

# **TRANSITIONING EARTH REMOTE SENSING DATA TO BENEFIT SOCIETY: A PARADIGM FOR A CENTER OF EXCELLENCE**

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## **1. INTRODUCTION**

Over the past decade there has been a substantial increase in the number of Earth remote sensing satellites launched for research and operational usage and numerous others planned by the international community. These satellites have been used to varying degrees by their supporting agencies for weather and environmental monitoring, climate studies, disaster monitoring and response, and other humanitarian activities. While there are success stories on useful applications of remote sensing data, the broader use of these satellite assets by other organizations and entities has been limited for a number of reasons including lack of data services, data dissemination issues, and a general failure to engage the broader end user community with useful data access and knowledge of how to use the data and products. This paper describes some of these current limitations on the broader use of Earth remote sensing data by the international community and describes the concept of a general “Center of Excellence” to facilitate the development, transition, and utilization of these Earth remote sensing observations by the broader international community.

## **2. OBSTACLES TO THE BROAD USE OF EARTH REMOTE SENSING DATA**

The development and implementation of a new observing capability by a government agency or private sector partner is motivated by a need to provide measurement capabilities which address a particular societal need. This need drives particular sensor specifications and observational characteristics to obtain the required measurements. The new observations not only address the initial need but often provide a wealth of observational data for the research community and for example governmental agencies to explore additional utility of the new observations.

The outcome of much of this new research too often ends up as findings in peer-reviewed journal articles without ever being used in an operational scenario. This failure in some organizations to transition this research to an application for the direct operational benefit to society occurs mainly because of a lack of an organization responsibility with a specific mission and formal process to transition these research capabilities to societal applications. In [1], the authors identify important aspects which contribute to a successful research to operations process for weather applications. These characteristics include linking end user requirements to instrument development, the integration of new data into operational “expert” decision support systems, providing appropriate end user training, and keeping the end user involved in the entire process. They also suggest a need for a test bed facility with the appropriate expertise to demonstrate the success of the research to operations activity before it fully gets implemented in a broader context. These test beds act like Centers of Excellence in their respective discipline areas.

### **3. SUCCESS STORIES**

There have been several activities which have successfully broken down the barriers limiting the broader use of research data. For example, NASA’s Short-term Prediction Research and Transition (SPoRT) project focuses on transitioning unique satellite data and research capabilities to the operational weather and disaster response community to improve forecasts and to support humanitarian relief efforts from natural weather disasters. Their successful paradigm [2] includes developing a close relationship between product producers and end users to enhance the understanding and utilization of the unique products in end user decision support systems. The SERVIR project [3] is a joint venture between NASA and USAID which provides satellite-based Earth observation data and science applications to help developing nations improve their environmental decision making. Principally supported by NASA and the US Agency of International Development, or USAID, a strong emphasis is placed in this capacity-building activity on partnerships to fortify the availability of searchable and viewable earth observations, measurements, animations, and analysis. A SERVIR coordination office and rapid prototyping facility is located at the NASA Marshall Space Flight Center in Huntsville, Alabama. Regional SERVIR hubs are located at the Water Center for the Humid Tropics of Latin America and the Caribbean, or CATHALAC, in Panama and the Regional Center for Mapping of Resources for Development, or RCMRD, based in Kenya, and the International Center for Integrated Mountain Development, or ICIMOD, located in Kathmandu, Nepal.

