



Needs, Capacities and Potential Benefits of NFCS in India

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GFCS Overarching Implementation Objectives

1: Priority Applications

Improving decision making in climate-sensitive areas:

- Health
- Food security and agriculture
- Disaster risk reduction
- Water resources
- Energy

3: Foundational Pillars

Enhancing technical and scientific capabilities to support user-driven climate services:

- Observations and monitoring
- Research, modeling, and prediction
- Climate services information systems
- Capacity building

2: Bridge

Connecting user needs with climate services through sustained engagement mechanisms:

- National activities
- Regional activities
- Global activities

Typical Interactions required for GFCS at national level

- National Meteorological and Hydrological Services (NMHSs) – **IMD**
- National agencies for agriculture and forestry, marine (coastal and ocean), water resources, health, energy, the environment and disaster management, and other climate sensitive sectors;
- National and local government committees that deal with policy formulation involving a consideration of climatic issues;
- Sustained platforms for multi-disciplinary interactions and collaborations – National and sub-national Climate Forums;
- Universities and other institutions conducting climate system and climate applications research as well as observations and climate monitoring activities;
- Non-governmental organizations whose activities are sensitive to climate variability and change;
- Private/public partnerships aimed at tackling problems with a climate dimension.



User Interface Platform

- **Feedback:** that allows providers to obtain information on how effectively their products are meeting the needs of user communities;
- **Dialogue:** that provides opportunities for people responsible for research, observations, product delivery, and applying climate information to meet and communicate on either a bi-lateral or multi-lateral basis for assessing how well the components of the service chain (inputs, outputs and take-up) are performing individually and in relation to each other;
 - Contribute to/lead Regional Climate Outlook Forums (RCOFs)/Regional Climate Forums (RCFs)
 - Coordinate in regular National Climate Outlook Forums (NCOFs)/National Climate Forums (NCFs)
- **Evaluation:** that monitors the development, delivery and effectiveness of climate services as agreed between users and providers;
- **Outreach:** that improves climate literacy in targeted sectors and the wider user community through a range of public education initiatives and on-line training programmes.

