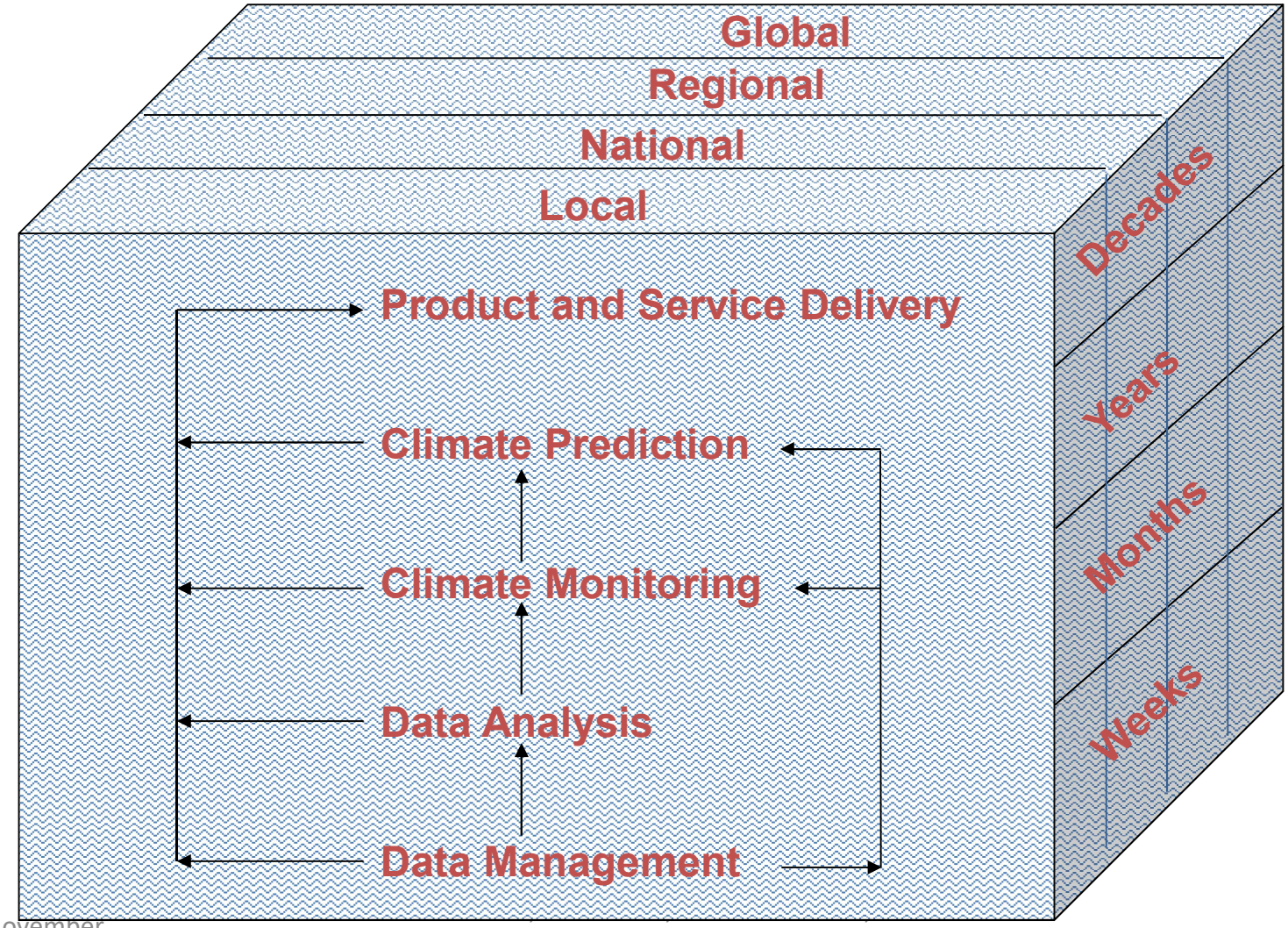
WORLD METEOROLOGICAL ORGANIZATION

Climate Service Information System (CSIS)

- The CSIS is the component of the GFCS most concerned with the generation and dissemination of climate information.
- It is the 'operational centre' of the GFCS. It will include climate data, monitoring, prediction (monthly, seasonal, decadal) and projection (centennial) activities.



