Future of Weather and Climate Forecasting:
Leverage by Public-Private Engagement (PPE)

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OCP WP #1: Weather and Climate Forecasting

"How do we see the future of global weather and climate predictions in 2030?"

Goals:

- *To provide a basis for informed decision-making by enterprise stakeholders in planning their activities and investments in Numerical Earth-system Weather-to-climate Prediction (NEWP) and operational forecasting during the next decade, often referred to as the "decade of digital transformation".*

- *To help decision-makers, researchers and even users in the rapidly changing landscape of the weather and climate enterprise, by compiling views, knowledge and expertise of a group of prominent scientists and practitioners from the public, private and academic sectors.*

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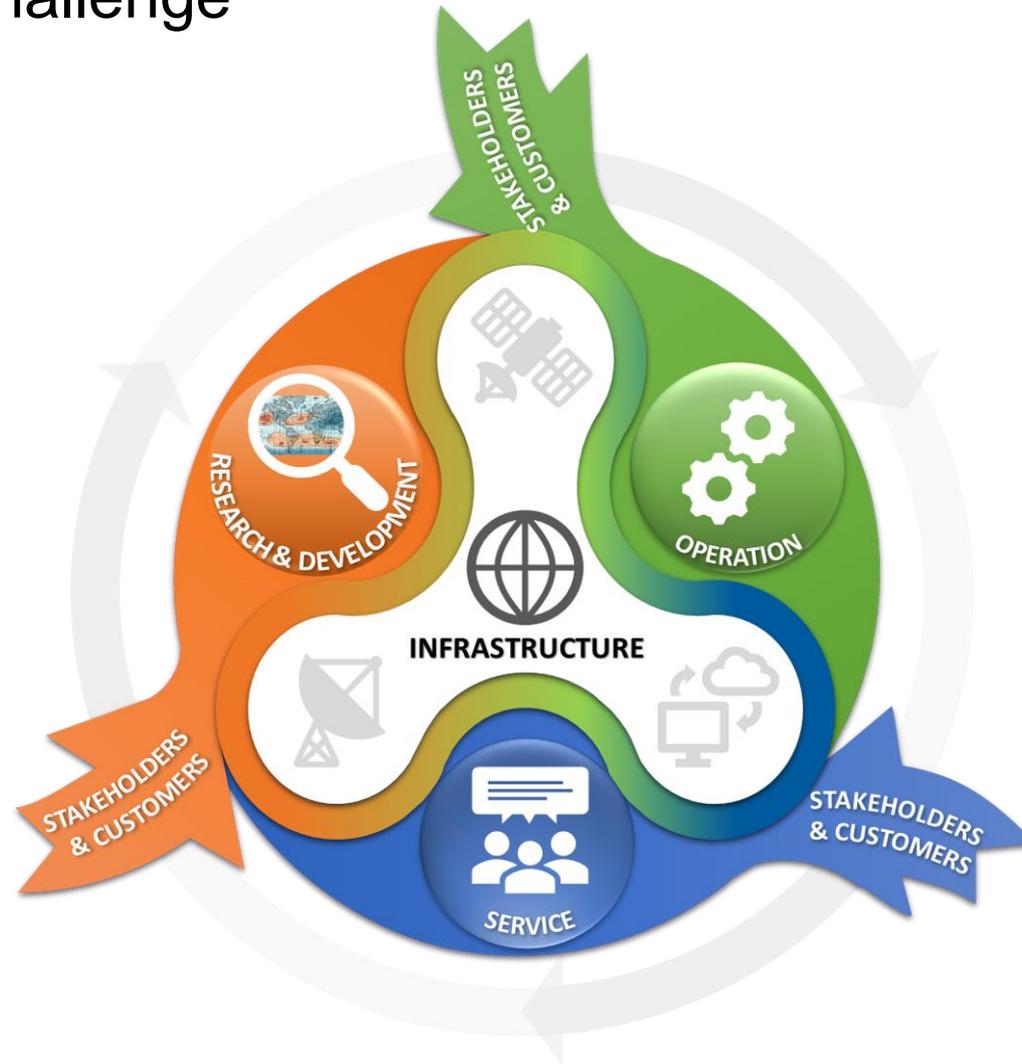
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The innovation cycle of weather and climate forecasting: the PPE challenge

The PPE will play an important and different role for each of these components.

WP #1 – Challenges & opportunities in the next decade

Infrastructure for forecasting
- Observational ecosystem
- HPC ecosystem

Research and Development
- Numerical Earth-system Weather-to-climate Prediction (NEWP)
- High-resolution global ensembles
- Quality and diversity of models
- Innovation through artificial intelligence (AI) and machine learning (ML)

Operations: from global to urban (local)
- Computational challenges and cloud technology
- Verification and quality assurance
- Further automation of post-processing systems and the evolving role of human forecasters

Acquiring value through weather and climate services
- Users perspective
- Forecasts for decision-support
- Bridging high-impact weather and climate services
- Education & training for future operational meteorologists/forecasters

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WP #1 – Key Messages and Recommendations

Towards an improved forecasting system: global, regional and local approaches

- The main structures of the forecasting enterprise will not change significantly in the coming decade, but we will see notable shift in roles and performance requirements.

- International cooperation at State level will continue to be a main factor. WMO should increase significantly its effort in international R&D coordination and promotion.

- At the national level, NMHSs need to engage more in community-based modelling and data initiatives, and R&D consortia. The importance of working closely with users and the opportunities for PPE should be recognized and promoted.

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WP #1 – Key Messages and Recommendations

Towards an improved forecasting system: global, regional and local approaches

- WMO should continue to be the backbone of capacity building and to provide numerical forecast for various global and regional service providers through its GDPFS.

- Governments need to sustain and ideally accelerate public investments in global observing system and supercomputing capability which are fundamental for the PPE.

- With the increasing improvements of global ensemble prediction systems there are strong views for just a few producing centres; the role of NMHSs and the private sector could be focused on downscaling forecast data.

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WP #1 – Key Messages and Recommendations

Towards an improved forecasting system: global, regional and local approaches

- Implementing NEWP systems with post-processing, production and visualization on the cloud may offer a unique advantage for NMHSs, especially in developing countries and make more effective PPE.

- WMO with PPE could come to an agreed methodology for validation of quality, and recognition and attribution of various providers of weather and climate forecasts.

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WP #1 – Key Messages and Recommendations

Towards an improved forecasting system: global, regional and local approaches

- Investments in observational networks will need to be coordinated with those for NEWP systems development, considering the cost/benefits impact of observations on forecast skill.

- The development/improvement of climate models needs to be in line with the strategy for weather prediction. A unified single model system across a range of timescales (nowcasting to centennial) and spatial scales (convective scale to climate system Earth modelling) is possible and desirable in this context.

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WP #1 – Key Messages and Recommendations

Progressing together with developing countries

- Massive investments through various development assistance projects have often provided disappointing results. The failures are often due to the lack of attention to the needs of NMHSs and planning for sustainable operations.

- A way forward could be building national sustainable expertise and computation infrastructure for accessing and utilizing available high resolution global ensemble forecasts.

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Thank You!

Innovation Cycle:
The PPE Challenge

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