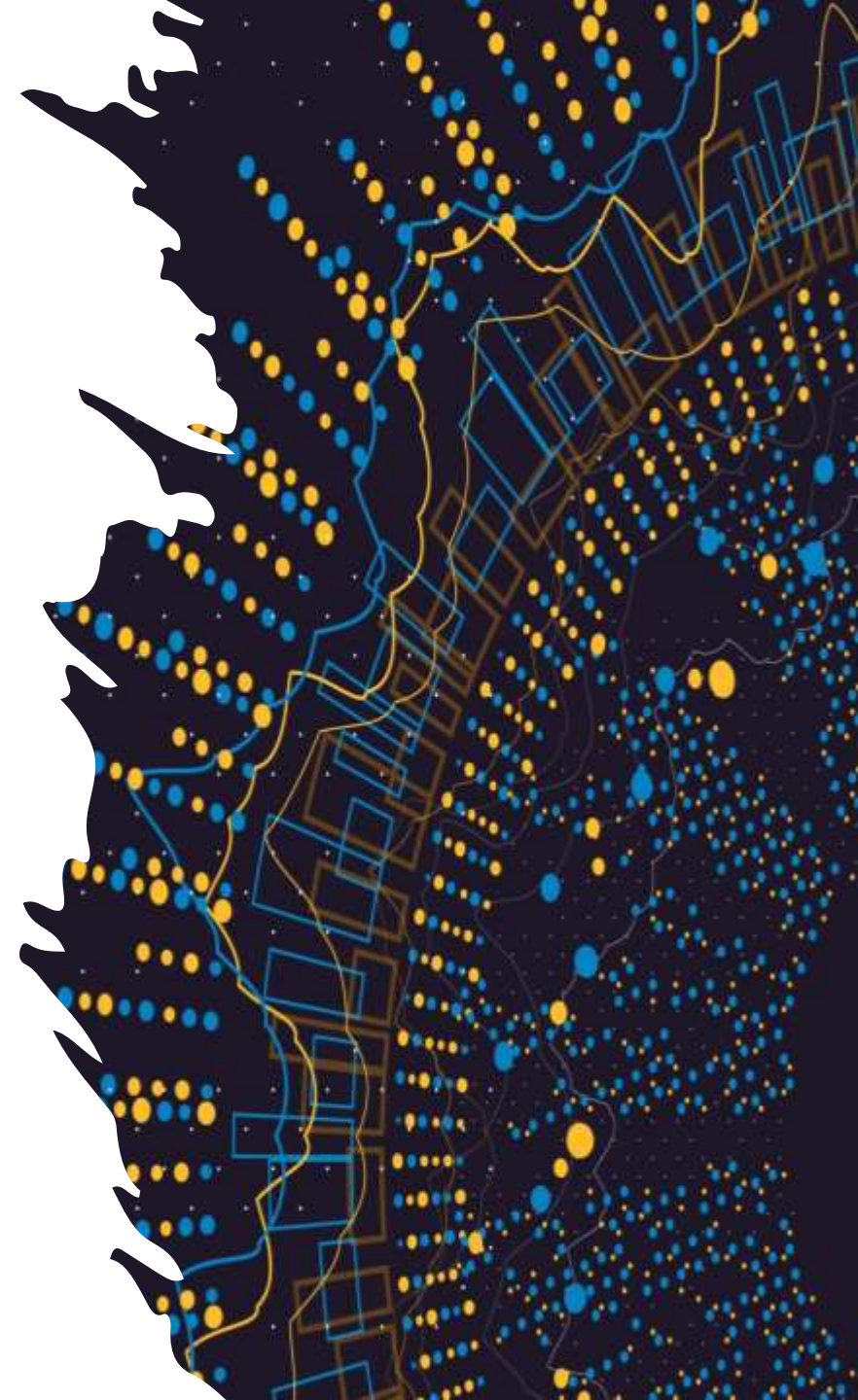


Climate Services Information System

- Physical infrastructure (computer capabilities, tools and operational practices, professional human resources); Climate Services Toolkit
- Ability to draw on climate information delivered by global and regional producing centres
- Promote the free and open exchange of national data and access to international data and products, while respecting national/international data policies
- Standards, protocols and schedules, quality control, archiving and subsequent access.
- Portfolio of climate products tailored to user contexts that will typically be required at national and local levels for various sectors
- A core national institution (NMHS in most cases) that provides at least a basic set of primary climate information and data products.
- Mandates (roles and responsibilities) of contributing institutions for strengthening and streamlining of the CSIS structure at the national level.
- The extent to which a NMHS can play the pivotal CSIS role will depend on its strengths, capabilities and given mandates.
- Contribute to/coordinate RCOFs/RCFs; coordinate NCOFs/NCFs
- Dissemination/communication