Product-space-time dimensions of CSIS



Global Producing Centres of LRF

- In 2006, WMO set up a process to designate centres making global seasonal forecasts as WMO **Global Producing Centres of Long Range Forecasts (GPCLRFs)**
- GPCLRFs adhere to commonly defined standards (Manual on GDPFS) – aiding consistency and usability of output:
  - a fixed forecast production cycle
  - a standard set of forecast products
  - WMO-defined verification standards
- A comprehensive set of standard verification measures, with which to communicate the skill of forecasts, has been defined (the WMO Standard Verification System for Long-Range Forecasts – SVSLRF)
- **12 GPCLRFs** designated so far
- Two **Lead Centres: LC-LRFMME and LC-SVSLRF**

WMO GPCLRFs worldwide

DWD – under consideration at CBS session

http://www.wmo.int/pages/prog/wcp/wcasp/clips/producers_forecasts.html

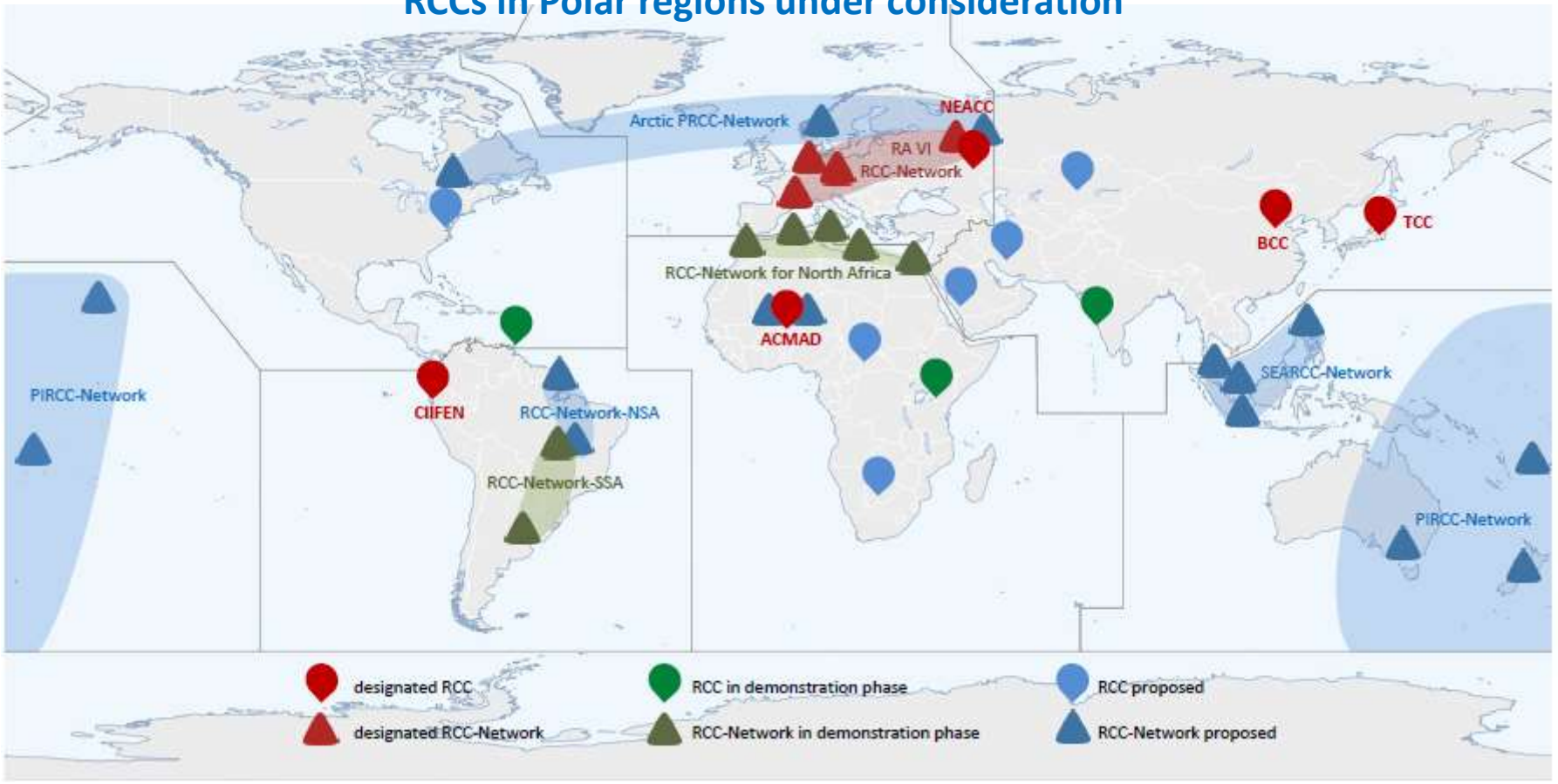
WMO Regional Climate Centres

- Development and delivery of effective climate services for the benefit of all WMO Members requires:
  - Regional cooperation for capacity-building and infrastructure development;
  - Operational implementation of the progress made in WMO's climate monitoring and research initiatives;