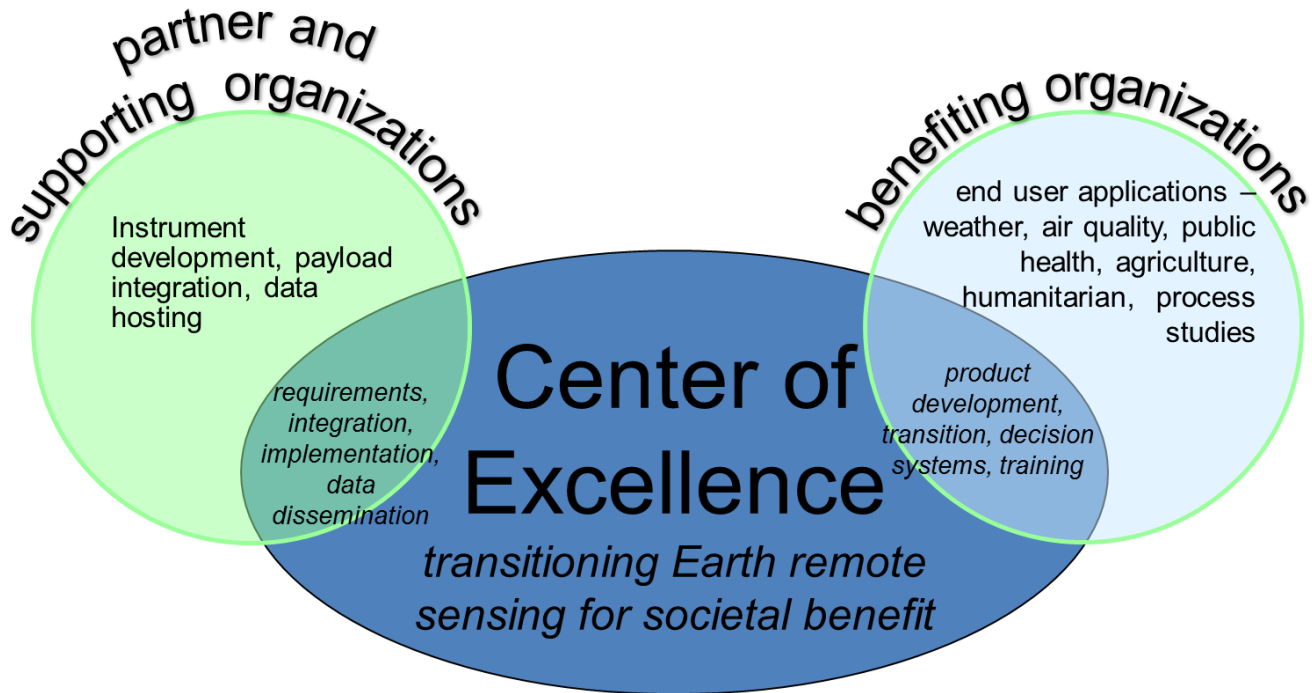
The United Nations Institute for Training and Research (UNITAR) and its Operational Satellite Applications Programme (UNOSAT) [4,5] has since 2000 developed operational applications of remote sensing technologies

found to be mature enough for practical use in the research sphere. These applications focus on support to humanitarian and development actions in the United Nations family, as well as to governmental agencies and Non-Governmental Organizations (NGOs). Through close collaboration with the research community, UNITAR-UNOSAT has developed a range of applications that are currently mainstreamed in the UN system, including rapid assessments during natural weather related disasters, damage assessments following earthquakes, mapping of refugee camps and groundwater resources. Hand-in-hand with these operational solutions goes training and capacity development in order to transfer the acquired knowledge typically to line ministries in developing countries, emergency manager, disaster risk reduction professionals and development professionals.

#### **4. CENTER OF EXCELLENCE FOR EARTH REMOTE SENSING**

To overcome many of the transition to operations challenges facing the community, an organization must be a leader in the the utilization of remote sensing capabilities for Earth science applications. Such an organization can acts as a Center of Excellence (CoE) drawing on world class remote sensing expertise and significant transition-to-applications experience to navigate through these obstacles to build a bridge over the “valley of death” [1] linking research capabilities to end users’ needs. This CoE concept is portrayed in the functional diagram below. The CoE plays a leadership role to unify collaborative partners in supporting and end users in benefitting organizations. The CoE draws on the resources of its home institution and partner network for scientific and engineering support, sensor and platform integration, and outreach to end users to integrate new observational capabilities and transition them to the applications community to benefit society. The functional activities of a CoE can for example include

- coordinate and support the development of advanced instrumentation that takes advantage of advanced observing technologies and platforms to make unique observations of the Earth,
- assist in the integration of remote sensing instrumentation into a space-based platform,
- lead mission operation activities which provide for the collection and downlinking of sensor data,
- conduct calibration studies to verify instrument performance and data accuracy,
- coordinate the generation, dissemination, and archiving of relevant data and derived products,
- provide out reach for the utilization of the new data and products, and
- conduct end user training on the use of the data and products to benefit society.



It is important that the CoE have the necessary infrastructure and establish strong relationships with supporting partners and end users, both of which are key to the successful use of the Earth remote sensing data for scientific process studies, humanitarian activities, as well as commercial ventures.

## 5. REFERENCES

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