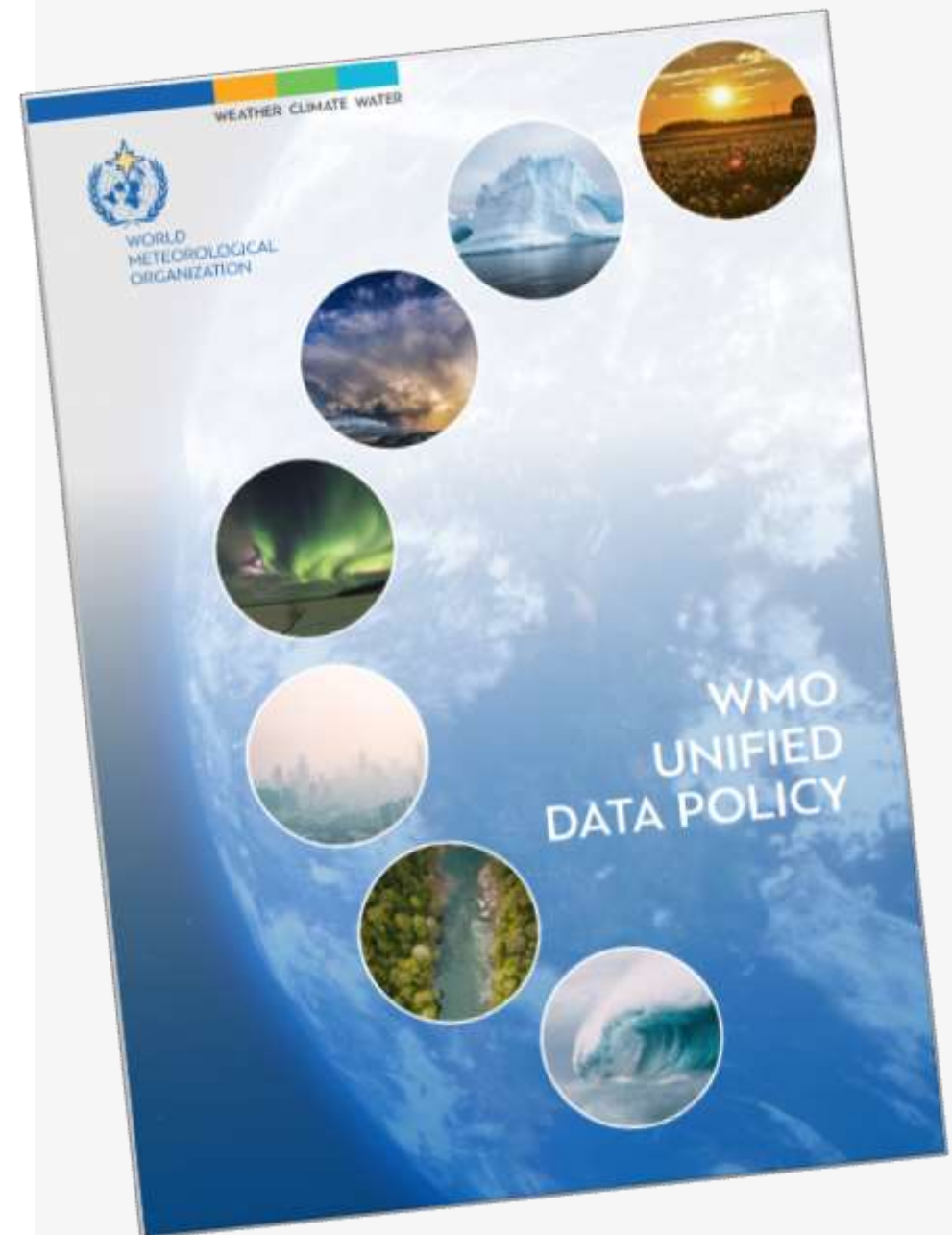
Observations and Monitoring

- Existing national capabilities for climate observations and arrangements for data exchange will provide the starting point for building the national infrastructure for climate services.
- Climate services at the national level will clearly benefit from the observing and monitoring systems operated by the NMHS and other organizations.
- Major spatial and temporal gaps in climate observations and historical data within national borders and areas of responsibility (which may include areas of open ocean), and especially in sparsely populated regions.
- Major shortcomings with respect to the organization and standardization of biological, ecological, environmental and socioeconomic observational programmes and data management practices.
- It will be important for all organizations with the potential to contribute to the GFCS at the national level to work together to scope out, agree on, and develop a national observations and monitoring effort as well as data sharing arrangements.
- Data management with quality assurance (archives & rescue)