  - A regional mechanism for interpretation and interface to NMHSs of global SIP

- **RCCs are Centres of Excellence**, designated by CBS and CCl, to perform regional-scale climate functions, including:
  - Operational LRF and Climate Monitoring
  - Coordination between RCCs, GPCs and NMHSs in the region
  - Data services
  - Climate Applications
  - Training and capacity building
  - Research and Development
- RCCs are complementary to and supportive of NMHSs, who will deliver all Warnings and national-scale products
- Establishment of RCCs is initiated by Regional Associations, based on regional needs and priorities

WMO RCCs worldwide

RCCs in Polar regions under consideration



WMO RCCs worldwide

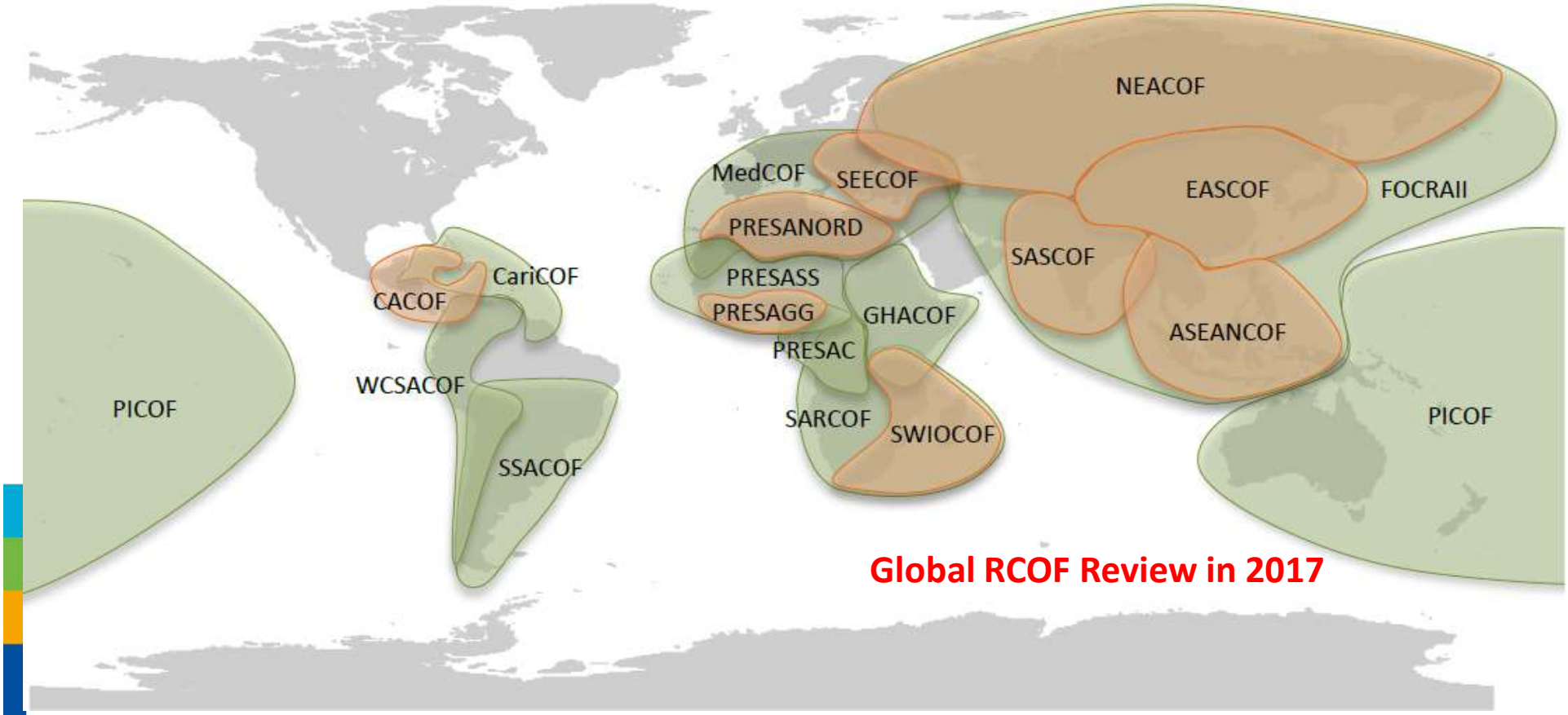
- Five RCCs (RCC-Beijing, RCC- Tokyo, NEACC, CIIFEN, ACMAD) and one RCC network (RAVI RCC-Network) designated up to 2016
- Five candidates (RCC-IGAD, RCC-Network-North Africa, RCC-IMD, RCC-Network-Southern South America and RCC-CIMH), are expected to seek designation at the forthcoming CBS session in November 2016
- If all the designation requests are approved, there will be a total of **8 RCCs and 3 RCC-Networks by 2017**

