Guidelines for Developing and Implementing a Basic Instruction Plan for Climate Services (BIP-CS)

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PURPOSE

- **BIP establishes a common understanding of the abilities required for individuals to be recognized as climatologists**

- **BIP allows NMHSs to achieve consistency in the classification of their climatologists and compliance with qualification standards as set out in WMO-No. 49, Volume I**

DEFINITIONS

- **Climate** is the set of weather conditions observed at a particular location or region over typically decades or longer

- **Climate system** is a complex and interactive system consisting of the atmosphere, land surface, snow and ice, oceans and other bodies of water, and living organisms

DEFINITIONS

- **Climatology** (climate science) is the study of the earth's atmosphere, weather patterns and interactions between the atmosphere and the hydrosphere, cryosphere, lithosphere and biosphere over time

DEFINITIONS

- **Climate services** provide climate information to help individuals and organisations make climate smart decisions

- **Climate information** includes data, summaries, tables, graphs, maps, reports analyses and advisories

DEFINITIONS

- **Climate products** are derived syntheses of climate data that combine climate data with climate knowledge
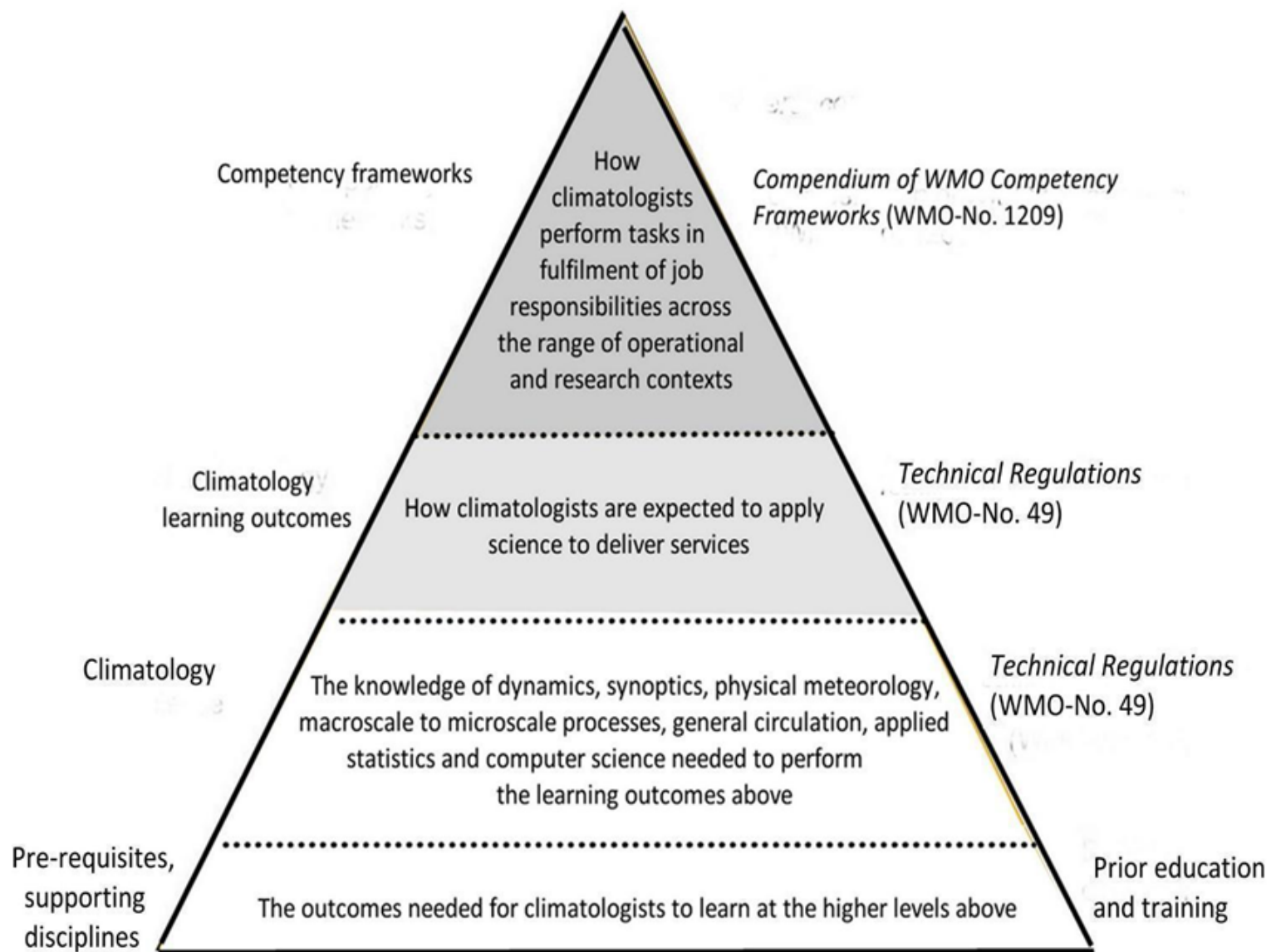
RATIONALE AND APPROACH