WMO Unified Data Policy

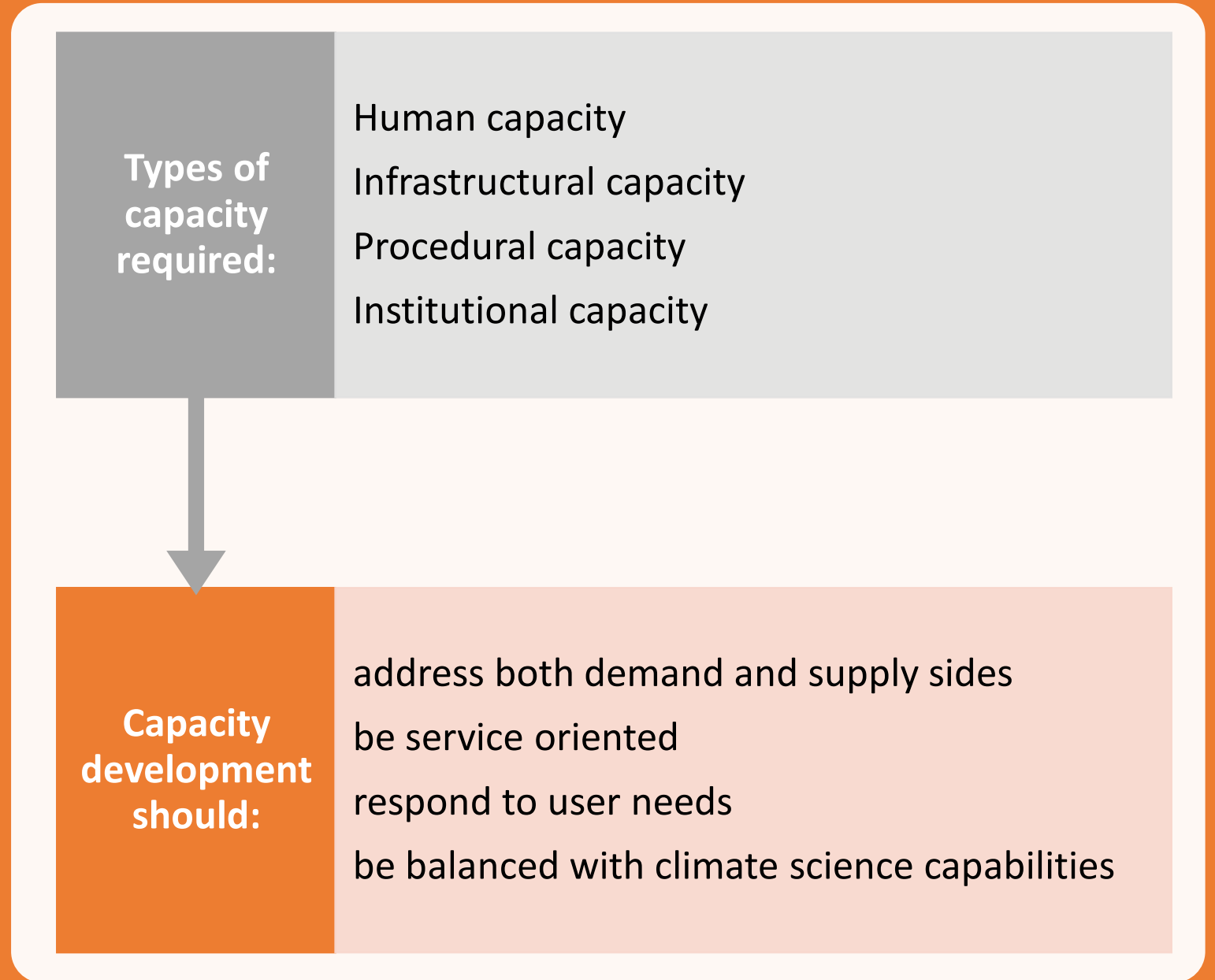
- The WMO Unified Policy for the International Exchange of Earth System Data is a comprehensive update of the international agreements guiding the exchange of weather, climate and related Earth system data between WMO Members.
- Resolution 1 (Cg-Ext (2021)) establishes the purpose, scope and intent of the international exchange of Earth system data covered by WMO policy and establishes the practice to be followed by the WMO Members in their implementation of it.