Regional Climate Outlook Forums

- RCOFs provide platforms for Climate experts and climate information users to:
  - Discuss current climate status
  - Exchange views on scientific developments in climate prediction
  - Develop consensus-based regional climate outlooks that can feed into national climate outlooks produced by NMHSs
  - Engage in user-provider dialogue
- An important aspect of RCOFs is the facility to bring together experts in various fields, at regular intervals, operational climate providers and end users of forecasts in an environment that encourages interaction and learning

Regional Climate Outlook Forums

RCOF in Arctic Polar under consideration



Global RCOF Review in 2017

Potential National Mechanisms

National Frameworks for Climate Services

- Similar to other levels of GFCS but involves practicalities and specifics for delivery of climate services at the national level through well-coordinated arrangements between the key national institutions responsible for observations, research, tailored products and expert advice as well as the user sectors.
- Some countries may establish coordination mechanisms appropriate to their national context, largely as integral components of the NMHSs, to support/facilitate GFCS implementation at the national level

Potential National Mechanisms

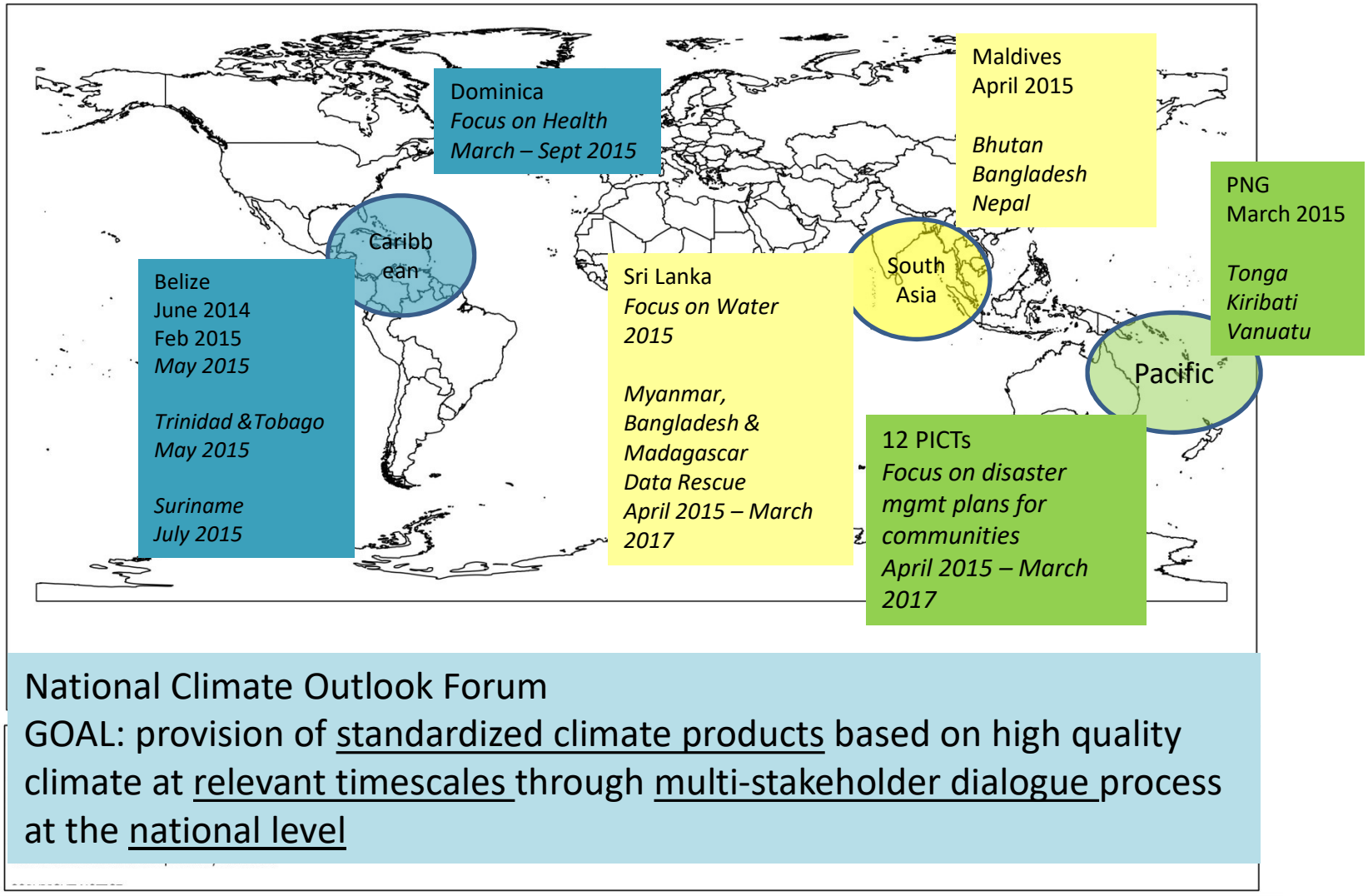
National Climate Outlook Forums (NCOF) / National Climate Forums (NCF)

