

## Lessons Learned in Transitioning Research to Operations: Applications to Space Weather

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Transitioning technology from research to operations (R2O) is difficult. The problem's importance is exemplified in the literature and in every failed attempt to do so. Although the R2O gap is often called the “valley of death”, a recent Space Weather editorial called it a “Valley of Opportunity”. There are significant opportunities for space weather organizations to learn from the terrestrial experience. Dedicated R2O organizations like those of the various NOAA testbeds and collaborative “proving ground” projects take common approaches to improving terrestrial weather forecasting through the early transition of research capabilities into the operational environment. Here we present experience-proven principles for the establishment and operation of similar space weather organizations, public or private.

These principles were developed and currently being demonstrated by NASA at the Applied Meteorology Unit (AMU) and the Short-term Prediction Research and Transition (SPoRT) Center. The AMU was established in 1991 jointly by NASA, the U.S. Air Force (USAF) and the National Weather Service (NWS) to provide tools and techniques for improving weather support to the Space Shuttle Program (Madura et al., 2011). The primary customers were the USAF 45th Weather Squadron (45 WS) and the NWS Spaceflight Meteorology Group (SMG who provided the weather observing and forecast support for Shuttle operations). SPoRT was established in 2002 to transition NASA satellite and remote-sensing technology to the NWS. The continuing success of these organizations suggests the common principles guiding them may be valuable for similar endeavors in the space weather arena.