https://library.wmo.int/doc_num.php?explnum_id=11256



Capacity development



NMHSs: Underpinning the GFCS

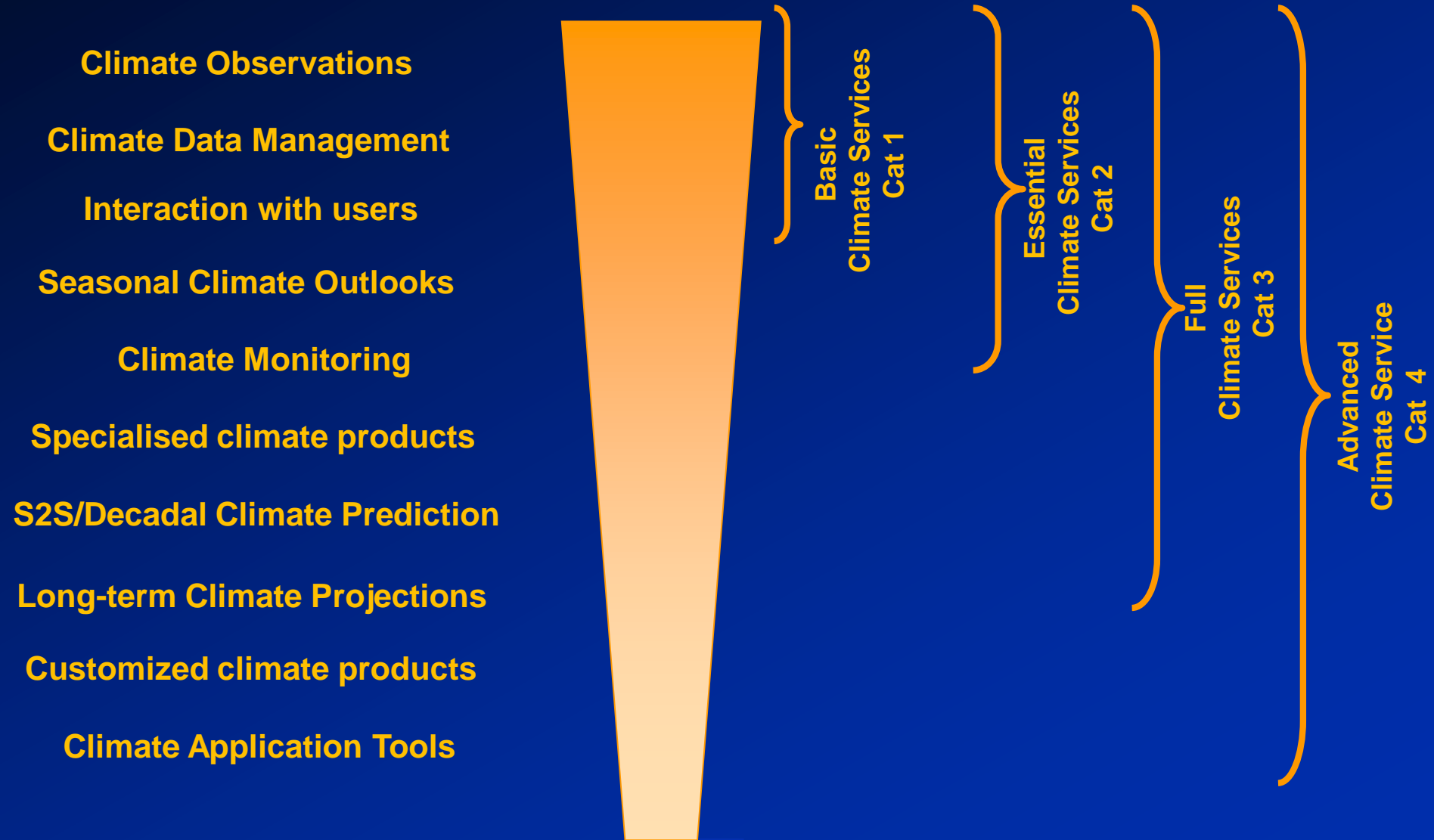
- NMHSs **already provide climate services** based on the historical archives of observational data collected for weather services; several of them also provide operational climate prediction products, up to seasonal time scales
- NMHSs are **mandated** by the WMO Convention to observing and understanding of weather and climate and in providing meteorological (including climatological), hydrological and related services in support of relevant national needs, ensuring authenticity to their products and services
- NMHSs are structured and trained to provide **24/7 services**
- NMHSs through collaborative mechanism have established **standard practices** across the globe for weather services that can be easily extended for delivering climate services
- Users deal with weather and climate information in a seamless manner, and it greatly helps them to meet all their weather and climate information needs through a '**single window**'; NMHSs can effectively provide such a single window.
- NMHSs and their partners constitute a **large pool of technical experts** dealing with weather and climate