Essential mechanism for promoting inter-agency coordination and regular multi-stakeholder dialogue between information provider and users at the national level

- NCOFs
  - Adapting the Large and Regional scale forecasts to the national context
  - Tailoring forecast products and translating key messages for users
  - Evaluating the impact of expected conditions (with existing vulnerabilities)
- NCFs beyond the "climate outlook" context
  - Focus on designing of tailored climate information including data, monitoring, prediction and projection

NCOFs/NCFs extremely effective in improving application of climate information

NCOFs worldwide



National Climate Outlook Forum
GOAL: provision of standardized climate products based on high quality climate at relevant timescales through multi-stakeholder dialogue process at the national level

Climate Services Toolkit:
Overview and Current Status

What?

- A set of fit-for-purpose software products
  - Data portals, data management systems, analysis and prediction packages
- Accompanying training modules
  - Specifically designed to support the generation and use of climate information and prediction products that meet user needs
- Facilitates the production, communication, and application of climate information products.
- Maintains consistency and quality by establishing and implementing a set of standards for tools.

Climate Services Toolkit

Why?

- To ensure that climate-sensitive sectors in any country have access to the most up-to-date, reliable and consistent climate information and products that meet their basic needs
- To provide a conduit for technology transfer to developing countries, enabling their access to the latest methods, techniques and information required for CSIS activities and products
- To facilitate climate services standards in effectiveness, consistency and quality for the Regional Climate Centers (RCCs) and National Meteorological and Hydrological Services (NMHSs)

Scope of CST

- Data management tools – including:
  - Data portal for access to and analysis of observations and GCM outputs
  - Database management tool for quality control and simple manipulation of data
- Climate analysis tool for diagnostic analyses
- Climate monitoring tools – for calculation of anomalies, percentiles, return periods.
- Forecasting, downscaling and verification tools - for statistical and MOS Models, and with flexibility to interface to impacts models.

CS T Climate Services Toolkit

- Improve efficiency and raise capacity of service providers by facilitating the production, communication and application of climate information products.
- Ensure that the information and products developed for and provided to end-users is reliable, consistent (through time and across regions) and of high quality.
- Share new tools, information and methods, and thereby enable all CSIS providers to take advantage of research advances.
- Facilitate climate services standards and consistency in support of National Meteorological and Hydrological Services
- Enable more countries to develop their national products, and so encourage improved data sharing, and foster the interaction and shared learning between information providers through the development of a common set of skills.
- Reduce the need for expensive capacity building through availability of training resources. The Climate Services Toolkit will also make training workshops more focused, tangible and efficient in imparting the operational skills.

