

## CGMS FUTURE DIRECTION 2022+

### POSITION PAPER THEME: RESEARCH TO OPERATIONS

Lead: CMA

#### TOPIC DESCRIPTION AND RATIONALE FOR CGMS ENGAGEMENT

##### Background

Research to Operations has been identified as an ‘umbrella’ strategic theme to address the following issues raised by CGMS members:

- Operational agencies to be more involved in the preparation and implementation of innovative missions which can be considered as precursor of future operational systems;
- R&D agencies to benefit more from the capacity of operational agencies to distribute widely the products derived from their R&D missions;
- Sharing experience and best practices in actual use of new satellite data (e.g., hyperspectral infrared sounders);
- Increased challenges for user preparations of new satellite systems;
- To enhance the satellite application capacity of developing countries.

##### Rationale for CGMS engagement

- Operation agencies increasingly use data from R&D satellites to support operations and services;
- In terms of satellite applications such as NWP, weather forecast and early warning, meteorological disaster prevention and mitigation, we are increasingly benefiting from the joint application of new operation satellites and R&D satellites data;
- Increased temporal, spectral and spatial resolution of next generation research satellite systems and sensors, and demonstration of their potential value for operational forecasting and decision support will raise expectations for Research to Operations;
- New technologies and methods such as satellite, payload observation and data assimilation have accelerated the rapid transition from Research to Operations;
- A reference point for focusing on measures to ensure a smooth transition from Research to Operations could be the response to the WIGOS Vision;
- At present, Research to Operations lacks a baseline or consistent process that covers all transition activities. The transition from Research to Operations is basically based on specific circumstances, and there is no unified plan and procedure;
- In the transition from Research to Operations, it is a challenge to overcome the complexity caused by cultural differences within different agencies and obtain the necessary resources;
- At present, the requirements for the transition from research to operations mainly come from developed countries. With the improvement of satellite application capacity in developing countries, the research and operations requirements should be fed back to satellite operation agencies and R&D agencies to improve the transition from research to operations;

##### **Commented [AT1]:** NASA input:

It's worth remembering that there are two types of R-O: "for CGMS purposes" – (a) getting quasi-operational use of research data as soon as possible after a mission launches, and (b) figuring out how to continue observations pioneered with research satellites in a sustainable way that may be more reliably achieved by operational agencies (which can better assure continuity and the systems to support operational use).

It's also worth emphasizing the importance of O-R (operations to research) – and it's worth separating into what we can do now (e.g., the new generation of geostationary satellites have such good imagers, that they can be exceedingly helpful in research, and that trend will only continue as new capability comes along, like with hyperspectral imagers in GEO) and what we need to do in the future (e.g., what specific limitations in the current operational systems are limiting our ability to provide the products and services that are desired, including forecasts, and how can research help create the pathway that could get us past those limitations).

There are some good models (e.g., the NASA Applied Sciences Program's Early Adopters program) that have been implemented.

WMO was working on a document "Guidelines on Best Practices for Achieving User Readiness for New Satellite Systems" – that may be relevant here. TBD if the document has been ratified by the WMO ET-SSU.

- More generally, sustainable development is the common challenge facing humanity and developing countries will face more serious challenges compared with developed countries. Satellite remote sensing technology can provide monitoring, assessment and early warning support in the fields of food security, energy security, climate change and disaster prevention and mitigation.

## LONG- AND MEDIUM-TERM GOALS FOR CGMS:

### Medium-term goals (1-2years):

- Collect the experience of each agency by carrying out a Research-to-Operations method survey with each agency;
- Based on the results of the method survey, propose a consistent Research-to-Operations baseline process that includes flexibility and adaptability, including:
  - Best practices for new satellite data;
  - Feedback mechanisms from Operations-to-Research;
  - Sharing of impact studies on research missions
- Provide training for developing countries on satellite applications and space weather forecasting techniques;
- Concerning developing countries:
  - Provide satellite application data-sharing support (through the Internet, satellite receiving stations, etc.);
  - Promote multilingual versions of the satellite remote sensing application service platform;

### Long-term goals:

- Encourage both CGMS agencies and R&D operations to incorporate the Research to Operations baseline process in the planning stage of the new satellite system and to report on their experiences with the application of the process;
- Facilitate the participation of R&D agencies in operations projects, including the use and evaluation of observation data as early as possible, the early development of application models and effective use of resources;
- Concerning developing countries:
  - Provide space weather guarantee services for satellite operations;
  - Assist in the launch of meteorological satellites, and to improve the timeliness and capacity of satellite remote sensing applications;
  - Encourage feedback on requirements and applications for satellite products from users in developing countries and their inclusion in application demonstrations.

## IMPACT ON CGMS ACTIVITIES

- WG IV and WG II establish a joint working group to carry out R2O-related discussions and share best practices (TBC)

## IMPLICATIONS ON CGMS STRUCTURE AND KEY DOCUMENTS

- TBD

## IMPACT ON EXTERNAL INTERFACES

- TBD

## INITIAL LIST OF REFERENCE DOCS

- TBD