Essential climate services related capabilities of NMHSs

- Observations
 - Data management with quality assurance (archives & rescue)
 - Climate standards (i.e., those of GCOS)
 - Historical & real-time observations of the Essential Climate Variables
 - Contribute data to WIS
 - Improve station density
- Research
 - Participate in field experiments and applied research
 - Develop new products
- Operations
 - Generation of climate information, monitoring and prediction products (including GPC/RCC/RCOF linkages)
 - Tailoring/downscaling
 - Dissemination/communication
- Capacity Development
 - Participate in/organize training activities
 - Participate in Regional Climate Outlook Forums
- User interface
 - Interact with user to meet requests and improve products
 - Contribute to Regional Climate Outlook Forums
 - Coordinate or National Climate Outlook Forums

Categories of National Capacities for Climate Services



Advanced Climate Services

- Basic+Essential+Full climate services
- Provision of output and interpretation of global and regional-scale products;
- Global and regional scale data resources as input to modeling, research, applications
- High density, small scale specialized data resources useful for studies of processes, urban environments
- Satellite and other global and regional scale monitoring products
- Host GPCs and RCCs
- Process improvement studies for RCOFs and NCOFs
- Analysis and products relevant to El Niño and La Niña Updates, and Global Seasonal Climate Updates (GSCU), etc.