Catalog of implementation resources for implementation of the results framework for WMO's contribution to the Global Framework for Climate Services

WMO's Technical Commissions, Regional Association climate-related working groups, and programmes, including joint programmes, have generated a large number of resources for supporting the Global Framework for Climate Services (GFCS) implementation. These resources include software, guidelines and manuals, training curricula, experts, institutional assets, programme delivery capabilities and others. An initial inventory of some of these resources is below. They are organized by the five pillars of the GFCS with the last pillar, User Interface Platforms, further sub-setted into the five GFCS priority areas. These resources will be drawn upon in the course of implementing the results framework for WMO's contribution to the GFCS.

[Note to contributors: The following is initially intended as a list of examples to inform a discussion by the Presidents of Technical Commissions and Regional Associations and joint programme representatives in January 2016. Inclusion criteria include that the item identified is already operational and deployable and that the description clearly links it to an aspect of implementation of the GFCS and, ideally, specifically the draft results framework for WMO's contribution. Please note that they are categorized by GFCS pillar and priority rather than by WMO department. The initial list below is merely indicative. There is no standard format for the entries below for the moment but one can be developed subsequently.]

Plan:
Observations and monitoring
Climate Services Information System
Research Modeling and Prediction
Capacity Development
User Interface Platforms

- *Disaster Risk Reduction*
- *Water resources*
- *Agriculture*
- *Health*
- *Energy*

About CST
Guidelines
Data
Tools
Capacity Development
Application Exemplars
CST User Forum
Help

Guide to Climatological Practices
WMO No. 100

All the relevant information regarding the most important practices and procedures in climatology is established in the Guide to Climatological Practices.
http://www.wmo.int/pages/prog/wcp/ccl/guide/guide_climat_practices.php

Technical Regulations
Volume I: General Meteorological Standards and Recommended Practices
WMO No. 49

This volume contains the regulations of the World Weather Watch, climatology; meteorological services for marine activities, agriculture and environmental pollution; meteorological bibliography and publications; education and training; units and procedures used in international meteorological research programmes and during special observational periods.
http://library.wmo.int/opac/index.php?lvl=notice_display&id=14073#.VgEfHmM8qi0

Manual on the Global Data-Processing and Forecasting System (GDPFS)
WMO No. 485

Volume I - Global Aspects
(2010 Edition - Updated in 2012)

Volume II - Regional Aspects
(1992 Edition)

The Manual on the Global Data-Processing and Forecasting System (GDPFS) is the single source of technical regulations for all operational data-processing and forecasting systems operated by WMO Members, including their designated meteorological centres, as well as those designated in close cooperation with a WMO technical commission.
https://www.wmo.int/pages/prog/www/DPFS/Manual/GDPFS-Manual.html

About CST
Guidelines
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Tools
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CST User Forum
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CS
Climate Services Toolkit

GFCS

World Meteorological Organization
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	Temperature	Precipitation	Sea Surface Temperature
Observations			
Current Conditions			
Forecasts			
Projections			

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CS Climate Services Toolkit

Climate Services Tools provide access to best practices in accessing, mining, and using information for improving climate services and supporting climate-sensitive societal challenges

- Managing Data
- Analyzing Climate
- Monitoring Climate
- Forecasting & Verification
- Projecting Future
- Tailoring Information