- **Focused on specifying the learning outcomes required by climatologists of all types**

- **Explicitly provides latitude for institutions, WMO Members and employers to tailor learning outcomes to the nature of the course of study or national needs**

RATIONALE AND APPROACH

- **Provide specific information on the knowledge and thinking skills required of climatologists**

- **Does NOT attempt to define the detailed skills and competencies needed in particular branches of professional practice, such as data management, consulting and research**

Competency frameworks — How climatologists perform tasks in fulfilment of job responsibilities across the range of operational and research contexts — *Compendium of WMO Competency Frameworks* (WMO-No. 1209)

Climatology learning outcomes — How climatologists are expected to apply science to deliver services — *Technical Regulations* (WMO-No. 49)

Climatology — The knowledge of dynamics, synoptics, physical meteorology, macroscale to microscale processes, general circulation, applied statistics and computer science needed to perform the learning outcomes above — *Technical Regulations* (WMO-No. 49)

Pre-requisites, supporting disciplines — The outcomes needed for climatologists to learn at the higher levels above — Prior education and training

CLIMATOLOGICAL TASKS

- **Creating and managing data sets**

- **Deriving retrospective products from climate data**

- **Creating and/or interpreting climate predictions, projections outlooks and model output**

CLIMATOLOGICAL TASKS

- Insuring the quality of climate information and services

- Communicating climatological information to users

COMPETENCIES

- **All** climatologists should have
  - *Understanding of physics of general circulation and climate system*
  - *Understanding of assumptions, uncertainty and use of products and services*
  - *Physics background to explain and interpret mechanisms of climate variability and change*

COMPETENCIES

- **All** climatologists should have
  - *Awareness of quality assurance principles and methods*

LEARNING OUTCOMES

- **Data management** climatologists should have knowledge and ability about
  - *Data input, storage, backup and retrieval structures*
  - *Metadata*
  - *Functioning data bases (hardware and software)*

LEARNING OUTCOMES

- **Data management** climatologists should have knowledge and ability about
  - *Data base management techniques*
  - *Maximising accuracy and quality of stored information*

LEARNING OUTCOMES

- **Climatologists who derive products should**
  - *Assess need and purpose of products*
  - *Assess information quality*
  - *Perform data manipulations, corrections, summaries and changes*
  - *Select, use and describe methodologies, assumptions and limitations*

LEARNING OUTCOMES

- **Climatologists who derive products should**
  - *Analyse the advantages and disadvantages of different information presentations*
  - *Document the processes used to create the product*

LEARNING OUTCOMES

- **Climatologists who create and interpret climate forecasts, climate projections and model output need knowledge of**
  - *Math and physics to create reasonable models*
  - *Computer skills to produce models*
  - *Strengths and weaknesses of products*

LEARNING OUTCOMES

- **Climatologists who create and interpret climate forecasts, climate projections and model output need knowledge of**
  - *Intended use of products*

LEARNING OUTCOMES

- **Ensuring the quality of climate information and services requires**
  - *Understanding the principles of quality management*
  - *Understanding the principles and practices of quality control*

LEARNING OUTCOMES

- **Communicating** climatological information to users requires
  - *Skill to assess the information that users desire*
  - *Using shared terminology*
  - *Translating the language of science into the language of lay people*

COMPETENCIES AND LEARNING OUTCOMES DEFINED BY OTHERS

Private sector climatologists' tasks, competencies and learning outcomes are similar

COMPETENCIES AND LEARNING OUTCOMES DEFINED BY OTHERS

Additional skills include

- *Critical thinking and reading comprehension*
- *Deductive and inductive reasoning*
- *Assimilating information*
- *Problem solving*
- *Computer skills*
- *Scientific research methodology*

ASSESSMENT

Competency assessment should bridge the gap between "knowing" and "doing"

ACHIEVING COMPETENCIES

- *Academia*
- *Targeted training*
- *WMO training*
- *UN CC:Learn*