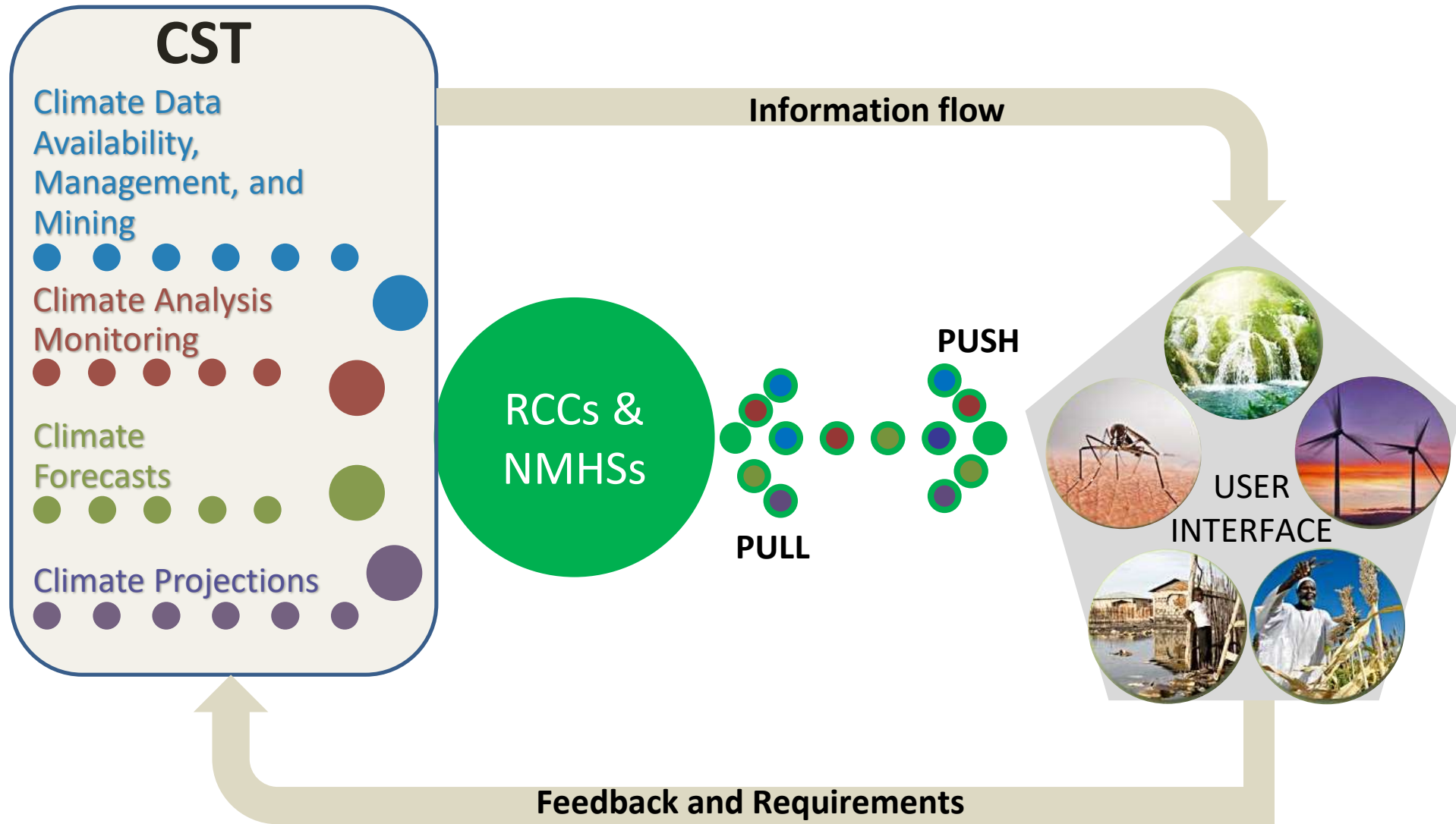
Human Resource Challenges

- New Competencies
 - New climate functions will require additional competencies in addition to meteorology (e.g. in interdisciplinary sciences, geography, project management, etc.).
 - There will be multidisciplinary training requirements, on applications of climate (tailoring climate information) to key sectors such as agriculture, water resources, health, etc. These activities need joint planning and coordination with user sectors.
- Training materials development
 - The training materials for basic to advanced climate specialties are not yet fully developed.
 - Some course modules can be conducted by e-learning techniques, others will need hands-on workshops.
- Recruitment and Retention

Procedural Capacities

- WMO Guides, Manuals, Standards
 - Guide to Climatological Practices
 - Objective sub-seasonal/seasonal forecasting operations
 - Standards/good practices operational climate forecasts, global-regional-national cascading.
- Tools for tailoring/downscaling (e.g., CPT, ClimPACT, etc.)
- Guidance on best operational practices necessary, particularly on national scales
 - Climate information (including prediction/projection) should invariably include information about quality.
- Climate Services Toolkit (customizing for national needs)

Climate Services Toolkit (CST)



Source: Marina Livezey, NOAA

Institutional Capacities

- Absence of clear mandates on climate-related issues is a hindrance to the proper functioning of climate services.
- The roles that various institutes should play in climate services at the national levels need to be defined so as to identify authoritative information providers.
- Clearly, NMHSs will play a key role and appropriate improvements in their management structures and procedures may need to be pursued to efficiently support climate services.
- Revised management processes and procedures are also required for NMHSs to be active participants in the global/regional communities.
- Based on the experiences of countries with advanced climate services, essential internal organizational standards can be developed to guide other countries with limited capacities.