Tools Standards and Specifications

CST
Climate Services
Toolkit

GFCS

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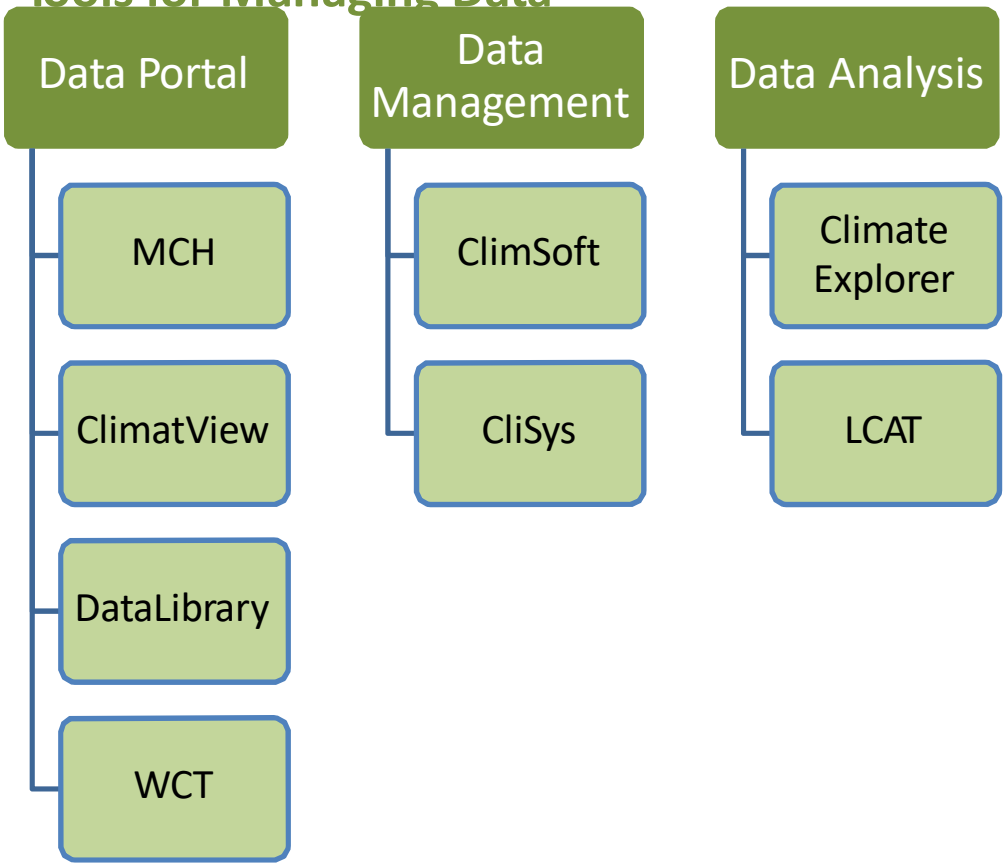
Tools for Managing Data



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Capacity Development resources provide access to:

- Education and Training Resources
- Guidance on Quality Management
- Guide to Climatological Practices
- Advisors on Social Media
- Infrastructural and Institutional Capabilities

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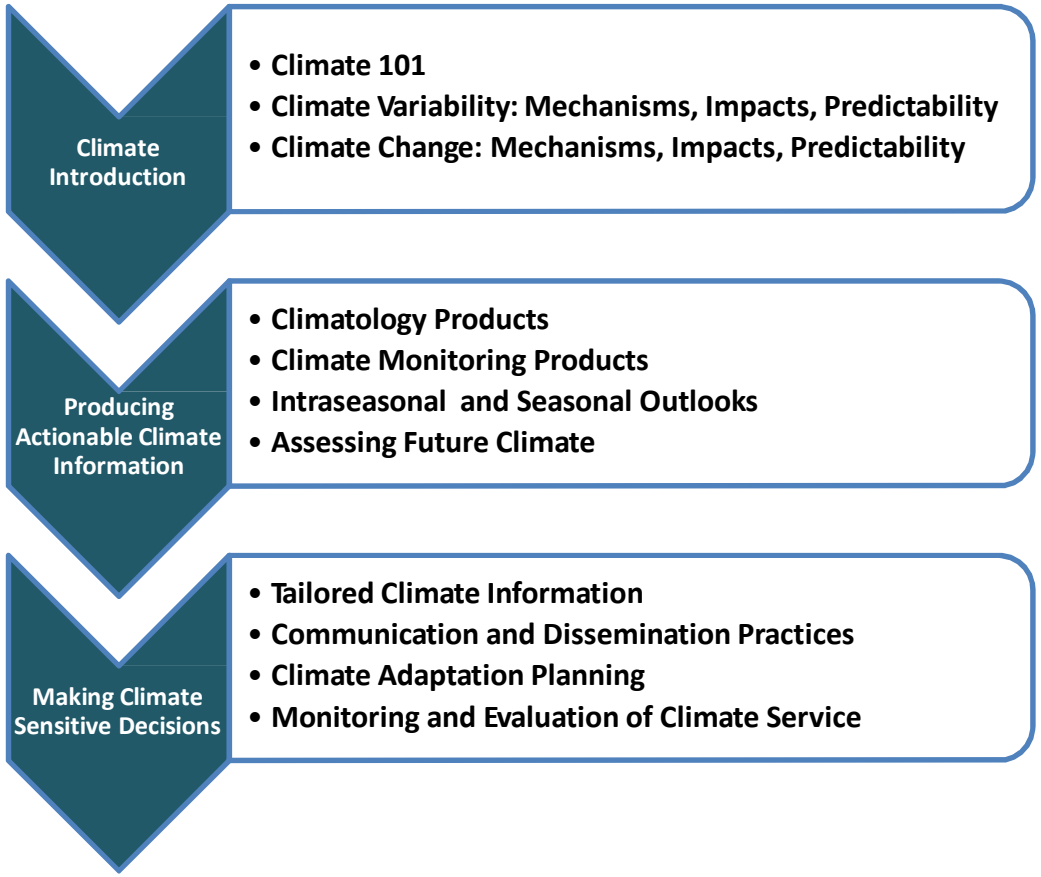
Education and Training Resources provide learning progressions for staff from RCCs and NMHSs as well as technical user of climate information.



Application Exemplars facilitate connection between climate information producers and users to enhance management of climate-related risks in the five priority areas:

Health

Water

Energy

Disaster Risk Reduction

Food Security

CS
Climate Services Toolkit
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CST User Forum fosters development of climate community including climate information users, producers, and researchers. The forum fosters usability of climate data and tools, shares information, improves climate knowledge management, and promotes ideation for climate services.

CS
Climate Services Toolkit

GFCS

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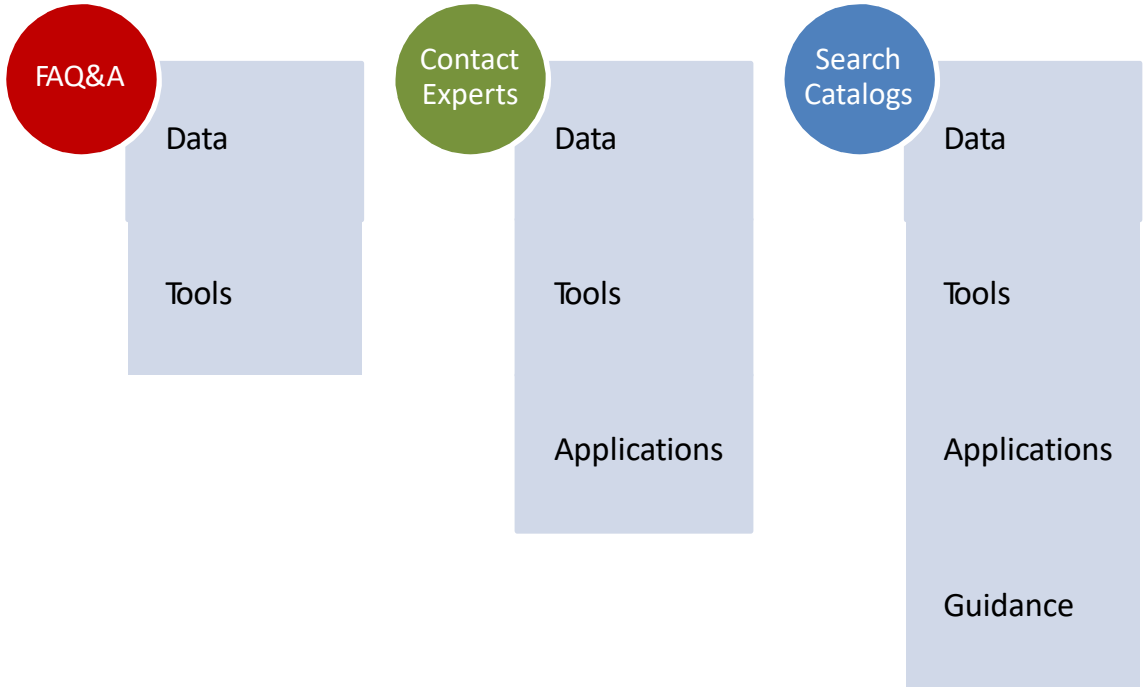
CST Help Desk



CST Development and Deployment : Next Steps

- Developers Meeting on the GFCS Relevant Climate Data, Products, and Tools, 6-8 Dec 2016, Geneva
  - Initial integration of CST components
  - Communication strategy with stakeholders
  - Beta version of CST delivered to priority countries
- Deployment
  - CST improvement based on CST deployment in priority countries
  - Deployment of First version of CST in all countries
  - CST monitoring and evaluation process /feedback
  - CST user engagement/Help Desk
- WMO International Workshop on Climate Services Information System Operations and Coordination March 2017, Nanjing China

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Thank you

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