National Frameworks for Climate Services

- WHAT
 - A mechanism for coordinating, facilitating and strengthening collaboration among national institutions
- WHY
 - To improve co-production, tailoring, delivery and use of science-based climate predictions and services focused on the five pillars of the Global Framework for Climate Services (GFCS) and its initial priority areas
- WHO
 - National Meteorological and Hydrological Services lead and engage national stakeholders from the five GFCS pillars and priority areas



Towards NFCS

- The NFCS facilitates dialogues between relevant stakeholders who engage in the production and application of climate services.
- These dialogues can be seen as critical components of establishing adequate coordination and collaboration, as well as a vital mechanism to establish legitimacy of climate services and the role of each stakeholder within the production and application system.
- In the process of supporting the NFCS, the GFCS proposes the NMHS to be given a primary coordinating role for climate services.
- GFCS promotes a structured approach to the NFCS that starts with a baseline assessment, followed by a NMHS-led consultation process that identifies major gaps, user needs, and priorities for climate services.

Potential Benefits

- Increased collaboration between national meteorological services, national ministries, and other organizations
- Increased information sharing among participating organizations
- Elevated importance of climate services and adaptation in national development agendas
- Better identification of climate and weather information and service needs
- Planning and implementation of climate services projects to address national needs
- Complementary roles and responsibilities of climate services stakeholders
- Improved credibility of climate information
- New climate information products
- Minimizing duplication/inconsistency of effort
- More efficient resource allocation and utilization

NFCS Governance

- High-level engagement with stakeholders and government ministries is critical to obtaining political support, funding, and agreement on the steps for implementation.
- The NFCS places organization and leadership central to the NMHS while also aiming for an inclusive process with relevant national organizations that play key roles in delivering climate services.
- The form of the framework and the governance around it should ultimately be determined by the country in order to take into account the existing infrastructure and national needs



Way Forward

- National CSIS implementation including National Climate Forums
 - Partnerships to mobilize stakeholder engagement (including research partners, e.g., IITM, universities, etc. and professional bodies, e.g., IMS, OSI, etc.)
 - State Climate Forums in local languages
- Enhancement of global/regional inputs
 - GPC-LRF Pune, RCC-Pune, TPRCC-Network (under development), CORDEX-South Asia at IITM, Antarctic RCC-Network (under development), etc.
- Expanding SASCOF product portfolio (monitoring, sub-seasonal products, regional climate change, etc.), including evolution towards a more inclusive Regional Climate Forum: South Asian Climate Forum
- Sustained Climate Services User Forums, especially for water, agriculture and health in which some headway has already been made
 - Co-design and co-production of climate inputs for decision support
- Greater and sustained engagement of regional implementation partners (e.g., RIMES, ICIMOD, etc.)
 - Sustainable regional mechanisms to engage stakeholders from South Asian countries
- Regional consolidation and complementarity of investments in support of India's leadership in climate services in South Asia



Concluding Remarks

- In many climate-sensitive decision contexts, there is sub-optimal use of even the existing climate information and knowledge. It is important to find ways to cope with climate variability and change through **improved access** to climate information including past, present and future variations.
- Climate adaptation and Climate-related risk management require **multi-disciplinary/international collaborations** and cross-disciplinary/international **exchange of information**.
- **NFCS can serve as a major step forward** in systematically providing climate information for decision making of climate-sensitive sectors at the national level.
- Greater focus required on enhancing **national capacities** to efficiently incorporate global and regional inputs into their operational provision of tailored climate information products for local communities.



Thank You

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